Taxes and Labour Supply Responses in the Nordic Countries

Report to the 2006 Nordic Meeting of Tax Economists
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Final version

1. **Foreword**

This working group was established at the 2005 Nordic Meeting of Tax Economists in Helsinki. The mandate of the group was to report on how the different Nordic countries treated effects on labour supply in tax policy discussions and proposals. This includes both a description of recent practices on how such effects are calculated (if at all), the size of elasticities used and examples of models used. The group was also to refer to empirical results in the different Nordic countries. At completion of this report the working group had the following members:

Brynjar Indahl	Ministry of Finance, Norway
Christian Brinch	Ministry of Finance, Norway
Kristian Nyberg	Ministry of Finance, Sweden
Iida Hakkinen	Ministry of Finance, Sweden
Simon Kjær Poulsen	Ministry of Taxation, Denmark
Jonas Jensen	Ministry of Taxation, Denmark
Carina Kjersgaard	Ministry of Taxation, Denmark
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At different stages of making of the report Kent Damsgaard (Denmark) and Dorothea Johannsdottir (Iceland) have also contributed. The working group has had one meeting in December 2005 in Copenhagen.

2. Introduction

The demographic development in the next few decades brings a lot of challenges for the labour markets in the Nordic countries as well as in the rest of Europe. The population is ageing rapidly and the share of population in the working age will diminish in the next few decades. The share of the population aged 16-64 is expected to start declining in Denmark in 2011 and in Finland in 2009. Fewer workers in employment will have to support an increasing amount of people outside the labour force. It will be difficult to keep the level of taxes, income transfers and public services at their current level if the employment among those in the working age population does not increase. Therefore, labour supply issues have become more and more important in the public debates.

Labour supply policies include a wide range of measures, such as labour market reforms (stimulating search activities), reducing the cost of labour participation (child care subsidies) and reducing the tax wedge on labour. This report focus mainly on taxes and the effect these (and changes in these) might have on labour supply. We only consider taxes on income in this report. Of course, other taxes, like VAT, may be important for labour supply as well.

The theory of labour supply is based on the basic theory of consumption. The primary insight is that a tax wedge between what the employer pay and what the employee receive results in a deadweight loss because the resulting labour supply deviates from the labour supply in absence of taxes. However, the basic theory of labour supply does not imply that labour supply is an increasing function of net wage (that is, a negative function of tax rates). The reason for this is that the income effect of tax changes (or more precise, wage income changes) indicates a positive relationship between tax rates and labour supply, while the substitution effect indicate a negative effect. Normally consumers can not choose the actual amount of labour supply freely, but have a limited choice set, mostly between zero or some choices around full time or part-time. When the basic labour supply theory is expanded with this feature, an important insight is that average tax rate determines the participation decision (i.e. whether to participate in the labour market or not) and the marginal tax rate determines how much the consumer is willing to work, given labour force participation. When discussing how taxes affect the labour supply it is important to separate between the participation effect and the "hours effect". Chapter 3 in this report describes the basic theory of labour supply in more detail, as well as briefly discussing issues related to effective tax rates, dynamic theory and qualitative features of labour.

The tax structures in the Nordic countries is illustrated briefly in chapter 4 (as well as described in more detail in appendix A). As the chapter shows, the marginal tax rates do not differ too much compared to the EU15 and OECD averages (the EU average are higher than the OECD average). However, the illustrations show that Sweden and Finland (and to some degree Denmark) have relatively high marginal tax rates, while especially Iceland has relatively low rates. When comparing average tax rates the picture is similar. Sweden and Finland have relatively high average tax rates, while Iceland and to some extent Norway have relatively low tax rates. Denmark is around the EU15 average, but higher than the OECD average. When comparing some effective tax rates (that also incorporate (some) benefits) the picture changes somewhat. Norway and Iceland now have relatively high tax rates (at least for the examples considered). The Nordic countries seem in general to have higher effective tax rates than the OECD average.

Chapter 5 tries to capture the development in labour supply in the Nordic countries in recent years by looking at labour participation rates and annual working hours and the extent of part-time employment. If the labour supply decision only were influenced by tax rates (or net wage rates), we would, based on theory and the tax structure, expect that labour participation would be high in Iceland and Norway, while lower than average or around the average for the other Nordic countries. While it is true that Norway and Iceland have relatively high labour participation rates, this is also true for the other Nordic countries. An explanation is that other factors are also important for labour participation. Although participation rates are high, annual hours worked are relatively low in most Nordic countries, especially in Norway and Sweden. Iceland is the only country having both high participation rates and high annual hours worked. The data suggests that there is a limited scope for increasing the general labour participation rates further in the Nordic countries, with a possible exception of Finland. But there is still potential to increase the number of hours worked among those who already participate. More disaggregate data also shows that there is still potential to increase participation rates for some groups. The labour participation rates in all Nordic countries are generally low for young adults, mothers of young children, immigrants and the elderly compared to other groups.

Chapter 6 discusses the estimation of labour supply elasticities, or more generally models of labour supply. Particular emphasis is on the problem of identification when estimating supply curves. It is necessary with some independent variation in demand for the recovery of supply curves. In the case of individual based data, this means that it is necessary to find variables that we can plausibly assume to affect labour supply only through the wage. The problem of coming up with such variables is the main reason why it is difficult to recover labour supply curves and to come up with robust estimates of labour supply responses to tax changes. Various more technical issues in labour supply estimation are also discussed, and the main methods briefly surveyed. The main empirical results from the international literature are briefly discussed, before we present a non-comprehensive survey of empirical work on labour supply using Nordic data. The results vary quite a bit, but the main message seems to be small labour supply elasticities for high income men and moderate but uncertain elasticities for low income persons of both genders and women more generally.

Chapter 7 describes policy experiences regarding labour supply in the Nordic countries. The relationship between taxes and labour supply has recently been attracting more attention in the Nordic countries. This is partly a result of the increasing challenge from an ageing population and increased international competition for high-skilled workers. However, none of the Nordic countries normally calculate explicit estimates on the labour supply effect of tax proposals. Only first order revenue and distributional effects are accounted for in most policy documents, although the likely direction on labour supply is often commented on. This is a result of the problems associated with making reliable and plausible estimates discussed in chapter 6. Labour supply issues are discussed more in connection with larger tax reforms in the Nordic countries. The tax reform in 1990-91 in Sweden was largely motivated by labour supply effects, and several studies were made in relation to this. Regrettably the large economic changes in the mid-90 have made it almost impossible to detect whether the reform had had any effect. In Norway some calculations indicate a positive labour supply effect of the 1992 tax reform, and in Denmark the three tax reforms from 1987 to 2002 have been estimated to increase labour supply by 1.5 per cent. Similar calculations were made in Finland based on the 1996-98 tax reform. Presently, Denmark, Norway and Sweden have plans or projects under way to establish a more formal method of making labour supply estimates, using micro-simulation models. The results of these efforts remain to be seen.

3. Theory of labour supply and taxes

3.1 *Introduction*

Tax policy affects employment. In particular, taxes on income from labour affect the incentives of potential employers and employees. In this report, we will primarily discuss how taxes affect the labour supply decisions. A few words about this choice of perspective seem appropriate.

In general, to understand the effect of a tax on a market outcome, it is necessary to consider both the supply and the demand side of the market. In a simple partial equilibrium model of the labour market, the effect of a tax increase on wages would typically be to reduce employment and wages. It may, however, be rather misleading to study the labour market as a partial equilibrium. From a general equilibrium perspective, a decrease in employment leads to decreased income (for someone), which leads to decreased demand for labour. In a minimalist general equilibrium model, with constant returns to scale and labour as the only factor of production, such an exogenous shift in labour supply would reduce income enough to decrease the demand for labour exactly enough to offset the effect of labour supply on wages. Thus, from a general equilibrium perspective, the effects of taxes on employment could be studied by studying only the supply side of the market.

Macroeconomic conditions, in particular aggregate demand, may be important for employment. If an increase in supply of labour leads to increase in unemployment, new income will not be generated, and the general equilibrium effects above will not apply. Still, a partial analysis of labour supply may be useful. Many people are able to find a job if they want one, even under adverse macroeconomic conditions. Further, the effect of labour supply on unemployment is a short term effect. In the longer term, the number of persons who are willing to work should not have any large impact on the proportion of the labour force that is unemployed, even according to macroeconomic theories with a focus on aggregate demand.

3.2 *The basic theory of labour supply*

The basic theory of labour supply is an application of consumer choice theory. Thus, it is a theory for the choice of one single agent. To some extent, labour supply decisions are marginal decisions, and the generalisation from a single agent to effects on the labour force are trivial, a change will have the same effect on all agents. To some extent, labour supply decisions are also non-marginal, as in whether to work or not.

The agent in our analysis must choose between two goods, a composite consumer good C and leisure L. The agent is endowed with a preference ordering over different combinations of C and L, represented by a utility function. The utility function is assumed to be increasing in C and L, with contours that are convex to the origin. In addition, the preferences are assumed to be such that both C and L are normal goods, which means that an increase in labour independent income will lead to increases in both consumption and leisure time.

To buy L and C (whose price is p), the agent has at her disposal an income Y, independent on the number of hours worked, a number of hours H at her disposal, to choose between work and leisure, and a hourly wage rate w. Thus, the agent must finance her consumption of ordinary consumer goods by working and/or using the independent income Y. That gives the following budget constraint

(1) $\qquad Y + w(H - L) = pC.$

Maximizing utility subject to this constraint gives the condition that the agent chooses to supply labour until the goods that can be bought from an hour of more work give less utility than one hour of leisure.
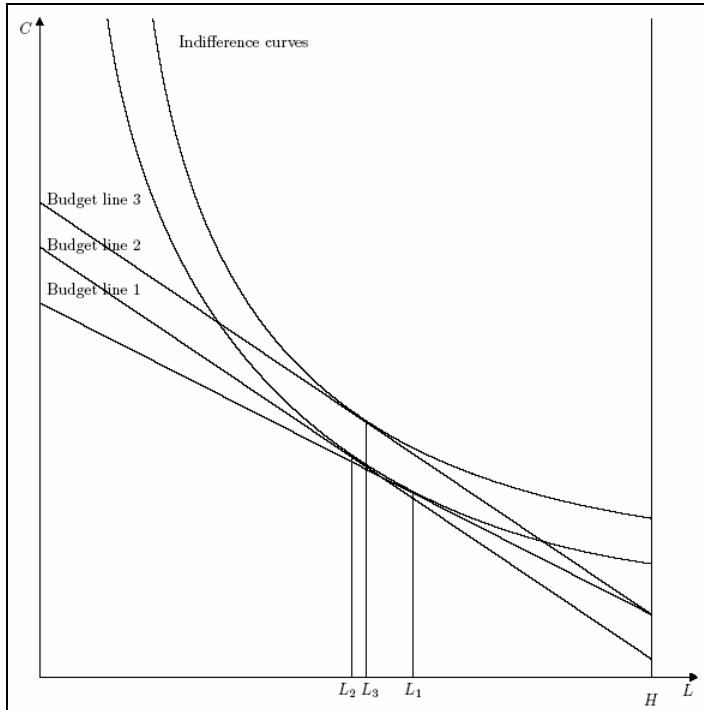

Figure 3.1 Indifference curves and budget lines. Individual Labour supply.

In Figure 3.1, this condition is satisfied where the budget line is the tangent of the indifference curve. By considering how different prices and incomes affect the budget constraint, we can deduce that:

1. Labour supply is decreasing in the independent income *Y*. This is illustrated in Figure 3.1 by moving from Budget line 2 to Budget line 3. This is a pure income effect. Thus, the result hinges on the assumption that leisure is not an inferior good.
2. The real wage determines the slope of the budget line. The effect of an increase in the real wage can be seen by moving from Budget line 1 to Budget line 3. The change in labour supply can be decomposed into a substitution effect and an income effect. The substitution effect is the effect of changing from the initial budget line to a budget line with a new slope, corresponding to the new real wage, but touching the original indifference curve (in Figure 3.1, the change from Budget line 1 to Budget line 2). The income effect is the movement from this artificial budget line to the new correct budget line (in Figure 3.1, the change from Budget line 2 to Budget line 3). The effect on labour supply is in Figure 3.1 illustrated by the movement from L_1 to L_2, the substitution effect, and the movement from L_2 to L_3, the income effect. The substitution effect increases labour supply. The income effect decreases labour supply.

Thus, the basic theory of labour supply does not even imply that labour supply is an increasing function of wage, nominal or real. The reason for this is that, as the wage increases, our agent gets richer and wants to use more consumer goods, but also wants to spend more of his/her time as leisure. This income effect counteracts the substitution effect (leisure has become more expensive).

The typical application of consumer choice theory assumes an interior solution. However, in this model, there is an absolute maximum for leisure. A relevant solution for our agent may be to supply no labour at all, a corner solution in our model. The condition for participation in the labour market in this model is that the income generated from the first hour of work is able to buy enough consumer goods to offset the disutility generated from this forfeit of leisure.

3.3 *Taxes and labour supply*

Taxes are easily incorporated in the model above. Most insights about the effects of taxes can be deduced from studying a linear tax on the income from work. Total tax T is given by

$$(2) \qquad T = T_0 + tw(H - L),$$

where t is the marginal tax, and T_0 is an income independent component of the tax, typically negative. If T_0 is negative, the tax system is progressive.

The tax affects the budget constraint of the agent, which changes to

$$(3) \qquad Y - T_0 + (1-t)w(H - L) = pC.$$

An increase in T_0 works like a reduction in independent income, giving increased labour supply. An increase in t reduces the net wage of the agent. This gives rise to a substitution effect, decreasing labour supply, and an income effect, increasing labour supply. An increase in the tax rate leads to decreasing labour supply only if the substitution effect dominates the income effect.

3.4 *Limited choice sets and the effects of taxes*

One particular feature that leaves the model above unrealistic in many cases is the presentation of the choice set as the full continuum from 0 hours to the full time at work. A simple model that does not give this full choice set is to reduce the choice set to two alternatives, full time work and no work (as obviously false as the previous model). Thus, the agent can choose between $L=H$ and $L=L_f$. In the first case, the consumption will be given by

$$(4) \qquad C = \frac{Y - T_0}{p},$$

as no income from labour can be used for consumption. In the second case,

$$(5) \qquad C = \frac{Y - T_0}{p} + \frac{(1-t)w(H - L_f)}{p}.$$

There are no marginal considerations. The immediate implication is that it is the average tax and not the marginal tax that is important for labour supply. Increases in taxes lead to reductions in labour supply.

We could further extend the model by taking into account the possibility that the agent could choose between, say, full time work, part time work and no work. It is the net wage corresponding to the different choices that matter for the choice of labour supply. In such a model, however, the ambiguity in the original model carries over. A reduction in the tax rate may in such a model lead to a reduction in labour supply. A reduction in the tax rate increases the utility in the full time and part time alternatives compared to no work, but there is no unambiguous effect on the relative merits of working part time or full time.

As another extension of the model, let us assume that the agent can choose between no work and, say, at least 35 hours of work a week, but that the exact amount, above 35 hours a week, is freely determined.

In this model, our agent can choose between three qualitatively different positions: No labour force participation, exactly 35 hours of work, or more than 35 hours of work. If our agent chooses more than 35 hours of work, the analysis in the previous section applies. Whether our agent chooses to work for exactly 35 hours or more also depends directly on the marginal tax at this level of labour supply. The choice between 0 hour and 35 hours, however, only depends on the average (or total) tax, for working 35 hours.

This is an important insight: The average tax determines our agent's labour force participation and the marginal tax determines exactly how much our agent is willing to work, given labour force participation.

3.5   *Labour supply and effective tax rates*

The theory of labour supply is a theory at the individual level. The total effect on labour supply from changes in the tax system is the sum of the effects from each individual agent. In this context, it is often useful to group people according to their position in the labour market. Different changes in the tax system will typically have different effect on different groups.

From a perspective of labour force participation, the most important groups are potential pensioners due to old age, potential disability benefit pensioners and women with small children. All these groups have in common the fact that their incentives are typically affected by benefit systems in addition to the tax system. It is necessary to study the effects of such benefit systems in conjunction with the tax system to understand the effects on labour supply. Typically the average effective tax rate (AETR) will be important for such labour force participation decisions. The AETR is the proportion of income from work that does not reach the agent in question, when both taxes on income and the loss of benefits are taken into account.

Similarly, agents that are working, but for some reason receive some benefits may be affected by both taxes and benefit systems in conjunction. The marginal effective tax rates (METR) measures how much of the income generated from working one hour more that does not reach the worker in question when both taxes and loss of benefits are taken into account.

3.6   *Various labour supply issues*

3.6.1   A dynamic theory of labour supply

One characterizing feature of the labour market is the long duration of the contracts. For most of us, the decision of whether to work next week is already taken. We have to notice employers months in advance if we want to quit. The decision of whether to work in, say, a year is very different for individuals with different current positions in the labour market.

A formal model of this can be found in the search theory of unemployment, which is easily generalized to a search theory of labour supply. In such a model, a person that is not currently in employment must search for a job if he or she wants to become employed. Searching for a job takes an effort, but generates a random flow of job offers. The expected benefits from searching for a job depends on, (i) the probability of finding a sufficiently attractive job, and (ii) the expected benefits from such a job. Of course, the expected benefits from searching for a job will depend on demand conditions in the labour market.

The decision of whether to supply labour for someone who is not currently employed is based on a comparison with the expected benefits from searching for a job and the expected search costs. If searching for a job is not expected to be worthwhile, the agent will stay out of the labour market.

A person currently employed does not need to search for a job, and the relevant comparison is between the (known) benefits from staying in the job and the benefits from not participating in the labour market.

Some insights can be summarized:

- labour supply depends crucially on employment last year
- labour supply depends on macroeconomic conditions, through other channels than the wage
- higher taxes lead to longer search times, as fewer jobs are considered attractive
- higher taxes lead to lower labour supply, as the expected benefits from looking for a job are reduced

The two latter effects of course, depend on the assumption that the worker may actually choose to turn down job offers. Most importantly, many effects of taxes on labour supply will not be immediate, as labour supply decisions are entrenched: Higher taxes may not mean that people quit their jobs, but they may decide not to search for a new one if they lose their job.

3.6.2   Qualitative features of labour supply

Taxes on labour do not only affect whether labour is supplied or not, but also qualitative features of labour supply.

In particular, tax on labour income is a tax on human capital. Individual investment in education leads to, and may be motivated by, higher earnings. A strictly economic model of educational choice implies that educational decisions are determined by considerations of whether the expected discounted lifetime benefit from one more year of education (which is taxed) is greater or less than the costs of one more year of education. Taxes on labour income,

in particular high marginal taxes, lead to lower investment in human capital than what would otherwise be the case.

A related subject is the supply of quality, or effort, on the job. In just the same manner as the investment in human capital may be distorted by taxes, effort on the job may be distorted. Effort on the job may or may not determine wages in the short run, but is, at least in the long run likely to be an important determinant of the wage.

Another area where taxes may be important to qualitative features of labour supply is mobility, geographically or between occupations and industries. In a labour market with frictions, it is necessary to pay a premium to induce mobility of labour, geographically or otherwise. With high marginal taxes, the necessary premium must be higher, as the tax wears away part of the premium.

4. Tax structures

4.1 *Introduction*

As discussed in chapter 3, basic theory dictates that tax rates have an effect on the individual choice between supplying labour and consuming leisure, although the direction of the effect is not predicted. Section 4.2 in this chapter gives a summary overview of formal marginal and average tax rates on wage income on some wage levels in the Nordic countries. For a more detailed description of the wage tax systems in the Nordic countries, see appendix A. Section 4.3 discusses some effective tax rates in the Nordic countries for some specific groups (single parent, one-earner couple and pensioners).

4.2 *Formal tax rates*

As discussed in chapter 3, the limited choice set on how much to work means that both marginal and average tax rates may have an influence on labour supply decisions. For employed individuals the marginal tax rates are important, while for those outside the labour force the average tax rate is most relevant (as well as any benefits or pensions they are eligible for outside the labour market). To understand how the tax structure might influence incentives to work in the Nordic countries, it is therefore important to focus on both marginal and average tax rates at different wage levels.

Figure 4.1 shows the marginal tax rate on gross labour income in the Nordic countries in 2006. The numbers are based on the OECD Taxing Wages framework, and are calculated on the basis of the standard tax rules, including employers' social security contributions.[1] The tax rates are calculated on different wage levels based on the average production worker wage (APW) in each country.[2] Table 4.1 shows the different wage levels in 2005 in Euro.

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[1] The tax rates are thus a tax wedge, in the sense that they illustrate the difference between what employers pay (labour costs) and what employees receive after tax. Value added tax (VAT) or other consumption taxes is however not included in this calculation.

[2] Average wage for manual workers in the sectors C-K after the ISIC standard. This includes most service and production sectors. Agriculture, fisheries, the public administration sector and the voluntary sector are not included.
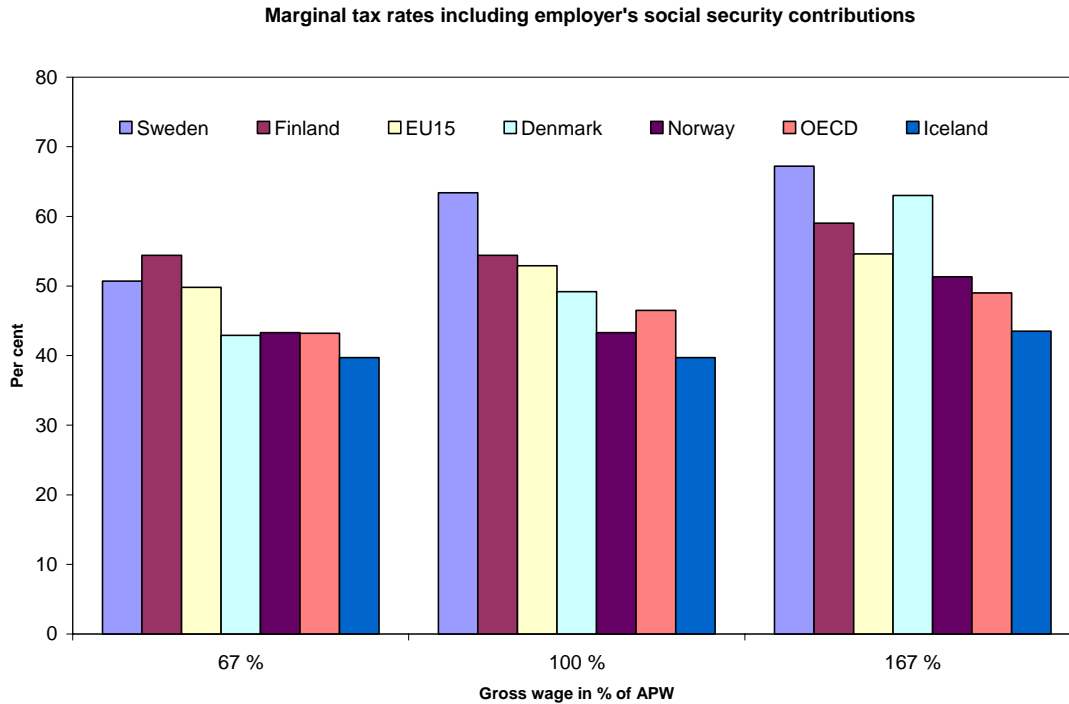
Marginal tax rates including employer's social security contributions

Figure 4.1 Marginal tax rates on labour on different wage levels in the Nordic countries. Single person without children. 2006[1]. Per cent
1. The EU15 and OECD averages and numbers for Iceland are from 2005.
Source: OECD Taxing Wages 2000-2005 and the Nordic countries.

Table 4.1 Average wage levels. Euro.[1] 2005

	% of APW		
	67 %	100 %	167 %
Denmark	20 634	30 952	51 586
Finland	18 799	28 199	46 998
Iceland	17 232	25 847	43 079
Norway	20 664	30 995	51 659
Sweden	17 790	26 685	44 476
OECD	16 506	24 758	41 264
EU15	18 657	27 986	46 643

1. Based on PPP exchange rates (Purchase Power Parity) for 2005.
Source: OECD Taxing Wages 2000-2005.

Figure 4.1 illustrates that marginal tax rates increase with income in all of the Nordic countries as a result of a progressive tax schedule. The figure also shows that the Nordic countries are not that different from the EU15 and OECD averages. Sweden has a relatively high marginal tax rate on all wage levels, ranging between about 51 pct. and 67 pct. This the same or higher than both the EU15 and OECD averages. Iceland, and to some extent Norway, has relatively low marginal tax rates on all wage levels compared to both other Nordic countries and the EU15 and OECD averages. The rates are between 43 pct. and 52 pct. in Norway and 40 pct. and 44 pct. in Iceland. Finland has relatively high marginal tax rates on low and average wage levels, while somewhat lower rates on higher wage levels (compared to Sweden and Denmark but not compared to the EU15 and OECD). The marginal tax rates in Finland range between 54 and 59 pct. Denmark have the reverse, with comparable low marginal tax rates on low and average wage levels, and high marginal tax rates on high wage income.

Figure 4.2 shows the average tax rates for the Nordic countries in 2006. The picture is similar to that of the marginal tax rates. Average tax rates increase with the wage level for all countries. Sweden has a relatively high average tax rate on all wage levels studied compared to the other Nordic countries and the EU15 and OECD averages, ranging between 46 pct. and 55 pct. Iceland, and to some extent Norway, have a relatively low average tax rate on all wage levels (with Norway close to the OECD average). Average tax rates are between 35 pct. and 43 pct. in Norway and between 24 pct. and 37 pct. in Iceland. Finland and Denmark lie between these levels, with relatively similar average tax rates, ranging between 39 pct. and 50 pct. in both countries. This is close to the EU15 average.

Average tax rate including employer's social security contributions
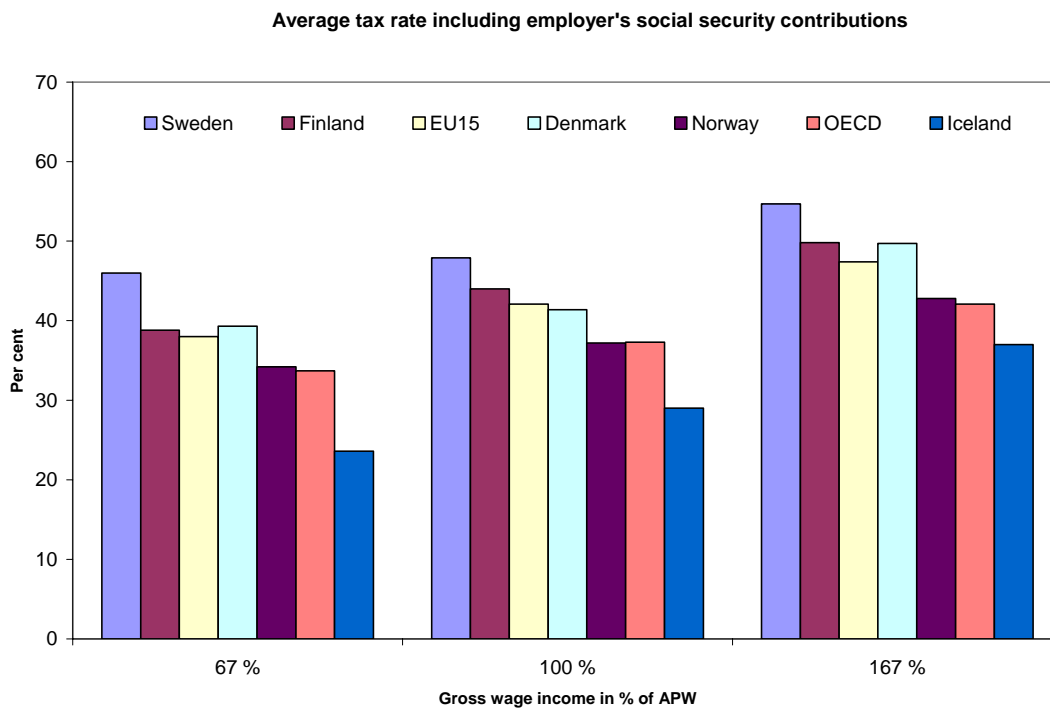
Figure 4.2 Average tax rates on labour on different wage levels in the Nordic countries. Single person without children. 2006[1]. Per cent
1. The EU15 and OECD averages and numbers for Iceland are from 2005.
Source: OECD Taxing Wages 2000-2005 and the Nordic countries.

4.3 *Effective tax rates on labour*

While the benefit and pension systems in the Nordic countries are not an issue in this report, they may play an important role in the individual labour supply decision that cannot be ignored in a report about labour supply. In many cases such benefits are an alternative to wage income since they are often designed to give people outside the labour market a reasonable income. These can be old age or early retirement pensions, health related benefits (such as disability benefits and pensions) or socially related benefits (such as unemployment benefits and social assistance of different kinds). Since this kind of income is targeted towards those outside the labour market they are normally means-tested towards any wage income. A decision to work would therefore mean a loss of these benefits, partly or in full. This loss can be viewed as an extra tax on working, thus increasing the *effective tax rate* on labour income above what the formal tax system dictates.

Equivalent to the discussion in chapter 4.2, both marginal effective tax rates (METR) and average effective tax rates (AETR) are important to understand the incentive structure in the tax and benefit systems combined. High tax rates in the Nordic countries combined with a generous benefit system may result in poor incentives to work, and may explain why the labour participation rates (as well as employment rates) for some groups are quite low in the Nordic countries (see chapter 5). Participation rates are particularly low among older persons, single parents and immigrants. This suggests that there are high effective tax rates on moving from inactivity to work for these groups.[3]

Figure 4.3 shows the AETR in 2002 for persons in the Nordic countries when moving from inactivity to full-time work at a wage level equal to 67 pct. of the APW. The calculations are based on the OECD tax-benefits models and show how much of the wage earned following a move to work from inactivity is taken away in the form of taxes and lower welfare benefits.[4] The figure shows that the AETR is in excess of 60 pct. for both a single parent and a one-earner married couple with two children in all countries. While the AETRs are around the OECD average for the single parent (higher in Denmark, Norway and Iceland and lower in Sweden and Finland), it is higher than the OECD average for a one-earner married couple with two children in all Nordic countries (only slightly so in Denmark).

It must be stressed that these calculations are based on 2002 data, and thus do not take into account any changes in the tax and benefit systems since then.

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[3] Since unemployment benefits normally are conditioned on some sort of active job searching, recipients would normally be registered as unemployed and be thus included in the work force. However, high effective tax rates on moving from unemployment benefits to work may over time make some of the unemployed "unemployable" and push these out of the work force and over to more passive benefits. Generous unemployment benefits may therefore contribute to relatively low labour participation rates for some marginal groups. An analysis on effective tax rates moving from unemployment benefits to employment is not included in this chapter.

[4] The OECD calculations presented in the figure include cash benefits such as social assistance, family benefits and lone-parent benefits, housing benefits, child-raising allowance paid to parents assuming child care responsibilities for their own children and employment-conditional (or "in-work") benefits. The calculations exclude benefits "in-kind" (such as subsidized public goods and services) and benefits related to the purchase of particular goods and services. Other cash benefits such as old-age pensions, retirement pensions, sickness and disability benefits, unemployment benefits etc. are also excluded.

Average effective tax rate when moving from inactivity to full-time work at 67 % of APW
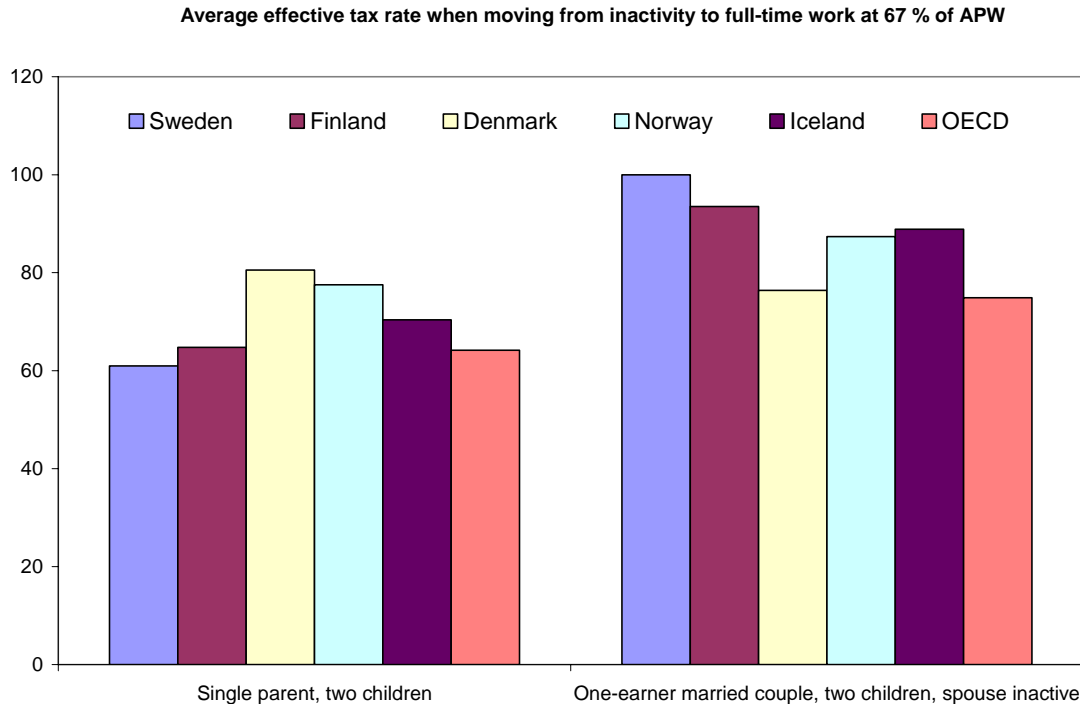
Figure 4.3 Average effective tax rates[1] for single parents and one-earner married couples with children in the Nordic countries and OECD[2] when moving from inactivity (social benefits etc.) to full-time work at a wage level equal to 67 % of the average production worker wage. 2002. Per cent

1. OECD calls this a METR since they normally reserve the term AETR for the formal tax system (where they include employers social security contributions) not including the effect of the benefit systems. However, in the terminology of this paper, this is an AETR.
2. Unweighted average for all OECD countries.

Source: OECD Tax-Benefit models and OECD (2005b).

The incentives to retire early can be assessed by measuring the net replacement rate and the change in net pension wealth. The net replacement rate is the ratio of annual pension after tax to earnings after tax just prior to retiring. The change in net pension wealth reflects the change in the discounted value of future net pension payments an eligible person may expect to receive from working an additional year.

As the relationship between taxes and labour supply is the main issue in this report, we focus on how taxes influence the net replacement rates and not on the level of the gross replacement rate (which also affects the effective tax rates). The tax system might have an increasing effect on the effective tax rate if it significantly contributes to increase the net replacement rate above the gross replacement rate. In it self, a progressive tax system will do this even if pension and wage income is taxed with the same rules (if the gross replacement rate is lower than 100 pct.). However, a more favourable tax system for pension income than for wage income will also contribute to the net replacement rate being higher. Figure 4.4 shows the difference in taxation of wage and pension income in Norway, Denmark, Sweden and Finland in 2005, while Figure 4.5 shows the difference between gross and net replacement rates in all of the Nordic countries. Figure 4.4 illustrates that favourable taxation of pension income especially has an impact in Norway.[5] The difference is small and even negative for some

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[5] This is mainly a result of a special tax reduction credit and an old age allowance.

levels of income in Finland.[6] Sweden, Iceland and Denmark more or less tax wage and pension income according to the same tax rate schedule. Low or no social security contributions on pension income in all countries also contribute to higher net replacement rates, which explain why the difference in tax is big in Denmark (Figure 4.4) and the difference between gross and net replacement rates in Denmark and Iceland are relatively big (Figure 4.5). It is however arguable to what degree this have an impact on the effective tax rates as it can be argued that at least parts of social security contributions might be seen as (mandatory) savings.

Difference in tax on wage and pension income
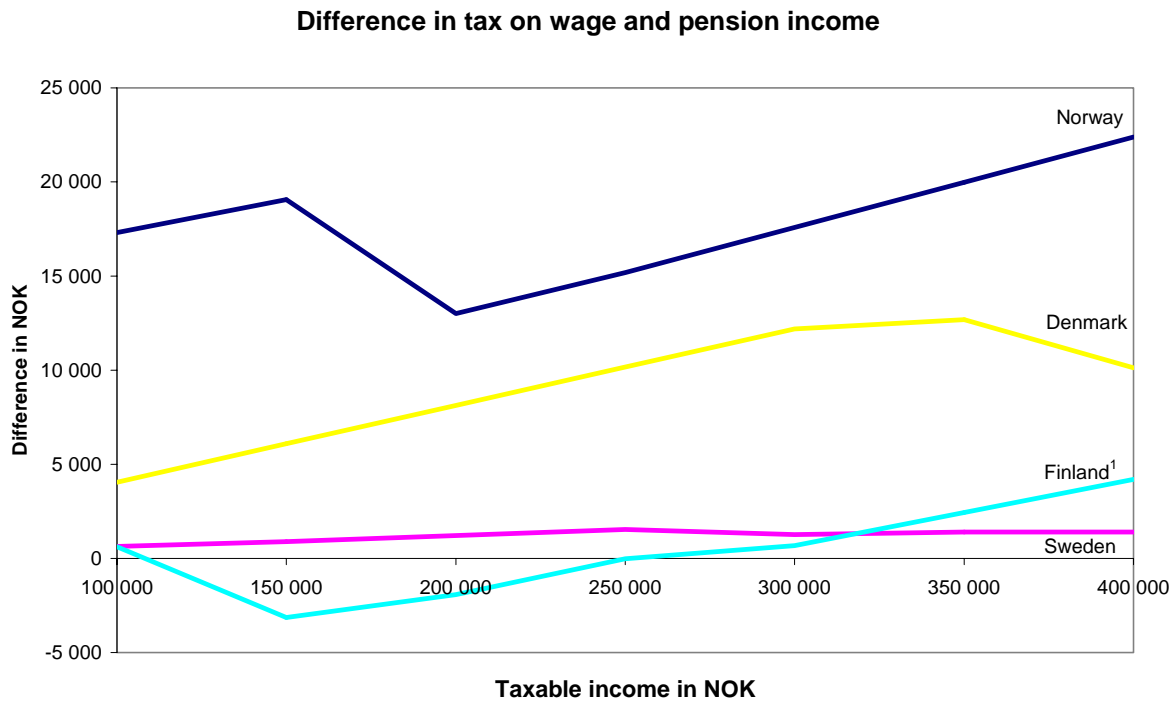
Figure 4.4 Difference in taxation of wage and pension income in Norway, Sweden, Denmark and Finland. 2005. NOK

1. In Finland there is no tax on minimum pensions. In 2005 the minimum pension is about NOK 50 000. At this level the difference in tax is about NOK 6 600.

Source: Ministry of Finance in Norway, Ministry of Finance in Sweden, Ministry of Finance in Finland and Ministry of Taxation in Denmark.

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[6] There is a pension income allowance in Finland that have some effect on low income levels.

Difference between gross and net replacement rates. 2002
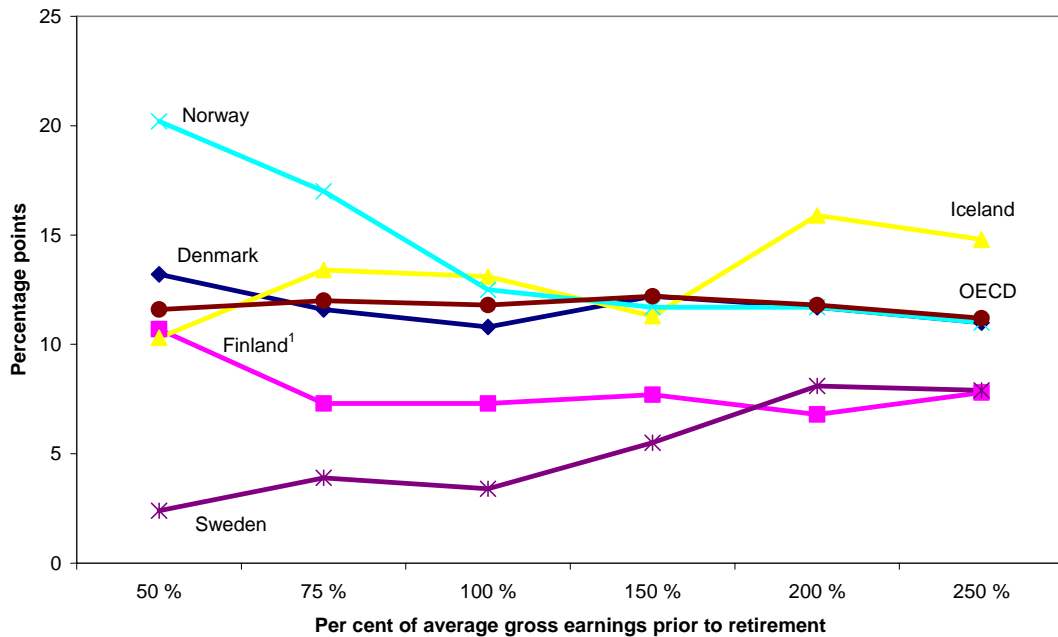
Figure 4.5 Difference between gross and net replacement rates on old age pensions in the Nordic countries.[1] Percentage points

1. The publication is based on 2002 tax and pension rules. However, the effect of the 2005 pension reform in Finland is included in the calculations.

Source: OECD (2005a).

As far as we know, no updated calculations have been done on net pension wealth after the pension reforms in Sweden and Finland in recent years. See Casey et. al. (2003) for calculations based on earlier data for Norway, Sweden and Finland.[7]

4.4 *References*

Casey, B., H. Oxley, E. Whitehouse, P. Antolin, R. Duval and W. Leibfritz (2003) Policies for an Ageing Society: Recent Measures and Areas for further reform, Economics Department Working Papers no. 369, OECD.

OECD (2005a) Pensions at a Glance: Public Policies across OECD Countries, OECD.

OECD (2005b) Employment Outlook 2005, OECD.

OECD (2005c) Taxing Wages 2000-2005, OECD.

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[7] Although these results are not longer applicable for Sweden and Finland, they still have relevance for Norway. The calculations shows that the net pension wealth for an individual retiring at the ordinary pension age, falls in Norway if the individual works one more year. A fall in the net pension wealth by working an additional year would translate to a higher effective tax rate on labour since the individual lose pension income in the future by continuing working.

5. Labour supply in the Nordic countries

5.1 *Introduction*

This chapter describes the characteristics and the trends in the labour supply in the Nordic countries. We consider several different measures of labour supply. We also briefly discuss the policies that each country has implemented in order to solve the labour supply problems. Naturally, labour supply is not the only important aspect of a healthy labour market. Labour supply is interconnected with demand of labour and demand problems have often been considered greater than supply problems. However, in the long run an increase in the labour supply should also increase the demand. This chapter considers mainly labour supply issues.

Since the demand and supply of labour are not independent of each other, it is difficult to measure labour supply. We consider several different measures, labour force participation rates, employment and unemployment rates, shares of part-time employed and hours of work, to get an adequate picture of the current labour supply and the potential amount of labour that could be supplied in the labour market.

The rest of the chapter is organized as follows. Section 5.2 discusses the trends in the total labour supply in each country. Section 5.3 looks at the labour supply of some subgroups - young adults, mothers of small children, immigrants and elderly people – in order to see which groups have underused potential labour supply. Section 5.4 concludes.

5.2 *Total labour supply*

Figure 5.1 shows the labour force participation rate in the Nordic countries and the average labour force participation rate among EU15 and OECD countries for persons aged 16-64. In an international comparison, all Nordic countries have relatively high labour force participation rates. However, there are differences in both the levels and the trends. In 1990, more than 84 per cent of the working age population was in the labour force in Sweden and about 82 per cent in Denmark and Iceland. In Norway and Finland labour force participation was at somewhat lower level, roughly 77 per cent. In the beginning of the 1990s, the labour force participation declined in all the Nordic countries except Iceland. In Sweden and Finland the single most important reason for the decline was the severe recession. The decline was deepest in Sweden - six percentage points. In Denmark, the decline from 1993 to 1994 was mainly due to the introduction of two types of leave schemes in 1994.[8] After 1994, the labour force participation has remained fairly constant, without any notable recovery in Sweden and Denmark. Labour force participation has increased in Norway and Finland but the positive development has slowed down after 2002. Iceland has the highest labour force participation rate; 85.5 percent of the working age population in Iceland is in the labour force.

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[8] Temporary leave schemes for education, care for children, or sabbath and the early retirement scheme (overgangsydelsen) for persons aged 50 years and above.

Labour force participation rate
Persons aged 16-64 (percentages)

Figure 5.1 Labour force participation rates for persons aged 16-64. Per cent
Note: Persons aged 15-64 for Denmark and Finland.
Source: OECD Employment Outlook 2005.

Figures 5.2 and 5.3 show the labour force participation rates for men and women respectively. Men have higher labour force participation rates than women, but the trends are very similar for both genders. Women in the Nordic countries have extremely high participation rates compared to the average of EU15, even though the EU15 average has increased by roughly 8 percentage points during the last 15 years. The childcare systems and parental leaves are still much more developed in the Nordic countries than elsewhere, which has been essential for the labour market participation of women.

Labour force participation rate
Men aged 16-64 (percentages)

Figure 5.2 Labour force participation rates for men aged 16-64. Per cent
Note: Persons aged 15-64 for Denmark and Finland.
Source: OECD Employment Outlook 2005.

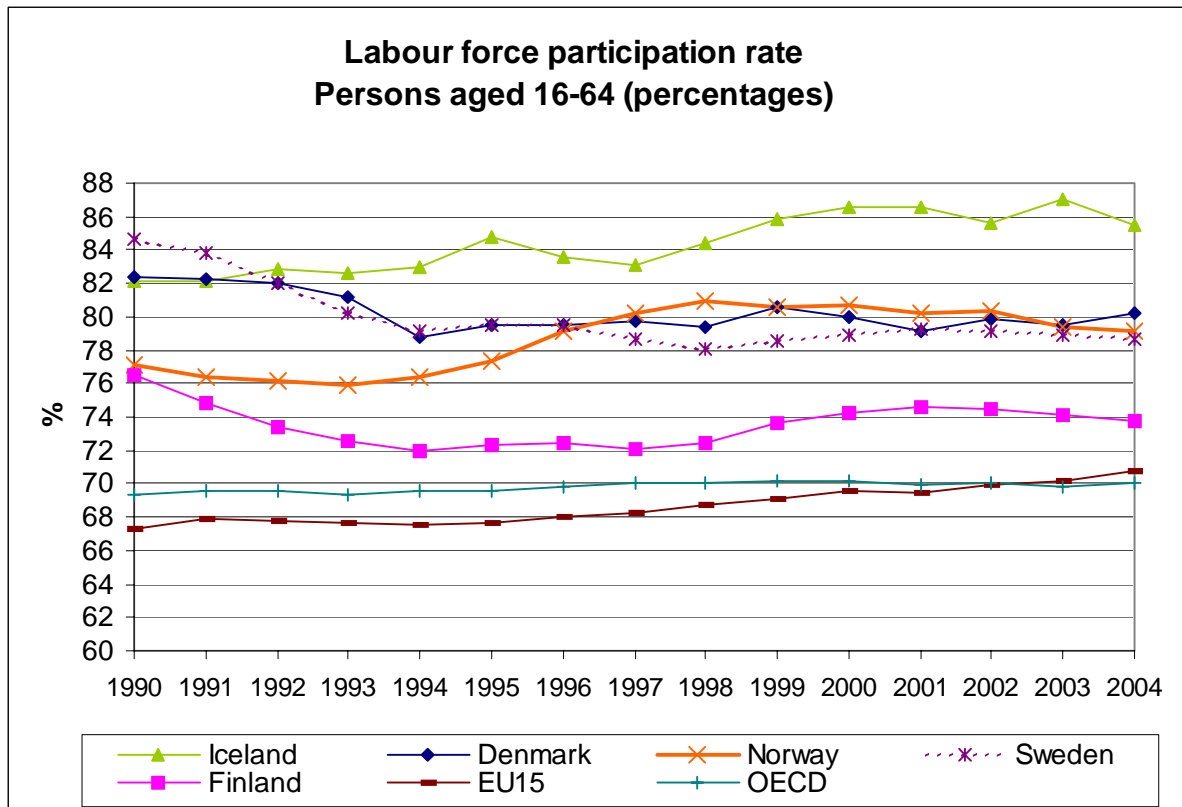**Labour force participation rate**
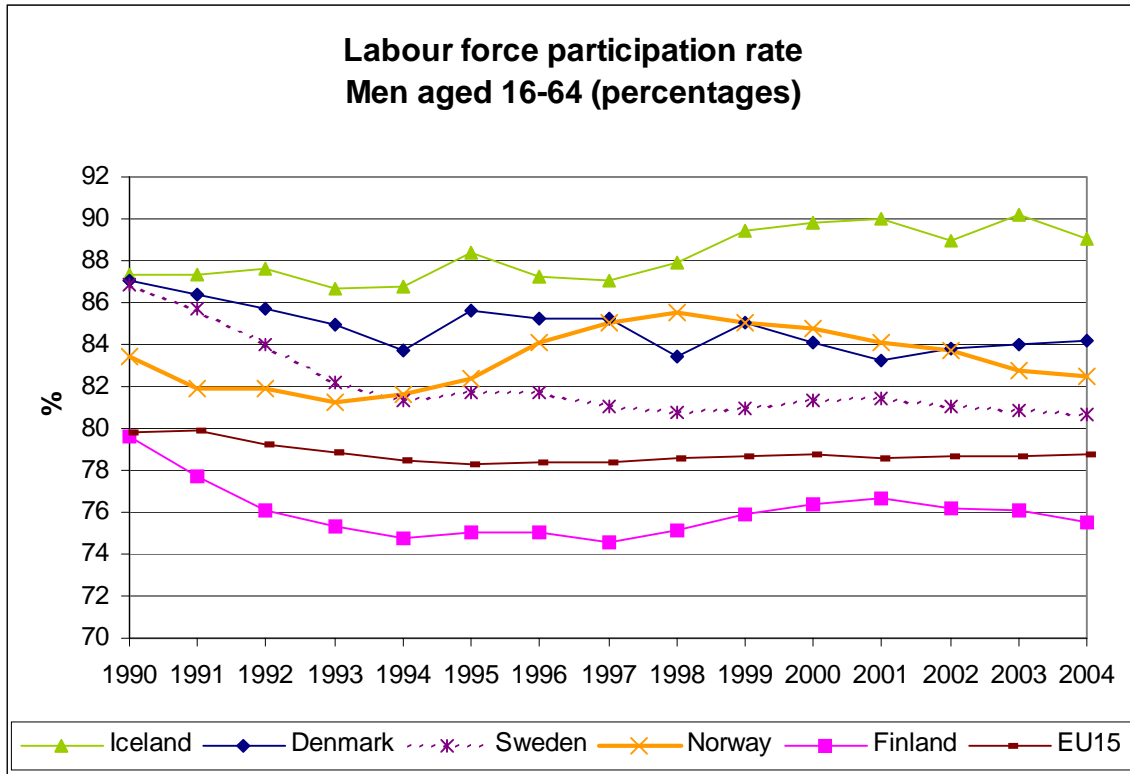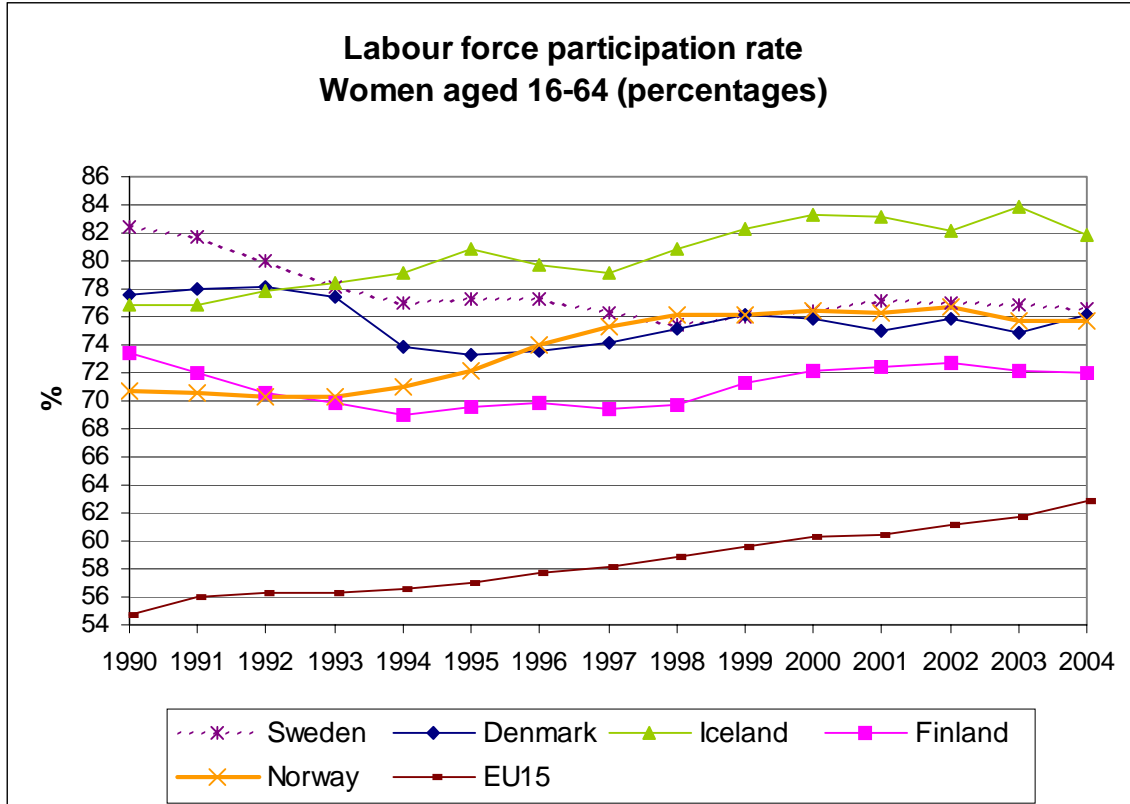**Women aged 16-64 (percentages)**

Figure 5.3 Labour force participation rates for women aged 16-64. Per cent
Note: Persons aged 15-64 for Denmark and Finland.
Source: OECD Employment Outlook 2005.

Table 5.1 shows the main activity of people in the working age population in 2004. In addition to labour force participation rates, it is useful to look at the share of population in the working age that is employed. Employment rates in Norway, Denmark and Sweden are quite impressive, respectively 75.5, 74.1 and 73.4 per cent of the population was employed in 2004. Finland's lower employment figures (67.2 per cent) are partly explained by the higher unemployment (8.9 per cent) than in other Nordic countries (4.5–5.5 per cent).

Despite the high employment figures, more than 20 percent of the working age persons are outside the labour force. A large part of these are young people pursuing full-time studies. However, the number of Norwegians and Swedes on sick leave or drawing disability pensions is high, and this development does not seem to be directly related to measures of overall health status. In Finland and Denmark, a large number of working age persons are on different types of early retirement pensions. These figures reveal that there is a lot of unused labour potential in all Nordic countries.

Table 5.1 Main activity of persons aged 16-64 in 2004.

In thousands/%	Denmark		Finland[a]		Norway		Sweden	
	Number	%	Number	%	Number	%	Number	%
In the labour force	**2 751**	**78.3**	**2 574**	**73.8**	**2 335**	**79.0**	**4 459**	**77.7**
Employed	**2 604**	**74.1**	**2 345**	**67.2**	**2 230**	**75.5**	**4 213**	**73.4**
- persons at work							3 508	
- persons absent from work							705	
Unemployed	**147**	**5.3**	**229**	**8.9**	**105**	**4.5**	**246**	**5.5**
Not in the labour force	**761**[b]	**21.6**	**915**	**26.2**	**667**[c]	**22.0**[d]	**1 277**[b]	**22.3**
- Full-time students	140	4.0	334	9.6	225	7.6	521	9.1
- At home	-	-	96	2.8	74	2.5	50	0.9
- Persons on old-age pensions and early retirement pensions	128	3.6	131	3.8	12[e]	0.4	70	1.2
- Sick or on disability pension	214	6.1	226	6.5	283[f]	9.6	415	7.2
- Abroad	-	-	-	-	-	-	47	0.8
- Other	280	8.0	127	3.7	72	2.4	173	3.0
Total population 16-64	**3 513**		**3 489**		**2 955**		**5 736**	

Note: Share of unemployed is calculated as percent of the labour force, everything else as percent of the total population.
[a] Data refers to persons aged 15-64.
[b] Full time students are not included in the labour force even though they are looking for a job (in the international statistics they would be counted as unemployed).
[c] Data for persons not in the labour force refers to persons aged 16-66.
[d] Per cent of total population aged 16-66.
[e] Only includes old age pensions eligible before the age of 67. The data do not include early retirement pensions.
[f] Include early retirement pensions. There was about 35 000 early retirement pensioneers (AFP-pensjonister) in 2004.
Source: Sweden, Finland, Norway: Labour Force Surveys, Denmark: www.statistikbanken.dk.

Although the labour force participation rates and employment rates are high compared to the OECD and EU15 average, in terms of hours worked, Finland, Sweden and Denmark are around average among OECD countries and Norway is somewhat below the average. This is due to low annual hours of work for those employed and can be illustrated by worked hours per person in the working age population (Figure 5.4). As Table 5.2 shows, high absence rates are one of the main reasons for the shortfall in hours at work in Sweden and Norway. Another important explanation is the high incidence of part time work. Swedes and Norwegians do not have more holidays, but are more than twice as likely to be absent for various other reasons than the European average. Half of this is due to sickness absences. The other half is due to

various leave schemes, including parental and study leave. In addition, Sweden and Finland have introduced a paid sabbatical leave scheme whereby employees can take up to a year off and be replaced by an unemployed person.[9] The aim is to provide workers with a chance for recreation or personal development and to give the unemployed a foothold in the labour market. However, sabbatical leaves are detrimental to labour supply, even though this only concerns a small proportion of the labour force.

Hours worked per person in working age 2003

Figure 5.4 Annual hours worked per person aged 15-64 in 2003.
----- unweighted average
Source: Own calculations based on OECD statistics database.

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[9] In Denmark the sabbatical leave scheme has been phased out.

Table 5.2 Anatomy of a typical work year. Decomposition of average annual hours worked by full-time equivalent workers (dependent employees working full or part-time weekly hours). 2002

	Annual hours of work	Average weekly hours on all jobs	Usual weekly hours on the main job	Extra hours on the main job (overtime, flexitime, etc)	Hours on additional jobs	Annual weeks worked	Holidays	Absences for other reasons
	(a) = (b)*(f)	(b) = (c) + (d) + (e)	(c)	(d)	(e)	(f) = 52 − [(g) + (h)]	(g)	(h)
	Hours	Hours worked per week				Weeks worked/not worked		
Denmark	1410	36.3	34.8	0.8	0.7	38.9	7.4	5.7
Finland	1491	38.8	36.9	1.4	0.4	38.5	7.0	6.5
Iceland	1714	43.2	39.9	1.7	1.7	39.6	6.1	6.3
Norway	1339	37.3	34.8	1.8	0.7	36.0	6.5	9.5
Sweden	1349	38.1	36.0	1.4	0.7	35.4	6.8	9.8
"European average"[a]	1567	38.5	37.2	0.8	0.5	40.7	6.8	4.5

[a] Unweighted average of Poland, Greece, Hungary, Slovak Republic, Iceland, Czech Republic, Portugal, Spain, Switzerland, Ireland, Luxembourg, United Kingdom, Italy, Austria, Finland, Germany, France, Denmark, Belgium, Sweden, Norway and Netherlands.
Source: OECD (2005): Economic Surveys Sweden.

Besides the high absence numbers, the normal workweek in Denmark, Norway and Sweden is slightly shorter than the European average. Finland and Iceland have somewhat longer weekly working hours than European average. The average working hours have decreased in Finland and Sweden but increased in Denmark and Norway since 1995 (Table 5.3).

Table 5.3 Overall change in the average working hours 1995-2002.
Per cent

Denmark[a]	2.1
Finland	-2.6
Norway	1.0
Sweden	-0.6

[a] Data for Denmark covers 1990-2002.
Source: OECD (2005): Economic Surveys Sweden.

Table 5.4 shows the incidence and composition of part-time employment. If part-time employment is a substitute for not working at all, part-time employment increases labour supply. However, at least some of the part-time employed would work full-time if part-time option was not available and some of the part-time employed are involuntary underemployed. 63-82 per cent of the part-time workers are women. Part-time employment has increased in Finland, but the level of part-time employment, 11 per cent, is still much lower than in other Nordic countries. Norway and Iceland have the highest share of part-time workers, roughly 21 and 22 per cent respectively. Roughly 14 per cent of the employed in Sweden and 17.5 per cent in Denmark work part-time.

Table 5.4 Incidence and composition of part-time employment[a]Per cent

	Part-time employment as a proportion of total employment					
	Men		Women		Total	
	1990	2004	1990	2004	1990	2004
Denmark	10.2	11.6	29.7	24.3	19.2	17.5
Finland	4.8	7.9	10.6	15.0	7.6	11.3
Iceland [b]	7.5	..	39.7	..	22.2	..
Norway	6.9	10.3	39.8	33.2	21.8	21.4
Sweden	5.3	8.5	24.5	20.8	14.5	14.4

[a] Part-time employment refers to persons who usually work less than 30 hours per week in their main job.
[b] The year 1990 refers to 1991.
Source: OECD Employment Outlook 2005.

5.3 *Decomposition of labour supply*

5.3.1 Young adults

Labour force participation of young adults is often more volatile and more sensitive to labour market shocks than working decisions of more established individuals. Young people with little labour market experience and few labour market contacts are prone to stay outside the labour force at times of high unemployment and increase their labour supply when the demand for labour is high. Figure 5.5 shows the participation rates for 16-24-year-olds in the Nordic countries. Differences in the levels of participation rates between the Nordic countries are large. Participation rates of the young are lower than the participation rates for the whole working age population because young people participate in education. In fact, the major part of the drop in participation rates of the young at the beginning of the 1990s can be explained by an expansion in education. An educated labour force is essential for growth and it might not even be optimal for young people to be in the labour force. However, students in the large Nordic countries are old in international comparison and it can be questioned whether it is optimal that university graduates enter the labour market on average at the age of 25-27[10]. Long times-to-degree are a problem that at least in some part has to do with the liberal study culture at the universities and generous study grants. However, at times of low demand for labour it is more lucrative to stay in education than become unemployed, which increases the times-to-degree and decreases the labour supply of the young. Youth unemployment rates in the Nordic countries were high at the early 1990s and they are still higher than the unemployment rates for the total population.

In Iceland both educational outcomes and attainment are lower than in many OECD countries. The share of the working-age population that has no more than compulsory education is still high, because there are unusually good job opportunities for workers with few formal educational qualifications. However, low-skilled jobs may not survive through a possible further expansion of the power-intensive industry. Iceland's relatively poor record regarding educational qualifications is not the result of low initial enrolment rates but of high dropout rates, especially from upper-secondary institutions. The government has begun to take measures that should reduce dropout rates, notably broadening the variety of courses and making schools' financial allocations dependent on pupils' sitting exams. It is also considering shortening the duration of upper-secondary education following a lengthening of the school year.[11]

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[10] OECD Education at a Glance (2005).
[11] OECD 2005: Economic Survey of Iceland

**Labour force participation rates
young people aged 16-24 (percentages)**
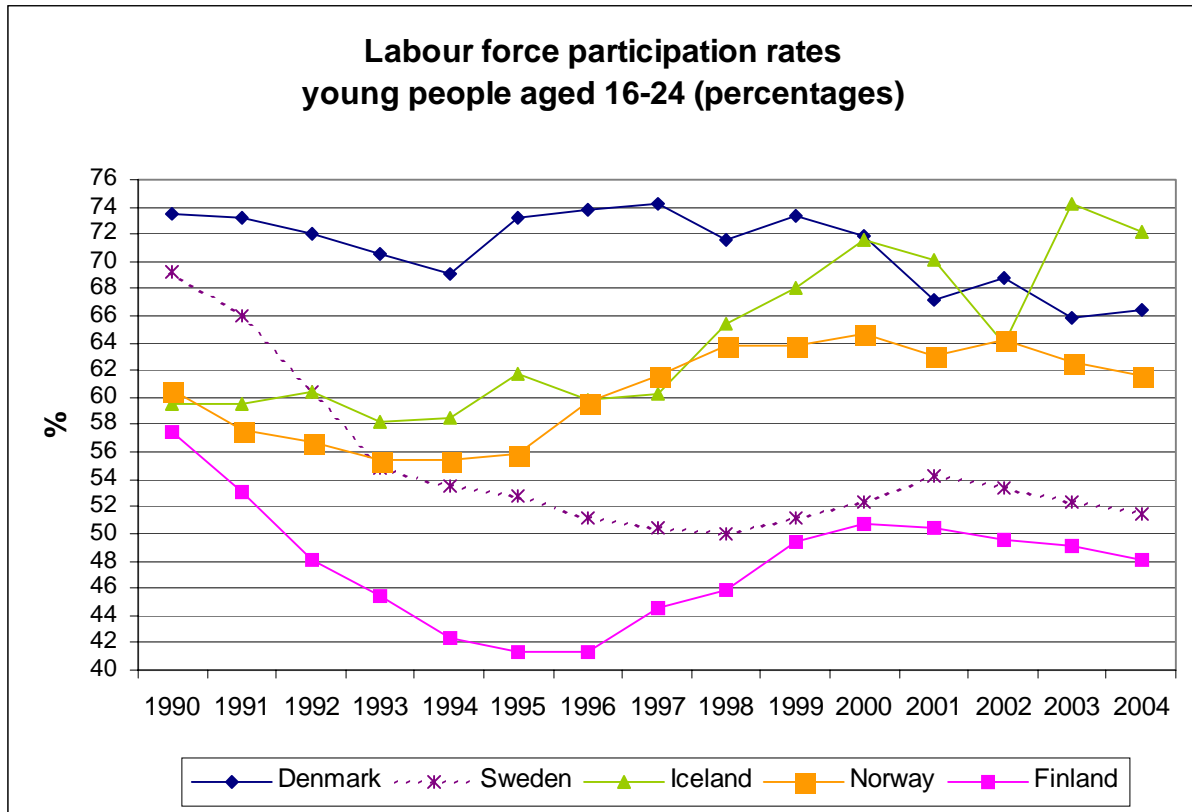
Figure 5.5 Labour force participation rates for young people aged 16-24. Per cent
Note: Persons aged 15-24 for Denmark and Finland.
Source: OECD Employment Outlook 2005.

Figure 5.6 shows that even though a large part of the lower labour supply of the young is due to education, there are groups that are neither in education nor employed. Finland has the largest share of non-active 15-29-year-olds. In Denmark, Norway and Iceland it is common to combine education and employment whereas in Sweden and Finland, most students are not employed while in education.

In education, not employed   **In education, employed**   **Students in work-study programmes**
Not in education, not employed,   **Not in education, employed,**

Finland

Denmark

Iceland[1]
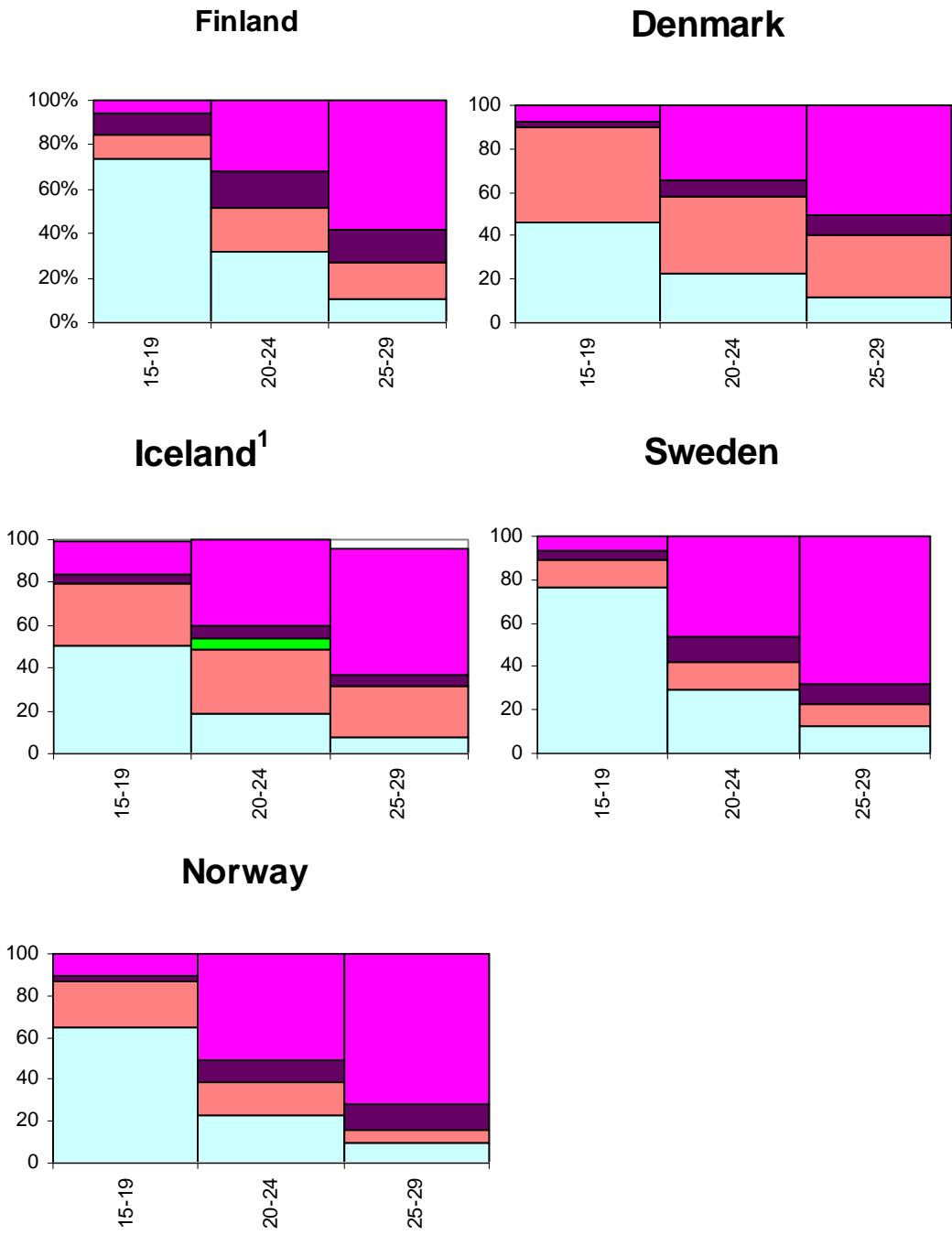
Sweden

Norway

Figure 5.6 Country profiles on transition from education to work (2003). Percentage of the 15-to-29-year-old population in education and not in education, by age group and work status

[1] Data from 2002.
16-29-year olds for Iceland, Sweden and Norway.
Source: OECD Education at a Glance 2005.

5.3.2 Mothers of young children

The participation rates for women in the Nordic countries are high and this also applies to mothers of young children. Table 5.5 shows employment and unemployment rates for mothers in different family types. In all the countries, employment rates of mothers have increased, but there still exist huge differences between the employment rates of mothers in different family types. Compared with other Nordic countries, the employment rates for Finnish mothers in two-parent families are the lowest. Unemployment rates have decreased since the mid-1990s, but single mothers still face higher unemployment than mothers in two-parent families. High effective tax rates related to other benefits reduce labour supply by introducing so-called poverty and inactivity traps. This has raised some concern in Norway regarding single women with young children.

All Nordic countries have paid parental leave schemes that boost female labour force participation by helping women to reconcile work and family life. The job security dimension also strengthens the continuity of their attachment to the labour market. However, the parental leaves may also have a negative effect on women's labour market prospects. For example extremely long parental leaves might have negative effects on hiring women and lead to human capital loss, which is detrimental to longer-term career prospects. Table 5.6 shows the length of parental leave and the benefits as a percentage of the labour income in the Nordic countries.

The key to high labour supply of parents of young children is providing high quality child day care at reasonable costs. Norway and Sweden have introduced a maximum day care fee aimed to boost labour supply.[12] A recent evaluation of the day care fee reform in Sweden shows that it has increased the labour force participation of women with small children.[13]

Table 5.5 Employment and unemployment rates for mothers in different family types. Per cent

	1996	1998	2000	1996	1998	2000
	Employment rates (%)			Unemployment rates (%)		
Denmark						
Single mothers	65.7	66.2	69.2	10.2	8.8	6.3
Mothers in two-parent families	78.6	80.4	81.4	6.3	4.9	3.9
Finland						
Single mothers	62.6	68.5	66.0	16.5	13.7	11.0
Mothers in two-parent families	70.1	71.6	74.7	9.6	7.7	6.0
Norway						
Single mothers	70.0	70.0	72.0	5.5	5.1	4.6
Mothers in two-parent families	80.0	83.0	83.0	3.5	2.0	1.9
Sweden						
Single mothers	72.6	72.2	77.1	16.8[1]	13.3[1]	7.2[1]
Mothers in two-parent families	84.1	85.8	87.5	7.2[1]	6.0[1]	4.3[1]

[1] Unemployed of the labour force.
Source: Single parents in the Nordic Countries. Nordic Social-Statistical Committee 2004.

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[12] Redistributional goals were an important aim with the reform in Norway.
[13] Mörk et. al. (2006).

Table 4.6 Parental leave schemes.

	Denmark	Finland	Norway	Sweden
In the labour force*				
Maximum number of weeks in which parental leave is payable	50	44	52[a]	64
Amount of parental benefits as a percentage of labour income	90[b]	70	100/80	80[b]
Benefits are taxable	Yes	Yes	Yes	Yes
Outside the labour force				
Maximum number of weeks in which parental leave is payable	-	44	Non-recurrent payment	64
Benefits are taxable	-	Yes	No	Yes

* The table shows the "typical" or minimum benefit levels, many employers pay a higher share of the income - some even 100 percent of the previous income - for the whole or a part of the parental leave period.
[a] 42 weeks at a compensation level of 100 % or 52 weeks at a compensation level of 80 %.
[b] Up to a maximum yearly income.
Source: Single parents in the Nordic Countries. Nordic Social-Statistical Committee 2004. Figures for Denmark obtained from the Danish Ministry of Employment.

5.3.3 Immigrants

Foreign-born and immigrants have lower participation rates than nationals in most OECD countries and this is also the case in the Nordic countries. This is particularly evident in Denmark and Sweden. Table 5.7 shows that in 2003 the participation rate for native Danes was 79.6 percent and only 58.3 for the foreign-born. The corresponding figures for Sweden were 79.3 and 70.7. The difference in participation rate is smaller in Norway, Finland and Iceland, but the total amount of immigrants in these countries is much smaller than in Sweden and Denmark. A common fact in all Nordic countries (except Iceland) is that the gap in participation rate between nationals and immigrants is larger among women than men (not shown in the table).

Employment rates and unemployment rates in table 5.7 show large discrepancies between natives and foreign-born in all Nordic countries. The employment rate is between roughly 10 to 20 percentage points lower for immigrants compared to natives in all Nordic countries (except Iceland) and the unemployment rate is almost twice as high.

Table 5.7 Labour force participation, employment and unemployment rates for natives and foreign-born.

Participation rate	Native			Foreign-born		
	1995	2000	2003	1995	2000	2003
Denmark	80.1	80.6	79.6	58.5	59.3	58.3
Finland	72.4	76.8	76.9		65.8	72.5
Iceland		88.9			87.5	
Norway		81.2	79.3		73.5	74.1
Sweden	81.1	78.3	79.3	68.3	66.6	70.7

Employment rate	Native			Foreign-born		
	1995	2000	2003	1995	2000	2003
Denmark	74.2	77.5	76.5	46.4	53.6	53.3
Finland	60.1	68.3	69.0		45.1	58.6
Iceland		87.2			86.8	
Norway		78.5	76.2		69.0	67.5
Sweden	75.2	74.6	75.5	53.5	58.9	62.3

Unemployment rate	Native			Foreign-born		
	1995	2000	2003	1995	2000	2003
Denmark	7.3	3.9	4.0	20.6	9.5	8.7
Finland	17.0	11.1	10.3			19.2
Iceland		1.9				
Norway		3.3	3.9		6.1	9.0
Sweden	7.3	4.7	4.8	21.7	11.6	11.1

Source: OECD (2005): Trends in International Migration.

There are many possible causes of lower labour supply for immigrants[14], such as differences in culture, language barriers, integration problems, lower general education etc. Further, discrimination in the labour market may be an explanation, and disincentives in the welfare benefit system in cooperation with the tax system at lower incomes, causing extremely high effective marginal tax rates for low wage earners.

At the same time it is important to note that immigrants are far from a homogenous group and the participation rate differs for example between immigrants from different regions, time spent in the county and reasons for immigration. Immigrants from western countries have generally higher participation rate than people coming from non-western countries. This can probably at least partly be explained with the reason for immigration. For example, the composition of immigrants to Sweden and Denmark has changed over the years. Between 1950s and 1970s demand for labour force in the Swedish and the Danish industries was huge and labour force migration dominated. Most immigrants came from the Nordic countries, Yugoslavia, Turkey and Greece and they often had a job before they arrived. At the time the labour force participation rates where not remarkably different for immigrants compared to the natives. Since the mid-1980s, a larger share of immigrants comes from countries outside

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[14] For references see for example Arai et al. (1999) and Edin & Åslund (2001).

the Nordic region and the largest portion of non-Nordic immigrants consists of refugees and relatives to refugees. The integration of this group on the labour market has been harder than for the ones that arrived before the early 1970s.

5.3.4 Elderly people

Labour force participation of people aged 55-64 is shown in Figure 5.7. Even if the labour force participation has varied during 1990s, the participation rates for this age group have been increasing since the end of the 1990s. This is mainly a result of a significant increase in the labour force participation among women aged 55-64, but men's participation rates have increased as well in most countries. The increasing labour supply of older workers might have to do with the pension reforms carried out in some of the Nordic countries during the late 1990s and early 2000s that give individuals higher pension if they work longer and the elimination of certain types of early retirement schemes.

Cross-country empirical evidence suggests that retirement decisions can be strongly influenced by pecuniary incentives. As mentioned in chapter 4 these can be separated into two components. The first is the net replacement rate – *i.e.* the net pension received as a proportion of net working income prior to retirement. The higher the net replacement rate, the greater is the incentive to retire. The second component is the change in net pension wealth from working an additional year and so forgoing an extra year of pension and paying a further year of contributions. If net pension wealth remains constant as a result of working an extra year, then the system is neutral, but if it falls then the system imposes an implicit tax on working.

In 1994, Denmark introduced an early retirement scheme (overgangsydelsen), which enabled early retirement for people over 50 years. Even though this scheme has now nearly been phased out, there still exists an early retirement scheme for 60-64-year-olds (efterløn). These early retirement schemes have largely offset all efforts of increasing labour supply among the elderly. In 1995 less than 29 percent of the 60-64 year old was on early retirement, whereas 37 percent of this age group was drawing pensions in 2000. Early retirement schemes have also lead to a high unemployment rate for the people aged 57-59, as the value for the employers and the job search motivation for many in this age group is reduced by the prospect of early retirement.

In Finland, despite a statutory retirement age of 65, the effective age of retirement was just over 60 in 2002, which was the lowest among the Nordic countries and among the lowest in the European Union. However, since the 2005 pension reform, there are increased pecuniary incentives to retire later on an old-age pension through the introduction of a flexible retirement age between 62 and 68, with a sharp rise in the accrual rate of pension rights after reaching the age of 63 and the abolition of the current ceiling on the maximum pension. In the pension reform, options for early retirement were curtailed by increasing the minimum age for qualifying for the "unemployment pipeline" to 57 and abolishing the unemployment pensions. Also, the individual early retirement pension that was available to those aged 60 to 64 and for which the medical eligibility conditions were less strict has been phased out.

In Norway, during the 1990s several favourable early retirement schemes (Avtalefestet Pensjon - AFP) were introduced for all public sector employees and a significant part of private sector employees. The AFP schemes create adverse incentives for both the individual and the employer as neither is faced with the full cost of the early retirement schemes. This is because the yearly pension is not actuarially adjusted (neutral) to take into account more years

as a pensioner and that AFP costs are divided among all employers participating in several of these schemes. This has in effect reduced the formal retirement age from 67 years to 62 years for a large proportion of the labour force. Evidence suggests that about 50 percent of all persons eligible for AFP retire early. Even though the AFP schemes have increased the number of early retirees, a majority of persons that retire early are still picking up a disability pension. In 2003 about 45 percent of the persons getting an old age pension for the first time (i.e. turned 67) had previously received disability pension.[15] High effective tax rates on labour when taking into account both taxes and disability pensions are believed to contribute to the high number of persons that retire early with a disability pension. Currently a pension reform is under way also in Norway, where one of the goals is to increase the effective retirement age by reducing disincentives to work longer. The plan is to phase in a new pension system from 2010.

In 2003 Sweden had fully implemented a new national pension system, which is constructed to be financially stable by linking pension rights to economic growth as well as to average life expectancy. It rests on the lifetime earnings principle, meaning that all contributions to the pension system result in new pension rights. This feature of the pension system implies that taxes are transformed into insurance premiums, which reduces the tax wedge without affecting disposable income. The expected effect on labour supply of such a change is unambiguously positive. The retirement age has become more flexible with the new pension system. There is no fixed retirement age, but income and premium pension cannot be drawn before the age of 61. An employee has the right to keep his post until the age of 67. These rules do together determine the retirement age to 61-67 for a large group of individuals. This age span should be compared to the age of 65, which was the retirement age in the old pension system. The effects on labour supply of a more flexible retirement age are not evident. On the one hand, the system allows for rather early exit from the labour market. On the other hand, pensions that are drawn early are generally small.

Since the Nordic pension reforms are still very new, the effects on retirement decisions and labour supply of the elderly people are yet to be seen. However, the trend in the labour supply of the elderly workers in the recent years has been positive, except in Norway and Iceland where labour participation rates for the elderly has made a downward turn in the last few years (figure 5.7).

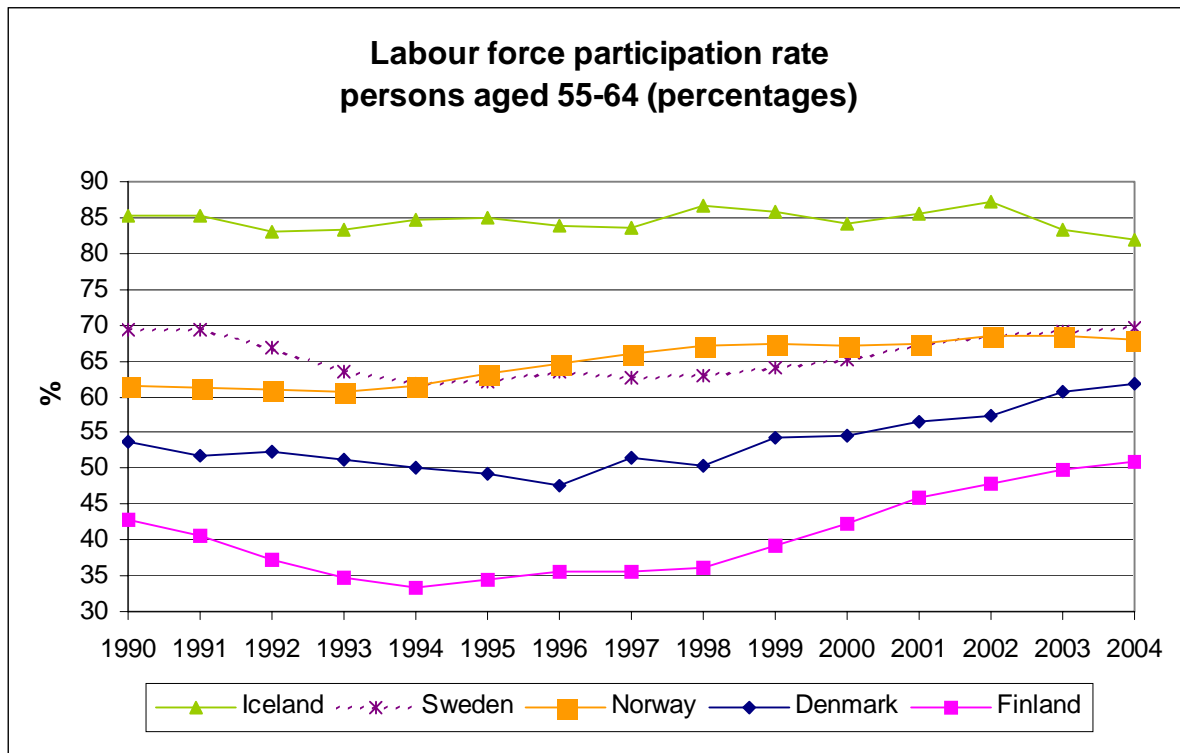[15] Ministy of Labour and Social Inclusion, Norway.

**Labour force participation rate
persons aged 55-64 (percentages)**

Figure 5.7 Labour force participation rate for persons aged 55-64. Per cent
Source: OECD Employment Outlook 2005.

5.4 *Concluding remarks*

In terms of hours worked per person in the working age population, Finland, Sweden and Denmark are around average among OECD countries and Norway is somewhat below the OECD average. This is reflected by high labour force participation and high employment rates, in particular for women, but low annual working hours for those in employment. Working hours are low partly because of high absence due to generous parental, study and sickness leave schemes.

Labour supply could be increased by encouraging young people to study more effectively so that they could start their working career sooner and by having stronger incentives for the elderly to stay in the labour force longer. The trend in the labour supply of the elderly workers in the recent years has been positive, with the exception of Norway and Iceland. However, there are other groups that could still increase their labour supply. For example immigrants have much lower labour force participation rates and higher unemployment rates than natives in the Nordic countries. Also, there are a lot of people on different kinds of disability and early retirement schemes that lower the labour supply.

5.5 *References*

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6. Estimation of labour supply effects

6.1 *Introduction*

The aim of this chapter is to give a condensed, not-too-technical introduction to estimation of labour supply, and to survey some estimation results from the Nordic countries. A more technical survey of methods of labour supply can be found in Blundell and MaCurdy (1999).

The focus is here on particular problems that appear in labour supply estimation. The main problem is the classical identification problem in estimating supply or demand schedules from market data. Estimation of supply schedules requires independent variation in demand. This issue is discussed below in contexts of different data types. In addition, there are technical problems in labour supply problems and responses that imply that structural estimation is likely to be the most appropriate method for labour supply estimation.

The main message is that we lack important knowledge about labour supply responses, and that the production of such knowledge is more a question of "experimental design" or finding data that can be considered "natural experiments" than the collection of ordinary market data and the examination of the properties of such data.

6.2 *Problems and solutions*

6.2.1 The main identification problem

We want to estimate the labour supply as a function of wage. However, the labour supply curve is a theoretical construct that can not be directly observed in data. In the market(s) we observe different combinations of wage and employment. We can not, in general, expect these combinations to suggest the shape of a supply curve. Variation in wage and employment can be a result of shifts in the labour supply schedule, and the realised wage-employment combinations would then suggest the shape of the labour demand function. This is illustrated in Figure 6.1 and 6.2. Figure 6.1 shows the realization of wage and employment in markets with variation in labour demand, and outlines the shape of the supply curve. Figure 6.2 shows the realization of wage and employment in markets with variations labour supply. Here, the combinations of wage and employment suggest the shape of the labour demand curve.
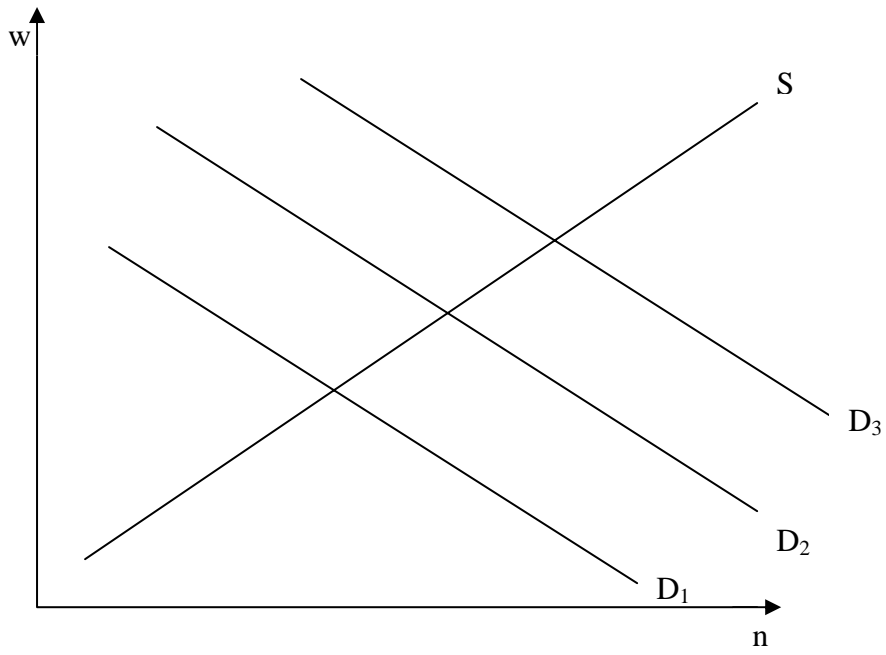
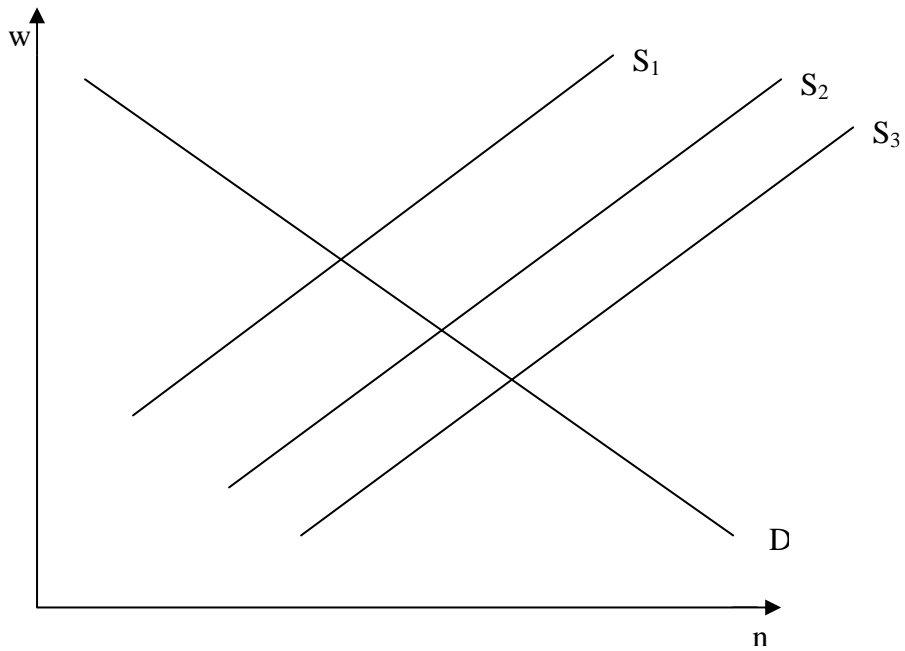*Figure 6.1 Wage and employment variations due to demand shocks reveal shape of labour supply curve*

Figure 6.2 Wage and employment variations due to supply shocks reveal shape of labour demand curve

The essential assumption when using aggregated market data for studying labour supply is therefore that variations in wage and employment are caused by variations in the *demand* for labour.

It is possible to relax this assumption with the introduction of covariates, which are variables that correlate with labour supply. Labour supply can be specified as a function of covariates in addition to wage, so that also labour supply can be allowed to differ between markets. The essential assumption must still, however, be that there is some variation in wage and employment that are due to labour demand changes. In practice, it is necessary to assume that at least one covariate that affects labour demand does not affect labour supply. It is worthwhile to stress that such an exclusion restriction is an identifying assumption and inherently untestable. This problem is treated in econometric textbooks such as e.g. Greene (2003) as "the problem of identification in simultaneous equations models".

The most important case of aggregated market data used for estimation of labour supply is time series data. We will not discuss further various problems and approaches within this context. The fact that aggregate labour supply may not always be realised as employment, because of unemployment, greatly complicates the use of aggregate data for labour supply estimation. Even if changes in wage or employment are caused by demand shifts, the mechanism for increased employment may not be increased supply of labour because of a higher wage. Indeed, it has been a problem for real business cycles theories that it is very hard to explain changes in employment over the business cycle as voluntary responses to real wages, as real wages vary little over business cycles. See for example Gamber (1999).

The most widespread type of data for the estimation of labour supply is individual based data. By individual based data, we mean datasets where the unit is persons or households and for example their weekly hours of work are recorded, along with other information. The heterogeneity of labour can thus be useful, as heterogeneity introduces variation in wage and employment "within a market". The heterogeneity in the labour market in effect creates many small markets with their own wage and employment outcomes. It is possible to use this variation to study labour supply.

It is important to keep in mind that we are still facing "market data" even when using individual based data. A simple market model to keep in mind is one where the wage is independent of the individual labour supply, as the choice of one single labour supplier is unlikely to be important for the marginal productivity of labour. Thus, each labour supplier responds to the wage given from the demand side with the labour supply that conforms to the "offered wage". Now, different personal characteristics are likely to affect both demand for (exactly this type of) labour and the supply from the person in question. Such a model is outlined in Figure 6.3.
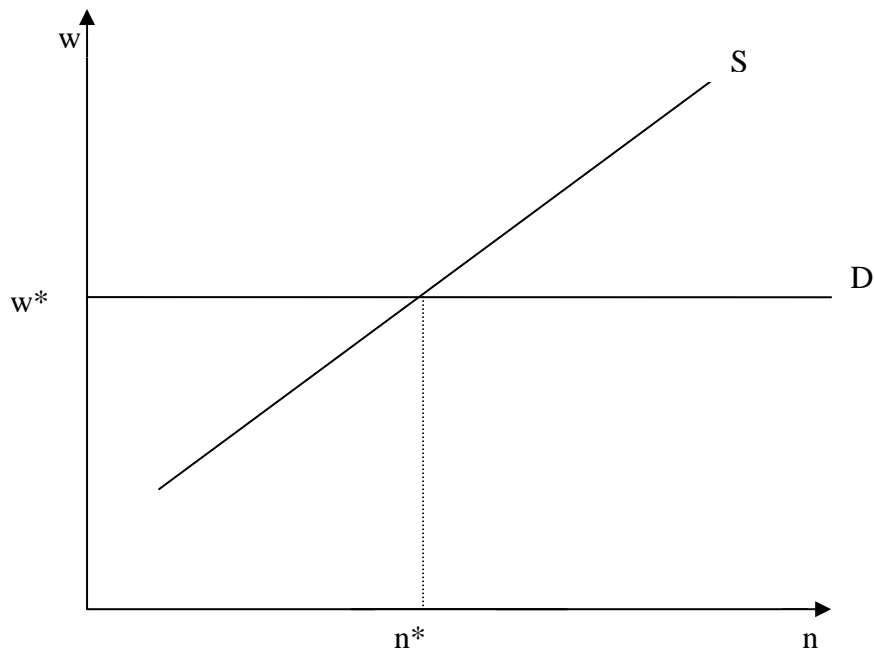
Figure 6.3 The market for one individual's labour

A scatter plot of wages and hours worked for different persons will not in general suggest the shape of a labour supply function. The main reason is that background characteristics that affect the wage that an individual can claim in the market, can also be correlated with the individual's preferences for work, leisure and consumption, independently of the effects that work through the wage. As an obvious example, education typically increases the wage that a person can claim in the market, but may also affect whether a person can find a job that he or she thinks of as interesting. The latter point is of course important for the amount of time every week this person wants to work. Thus, increased education may lead to a shift in the labour supply curve, with more hours per week chosen for a given wage. (Figure 6.4). The combinations of wage and employment will not suggest the shape of the supply curve.
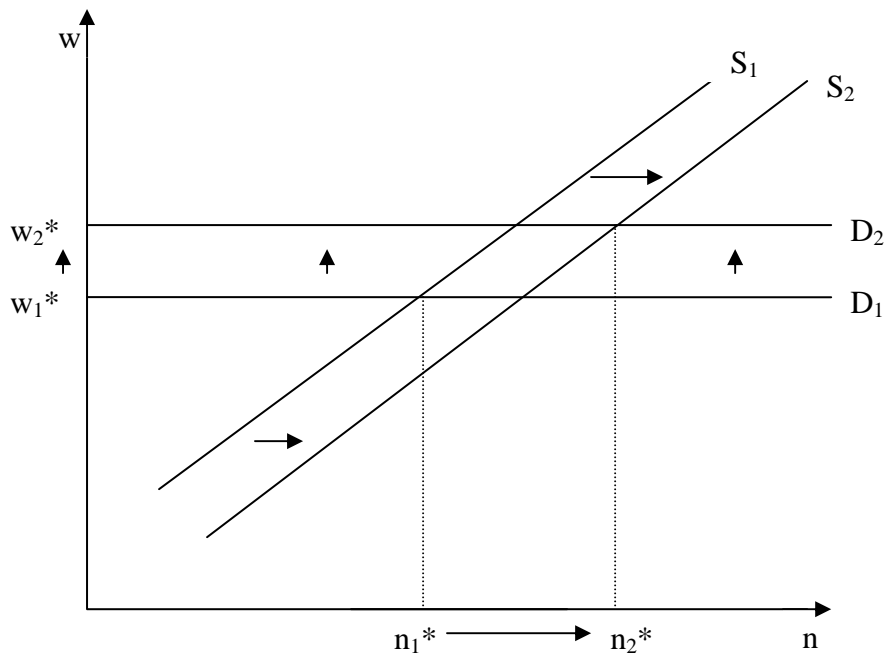
Figure 6.4 Plausible effect of increased education in the market for one individual's labour

The essential identifying assumption that is necessary to recover the labour supply function is that some observed individual characteristic does not affect the individual's labour supply schedule, but only affects the amount of labour supplied through the wage. It is maybe an understatement that it is not easy to find such a variable.

A possible, but quite problematic, alternative, is to assume that all covariates affect both wages and labour supply, but that the unexplained part of the variation in wage is not correlated with preferences for leisure, such that the relationship between the unexplained part of the wage and labour supply gives the slope of the supply curve. The appropriateness of such a solution would of course depend, among other things, on what covariates are actually observed (and thus which explanatory factors are left out).

The discussion above is implicitly in a framework where labour supply and labour demand (or wage) can be characterized as linear functions of sets of covariates. For reasons that in particular have to do with technical problems discussed below, labour supply is rarely studied in such a straightforward framework. In non-linear models, identification problems tend to disappear as practical problems, but to remain as conceptual problems. In such models, it may be very hard to understand the mapping from data to empirical results, or what properties in the data that give rise to the estimates of labour supply elasticities.

The above discussion can be summarised as follows: The aim is to estimate a theoretical construct, the labour supply function. The essential assumption that is necessary to measure such a function, is that some available variable only affects price and quantity in the labour market through shifts in the demand function, and not through shifts in the supply function. In the special case with individual data, the exclusion restriction amounts to specifying a variable that affects the wage, but does not shift the labour supply function.

6.2.2 Technical problems in labour supply estimation

In the following, we discuss labour supply estimation using individual based data and for the time being abstract from the identification problems discussed above. There are then three main technical considerations in labour supply estimation:

1. Labour supply decisions are partly discrete or qualitative.
2. Wages are only observed for the actual number of hours worked, and unobserved for those who do not work.
3. The net hourly wage may depend on the number of hours worked.

The first consideration refers to the fact that many individuals choose not to work at all and that the supply of hours worked per week tend to peak at fulltime and possibly part time numbers. These phenomena may be the result of corner solutions to the simplest theoretical model in chapter 3 and preferences for small intervals of hours per week. More plausibly, the phenomena indicate restrictions on the choice sets as discussed in chapter 3.4.

The second consideration involves two problems. The first is that wages are unobserved for those who do not work. The second problem is that even if wages are observed, the observed wage may not be relevant for other choices of labour supply, because of the third consideration.

Thus, the observed choice set, or the relevant budget constraint, may be unobserved. The third consideration above also implies that is can be complex, that is, non-linear. The gross hourly wage may depend on the labour supply because some kinds of jobs may require a certain minimum amount of hours per week of work. In addition, the net hourly wage may depend on the tax system, which typically would turn an otherwise linear budget constraint into a budget constraint with kinks, due to marginal tax rates that are changing with income.

It is somehow necessary to take into account the fact that wages are not observed for all individuals. This is possible through instrumental variable techniques. It is not strictly necessary to take into account the other considerations, as it is possible to simply study how the mean of hours worked depend on net wage. For the specification and estimation of models that actually can explain the data from individual labour market data, it is probably necessary to use some kind of structural estimation approach, that is, to specify fully an economic/econometric model of individual labour supply. With such a model, it is also possible to simulate the effects of complex tax system changes.

6.2.3 Experiments and natural experiments

It was argued above that the main problem in the estimation of labour supply was to find some variable that affected (net) wage, but without affecting labour supply except through the wage. It is extraordinarily difficult to find such a variable in ordinary market data. Two solutions to this problem come to mind.

The first solution, while difficult in practice, is to create an experiment, where some individuals are granted e.g. a tax rebate, while others are not, and this tax rebate is assigned randomly. Whether you have received such a tax rebate will affect your net wage, and it will affect your labour supply, but only through the change in the net wage. Experiences with such experiments in labour economics suggest that it is quite difficult to complete them successfully. Given how difficult it is to learn about labour supply from other sources, it may be worthwhile to try anyway.

The "second best" solution is to look for data properties that can reasonably be treated as natural experiments. A natural experiment is simply a feature in non-experimental data that mimics the properties of a real experiment. Differences in taxes are a good candidate in labour supply studies, as these are variables that are actually changes abruptly from time to time or across regions. Tax reforms present such opportunities, not least because most tax reforms should affect the labour supply decisions of some, but not all, persons that are affected by a system, so that it is possible to (at least partially) validate the assumption that changes are caused by changes in the tax system.

6.2.4 Some examples of methods used

6.2.4.1 Reduced form approaches

By reduced form approaches, we usually mean econometric techniques for estimation of simple relationships that we do not expect to be invariant to changes in the economic environment. More generally, reduced form approaches can be thought of as approaches that do not explicitly require the specification of an economic model.

In reduced form approaches, the main focus is on estimating the relationship between wage and employment, such as an "hours worked per week" variable. An example of such an approach can be an instrumental variable approach, where a variable that only affects employment through the wage is used as an instrumental variable for wage. This solution simultaneously solves the problem that wages are unobserved for some persons, and the problem that wages are not exogenous. A variation of such an approach would be to estimate the wage as a function of covariates and the employment as a function of wage and other covariates as a system of equations.

A reduced form model would typically not be able to take into account the qualitative nature of labour supply choices, as discussed above. While the results of such a model may in fact be robust to this sort of deviation from the ideal model for such estimation procedures, we should expect there to be some loss of explanatory power in a model that can not account for the phenomena that we observe in the data.

A partial solution to such a problem is to use a Tobit-model, a straightforward reduced form model that is able to handle corner solutions. A Tobit-model is a threshold model, where e.g. it is specified that any choice of employment below a certain threshold, in this case 0, is to be interpreted as zero employment. Thus, the model implies a continuous distribution over "hour worked per week", but with a spike at 0.

However, even the quite complex Tobit model will typically not fit data very well. To understand the effects of often complex tax systems and a complex underlying microeconomic structure, labour supply relationships are often estimated using structural approaches.

Reduced form approaches are often used in conjunction with data with natural experiments. Natural experiments usefully suggest what variable should be used as an instrument, so they fit neatly into the approaches above.

6.2.4.2 Structural estimation – Kinked budget constraint approaches

In structural approaches, the underlying microeconomic model is specified parametrically. Thus, the choice variable, in this case employment, is deduced from the specified utility function and choice set. Somehow, randomness must also be introduced into the model.

Beginning with Burtless & Hausman (1978) and Hausman (1981), methods were proposed which explicitly took account of the non-linear budget constraint generated by a non-proportional tax system. The methods specify microeconomic models with utility functions and budget constraints. Random utility functions lead to variation in labour supply for observably similar persons. In addition, an extra random term allows for "optimization failure" such that persons do not supply labour at their exact maximum.

The main function of an "optimization failure" random term is the following: If the tax system has e.g. a very high marginal tax rate starting from an annual income of at, say 40 000 Euro, then a microeconomic model with random preferences will typically predict that many individuals will supply labour so that their annual income will be exactly 40 000 Euro. An "optimization failure" random term will now smooth the distribution of hours worked, such that the model predict many persons with annual incomes around 40 000 Euro and not exactly 40 000 Euro.

The attractiveness of the model is its ability to simulate the effects of detailed changes in the bracket structure of the income tax system, taking into account both the number of individuals affected in each bracket and the degree to which they would change brackets after a tax change. The model takes the joint decision of participation and hours into account as well as measurement errors and unobserved heterogeneity of preferences.

6.2.4.3 Structural estimation – Discrete choice approach

An alternative structural estimation approach treats the labour supply decision as a purely discrete choice. Thus, not only the participation decision, but also the choice of hours of work is treated as a discrete choice. Hours of work is partitioned into a number of categories to accommodate the discrete choice specification.

The utility associated with each alternative is characterized by a parametric utility function, as in chapter 3 a function of leisure and net income. In addition, the utility for each alternative contains an additive independent random term. The random term is specified with a distribution (the extreme value distribution) that implies choice probabilities as in multinomial logit models.

The approach is, at least in theory, able to take into account unobserved choice sets. In practice, however, at least a part of the distribution of job offers is specified in the models. In practice, the gross hourly wage is also specified as independent of the number of hours worked. Like the other structural approach outlined above, this approach can be used for simulations of the effects of complex changes in the tax system.

6.3   *Survey of empirical results*

In empirical research, the results depend on the methods that are applied. In labour supply studies in particular, results will depend crucially on the applied methods, because (often implicit) assumptions about what covariates affects demand for but not supply of labour will determine the slope of the labour supply function. In addition, misspecification of models may lead to misleading results. Therefore, empirical results tend to vary a lot between different

studies. It would have been of great use if the research literature had in general been more explicit on the assumptions that underpin the estimation of labour supply elasticities.

There is an enormous international literature on empirical estimation of labour supply elasticities. The results vary a great deal, but we try to summarize the main findings. In Tables 1 and 2 in appendix B, results from quite a few studies are listed. In addition, the reader is referred to tables in Blundell and MaCurdy (1999) for even more such listings.

The different wage elasticities of mens labour supply are in general estimated to be small, in the order of 0-0.1, and sometimes even negative. This holds both for the uncompensated wage elasticity, taking into account both the substitution effect and the income effect, and the compensated elasticity, taking only into account the substitution effect. The estimates of the compensated wage elasticity exhibit more variation, no doubt because it is difficult to decompose the effects of wages on employment into a substitution effect and an income effect.

The wage elasticities of women exhibit far more variation. Still, most studies predict wage elasticites between 0 and 1. The most obvious reason for the larger effects for women is that the labour supply of women vary much more than the labour supply of men, both in terms of participation and in terms of hours worked, given participation. Obviously, some studies find that this variation can not be explained by variation in net wages, while other studies find that it can. Part of the variation in the estimated wage elasticities of women in the tables can no doubt also be explained by the different populations used. Some studies are for example studies of women with young children, who may be expected to have higher wage elasticities than other women.

Many studies also find different labour supply responses for different income groups. Those who would have a low income even if they work full time tend to have higher wage elasticities than those with a high income. These findings may reflect some of the same phenomenon discussed for gender differences above. Low wage earners are likely to vary much more in labour supply than high wage earners. Some studies find that this variability can be explained by wage differences, while for high wage earners, there is not much labour supply variability to explain.

6.4 *Country surveys*

6.4.1 Denmark

6.4.1.1 Introduction with main approaches in past, groups in focus

This section describes the most recent work on elasticities and the commonly applied in most of calculations on Danish labour supply responses.

On the whole the key focus in empirical work has been on the hour effect to labour supply. Responses in participation (and/or unemployment) have mostly relied on foreign studies or ad-hoc assumptions. Other effects regarding the quality of the labour force, such as responses concerning education and diligence are – even though they could be significant – mostly ignored. The elasticities relevant for the individual quantitative labour supply decision are presented below.

6.4.1.2 Table with main results, gender, method, group, year

Table 5.6.1 Labour supply estimates - Denmark

		Total wage elasticity	Participation elasticity	Compensated wage elasticity	Income elasticity
Graversen et al. (2001)	Men	0.047	-	0.053	-0.006
(Hausmann model)	Women	0.145	-	0.152	-0.007
Graversen & Smith (1998)	Men	0.353	-	0.496	-0.143
(Hausmann model)	Women	0.77	-	0.907	-0.137
Graversen (1997)	Men	0.121	-	0.178	-0.057
(Hausmann model)	Women	0.651	-	0.723	-0.072

6.4.1.3 Comments to differences in results, methods, qualities

The hour effect – the decision on the internal margin

As mentioned in chapter 3, the individual decision on how many hours of labour to supply on the market, can be summarized in the substitution and the income effects. These are summarized in the compensated wage elasticity and the income elasticity. The most applied estimates for these elasticities in Denmark are 0.1 and –0.03, respectively. These estimates are calculated from the Hausmann-approach estimates in Graversen et al. (2001), and are based on weighted averages across income intervals and between men and women. As often is assumed, low-earning individuals are more sensitive to income changes than high-income individuals. Women's labour supply is also more sensitive to wages than men's labour supply.

The table below shows how elasticities vary depending on income and sex. The study confirms that the elasticity for women is greater than for men, and that the elasticity is greater the lower the wages.

Table 5.6.2 Income and substitution elasticities

Wage income, DKK.	Men	Women	Men	Women
	Compensated wage elasticity		**Elasticity of income**	
0-50,000	0.31	0.95	-0.11	-0.40
50-100,000	0.10	0.32	-0.03	-0.11
100-150,000	0.06	0.22	-0.02	-0.06
150-200,000	0.05	0.16	-0.01	-0.04
200-250,000	0.04	0.15	-0.01	-0.03
250-300,000	0.04	0.15	-0.01	-0.03
300-350,000	0.05	0.16	-0.01	-0.05
>350,000	0.04	0.16	-0.01	-0.05
All	0.05	0.18	-0.01	-0.05
Applied elasticity	**0.10**		**-0.03**	

Source: Ministry of Finance 2002; Fordeling og incitamenter. Page 285.

The estimates provided in the table above, published in 2001,[16] are the most recent study on Danish data. These estimates on the compensated wage elasticity are in general lower than previous Danish studies.[17]

Compared to many previous studies, this study from 2001 separates the participation effect and includes among other effects also overtime payments and the possibility of increasing labour supply through entering a second job. Excluding these effects, the authors estimate an average compensated wage elasticity of 0.358 and an income elasticity of –0.078.

The Economic Council and the Welfare Commission use elasticities in line with those in table 1 in many of their calculations.

The participation effect – the decision on the external margin
Two elasticities more or less originating from ad hoc assumptions are usually applied; one which is valid for people in job-release schemes and one which is valid for all other potential suppliers of labour.

Concerning individuals in a job-release scheme, it is assumed by Finansministeriet (2002) that a fall in the degree of compensation of 10 percentage points leads to an increase in the participation rate among the 60-64 years old of 1 percentage point. It is assumed that the increasing participation in the long run is transferred into a rise in employment (i.e. it is assumed that the (structural) unemployment rate is unchanged).

Concerning all other potential suppliers of labour (primarily the unemployed) a linear relationship between the structural unemployment and the degree of compensation is assumed. The assumption is that a decrease in the degree of compensation of 10 percentage points causes a fall in the unemployment rate of 0.7 percentage points. This is as mentioned to some degree an ad hoc assumption. The assumption is a bisectional of estimates carried through in early 1990s, i.e. estimates based on data from the late 1980s and early 1990s. Since the 1980s and early 1990s a pronounced decrease in the Danish unemployment rate has taken place, and it therefore seems unrealistic that the potential for a decrease is as large as earlier. This is why the estimates from the early 1990s - when the structural unemployment was about 10 pct. - are halved. The structural unemployment today is roughly 5 pct. Under the assumption that the structural unemployment can never fall below 3 pct., one could however argue that the estimates from the early 1990s should be more than halved. This is so because the potential fall in the unemployment rate has fallen from 7 to 2 pct.[18]

The Economic Council (2004) applies a participation elasticity of 0.2. The elasticity applied in the Economic Council is defined as the percentage change in the absolute number participators when the percentage difference in disposal income between being in a job and without a job is changed by one pct. This elasticity implies that if for instance the difference between being in work or on a passive benefit scheme is raised by 5 per cent for a group of 100 000 on that specific scheme, 1 000 persons from the scheme will leave it and seek work.

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[16] Fredriksen, Graversen and Smith; "Overtime work, Dual job holding and Taxation", 2001.
[17] The same authors have calculated the previous estimates. This is why we assume that the latest study can be regarded as an improvement of these previous higher estimates.
[18] 10 pct. point – 3 pct. point = 7 pct. point; 5 pct. point - 3 pct. point = 2 pct. point.

Using Danish panel data, Le Maire et al. (2006) have recently estimated the elasticities from changing disposable income on the participation probability to be in the range of 0.2-0.4 for selected groups with weak labour force participation.

6.4.2 Finland

6.4.2.1 Introduction with main approaches in past, groups in focus

The most important and up-to date study is Mika Kuismanens' article which is summarised below. The wage (or income) elasticities of labour supply in other relevant studies are given in the table and briefly in the end of chapter 6.4.2.3, where there is a description of a study which estimates labour supply reactions using wages, benefits and taxes. Most of the elasticities are for females and vary from -0.1 to 0.3. The elasticity of men is estimated only in two cases and it is about 0.1.

The estimates are based on data that describes the labour market and tax system in 1990's. Unfortunately no estimates are available from late 1990s or the 2000s. Labour market flexibility may have increased and the tax system is less progressive today than 10-15 years ago.

6.4.2.2 Table with main results, gender, method, group, year

Table 5.6.3 Labour supply estimates – Finland

		Total wage elasticity	Participation elasticity	Compensated wage elasticity	Income elasticity
Lahdenperä (1991)	Women	-0.10	-	0.10	-0.20
Ilmakunnas (1997)	Women	0.10	-	0.29	-0.19
Kuismanen (1998)	Women	0.23	-	0.23	0.00
Kuismanen (1995)	Men	0.06	-	0.08	-0.02
Laine & Uusitalo (2001)	Men Women	0.12 0.22			
Kuismanen (2005)	Women	-	-	0.21	[Negative]

Source: Taxation in an International Framework working Group Report. Prime Ministers Office Publications 13/2003. p. 54-55.

6.4.2.3 Comments to differences in results, methods, qualities

Kuismanen (2005):

Model and methods: The labour supply is estimated by using the concept of non-linear budget constraint. The labour supply estimates are incorporated into the micro simulation model where different "tax reforms" are studied. Calculations are made for hours worked, participation rates and dead weight losses. All "reforms" are made using 1989 tax system and other structures.

Data: Sample of 2000 married females aged 25-60 years from Finnish labour force survey data for year 1989. Income data for these females and their partners are drawn from the Tax Register Data.

Overall results: Compensated mean wage elasticity is around 0.21, leisure is a normal good

Simulations: All reforms are made using 1989 case as a baseline. The absolute values are not very informative in today's respect but the direction of changes is.

Simulation 1: Different income tax system

	%- change in average hours of work	Participation rate	Deadweight loss
Progressive tax (baseline)	-	0.72	14.8 %
No tax	13.3 %	0.76	-
Lump-sum tax	17.0 %	0.77	0 %
Proportional tax	2.8 %	0.72	4.8 %

Results: Moving from progressive to proportional tax system does not increase labour force participation. The deadweight loss is smaller (4.8 % compared 14.8 % in the baseline) and the labour supply is 2.8 % higher than in the progressive tax system. Labour supply effects come mainly from the upper end of the income distribution. Losers and winners are easily identified. High income-earners will gain most. By symmetry, the biggest losers are very low income-earners.

Simulation 2: The effect of the change in progressive income tax rate
Relative to the baseline

Percentage change in	-6	-4	-2	2	4	6
Mean hour	7.5	6.1	4.0	-1.0	-3.1	-5.0
Mean tax revenue	-31.3	-19.0	-8.9	7.8	15.4	22.7

Results: The labour supply reactions are not symmetrical. Percentage change in mean hours and mean tax revenues relative to the baseline are bigger when decreasing the marginal tax rates. The main reason for this is that tax reductions encourage more people to enter the labour market than tax increases lead people to step out.

Simulation 3: Reductions in the marginal tax rates in the three lowest segments by 4.4 and 3 percentage points.

Results: The labour force participation increases by 4 percentage points. But individuals who would be willing to enter the labour market are willing to work quite a few hours per year. The percentage change in the mean hours is 8.8 pct. and the main response comes from individuals whose net incomes are in the three lowest deciles. The labour supply impact is small at income levels above the median income. Loss in the mean tax revenue is 12 pct.

Simulation 4: Reduction in the top marginal tax rate from 44 to 35 percent. The three highest segments are involved.

Results: No effect on the labour force participation. Mean hours increased by 4.5 pct. and the biggest labour supply changes are found from the three highest income deciles. The reform improves high-income earners' position relative to that of the rest of the population because their after-reform net incomes increase. The loss in the mean tax revenue is 13 pct.

Laine, V, Uusitalo R (2001):

Model and methods: Group wise estimation of labour supply in a tax-benefit model. Labour supply functions are estimated using a modification of a group wise estimation strategy by Blundell & al. (1989).

Data: Sample split on sex, level of education, age and the age of children.

Results: The uncompensated labour supply elasticity for men is estimated to 0.12 and for females 0.22.

6.4.3 Norway

6.4.3.1 Introduction with main approaches in past, groups in focus

There has been quite a bit of research on empirical labour supply in Norway during the last 25 years. The main branch of this research has been located in Statistics Norway. This research deserves some extra mention and explanation here because labour supply research in Norway has been performed within a framework that has to a large extent been developed here – but has also seen applications to data from other countries, such as Sweden and Italy.

The Norwegian labour supply research program is based on structural estimation of qualitative response models, where individual agents can choose between different intervals of hours of work. Most of the empirical work on labour supply in Norway is done using such an approach. The exception is time-series based work that is mainly used in connection with macro-economic prediction models. The Norwegian "research program" on labour supply is ambitious and has resulted in quite a few publications in good international journals.

6.4.3.2 Table with main results, gender, method, group, year

Table 5.6.4 Labour supply estimates – Norway

		Total wage elasticity	Participation elasticity	Elasticity of hours worked
Dagsvik and Jia (2006)	Women, married	0.61	0.33	0.28
	Women, single	0.004	0.023	0.002
	Men, married	0.28		
	Men, single	0.03		
Dagsvik & Strøm (2004) (discrete choice model)	Women, married	0.65	0.28	0.37
Kornstad & Thoresen (2006) (discrete choice model)	Women, married mothers of pre-school children		0.44	0.59
Kornstad & Thoresen (2004) (discrete choice model)	Women, married with children	(0.25)	-	-
Aaberge, Dagsvik & Strøm (1995) (discrete choice model)	Men, married	0.45	0.29	0.16
	Women, married	1.82	0.83	0.99

6.4.3.3 Some empirical studies

Dagsvik and Jia (2006), "Micro-simulation of labor supply behaviour with latent choice sets of job alternatives"

Model and methods: The model is specified as a structural discrete choice model, with married men and women modelled simultaneously. Each person can choose between 8 categories of working hours. There are restrictions on the demand for labour in each category.

Data: The data used is the Norwegian labour force survey (AKU) from 1997, with supplementary information from administrative registers.

Results: The paper simulates uncompensated wage elasticities based on the estimated model. The uncompensated wage elasticity of labour supply is estimated to 0.61 for married women and 0.28 for married men, while unmarried men and women have practically inelastic labour supply.

Problems: It is not clear to what extent the assumptions about the demand side of the labour market are crucial to the results.

Summary: The paper is very useful for our purposes, as elasticities for large groups of the population are estimated. It is very hard to understand what features in the data that give rise to the estimated elasticities. The empirical results should probably be seen as conjectural.

Dagsvik and Strøm (2004), "Sectoral labour supply, choice restrictions and functional form."

Model and methods: The model is specified as a structural discrete choice model, with 2 sectors, public and private, and 7 categories of hours of work for each sector. Thus, there are 14 different types of jobs. There are restrictions on the demand for labour in each category. The methods take into account that only predicted wages are observed.

Data: The data used is a set of married Norwegian women in the mid-1990's. Their labour supply is studied, conditional on the income of their spouses. The dataset has been cleaned in various ways, with the consequence that labour force participation in the sample was 92 percent.

Results: The model does not specify wage elasticities as parameters, but such elasticities can be deduced from the model. The uncompensated wage elasticity of labour supply is estimated to 0.65, where about 0.28 is explained by increased participation and the rest by increased number of hours worked.

Problems: It is not clear to what extent the assumptions about the demand side of the labour market are crucial to the results. For some reason, unexplained in the paper, the wage equations are estimated for a different sample than the one used for the rest of the analysis.

Summary: The paper is quite technical and not very transparent. The paper is more of a "research frontier" paper than an empirical analysis using a well-established and robust empirical approach, and the empirical study is just an application of this approach. The

empirical results should probably be seen as conjectural. It is very difficult to generalize the results about elasticities. The elasticities tell us something about the average response among a group of married women that is unusually active in the labour market.

Kornstad and Thoresen (2006), "A discrete choice model for labour supply and child care"

Model: The model is specified as above. The alternatives are different combinations of working hours and 3 types of child care.

Data: Mothers of pre-school children with a full time working spouse, from the Home Care Allowance Survey in 1998.

Results: The elasticity of wage on hours worked is estimated to 0.59 and the elasticity of wage to participation is estimated to 0.44.

Problems: Problems with specification of demand side considerations, as discussed above. Problems with the estimation of wage equation (selection effects not taken into account). Predicted wages enter model directly as observed wages. The model predicts a reduction in labour supply of 16 percent (among mothers with young children) as a result of the Norwegian child care reform. It is not clear that anything like this has happened.

Kornstad and Thoresen (2004), "Means-testing the child benefit"

Data: The data are Norwegian married women in the mid-1990's. Simulations are based only on women entitled to child benefits, that is, women with children up to 16 years old.

Results: Elasticities are not reported. It is shown that taxation of the child benefit will not have a large effect on labour supply, though the effect of taxation and means testing will reduce the labour supply somewhat (about three to five percent, depending on whether the reform is revenue-neutral or not). The means testing works like an extra 10 percentage points of marginal tax in a quite large interval.

Problems: Some problems with the wage equations, some problems with demand side considerations.

Summary: The study indicates wage elasticities on labour supply in the order of 0.25 (rough calculation based on the numbers above) for married mothers. The wage elasticity is not the main focus of the study.

Aaberge, Dagsvik and Strøm (1995), "Labour supply responses and welfare effects of tax reforms"

Model and methods: The same framework as above. A large number of alternatives, corresponding to hours worked, is used.

Data: A representative sample of married couples in 1979.

Results: The uncompensated elasticity of labour supply is estimated to an average of 0,45 for men, where 0,29 is explained by participation effects and 0,16 by hours worked. For women,

the uncompensated elasticity was estimated to 1,82, with 0,83 explained by participation and 0,99 by hours worked. The compensated elasticities were somewhat smaller for both genders, indicating that leisure is a non-normal good (more income leads to less leisure).

Problems: Predicted wages are plugged directly into the model. There are ad hoc assumptions about the demand side. The results are not consistent with time series data on labour supply: Large real wage increases and marginal tax reductions during the nineties have not lead to the huge increases in labour supply predicted from these results.

6.4.4 Sweden

6.4.4.1 Introduction with main approaches in the past groups in focus

Several studies have estimated the effect on labour supply as a result of changes in taxes in Sweden, where the majority cover the time period from 1980 to mid 1990's. An overview of the result from previous studies is presented in Aronsson & Walker (2006).

The studies presented in the report differ a lot regarding data and methodology, which makes it hard to draw any major conclusions. Still the studies have some common results. In all studies the empirical estimations show that men's reaction to a change in real wage is quite modest. The wage elasticity is in general positive and the spread in estimated values is small. The median elasticity in the sample of studies is about 0.08. The wage elasticities for women are often larger, but the spread in estimated elasticities is also larger. For women the median wage elasticity is about 0.3.

Estimations of the income elasticity are close to zero, mostly estimated with a negative sign, but in a few cases the income elasticity is positive. A negative sign on the income elasticity means that leisure is a normal good. The median income elasticity is slightly lower for women (-0.06) than for men (-0.02).

6.4.4.2 Table with main results, gender, method, group, year

Table 5.6.5 Labour supply estimates – Sweden

		Total wage elasticity	Participation elasticity	Comp. wage elasticity	Income elasticity
Blomquist (1983) (LNU 73)	Men, married, aged 25-55			0.08	-0.04
Blomquist and Hansson-Brusewitz (1990) (LNU 81)	Men, married, aged 25-55			(0.08, 0.12)	(-0.13, 0.02)
	Women, married, aged 25-55			(0.38, 0.79)	(-0.24, 0.03)
Flood and MaCurdy (1992)	Men, married, aged 25-55			(-0.24, 0.16)	(-0.10, 0.028)
Aronsson and Palme (1998) (LNU 81)	Men, married, aged 25-55			0.12	-0.03
	Women, married, aged 25-55			0.44	-0.12
Flood, Hansen and Wahlberg (2004) (HINK 1993, 1999)	Men, married, both spouses younger than 56 year.			0.05	-
	Women, married, both spouses < 56, no wealth			0.1	-
Blomquist et al (2001) (LNU 73, 81 and 91)	Men, married, aged 25-55			0.075	-0.04

Note: In some studies a few variations to the model is estimated, and the numbers show the interval of the different point estimates in each study (lowest and highest estimate).
LNU – Levnadsnivåundersökningen (The Level of Living Survey)
HINK – Hushållens inkomster (Income distribution survey)
HUS – Hushållens ekonomiska levnadsförhållanden (The Household Market and Non-market Activities)
Source: Aronsson & Walker (2006)

6.4.4.3 Comments to differences in results, methods, qualities

An expert report from the Swedish Green Tax Commission summarizes studies that estimate the compensated wage elasticity. [19] The compensated elasticity has two (at least) interesting implications. Since most tax reforms are financed in one way or another the compensated elasticity tries to capture the total effect of a reform. Another feature is that the compensated wage elasticity is an indication on the validity of the theoretical model. The theory predicts that the substitution effect will be positive. This is only possible if the compensated elasticity is positive. The compensated wage elasticity is positive in all but one of the studies in the sample where the compensated elasticity is estimated. In the studies the compensated wage elasticity ranged from 0.0 to 0.4 with median 0.15. For women the median was 0.5 and the spread was vastly larger.

Lately, research in Sweden has focused more on the combined effects of changes in social benefits and taxes on labour supply. One inspiring paper is van Soest (1995), where working hours is a discrete choice among classes of hours worked, i.e. not working, working part time or full time. Earlier studies were based on the assumption that individuals freely could choose

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[19] SOU 1997:11.

their working hours along a continuous scale. The discrete choice method facilitates the estimation of statistical models when analyzing the interaction between social benefits, taxes and labour supply.

Pylkkänen (2003) studies the labour supply of single mothers in Sweden. The results indicate that single mothers' labour supply is relatively sensitive to changes in tax and benefit systems. Another result is that the incentives vary greatly with income. The labour supply of individuals with low income tends to be more sensitive to changes in tax and benefit system than individuals with high income.

In Flood, Hansen & Wahlberg (2004) household choice of labour supply and use of social assistance and housing allowance is studied. The results are presented both in a setting with existing tax system and with a changed tax structure. The estimates show small wage elasticities both for men and women. An increased income of 10 percent for men raises their labour supply by 0.5 percent. Corresponding figure for women is 1 percent. An interesting result in the paper is that although the average effects are small, that is not the case for low-income households. This shows how hard it is to summarize this kind of studies if only presenting average effects. It is important to study the whole income distribution when evaluating the effect of changes in benefit and tax systems.

Most studies trying to measure labour supply elasticities in Sweden are based on old data. In the table above only one study, Flood, Hansen and Wahlberg (2004), uses fairly recent data. Even in that case the data goes back to 1999. In the other studies the data ranging from beginning of the 1970's to mid 1990's. It can reasonably be questioned whether elasticities estimated on such old data are fully representative today.

6.4.5 References

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7. **Policy experiences**

In this chapter we discuss how the relationship between taxation and labour supply is treated in the political discussion and decision-making in the Nordic countries. There are some differences between the countries in how much weight is given to labour supply effects when changes in tax policy are planned. However, there is no doubt that labour supply issues at the moment are of growing interest in the political debate in most of the Nordic countries.

7.1 *Background*

In most of the Nordic countries, the main issue in the tax policy discussion has in the past decades been the high level of taxation. The effects of high marginal tax rates on employment, and on the other hand the income distribution effects have been important questions in the debate of the taxation of earned income.

In the 1990s, structural reforms of income taxation were implemented in most of the Nordic countries. These reforms aimed at improving the international competitiveness and neutrality of the tax system, and also promoting employment. An important characteristic of these reforms was the lowering of average marginal tax rates on earned income, and the broadening of tax bases. Norway, Finland and Sweden introduced the so-called dual income taxation, where earned income and capital income are taxed separately[20]. The effects of these reforms were subject to many evaluations, both ex ante and ex post. The focus and scope of these evaluations naturally varied from country to country, but the main questions were the effects of the reforms on income distribution, welfare and employment. A variety of methods were used in making these evaluations.

In Sweden, the belief that lower marginal taxes would generate higher labour supply was a central part of the research work that was made before the 1990-1991 tax reform. A major evaluation of this tax reform was presented in 1995 (SOU 1995:104). One chapter of this expert report concentrated on the response of labour supply to the reform. Unfortunately it proved almost impossible to measure this effect, because of the severe recession that hit the country in the early 1990s. However, the evaluation shows that the reduction in working hours due to the economic downturn was less than expected when compared to historical trends.

In Norway, several evaluations of the effects of the 1992 tax reform were based on estimating welfare effects using general equilibrium models.[21] Many of the studies suggest that the reform had a positive welfare effect. The models used normally take labour supply as exogenously given, but there are also results that suggest that the 1992 reform had a positive effect on labour supply, as well as welfare.[22]

In Denmark, less than ten years ago very few calculations were made in attempt to indicate to the decision makers, in which way tax reforms can affect labour supply. The main tools in analysing policy were large-scale macroeconomic models that focused on the demand side of the economy. Labour supply effects were also considered on the basis of academic literature. This was for example the case for the 1998 tax reform package. Ex post it is estimated, that

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[20] Swedish tax reform: SOU 1995:104. Skattereform 1990-91. En utvärdering.
[21] Among others see Holmøy and Vennemo (1995).
[22] Aaberge, Dagsvik and Strøm (1995).

the reductions in the marginal effective tax rates and the broadening of tax bases from 1986 to 2002, including the 1998 tax reform, has increased labour supply by 1.5 per cent.

In Iceland, changes in taxation have generally not been brought about with special regard to labour supply. The fact that the rate of labour force participation has generally been high and unemployment low, is probably the main explanation why this aspect of tax changes has not been considered and its political weight has been scant. The general consideration that weighs most heavily when tax changes are considered is the impact on income distribution, as well as on the payment burden of selected income groups.

In Finland the research on the effects of tax reforms has concentrated mainly on distributional effects. The 1989 tax reform was prepared under strict guidelines that the income distribution may not be altered. After the reform, a three-year study was conducted, where it was established that the income distribution in fact did not change because of the reform. The study concentrated on evaluating the changes in income tax rates by income class before and after the reform. The 1992 tax reform was introduced at a time when Finland entered a steep economic recession. When the tax reform was prepared, the effects on tax revenue and income distribution of different households and income groups were estimated. Also ex post, an evaluation of the effects of the reform was made. The effects of the 1996-1998 tax reform on taxes and benefits were evaluated by a static micro simulation model (TUJA) using reservation wages and marginal effective tax rates as analysing tools. The analysis indicates, that the reform increased the incentives to work, and that it increased employment by 30 000 working years.

7.2 *Recent developments*

When the effects of taxation are discussed, labour supply questions have been increasingly of interest in the Nordic countries during the past few years. The reasons behind this relate to the economic situation, demographic development and performance of the labour market.

None of the countries yet includes labour supply calculations as a rule in the tax law proposals. The effects of tax law changes are typically calculated using a static micro-simulation model, and the calculations concentrate on estimating the first hand effects on tax revenue and on the effects on welfare and income distribution. Labour market effects are more often explicitly evaluated when larger tax reforms are carried out. They also play a role in the political and academic reasoning behind tax policy guidelines, and in the general debate about the effects of taxation.

7.2.1 Denmark – labour supply effects are a high priority

In Denmark, labour supply effects are high on the political agenda, and a high priority both in the ministries and labour market organisations and for economic debaters. Due to demographic changes the Danish Ministry of Finance estimates that it is necessary to increase the labour supply with 60 000 full time employees or more than 2 percent of the working force. Otherwise it is not economically possible to maintain the public expenses at the current level. Besides labour market reforms, cuts in income taxes are often mentioned as one of more ways to achieve an increase in the labour supply.

In designing the tax reductions in the 2004 tax package, labour supply effects were essential and labour supply calculations were made very explicitly – although still on ad hoc basis, as no general model was established. The total effect on labour supply was estimated to be in the area of 10-12 000 fulltime-employees – that is 0.4 per cent of the workforce. Approximately

2/3 of this increase supposedly comes from an increase in working time (the internal margin) and approximately 1/3 is from higher employment (the external margin). There has been no evaluation of to which degree the estimated labour supply responses actually have been effective. Presumable because it is very difficult at least in the short run to separate demand and supply responses from each other. In the coming years it is a high priority in Denmark to establish more formal ways to describe and estimate the economic effects of tax reforms, primarily regarding labour supply responses.

7.2.2 Iceland – expanding economy and unemployment at minimum

Also in Iceland, examining the connection between taxation and labour supply is considered to be of more interest than before. There are three reasons for this. First, at present, major cuts in the personal income tax are under way, prompting widespread discussion in the political arena as well as amongst the public in general about their impact on economic expansion and tax revenue. Some of the discussants have pointed out that the revenue loss from the tax cuts will be less than initially envisaged since the labour supply will increase, thus offsetting some of the revenue loss. This is not based on Icelandic research on labour supply elasticity, but is partly based on international indications, such as from the OECD. Another reason is that the Icelandic economy is undergoing a sharp expansion. Unemployment is at minimum, and the import of foreign labour is high. The demand for labour reaches therefore to other countries. The present expansion however is going to be followed by a downturn. It would therefore be quite pertinent for Iceland to examine the impact of tax changes upon labour supply. It would be useful to assess the impact of different aspects that are related to labour supply, such as the education of the labour force, its geographical distribution (urban vs. country areas), labour imports, the underground economy etc. It would also be useful to assess the impact of tax changes on the choice of consumers between leisure and work and how or whether personal income plays a role there. Thirdly, several studies have been conducted on the age composition of the population, how it will change in future years and what this impact on the labour supply will be.

7.2.3 Sweden

In Sweden, in the early 1990s it was more common to motivate changes in taxation with beliefs in higher labour supply. In early 2000 this view was not as strong. This has of course many explanations. First of all the tax system is in "better shape" than it was before the 1990-91-reform. Even if the highest marginal tax has become higher than right after the reform it is not as high as in the late 1980s. A second reason may be that the expected dynamic effects after the last reform were not clearly realized. Even if there were positive effects on the labour supply it was blurred in everything else that happened to the economy. Lastly, the academic literature dealing with estimations of labour supply elasticities was far more active until mid 1990s when the number of studies fell in Sweden. These reasons might have led to that all changes in taxes had to be financed in a static setting that in turn made the questions about dynamic effects less demanded.

Lately there has been a growing interest in tax reforms and the effects on labour supply. Much of the inspiration has come from the latest reforms in the US and the UK. Instead of looking at a continuous variable of hours work the focus has altered to a discrete set of working hours ranging from zero to "long full time". Also in Sweden a few studies based on discrete choices have been produced.

7.2.4 Norway – more emphasis on high effective tax rates

In Norway, although some analyses on how tax change proposals may affect economic efficiency, like labour supply effects, have been made, these are normally limited to referring to theory and existing empirical research. Thus, analyses do not include explicit calculations on efficiency effects of proposed changes. This is the normal approach both in the yearly budget process, and in larger tax reform processes. However, some evaluations do occur after tax changes are implemented and when data is available.

At the moment, Norway is implementing a new tax reform (over the years 2005-2006). The reform involves significant reductions in marginal tax rates on wage income. The main reason for the rate cuts for high-income groups is not primarily to stimulate to higher labour supply, but to reduce the rate differential between tax on labour and capital income. For low income groups the cuts are at least partly motivated by labour supply effects. Later evaluations may show whether this will be the result or not.

Recently more emphasis has been given on how the tax, benefits and pension systems combined can result in very high effective tax rates on labour for certain groups, and how this might have a negative impact on labour supply. Presently work is under way to map the incentive structure related to different benefits and pension schemes, and thus identifying vulnerable groups.

7.2.5 Finland – more emphasis on labour demand than on labour supply due to high structural unemployment

In Finland more attention has been given to the demand of labour than on supply. This is mainly due to the high structural unemployment in Finland. Some emphasis is, however, also put on the incentives to work. In 2005 there has been an attempt to analyze the effects on employment in some of the governments' tax law proposals. The possibilities for this kind of analysis are often limited, given the short time frame within which these proposals are often prepared. An example of this is the support of low paid work, where the employer of an ageing low-wage earner is given a reduction in the employer contributions. The effects of this proposal were estimated by using a macro-simulation model, under the assumption that the elasticity of the demand of labour to labour costs is larger at low income levels than on higher income levels.

The current government is not expected to present further tax cuts on labour, since it has already agreed on labour tax cuts until 2007, which is the last year of its term. So the possible new official work on the effects of taxation on labour markets would probably concentrate on the next governments' programme. Low employment is a major threat to the growth of the Finnish economy in the future, and the improving of employment is seen as a precondition for maintaining the current welfare society.

7.3 *Models that are used in evaluating labour supply effects*

In evaluating the effect of taxation on labour supply, different approaches are used in the Nordic countries. At the moment a lot of work is done to further develop the techniques and models that can be used in evaluating the connection between different policy measures and the supply of labour. But in none of the countries, there is yet established an "official" model that can be used in evaluating the labour supply effects of tax changes of for example governments' tax law proposals. The models that have thus far been used are in many cases

still incomplete, and a lot of work is still needed in improving them and making them a useful tool for the decision makers in tax policy design.

Table 7.1 shows some "typical" estimated labour supply elasticities in the Nordic countries. These can be looked upon as the most commonly applied average elasticities for the population as a whole or macro elasticities built partly on ad hoc assumptions or historic events such as a single reform on the labour market. To which extent these estimates are applied explicitly varies between countries. Mostly the estimates are viewed as rough guidelines or "rule-of-thumb" for discussing labour supply effects of different tax policies. Denmark is probably the country that most uses explicit estimates in policy discussion (cf. chapter 6.4.1). As shown in chapter 6, several empirical studies show that elasticities vary between individuals, especially over different income levels and gender. The effect on labour supply would then be expected to vary depending on what sort of tax changes are evaluated. For example we would expect different results if tax rates are primarily changed for low income individuals, than for high income individuals. Table 7.1 must be seen with this in mind.

Table 7.1 Some commonly applied labour supply elasticities in the Nordic countries

	Participation	Hour	E^{com}	E^{incom}	Total
Denmark	0.2^1	0.1	0.1	-0.03	-
Finland	[0.1; 0.2]	[0; 0.1]	[0.1; 0.2]	[-0; -0.1]	[0.1; 0.2]
Iceland	-	-			-
Norway[2]	-	-			-
Sweden	-	0.08	0.1	-0.04	-

1. Defined as the percentage change in the absolute number of participators when the difference in disposal income between being in a job and without a job is changed by one pct.
2. Norway has not used estimated elasticities in tax policy discussions directly. Discussions are mostly based on a qualitative evaluation based on general results from several studies (see chapter 6.4.3).

Source: See the "Country surveys" section in chapter 6.

In Denmark, Norway and Sweden there are plans or projects under way to establish a more formal way of making labour supply calculations. In Norway, methodical developments by Statistics Norway[23] have made it possible to estimate labour supply effects based on changes in the actual Norwegian tax system (as opposed to an approximated tax function that often is used in empirical work on labour supply effects). A project in cooperation between Statistics Norway and the Ministry of Finance is currently under way to make a version of the micro-simulation model normally used to estimate revenue and distributional effects (LOTTE) that could also be used in estimating labour supply effects. Results from the project are expected during 2006. Depending on the success of this project Norway may in the future be able to estimate labour supply effects of tax changes in connection with the budget proposal.

In Sweden, the Ministry of Finance has been developing a model that can be used to estimate labour supply effects of different changes in policy. The model is not currently systematically used to estimate labour supply response to policy changes. In Finland, the labour supply and demand effects of taxation are estimated with a simple macro-model. In Denmark, the labour supply effects of the tax reform(s) have mostly been evaluated using ad hoc macro-models –

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[23] See the Norwegian section in chapter 6.

along with a few political independent models – but developing a more formal way for making these evaluations is a high priority at the moment.

Unfortunately, the models mentioned above can not be described in more detail here, since their development is still very much a work in progress in all of the countries.

7.4 *Concluding remarks*

The interest in the relation between taxation and labour supply has grown in the Nordic countries in the past few years, both in political and academic debate. Finland is, to some extent, an exception. In Finland in the past years the discussion about the labour market effects of taxation has more concentrated on labour demand. This is mainly due to the high structural unemployment that hinders the growth of the economy. But labour supply questions will probably be given more attention in the future also in Finland.

The Nordic countries are facing similar challenges in their labour markets in the coming years – like the ageing of the population and international competition for high-skilled workers. In structuring the policy design with the objective to encourage workers to working longer hours and staying at work for more years, the analysis of the connection between taxation and labour supply is without a question very important. It is important to further develop the tools that can be used in analysing how the supply of labour is affected by different economic measures – among them taxation.

The analysis of how taxation affects the number of working hours supplied or the choice of whether to work will not be sufficient to cover the questions about taxation and labour supply that will have to be answered in the coming years. As described earlier, also the more qualitative measures of labour supply are given emphasis, such as how taxation affects the mobility of labour (both geographical and professional), how it affects the workers' choices for education, and how could the connection between taxation and things like do-it-yourself work and unreported work be evaluated. These more qualitative measures are in many cases still merely a question of future work, not something that is in reality estimated. There has also been interest in expanding the analysis of taxation and labour supply to other types of taxes other than just personal income taxes.

Although labour supply measures play an increasingly important role in tax policy design in the Nordic countries, and there is a clear interest to estimate and present elasticities that can be used in calculating the labour supply effect of specific changes in the tax parameters, it must be stressed, that the estimates must be used with caution. The relation between taxation and labour supply is always more complicated than what can be described by single figures, and there is also a high uncertainty about the estimated elasticities. The results of the effects of taxation on labour supply should not be simplified too much and taken too literally. (See chapter 6) In spite of all these reservations, labour supply effects should definitely not be fully ignored. By doing so, one implicitly expects the elasticity of labour supply to changes in taxation to be zero. That underestimation of labour supply effects is for certain wrong, and so the use of even imperfect estimates and incomplete models is better than fully ignoring the labour supply effects.

7.5 *References*

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8. **Concluding discussion**

This report has gone through a body of theories and facts about taxes and labour supply. In addition, trends in labour force participation and employment have been surveyed, with an emphasis on groups with a high potential for labour supply increases. We have also reviewed the aspects of labour supply that are currently discussed in the different Nordic ministries.

Economic theory by itself can rarely inform us about the numerical strength of economic relationships, such as between taxes and labour supply. In the area of labour supply, this situation is in fact even more difficult, because there are so few even qualitative results. For instance, basic economic theory does not even indicate that tax reductions should lead to increased labour supply. The role of the theory then becomes more a way of organizing ones thoughts than a device for prescribing policy.

We saw in Chapter 5 that the labour supply in the Nordic countries is relatively high by OECD standards, at least in terms of the number of people that participate in the labour market. At the same time, taxes and benefits to people outside the labour market are also somewhat high by OECD standards. Part of the explanation of this is quite likely demand side factors. However, supply side issues matter as well, with particularly the high rates of participation of women in the labour force being a Nordic phenomenon. While this is not a direct consequence of tax policy, the participation of women in the Nordic labour market is certainly not independent of the supply side policies of making sure that it is possible to combine children and a working career, particularly in terms of generous parental leaves and day care.

It is difficult to estimate the numerical relationship between net wages (and thereby taxes) and labour supply. The main reason for this difficulty is the classical difficulty in estimation of supply and demand curves in any market: It is very hard to find variables that by reasonable assumption shift demand curves and not supply curves. In the typical data used for labour supply econometrics, this translates into a difficulty of finding variables that affect the wage offered to an individual, but is not otherwise in any relationship with the persons preferences. In addition, there are technical complexities in labour supply estimation, as this is a market that abounds with corner solutions and unknown and nonlinear budget constraints. Still there are of course numerous attempts at estimation of this relationship in the literature.

The main findings are, if anything, that the elasticities of men with high income are quite small. Any large elasticities are typically found for groups that are marginal to the labour market, or among women that move between part time or full time work. As suggested by Chapter 5, this indicates a way of thinking about labour supply not in terms of a representative individual, but as different individuals in different situations facing choices between work and staying out of the labour force. Thus, the important labour supply questions, or the important supply side questions for labour force participation may be:

- How does the microeconomic environment of support for higher education together with the tax system facilitate early (or optimal) entry into the labour force?
- How do the system of pensions and particularly early pension schemes together with tax systems and the legal environment prevent too early retirement from the labour force?

- How do the systems of parental leaves and the supply of day care for children together with the tax system facilitate the labour supply of parents (in practice women) with young children?
- How does the tax system in conjunction with the various systems for sickness leave, disability pensions etc. facilitate the labour supply of persons that are sick, disabled or tired, but still potentially able to work?

Most of the Nordic ministries treat labour supply effects of tax changes by not taking into account these effects numerically. The exception is Denmark, where the economic ministries, as well as independent institutions and politically rooted organizations, are building models with different degree of sophistication used for calculating the labour supply effects and publish the results frequently. As mentioned in chapter 7.3, both Norway and Sweden are currently working on plans or projects to establish a more formal way of making labour supply calculations.

As a policy guideline, the working group would recommend a still conservative approach to the presentation of labour supply effects from the ministries. The reason for this recommendation is not that the labour supply effects are necessarily low, but that currently we do not have sufficient knowledge about the effects. Whether this guideline is followed using the Danish strategy, by presenting computed labour supply effects, based on quite conservative estimates, or by not presenting computed labour supply estimates, but only discussing such effects verbally, is a matter of taste.

Although we advocate caution, we still do encourage the ministries to continue, and to follow up on, the current work on building models for calculating labour supply responses on tax changes as referred to in chapter 7.3. This work will contribute to increasing our knowledge about the labour supply effects of taxes.

9. Appendix A – Country tax system details

In this appendix the tax system for wage income in the different Nordic countries is presented in more detail. The description is based on the country details described in the OECD Taxing Wages publication, but updated to the tax systems for 2006 (2004 for Iceland). An estimated APW for 2005 is also presented in each country description.

9.1 *Denmark (2006 tax rules)*

The national currency is the kroner (DKK). In 2005, DKK 7.45 was equal to EUR 1 (average of daily exchange rates). In that year, the Average Production Worker earned DKK 355 173 (country estimate).

9.1.1 Personal income tax systems

In the Danish personal income tax system, the income of the individual taxpayer is split into three categories:
- Personal income – which consists of employment income, business income, pensions, unemployment benefits etc.
- Capital income (e.g. interest payments and dividends received); calculated as a net amount.
- Taxable income – the aggregate of personal income and capital income less deductions (e.g. work-related expenses).

All three categories are relevant for various tax rates. The employees' social security contributions and their payments to labour market supplementary pension schemes (see Section 9.1.4.1) are not included in personal income (or taxable income). Regarding the tax unit the earned income of each spouse is taxed separately. However, as it is mentioned in Section 9.1.2.2. some unutilised personal allowances can be transferred between them.

9.1.2 Tax allowances and tax credits

9.1.2.1 Standard allowances

If a wage or salary earner has expenses related to earning his income (e.g. transport, trade union membership dues, unemployment premiums) these expenses are fully deductible against taxable income. In this Report contributions to unemployment insurance are considered as a standard tax allowance (and as a social security contribution). From 2004 and on there is a tax credit scheme whereby the taxpayer can deduct 2.5 per cent of earned income to a maximum of DKK 7 300 (2006) in the calculation of taxable income. The effective value of the credit is equal to the local income tax rate (33.3 per cent on average) multiplied by the value of the deduction.

9.1.2.2 Main non-standard tax allowances applicable to an APW
- Interest payments are fully deductible against capital income.
- The non-standard deduction for wage and salary earners: Actual costs related to the acquisition of income are deductible from taxable income. The main items are:
  o Contributions paid to trade unions.
  o Transportation costs: Up to 24 km per day: No deduction. 25-100 km: DKK 1.78 per km. Above 100 km: DKK 0.89 per km as a standard, but transport from municipalities placed in the outskirts of the country gives a credit of DKK 1.78 also above 100 km.

- o Other costs above DKK 5 100.
- Contributions/premiums paid to private pension saving plans are in general deductible from personal income. Contributions/premiums paid to private pension saving plans with sum payments are from 1999 on no longer deductible from income subject to the top bracket tax.
- Other allowances:
  - o Alimonies, if according to contract, are deductible from taxable income.
  - o Contributions to certain non-profit institutions are deductible from taxable income (limit DKK 6 600).
  - o Losses incurred from unincorporated business in earlier years are as a principal rule deductible from personal income.

9.1.2.3 Tax credits

Each person is granted a personal allowance, which is converted into a wastable tax credit by applying the marginal tax rate of the first bracket of the income tax schedule. For a person 18 years of age and older the tax credit amounts to:

For central government income tax	5.48 per cent of DKK 38 500 = DKK 2 110
For local government income tax and church tax (average rate)	33.3 per cent of DKK 38 500 = DKK 12 821

Personal allowance for an individual younger than 18 years: DKK 28 600.

If a married person cannot utilise the personal allowance, the unutilised part is transferred to the spouse.

9.1.3 Central government income taxes

9.1.3.1 Tax schedule

Low bracket tax to the central government is assessed on the aggregate of personal income and positive net capital income at the rate of 5.48 per cent.

Medium bracket tax to the central government is assessed on the part of the aggregate of personal income and positive net capital income above DKK 265 500, at the rate of 6 per cent. If a married individual cannot utilise the total allowance of DKK 265 500, the unutilised part is transferred to the spouse.

Top bracket tax to the central government is assessed on the excess of DKK 318 700 of the aggregate of personal income and positive net capital income at the rate of 15 per cent. If a married individual cannot utilise the total allowance of DKK 318 700, the unutilised part is not transferred to the spouse.

If the marginal tax rate including local tax but excluding church tax exceeds 59 per cent the top bracket tax rate is reduced by the difference between the marginal tax rate and 59 per cent. At the average local tax rate, this reduction equals 0.1 per cent in 2006. State and local income taxes

9.1.3.2 General description

Local income taxes are levied by the counties and the municipalities (and the church). They are flat-rate taxes levied by the local authorities (the rate varies by jurisdiction).

9.1.3.3 Tax base

The tax base is taxable income (see Section 9.1.1). Tax credit varies with tax rates. The average amount is given below.

9.1.3.4 Tax rates

Lowest rate: 28.50 per cent.
Highest rate: 36.70 per cent.
Average rate: 33.3 per cent (municipalities: 22.134; counties: 10.464; church: 0.737).

The average rate is used in this study. It is applied to the tax base less personal allowances (see Section 9.1.2).

9.1.4 Compulsory social security contributions to schemes operated within the government sector

9.1.4.1 Employees' contributions

Employees are required to make a fixed contribution of DKK 7 872 for unemployment insurance. From 1999 and on the contribution to unemployment insurance is split into two: One part consisting of the contribution to unemployment insurance (DKK 3 204), while the other part is a voluntary contribution to an early retirement scheme (DKK 4 668).

In this Report both contributions are included. What is not included is an administration charge paid to the unemployment fund. It varies between the funds from just above DKK 600 to above DKK 2 500. The mean for all 33 funds in Denmark is approximately DKK 1 400. The typical charge for an industrial worker is DKK 1 602.

Additional social security contributions are assessed on the basis of employees' gross earnings at the rate of 8.0 per cent.[24] Social security contributions are not assessed on social transfers nor on capital income.

Normally a compulsory contribution of 1 per cent of employee's gross earnings is paid to an individual Labour Market Supplementary Pension Scheme established for the employee – this contribution is not considered as a social security contribution rather it is savings being made by the individual. However, in 2004- 2007 this contribution is suspended. In addition, there is a compulsory fixed contribution to a general Labour Market Supplementary Pension Scheme of DKK 975 for workers with at least 117 hours of work each month and the employer makes a corresponding contribution that is double this amount (for workers who work less than 117 hours and at least 78 hours, the rate is DKK 650 while for those workers whose hours amount to at least 39 hours but less than 78, the rate is DKK 325). Under this scheme, each employee has a plan and it should be noted that the contribution that is ascribed to this plan is determined by the level of employment and does not necessarily relate to the actual amount described above. For the purposes of this Report, only the fixed contribution amount is considered as a social security contribution.

9.1.4.2 Employers' contributions

From 2000 and on the social security contribution is zero. The employer only contributes to a Labour Market Supplementary Pension scheme, which for a full-time employee corresponds

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[24] In the Revenue Statistics this payment is not reported as a social security contribution, but as a separate type of personal income tax. For presentational reasons it is included here as a social security contribution.

to a fixed amount of DKK 1 950 (Twice the fixed amount of DKK 975 mentioned in Section 9.1.4.1).

9.2 *Finland (2006 tax rules)*

The national currency is the euro (EUR). In 2005, the Average Production Worker earned EUR 32 547 (country estimate).

9.2.1 Personal income tax systems

9.2.1.1 Central government income taxes

Tax unit
Spouses are taxed separately for earned income.

Standard tax allowances
Standard tax allowances:
- Work-related expenses: A standard deduction for work-related expenses equal to the amount of wage or salary, with a maximum amount of EUR 620 is granted.
- An earned income tax credit against central government income tax is calculated on the basis of income from work. The credit is 1.5 % of the income exceeding EUR 2500, until it reaches its maximum EUR 157. The credit is reduced by 0.45 €of the earned income minus work related expenses exceeding EUR 33 000.

Main non-standard tax reliefs applicable to an APW:
- Interest: Interest on loans associated with the earning of taxable income, loans for the purchase of owner-occupied dwelling, and student loans guaranteed by the state can be deducted against capital income. Of the excess of interest over capital income 28 per cent can be credited against income tax up to a maximum of EUR 1 400.
- Membership fees: Membership fees paid to employees' organisations or trade unions.
- Travelling expenses: Travelling expenses from the place of residence to the place of employment using the cheapest means in excess of EUR 500 up to a maximum deduction of EUR 4 700.
- Other work-related outlays: Outlays for tools, professional literature, research equipment and scientific literature, and expenses incurred in scientific or artistic work (unless compensated by scholarships).

Travelling expenses and other work-related outlays are deductible only to the extent that their total amount exceeds the amount of the standard deduction for work-related expenses.

Rate schedule
Central government income tax.

Taxable income (EUR)	Tax on lower limit (EUR)	Tax on excess income in bracket (%)
12 200-17 000	8	9.0
17 000-20 000	440	14.0
20 000-32 800	860	19.5
32 800-58 200	3 356	25.0
58 200 and over	9 706	32.5

9.2.1.2 Local income tax

Tax base and tax rates
The tax base of the local income tax is taxable income as established for the income tax levied by central government.

Municipal tax is levied at flat rates. In 2006 the tax rate varies between 16.00 and 21.00 per cent, the average rate being approximately 18.40 per cent.

Municipal tax is not deductible against central government taxes. Work-related expenses and other non-standard deductions are deductible, as for purposes of the central government income tax.

Allowances in municipal income taxation
- An earned income allowance is calculated on the basis of taxpayer's income from work. The allowance amounts to 49 per cent of income between EUR 2 500 and EUR 7 230, and 26 per cent of the income exceeding EUR 7 230, until it reaches its maximum of EUR 3 850. The amount of the allowance is reduced by 4 per cent of the earned income minus work related expenses exceeding EUR 14 000.
- A basic allowance is granted on the basis of taxable income remaining after the other allowances have been subtracted. The maximum amount, EUR 1 480, is reduced by 20 per cent of the income exceeding EUR 1 480.

9.2.2 Compulsory social security contributions to schemes operated within the government sector

9.2.2.1 Employee contributions

Rate and ceiling
In 2006, the contributions paid by an employee under the Health insurance Act are the following: the contribution for medical care insurance is 1.33 %, and the contribution for earned income insurance is 0.77 %. The tax base for the contribution for medical care insurance is net taxable income for municipal income tax purposes, and the tax base for the contribution for earned income insurance is gross salary. The contribution for earned income insurance is deductible for income tax purposes.

In addition there is an employees' pension insurance contribution which amounts to 4.30 per cent of gross salary and an employees' unemployment insurance contribution equal to 0.58 per cent of gross salary. These two contributions are deductible for income tax purposes.

Distinction by marital status or sex
The rates do not differ.

9.2.2.2 Employers' contributions

The average rate of the employers' social security contribution in 2006 is 24 per cent of gross wage.

9.3 *Iceland (2004 tax rules)*

The national currency is the króna (plural: krónur) (ISK). In 2005, ISK 78,04 was equal to EUR 1 (average of daily exchange rates). In that year, the average production worker earned ISK 2 949 759 (OECD estimate).

9.3.1 **Personal income tax system**

9.3.1.1 Central government income taxes

Tax unit
Income is taxed on an individual basis, except for capital income of married couples which is taxed jointly.

Tax allowances and credits
Standard reliefs:
- Basic tax credit: A fixed tax credit, amounting to ISK 329 948 in 2004, is granted to all individuals 16 years and older, regardless of their marital status. The tax credit is deducted from levied central and local government taxes as well as net wealth taxes. Unutilised tax credits or portions thereof are wastable, i.e. non-refundable and non-transferable between tax years.
- Standard marital status relief: Married couples may utilise up to 100 per cent of each spouses' unutilised portion of his/her basic tax credit.
- Relief(s) for children: None.
- Relief(s) for compulsory pension contributions: Since January 2000, the compulsory payment to pension funds, which amounts to 4 per cent of wages, is deductible. In addition, an optional payment of up to 4 per cent of wages may also be deducted. As the additional 4% contribution is optional, it is considered to be a non-standard relief in this Report.

Main non-standard tax reliefs applicable to an APW:
- Interest payment relief: A fully refundable tax credit is granted to purchasers of personal dwellings (homes) to recuperate a part of mortgage-related interest expenses. The maximum tax-related interest credit is in 2004 ISK 164 603 for a single person, ISK 211 691 for a single parent and ISK 272 206 for a married couple. The following constraints apply to interest rebates: 1) they can not exceed 7 per cent of the remaining debt balance incurred in buying a home for one's own use; 2) the maximum amount of interest payments that qualify for an interest rebate calculation is 480 371 krónur for an individual, 630 626 krónur for a single parent and 780 878 for a couple; 3) six per cent of taxable income is subtracted from the interest expense; 4) the rebates begin to be curtailed at a net worth threshold of 3 613 148 krónur for a single individual and 5 989 414 krónur for a couple and are eliminated altogether at a 60 per cent higher amount.
- Seamen are entitled to a special credit against income tax of 746 krónur per day at sea in 2004.

Tax schedule
The income tax base is composed of personal income (e.g. wages, salaries, fringe benefits, pensions, etc.), which is taxed on an individual basis, and capital income which is taxed jointly for married couples.

The tax on personal income is single-rated. The central government income tax rate in 2004 is 25.75 per cent and applies to all personal income in excess of 71 269 krónur per month (855 231 krónur per year). The tax relief is provided by the basic credit described in Section 1.121.

A special 5 per cent income surtax is levied in 2004 on individuals with a monthly personal income in 2003 above 4 089 450 krónur for a single person and 8 178 900 krónur for a

couple. For 2005, the surtax will be applied to 2004-incomes of 4 191 686 and 8 383 372 krónur for single persons and couples, respectively.

The tax on capital income is 10 per cent. It is levied on all capital income of individuals, such as interest, dividends, rents etc. Such capital income is not subject to the personal income tax described above.

9.3.1.2 Local government income tax

The local government income tax base is the same as the central government's income tax base.

The local governments' income tax is single-rated, but the rate varies from 11.24 to 13.03 per cent between municipalities. The average rate in 2004 is 12.83 per cent.

9.3.2 Compulsory social security contributions to schemes operated within the government sector

9.3.2.1 Employees' contributions

Fee to the Retiree Investment Fund: Individuals, age 16-70, are subjected to a fixed tax of 5 576 krónur in 2004, provided the individual's taxable income was at least 835 020 krónur in 2003 (for the purposes of this Report, an estimate for the value in 2004 is used for the calculations).

9.3.2.2 Employers' contributions

Employers have to pay a social security tax on total wages of 5.73 per cent. In addition a 0.65 per cent is levied on the wages of fishermen as a premium for their government accident insurance.

9.4 Norway (2006 tax rules)

The national currency is the Kroner (NOK). In 2005, NOK 8.00 was equal to EUR 1 (average of daily exchange rates). In that year the Average Production Worker earned NOK 378 200 (country estimate).

9.4.1 Personal Income Tax System

The personal income tax has two tax bases: *personal income* and *ordinary income*. Personal income is defined as income from labour and pensions. Personal income is a gross income base from which no deduction may be made. Ordinary income includes all types of taxable income from labour, pensions, business and capital. Certain costs and expenses, including interest paid on debt, are deductible in the computation of ordinary income.

9.4.1.1 Central government income tax

Tax unit

The tax unit is in most cases the individual (tax class 1), but joint taxation (tax class 2) is also possible and more favourable if the spouse has little or no own income. Single parents are also entitled to be taxed under the tax class 2 schedule. Children less than 17 years old are generally taxed together with their parents, but may be taxed individually. All other income earners are taxed individually (class 1).

Tax allowances applicable to an APW

There are no tax allowances applicable to an APW under the central government income tax (surtax). The tax base is personal income from which no deductions are allowed. As part of the overall tax rate of 28 per cent on ordinary income, 11.8 per cent is considered as central government income tax.

Rate schedule (surtax)

Rate (%)	Class 1 and 2(NOK)
0 up to	394 000
9.0	394 000 – 750 000
12.0	750 000 and over

9.4.1.2 Local government income tax

The overall tax rate on ordinary income is 28 per cent. The local government (municipal and county) income tax is 16.2 per cent points of the overall rate. Tax on ordinary income is levied after taking into account a standard allowance of NOK 35 400 (class 1) and NOK 70 800 (class 2) in 2006. The deductions in the computation of ordinary income are:

Standard reliefs
- Basic allowance: each individual gets a minimum allowance equal to 34 per cent of wage income, with a minimum of NOK 4 000 and a maximum of NOK 61 100. For wage income each individual can choose a separate allowance of NOK 31 800 instead of the basic allowance. Hence, a wage earner would opt to choose this separate allowance as long as it exceeds the basic allowance to which they are entitled to.

Non-standard reliefs
The main non-standard allowances deductible from ordinary income are:
- Parent allowance: Documented expenses for child care limited to:
    o maximum NOK 25 000 for one child
    o plus NOK 5 000 for each subsequent child.

  The allowance applies in general to the spouse who has the highest income. Unused parent allowance may be transferred to the spouse. The allowance is also applicable to single parents.

- Travel expenses related to work exceeding NOK 12 800
- Labour union fees up to NOK 2 250
- Donations to voluntary organisations up to NOK 12 000
- Contributions to individual pension agreement schemes (IPA), maximum NOK 40 000
- Premiums and contributions to occupational pension schemes in the private and public sector, unlimited
- Unlimited deduction for interest payments.

The main non-standard tax credits are:
- Home savings scheme (BSU): The BSU scheme aims to encourage young people (under 34 years old) to save for a future home purchase. A wastable *tax credit* of 20 per cent of annual savings up to NOK 15 000 in special accounts is granted. Total savings may not exceed NOK 100 000.

9.4.1.3 Limitation on total tax payable

The total tax payable on ordinary income and net wealth may not exceed 80 per cent of ordinary income. If that is the case the tax on net wealth should be reduced. For net wealth exceeding NOK 1 000 000, the tax levied may not be less than 0.6 per cent of the surplus net wealth.

9.4.2 Social Security Contributions

9.4.2.1 Employees' contributions

Employees' contributions to the National Insurance Scheme generally amount to 7.8 per cent of personal wage income. Employees do not make contributions if their wage income is less than NOK 29 600. Once wage income exceeds this floor, an alternative calculation is made where the contributions equal 25% of the wage income in excess of the floor. The actual contributions made would represent the minimum between the alternative calculation and 7.8 per cent of the total wage income.

Contributions from the self-employed are 10.7 per cent of personal income. The self-employed in primary industries pay 7.8 per cent on personal income.

9.4.2.2 Employers' contributions

Employer's social security contributions are due for all employees in both the private and the public sector. The contribution is geographically differentiated according to the municipality where the employee resides. The standard rates are 14.1, 12.2, 11.7 or 0 per cent of gross wage. The highest rate applies to central parts of southern Norway. Lower rates may apply under certain circumstances. The weighted average rate is approximately 13.2 per cent in 2006.

The employer's social security contributions for employees aged 62 years and older are 4 percentage points lower than the standard rates, although not below zero per cent.

9.5 *Sweden (2006 tax rules)*

The national currency is the Swedish Kroner (SEK). In 2005, SEK 9.28 was equal to EUR 1 (average of daily exchange rates). In that year, the average production worker earned SEK 328 697 (country estimate).

9.5.1 Personal income tax systems

9.5.1.1 Central government income taxes

Tax unit
Spouses are taxed separately.

Tax allowances and tax credits
Standard reliefs:
-   Basic reliefs: A basic allowance is given for assessed earned income and varies between SEK 11 700 and SEK 30 600, depending on income. For individuals paying central government income tax this basic allowance has reached its lowest level, 11 700 SEK. The basic allowance amount depends on the assessed earned income and the basic amount (39 700 SEK).

Assessed-earned-income (SEK) relative to basic amount (BA)	Percentage of BA at lower bracket	For exceeding income, % of BA
0-0.99	0.423	
0.99-2.72	0.423	+0.2
2.72-3.11	0.77	
3.11-7.88	0.77	-0.1
7.88-	0.293	

- Standard marital status reliefs: None.
- Relief(s) for children: None.
- Work-related expenses: None.
- Other: None.

Main non-standard tax reliefs applicable to an APW:
- Interest on qualifying loans: Interest payments are offset against capital income. The resulting net capital income is the tax base. A tax credit is given in the case of negative capital income.
- Contributions to pensions, life insurance, superannuation schemes: For an APW a deduction of maximum SEK 19 850 (50 per cent of the basic amount) can be claimed for premiums paid to private pension arrangements. For higher income groups the deduction is limited to SEK 39 700.
- Medical expenses: None.
- Other: allowances are given for:
    o The amount of commuting expenses exceeding SEK 7 000.
    o Other types of work-related expenses exceeding SEK 1 000. Examples are costs of tools, work-related phone calls on private telephone.
    o Increased living expenses while on business trips, e.g. such as use of private car if costs are not reimbursed by the employer.
    o Double housing expenses due to temporary work at other geographical locations (too far from home for commuting), or if the family for some reason can not move, even if the job is of a permanent nature.
    o Travelling expenses for travelling home if working in another place than the place of residence.
    o Pension premiums.

Tax schedule

Taxable income (SEK)	Tax (SEK) at lower bracket	For exceeding income, %
0-306 000	0	
306 000-460 600	0	20
Over 460 600	30 920	25

Tax credits
A tax credit equal to 100 per cent of the compulsory social security contributions paid by the employee is granted.

A tax credit equal to 25 per cent of the trade union due and 40 per cent of the unemployment insurance fee is granted. This credit is a non-standard relief.

9.5.1.2 Local government income taxes

General description of the systems

Sweden has both a central government and a local government personal income tax. They are completely co-coordinated in the assessment process and refer to the same period, i.e. the income year coincides with the calendar year.

Tax base

The tax base is the same as for central government income tax. The basic allowance for individuals paying local government tax varies between SEK 11 700 and SEK 30 600, depending on income. For an APW this basic allowance amounts to SEK 12 300 (subject to revision with APW).

Tax rates

The local government personal income tax is proportional and differs between municipalities. The average rate amounted to 31.6 per cent in 2005, with the maximum and minimum rates being 34.24 per cent and 28.9 per cent, respectively.

9.5.2 Compulsory social security contributions to schemes operated within the government sector

9.5.2.1 Employees' contributions

A general pension contribution of 7 per cent of personal income is paid by employees and self-employed where income is equal to or greater than 42.3% of the basic amount underlying the basic allowance (see Section 9.5.1.1). The contribution cannot exceed SEK 25 100. The employees contribution is offset with a tax credit.

9.5.2.2 Employers' contributions

Contributions from the employer are calculated as a percentage of the total sum of salaries and benefits for a year. For self-employed the base is net business income. The rates for 2006 are listed below:

Program	Employer (%)	Self-employed (%)
Retirement pension	10.21	10.21
Survivor's pension	1.70	1.70
Parental insurance	2.20	2.20
Health insurance	8.64	9.61
Labour market	4.45	1.91
Occupational health	0.68	0.68
General wage tax	4.58	4.58
Total	32.46	30.89

A general discount applies both for employers and self-employed. The discount amounts to 5 per cent of the base and cannot exceed SEK 37 080 (it is not included in the calculations underlying this Report). The social security contributions are not applicable for employees or self-employed aged 65 or more. For the latter a special wage tax, which amounts to 24.26 per cent, is applicable.

10. Appendix B - International studies of labour elasticities

Table 1. International studies of labour elasticities.

Study	Year	Country	Target group	Compensated elasticity (Substitution)	Income elasticity	Uncompensated elasticity (Total)
Graversen et al.	2001	Denmark	All	0,1	-0,03	0,07
Men						
Average of Danish studies[10]	2002	Denmark	Men		-0,1	0,16
Agell et all[1]	1995	?	Men	0,08 to 0,24 (Concentration around 0,1)	-0,1 to 0	
MITTS[3]	2005	Australia	Men			0,025 to 0,27
Steiner	2004	Germany	Men			0,2
Hausmann & Porterba[5]	1987	US	Married men			0,9
Eissa[5]	1995	US	Married men			Close to zero
Blomquist et al	2001	Sweden	Men		-0,038	0,075
Poterba[7]	1998	US	Men	0,18 to 0,26		0,0 to 0,1
Women						
Average of Danish studies[10]	2002	Denmark	Women		-0,08	0,37
Steiner[4]		Germany	Women			0 to 1,7
Hausmann & Porterba[5]	1987	US	Married women			2,64
Eissa[5]	1995	US	Married women			0,8
Kumar[9]	2005	US	Women	1,19	-0,2	1,15
Triest[6]	1990		Women		-0,31 to -0,15	
MITTS	2005	Australia	Women			0,40 to 0,44
Agell et all	1995	?	Women	0,22 to 1,07	- 0,03 to - 0,24	
Orsini[2]	?	Different European countries	Married women			0,14 to 2,03 average 0,62
Hausman[6]	1981	US	Women employed fulltime		-0,5	
Steiner	2004	Germany	Women			0,3
Poterba	1998	US	Women	0,43 to 0,59		0,30 to 0,45

Note: The elasticities above are not fully comparable. For one thing they are estimated on different basis and by different techniques, for another because the elasticities can be defined differently from study to study (For example some elasticities are based on changes in net income other on changes in gross income).

1. Klevmarken 1997; Klevmarken refers to Agell's study, which provide an overview of elasticities. According to Klevenmarken these elasticities were general accepted in Sweden around 1997.
2. Orsini 2005 provides a survey of different European studies in which the labour elasticity for married women has been estimated.
3. Melbourne Institute Tax and Transfer Simulator.

4. Steiner refers to previous German studies.
5. Reported in Orsini 2005.
6. Reported in Kumar.
7. The study of Poterba is based on a questionnaire given to 134 university economists in the US. In the table above are given the median and the average of these economists' answers.
8. See note 7. 65 university economist have responded on the labour effects among women.
9. Kurma note that the total elasticity is rising in income.
10. Reported in Finansministeriet 2002.

Sources:

- Poterba (1998); Economists' Views about Parameters, Values, and Policies: Survey Results in Labour and Public Economics. Journal of Economic Literature.
- MITTS: Background note to Peter Dawkins' presentation "Welfare to work": Labour supply Responses to Work Incentives" at the conference Sustaining Prosperity. 31 March – 1 April 2005, Melbourn
- Orsini (2005): The Belgian Tax Reform: equity and efficiency.
- Kumar (2005): Nonparametric Estimation of the Impact of Taxes on Female Labour Supply.
- Klevenmark (1997): Did the Tax Cuts Increase Hours of Work? A Pre-post analysis of Swedish Panel Data.
- Steiner (2004): Household Taxation, Income splitting and Labour Supply Incentives – A microsimulation Study for Germany.
- Blomquist et al (2001): Tax reform evaluation using non-parametric methods: Sweden 1980–1991.
- Graversen et. al(2001): Overtime work, dual job holding and taxation.
- Finansministeriet 2002, Fordeling og Incitamenter.

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Table 11. Estimates of labour-supply elasticities

Country	Uncompensated wage elasticity (overall effect)	Broken down into:		Broken down into:	
		Compensated wage elasticity (substitution effect)	Income elasticity (income effect)	Average hours elasticity	Participation elasticity
A. Married women's labour supply					
Rosen (1976a) US	2.3	n.a	n.a	0.8	1.5
Hannoch (1980) US	1.4	2.3	-0.9	0.4	1.0
Schultz (1980) US	1.0	1.0	0	0.1	0.9
Cogan (1981) US	0.65	0.68	-0.03	n.a	n.a
Hausman (1981) US	0.45	0.90	-0.45	n.a	n.a
Blundell and Walker (1982) UK	0.43	0.65	-0.22	n.a	n.a
Arrufat and Zabalza (1986) US	0.62	0.68	-0.06	n.a	n.a
Triest (1990) US	1.2	1.5	-0.3	0.8	0.4
Strøm and Wagenhals (1991) Germany	0.96	1.02	-0.06	n.a	n.a
Kaiser, van Essen and Spahn (1992) Germany	1.04	1.22	-0.18	n.a	n.a
Blundell, Duncan and Meghir (1992) UK	0.42	0.61	-0.19	n.a	n.a
Eissa (1995) US	0.8	n.a	n.a	0.5	0.3
B. Men's labour supply					
Boskin (1973) US	-0.1	0	-0.1	-0.1	0
Hausman (1981) US	-0.03	0.95	-0.98	n.a	n.a
Ashworth and Ulph (1981) UK	-0.33	0.29	-0.62	n.a	n.a
Blundell and Walker (1982) UK	-0.23	0.13	-0.36	n.a	n.a
Juhn, Murphy and Topel (1991) US	-0.2	n.a	n.a	n.a	n.a
Kaiser, van Essen and Spahn (1992) Germany	-0.004	0.28	-0.28	n.a	n.a
Zabel (1995) US	0	0	0	-0.1	0.1
C. Lone mothers' labour supply					
Hausman (1980) US	0.47	0.65	-0.18	n.a	n.a
Bingley, Symons and Walker (1992) UK	0.76	1.28	-0.52	n.a	n.a
Jenkins (1992) UK	1.44	1.68	-0.24	n.a	n.a

Sources: OECD (1995b), pp. 59-60; and Congressional Budget Office (1996), p. 7.

OECD 1997, Economics Department, Working Papers No. 176, Taxation And Economic Performance.