

# Tax Policy and Employment: How Does the Swedish System Fare?

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## Abstract

This paper reviews the literature on optimal taxation of labour income and the empirical work on labour supply and the elasticity of taxable income in Sweden. It also presents an overview of Swedish taxation of labour income, offers calculations on the development in effective marginal tax rates and participation tax rates, and estimates, using the difference-in-differences method, the impact of tax incentives on employment rates of elderly workers. After this background, we ponder possibilities for reforming the Swedish tax system to improve its labour market impacts. We suggest better targeting the earned income tax credit at families and low-income workers, lowering the top marginal tax rates, and maintaining the tax incentives for older workers.

JEL-Code: H210, H240, J220.

Keywords: optimal taxation, labour income taxation, labour supply, taxable income, Swedish tax system.

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## 1. Introduction

One of the most heavily debated topics in economics is the employment effects of taxation. Some macroeconomists argue that virtually all employment differences between countries are due to differences in the tax burden, whereas most economists specialising in labour and public economics hold the view that taxes matter somewhat; for some groups of workers they might matter more, whereas others seem to work regardless of the level of income or other taxation.

This article offers a selected review of both the theoretical and empirical economic research on taxation and employment that we think is most relevant for the current Swedish system. This review focuses on the microeconomic part of research, drawing on both applied theory and microeconomic evidence (i.e. statistical analysis using data on individuals, not countries), although we briefly comment on the relations between macro and micro work in Section 4 below.<sup>1</sup> The purpose of our report is to discuss the Swedish system for the taxation of labour incomes in the light of the most recent theoretical and empirical findings on the intersection of labour and public economics.

Before starting the actual review, it might be useful to briefly describe the basic problem at hand: When setting taxes, the government typically wants to both raise revenues in an efficient manner (without distorting the economy too drastically or changing too much the way people work and save and the way firms invest) and to achieve a socially acceptable distribution of the tax burden and after-tax income. Taxation is also used to achieve other goals; for example, corrective taxes are imposed on externality-generating activities to equate private and marginal social costs, but these taxes are not the subject matter of this survey. The efficiency and equity objectives of taxation are to some extent conflicting objectives. If the government wants to achieve a very evenly distributed disposable income, it needs to rely on heavily progressive taxation and offer a comprehensive social safety net. However, such a policy reduces people's incentives to work and save, as well as the firms' incentives to invest, and therefore redistribution typically also diminishes the overall size of the economy, i.e. some efficiency losses are inevitable. Note that this is not a universal truth; one can imagine policies that are desirable as regards both efficiency and equity: To some extent, the social safety net can serve as one example if it also facilitates efficiency-increasing risk taking among the population. However, as a general rule, the trade off exists and the optimal choice depends on societal preferences. The more the government and the population value redistribution, the more they are willing to tolerate distortions to the economy.

A simple example, in which taxation affects individual decisions, is labour supply. If the marginal tax on labour income is raised, this reduces the take-home pay from work on the margin. This makes leisure relatively more attractive, and reduces the hours of work (economists call this a substitution effect). The greater is this effect, the more a given level of taxation distorts the economy. On the other hand, a higher level of taxation reduces people's disposable income. If leisure is a good that people want to enjoy more when their income

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<sup>1</sup> This paper concentrates on the relation between employment and taxation. A recent impressive study by Sørensen (2010) offers a general analysis of the Swedish tax system – including analysis of international competitiveness and capital income taxation. On the other hand, it is somewhat less focused on employment effects. Many of the conclusions in Sørensen (2010) and our work are very similar, as we will discuss below.

increases, making people poorer by increasing taxes also has an additional channel of influence that tends to increase labour supply (this is called ‘an income effect’). While the two effects point in opposite directions, the substitution effect typically dominates and therefore higher marginal taxes typically reduce labour supply.<sup>2</sup> Hence, higher tax rates to fund more public expenditure or more progression to redistribute income typically entail some efficiency losses. How large these losses are, and to what extent the employment effects vary across different tax instruments or within the tax system, is the essence of what we will review in this report.

The next section of this report offers a brief description of the aspects of the Swedish tax system that are most relevant for employment. Particular emphasis will be put on incentives created by the tax and the transfer system to take paid work as opposed to unemployment or sickness leave. Section 3 reviews the theoretical literature on designing a good tax system based on lessons in what economists call ‘optimal tax theory’. Here, we draw heavily on recent material in the Mirrlees Review<sup>3</sup>, a large-scale overview of tax theory and practice by the world’s leading tax economists and lawyers, initiated by the Institute for Fiscal Studies in the UK. Section 4 turns to the empirical evidence on the connections between taxation and employment, using both international material and evidence from Sweden. Section 5 summarises our findings and discusses reform options to enhance the design of the Swedish tax system from the employment perspective.

## 2. The Swedish tax system

### 2.1 General features and recent reforms

Sweden is a high tax country by any standards. In 2008 the total revenue of the general government sector amounted to 53 % of GDP, whereas total public expenditures were 50.6 % of GDP. There are several ways to classify taxes. One is to distinguish between taxes on labour, taxes on capital and taxes on consumption and input goods. *Table 2.1* reports the collected revenues for each category in 2007. *Table 2.1* shows that 59 % of the taxes collected relate to labour income. From the decomposition of labour income taxes in *Table 2.2* we recognize that the bulk of the tax revenues relating to labour income comes from local income tax (479 billion in 2007) and social security contributions (473 billion in 2007).

Table 2.1. Total taxes in 2007

	SEK, billion	% of total taxes	% of GDP
Taxes on labour	874	59%	28.5 %
Taxes on capital	208	14%	6.8%
Taxes on consumption and input goods	402	27 %	13.1 %
<b>Total taxes</b>	<b>1484</b>	<b>100%</b>	<b>48.4%</b>

Source: Taxes in Sweden 2009 (Table 4).

<sup>2</sup> Although at high income levels, the income effect may be stronger, in which case a tax increase would actually increase labour supply for a subset of population.

<sup>3</sup> See <http://www.ifs.org.uk/mirrleesReview>

In this report we analyse the optimal design of the labour income taxation and how taxes affect employment. The main emphasis will be on labour income taxation at the personal level and the supply side of the economy. Thus, we will mainly concentrate on how features of the personal income tax system affect individual behaviour. We will also discuss some issues in payroll taxation. However, from the viewpoint of economic theory there are no sharp dividing lines between ‘taxes on labour income’ and other taxes. First, standard economic textbooks teach that the statutory incidence of the tax does not say anything about the economic incidence of the tax. In other words, the agent who formally pays the tax does not necessarily bear the burden of the tax. Second, in some applications the implications of levying a consumption tax are analytically similar to levying an income tax. In a model where the individual disposes of all her income, and hence there is no saving, a proportional income tax of 50 % is equivalent to taxing consumption at a rate of 100%, if the tax on consumption is defined as a mark-up on the consumer price.

Table 2.2 Decomposition of tax revenues 2007

	SEK, billion
<b>Taxes on labour</b>	
Income taxes	402
<i>of which central government income tax</i>	45
<i>of which local income tax</i>	479
<i>of which tax reductions</i>	-122
Social security contributions	473
Tax on occupational insurance	1
Shipping support	-2
<b>Total revenues from taxes on labour</b>	<b>874</b>
<b>Taxes on capital - paid directly by individuals</b>	
Net tax on income from capital	49,335
Alternative tax for self-employed on funds retained for expansion	0,372
Real estate tax	13,210
Inheritance tax	0,015
Gift tax	0,008
Tax on dividends to non-residents	6,334
<b>Subtotal</b>	<b>69,274</b>
<b>Taxes on capital - paid by companies:</b>	
Real estate tax	12,390
Tax on pension fund earnings	12,320
Company profit tax	104,612
<b>Subsum incl. company profit tax</b>	<b>129,322</b>

Table 2.2. continued.

<b>Other taxes on capital:</b>	
Stamp duty	9,414
<b>Total revenues from taxes on capital incl. company profit tax</b>	<b>208,010</b>
<b>Taxes on consumption</b>	
Value added tax	288
Excise duties	114
<b>Total revenues from taxes on consumption</b>	<b>402</b>

Source. Taxes in Sweden 2009, Table 14, Source: Taxes in Sweden 2009, Table 5, Source. Skattestatistisk årsbok 2009, table 5.1.

A centre-right wing coalition came into power in 2006. This change in power had quite a profound impact on the taxation of labour incomes. One of the stated purposes of the government's tax policy was to

*"...contribute to an increase of the permanent level of employment (the number of hours worked) via an increase in labour force participation, increase in work hours among those who are in the labour force and increase in education and competence among those who work."*<sup>4</sup>

The introduction of the so-called 'jobbskatteavdraget', the earned income tax credit (EITC) stands out as the single most important tax reform.<sup>5</sup> However, changes have also been made in other areas of taxation with direct or indirect impact on work incentives. Some of the most important implemented *tax cuts* since the tax year of 2007 are

- An earned income tax credit was introduced in four steps 2007-2010.
- The tax burden on elderly workers was reduced both through targeted pay roll tax reductions and a considerably more generous earned income tax credit for those aged 65 and above (2007).
- Payroll tax reductions were targeted towards young workers aged below 26 (2009).
- A tax reduction for household services was introduced (2007) and a tax reduction for building, rebuilding and maintenance services (late 2008) was introduced.
- The property tax on owner-occupied housing was abolished and replaced by a charge that may not exceed SEK 6000. (2008).

<sup>4</sup> Prop. 2008/09:1, p.135. Our translation.

<sup>5</sup> In what follows we use the term 'earned income tax credit (EITC)' as a translation of 'skattereduktion för arbetsinkomster' which is often called 'jobbskatteavdraget' in the Swedish debate. EITC is the name of the U.S. in-work subsidy which has been in place since the 1970's. One should keep in mind that there are several important differences between the Swedish and the U.S. earned income tax credits

- The wealth tax was abolished (2007).
- The tax on corporate profits was lowered from 28 % to 26.3 % of profits (2009).
- The tax treatment of closely held corporations became more favorable (2007-2008).

To a large extent the EITC has been financed by reforms in the social insurance system. Most prominently, changes have been made to the unemployment insurance system and the sickness insurance system.<sup>6</sup>

## 2.2. The Swedish income tax system

The basic structure of the Swedish statutory income tax system, which to a large extent is a result of the comprehensive 1991 reform, is simple. A proportional local tax rate applies to all earned income and taxable transfers. The mean local income tax rate in 2010 is 31.56 %, with a minimum rate of 28.89 (Vellinge), and a maximum rate of 34.17 (Ragunda). For total labour incomes above a certain threshold, (SEK 384,200 in 2010), the taxpayer also has to pay a central government income tax. The central government income tax schedule consists of two brackets; the marginal tax rates in each bracket are 20% and 25% respectively. Thus, when only considering the personal income tax the top marginal tax rate on earned income is 56.56 % in 2010. Capital income is taxed separately from total labour income according to a proportional tax rate of 30 %.

In 2007, 20 % of the population aged over 20 were liable to the central government income tax. Six per cent of the population faced the top marginal tax rate. The thresholds for the central government income tax increased in real terms during the last couple of years (Table 2.3). In particular, the kink points in central government taxation were increased in 2009.

Table 2.3. The upper and lower kink points of the central government tax schedule 2006-2009, SEK.

	2006	2007	2008	2009
Lower kink	334,900	338,900	339,800	380,200
Upper kink	497,900	503,900	505,500	538,800
Kinks are expressed in the price level of 2009. (2006-2008 year values are deflated by the CPI).				

Before computing the individual's tax liability, a *basic deduction* is made mechanically by the tax authorities against the individual's assessed total labour income (the sum of earned income and social transfers). Since 1991 the basic deduction has been phased in at lower income levels and phased out at higher income levels with consequences for the marginal tax rate facing the individual in these income intervals. Figure 2.1 shows the statutory tax

<sup>6</sup> See Forslund (2009) for a good summary of the government's reforms.

schedule on individuals in 2010. The basic deduction is phased in between SEK 42,000 and SEK 115,300 and phased out between SEK 131,000 to SEK 334,100 in 2010.

2.2. *The earned income tax credit*

A Swedish earned income tax credit, which applies solely to earned income – and not to taxable transfers<sup>7</sup> -- was introduced in 2007. In the 2007 government bill the budget cost of this tax cut (‘the first step’) was estimated to be around SEK 40 billion. The EITC reform marks a break with the longstanding Swedish tradition of taxing several types of social transfers together with earned income. The technical design of the EITC is complicated. This is partly due to the pre-existing basic allowance. The size of the EITC in 2010 is calculated in accordance with Table 2.4. The EITC lowers marginal tax rates up to a level of earned income of SEK 334,000. However, in contrast to what is standard in other countries that have implemented in-work tax credits *the Swedish EITC is not phased out.*

Table 2.4. Formula for the earned income tax credit in 2010

Earned Income	Tax credit
0 – 0.91 PBA	$(EI - BA) * \text{local tax rate}$
0.91 PBA – 2.72 PBA	$(0.91 PBA + 0.304*(EI-0.91 PBA) - BA) * \text{local tax rate}$
2.72 PBA – 7.00 PBA	$(1.461 PBA + 0.095*(EI-2.72 PBA) - BA) * \text{local tax rate}$
7.00 PBA -	$(1.868 PBA - BA) * \text{local tax rate}$
PBA = price base amount (= SEK 42,400 in 2010), EI = earned income, BA = basic allowance.	

Figure 2.1 shows the marginal tax rate and average tax rate as a function of earned income, with and without the EITC in 2010 under the assumption that all reported income is earned income (not taxable transfers). In one sense, the EITC simplified the marginal tax schedule as the number of brackets decreased from 8 to 6.<sup>8</sup> A large number of taxpayers with middle range incomes receive a marginal tax rate cut of approximately 6 percentage points. The marginal tax rates of those earning above SEK 334,000 are not affected by the EITC. We can also infer that taxpayers with very low incomes received dramatic cuts in both the average tax rate and marginal tax rate. For higher incomes the reduction in average tax rates is more modest.

<sup>7</sup> This is not completely true since the EITC also depends on the basic allowance, which is also a function of taxable transfers.

<sup>8</sup> Note that this is on the assumption that the individual receives no taxable transfers. Since the basic deduction, but not the EITC, is a function of taxable transfers, the kink points in general depend on the amount of taxable transfers. This makes the tax code non-salient from the perspective of the taxpayers.



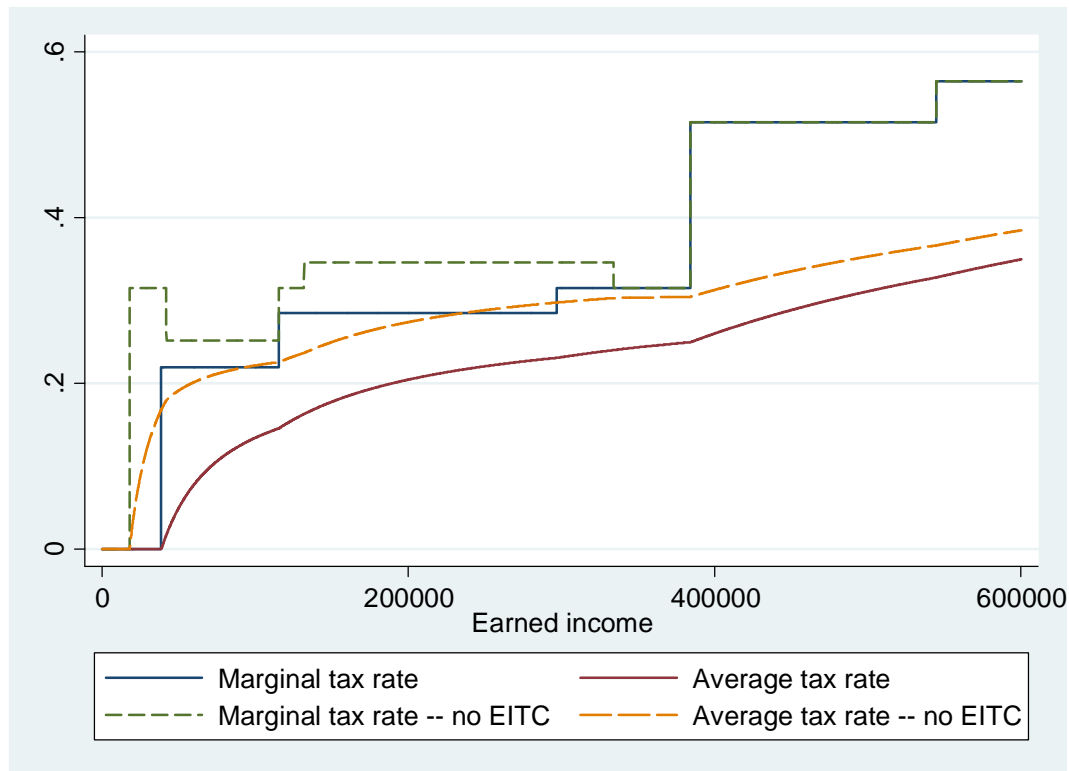


Figure 2.1. The marginal tax rate as a function of earned income (under the assumption that the individual receives no taxable transfers) in 2010. The tax schedule includes basic allowance, earned income tax credit and central government income tax.

The abovementioned rules apply to workers aged 65 or below. Elderly workers who earn wage income or self-employment income are subject to more generous rules. In 2007 and 2008 the EITC formula for elderly workers was quite similar to the formula for prime-aged workers, with the exception that elderly workers benefited from a more generous tax credit at a given level of earned income, see Appendix 4. In 2009 the EITC schedule for elderly workers was simplified so that it is no longer a function of either the local tax rate or the basic allowance – it is only a function of the amount of earned income.

### 2.3 Payroll taxes

The statutory payroll tax (social security contributions) in Sweden has been stable around 32-33 % of the gross wage since the mid 1990's. On top of that, employers pay contributions to collectively agreed social benefit systems. One should keep in mind, though, that the social security contributions also entitle the employee to a number of social benefits. However, to a large extent there is no direct link between the amount paid and the level of pension and benefits collected. Wage income exceeding 7.5 price base amounts does in general not generate any benefits. The tax component of the social security contributions has often been estimated to be around 60 % (The Swedish Tax Agency 2010, p. 11).

From July 1, 2007, the payroll tax rate was lowered to 22.71 % of the wage bill for individuals who had not turned 25 before January 1. From 1 January 2009 employers who have workers aged below 26 before 1 January only have to pay a social security contribution

rate of 15.74 % for these employees. These reforms were motivated by high youth unemployment rates and demographic trends.

The government has also targeted payroll tax cuts at elderly workers. For employees born prior to 1938 the employer does not need to pay any statutory social security contributions. These workers are not eligible for the new public pension system. For those born after 1938 but who are 65 and older, the employer pays a social security contribution of 10.21 %, see Appendix 4 for details.

Related programs currently in place in Sweden reducing wage costs for certain groups of workers are “nystartsjobben”, “nyfriskjobben” and “instegsjobben”. “Nystartsjobben” implies a wage subsidy for the long-term unemployed, “Nyfriskjobben” is a subsidy to individuals who have been on long-term sick-leave. “Instegsjobben”, finally, is a wage subsidy targeted at newly arrived immigrants.

#### 2.4. Consumption taxes

Consumption taxes can be divided into value added taxes (VAT) and excise duties. The general VAT rate is 25 %. Food, hotel accommodation and camping are taxed at a rate of 12%. Newspapers, books, magazines, cultural and sports events and passenger transports are taxed at 6 %. For a typical household the effective VAT rate is around 21 %.<sup>9</sup> The bulk of excise duties is levied on energy and environmental taxes.

#### 2.5. Tax reduction for household services

A tax reduction for household services was introduced on 1 July, 2007. The taxpayer receives a tax credit of 50 % of the cost of the household service. The tax reduction applies to services conducted *close to the house or apartment where the taxpayer lives*. These services include cleaning services, cooking, grasscutting and childcare. Almost 99,000 Swedish taxpayers applied for this tax reduction for the tax year 2008, see Section 5.3 for a further discussion.

A tax reduction for building, rebuilding and maintenance services, primarily for real estate, (*ROT-avdraget*) was reintroduced for purchases of this type of services from December 8, 2008 and onwards. This tax reduction has occasionally been in place earlier and has been motivated as a stimulus programme to the building industry. The tax reduction is again 50 % of the labour cost. The sum of these tax reductions (RUT + ROT) must not exceed SEK 50,000.

#### 2.6. Microsimulation

In the previous sections we made the observation that the introduction of the EITC considerably lowered both marginal tax rates and average tax rates. However, to properly describe the work incentives facing Swedish taxpayers one must also consider the effects of the complete tax and transfer system. In this section we look more carefully into work incentives for different socio-demographic groups and income groups. Since 2006 the centre-right government has reformed the unemployment insurance system and the sickness insurance system with the declared purpose to increase work incentives. However, some aspects of these reforms – as the increased contribution rates to unemployment insurance

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<sup>9</sup> Authors' calculations based on the Swedish Household Budget Survey (HUT),

schemes – have probably had a counterproductive effect on work incentives. While it is beyond the scope of this report to describe the transfer systems the analysis will focus on two key concepts:

(i) *The participation tax rate (PTR) for an individual is defined as*

$$PTR = 1 - \frac{\textit{The financial gain for the household when the individual chooses to work}}{\textit{Gross income of the individual when at work}}$$

In a world without any transfers the PTR would be equal to the statutory average tax rate of an individual.<sup>10</sup> Suppose that an individual earns a wage income of SEK 120,000 if she chooses to work and pays a net tax of SEK 38,000. Thus, her disposable income if working is SEK 82,000. If not working she instead receives unemployment benefits amounting to SEK 96,000, while paying a net tax of SEK 30,000, implying a disposable income if not working of SEK 66,000. This person would exhibit a PTR of  $1 - (82,000 - 66,000) / 120,000 = 86.7\%$ . If the PTR is 1 there is no financial gain from working. Note that the PTR is an individual measure, even though it is based on household income. To obtain the PTR one should study household income while holding constant the other household members' income.

(ii) *The marginal effective tax rate (METR) is defined as*

$$METR = \frac{\textit{The net change in taxes and transfers when work income increases with a small amount}}{\textit{The small amount}}$$

METR is a relevant measure of the incentives to acquire a small amount of additional earnings. If METR is zero, then the individual keeps all her incremental earnings. If METR is 1 she keeps none of her incremental earnings.

### *2.3.1. Participation tax rate*

The level of the PTR is different for individuals going from different transfer systems (e.g. unemployment insurance or sickness insurance) Since the rules differ for different transfer systems the PTR for the individual also differs. Table 2.5 reports average levels in 2010 and changes between 2006 and 2010 in PTR:s by household type and decile for three transfer

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<sup>10</sup> In Appendix 1 we discuss how the PTR and the METR are affected if one explicitly takes indirect taxes (VAT and payroll taxes) into account.

systems: the unemployment insurance system, the sickness insurance system and the disability pension system.<sup>1112</sup> Deciles are defined on the basis of labour income.

Table 2.5. Participation tax rates for different categories of non-employment

	Unemployment insurance		Sickness insurance		Disability pension	
	Level in 2010	Change 2010-2006	Level in 2010	Change 2010-2006	Level in 2010	Change 2010-2006
All	67.6	-10.3	69.9	-9.8	64.8	-5.3
Singles, no children	65.0	-10.8	71.5	-9.3	66.7	-5.8
Single parents	68.7	-10.8	72.3	-11.3	67.8	-8.0
Childless couples	62.0	-10.0	67.1	-10.5	63.4	-5.0
Two- parent households	72.5	-11.5	70.9	-9.4	64.4	-5.0
Decile						
1	116.5	-12.6	62.3	-21.6	65.2	-12.4
2	73.1	-7.7	70.7	-14.1	66.5	-8.1
3	67.2	-12.3	72.9	-8.4	67.6	-3.5
4	67.7	-10.5	74.9	-7.1	67.9	-2.5
5	64.9	-11.4	75.4	-6.2	68.0	-2.5
6	62.1	-11.1	75.7	-5.8	67.7	-2.8
7	59.3	-10.7	72.6	-8.3	65.5	-4.4
8	56.9	-10.2	69.1	-9.4	62.6	-6.4
9	54.8	-9.4	65.5	-9.5	60.2	-5.6
10	53.1	-6.6	60.4	-7.8	57.0	-4.6

Table 2.5 shows that the PTR:s for the unemployment insurance system have decreased across all demographic groups and income deciles. The mean level of the PTR has fallen from 77.8% in 2006 to 67.6% in 2010. The high PTR:s in the first decile can be explained by the fact that there is a minimum level in the unemployment insurance scheme. The unemployed person receives a minimum amount regardless of the income earned while at work. During the time period 2006 to 2010 the reduction in PTR:s was the largest in the 1<sup>st</sup> decile and the smallest in the 10<sup>th</sup> decile.

Figure 2.2 provides more information on the distributions of individuals in each PTR interval through 2006 to 2010. The population totals have been estimated using population weights. Among singles it is striking that over 200,000 singles faced PTR:s in the range 80-90% in 2006, while only about 30,000 individuals were doing so in 2010. The same pattern can also be discerned for ‘individuals in childless couples’, ‘single parents’ and ‘individuals in two parent households’.

<sup>11</sup> When interpreting average PTR:s and METR:s for the household types one should keep in mind that these differences may reflect differences in income.

<sup>12</sup> In this report we do not calculate PTR:s for those who are on social assistance (“socialbidrag”, “försörjningsstöd”) since this is not a standard routine at the Ministry of Finance. Social assistance is means-tested against income net of the preliminary tax payment.

Table 2.5 further reveals that the evolution in sickness insurance PTR:s has been quite similar as in the unemployment insurance case. In the case of sickness insurance the reduction has been more concentrated on deciles 1 and 2, however. PTR:s for the disability pension have evolved slightly differently. Here the average level was lower in 2006. On the other hand, the decrease has been considerably lower than in the other two systems. Interestingly, there have been no major reforms in the disability pension during the period of study. The reductions in PTR:s shown in Table 2.7 can therefore largely be ascribed to the introduction of the EITC. It is interesting that the reductions in PTR:s is considerably lower than in the unemployment insurance system and in the sickness insurance system, where PTR:s have been lowered *both* through changes in the social insurance system and in the income tax system.

How high are the participation tax rates in a comparative context? The seminal study that brought participation tax rates to the centre stage of analysis is that by Immervoll et al.(2007). It already contained simulation results for participation tax rates across EU countries based on EUROMOD analysis and 1998 tax rules. Then Sweden had the second highest participation tax rates (after Denmark), ranging from 70% to 75% , with the highest figures for the lowest decile. A more up-to-date comparison is available in Immervoll and Pearson (2009, Figure 1)<sup>13</sup> who depict the participation tax rate for a person moving from unemployment to full-time work at 2/3 of the average wage in 2005. For such a person, the participation tax rate was above 75% in Sweden (the third highest figure across the OECD countries), whereas for a typical country in continental Europe, the participation tax rate was around 65%. Participation tax rates were lower still in countries with less redistribution (such as the US). Therefore, before the introduction of the EITC in Sweden, the participation tax rates were among the highest in the world, but now the relative position of Sweden has probably improved somewhat in this aspect. While discussing trends in average tax rates (taking into account both the tax and transfer system) between 2000 and 2009, the OECD (2009) remarks that ‘the most significant reductions affecting all of the family types are noted in Sweden (p.130)’.

#### 4.3.2. Marginal effective tax rate

In addition to the statutory tax system METR takes account of all the transfer systems of an individual at a certain income level. Table 2.6 reports the evolution of METR:s 2006-2010. Note that METR:s on average are higher in the first decile than in the second decile. This is an effect of the transfer system. There has clearly been a decrease in METR:s for all, except for the top decile, where instead METR:s have been fairly constant through 2006 to 2010. In principle, for higher incomes the entire METR is due to the statutory tax system. As the top marginal tax rates were constant during the period of study the average METR in the top decile has also been fairly constant.

Figure 2.3 shows the number of individuals in each METR interval from 2006 to 2010. In particular, it is striking that the number of single parents with very high METR:s

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<sup>13</sup> This study also offers an in-depth review of different types of in-work benefits currently in place in OECD countries.

diminished during the last four years. One should keep in mind that the METR:s reported in Table 2.6 do not include the value added tax (VAT) and payroll taxes. If one also takes these indirect taxes into account the METR:s are higher. As discussed in Appendix 1, METR of 0.29 reported in Table 2.6 translates to METR of 0.48 if one also takes indirect taxes into account.

Table 2.6. Marginal effective tax rates 2006-2010

	2006	2007	2008	2009	2010	Change 2010- 2006
All	40.0	36.7	35.7	33.6	33.1	-6.8
Singles, no children	38.8	34.7	33.1	31.1	30.6	-8.2
Single parents	49.5	44.2	42.6	40.8	40.4	-9.2
Childless couples	39.0	36.8	36.5	34.2	33.8	-5.2
Two parent household	40.7	37.5	37.0	34.8	34.3	-6.3
Decile						
1	38.7	35.4	31.9	31.4	30.9	-7.8
2	32.4	24.8	22.5	21.8	22.1	-10.4
3	35.5	30.4	29.4	27.6	25.7	-9.8
4	37.6	32.6	31.6	30.6	29.5	-8.1
5	37.0	32.4	31.3	30.3	29.5	-7.6
6	36.5	32.4	31.3	30.1	29.2	-7.3
7	36.2	32.6	32.2	30.9	30.7	-5.5
8	39.6	39.1	40.4	32.5	32.4	-7.2
9	50.9	51.1	51.2	45.6	45.6	-5.3
10	54.7	54.7	54.7	54.1	54.1	-0.6

#### 4.3.3 Summary of METR and PTR simulations

Taken together, this descriptive microsimulation exercise shows that both PTR:s and METR:s have decreased in Sweden in the last couple of years. PTR:s for unemployment insurance is still falling in income, which could be problematic given that low income earners often are considered to be more responsive along the extensive labour supply margin (see the discussion in Section 4). We also note that METR:s decreased for some low income groups – among single mothers there has been a clear reduction 2006-2010. Interestingly, not much happened to the METR applying to top income earners. The top METR will be further discussed in Section 5.2.

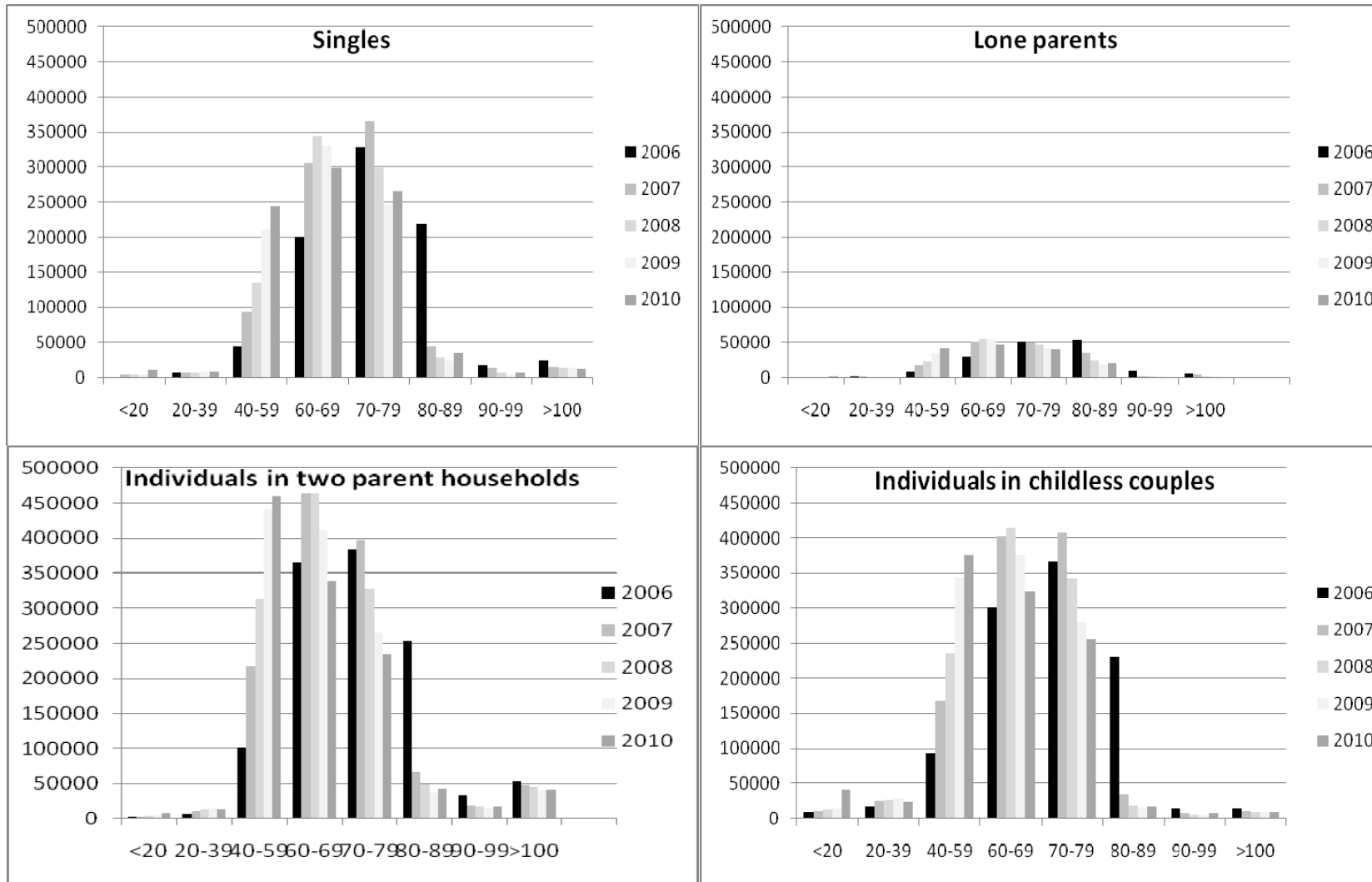


Figure 2.2. Participation tax rates if the individual receives unemployment insurance benefits if not working. Estimated number of individuals (vertical axis) with a PTR in a certain interval (horizontal axis).

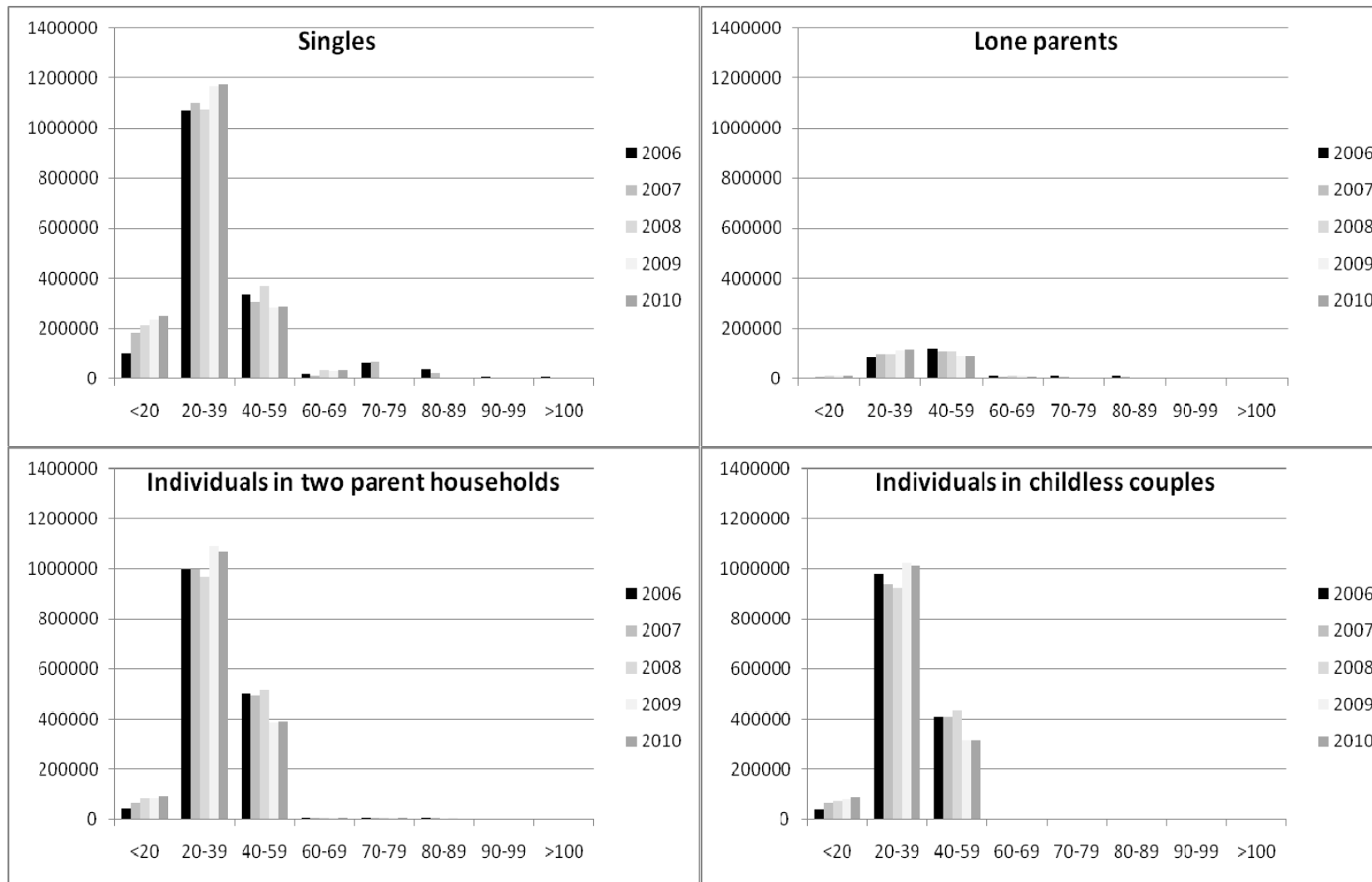


Figure 2.3. Estimated number of individuals (vertical axis) with a METR in a certain interval (horizontal axis).



### 3. Lessons from optimal tax theory

Optimal tax theory, initiated by the Nobel-prize winning economist James Mirrlees (1971), provides a robust base for analysing the inherent trade-off between distributional concerns and efficiency aspects mentioned in the introduction. Optimal taxation does not start with some arbitrary principles, such as “it is always good to have a broad tax base and low tax rates” or that “one should tax consumption, not income”, a statement behind some flat tax proposals, for example. Instead it starts from a specification of societal preferences (captured via a social welfare function) and then examines which tax structures and tax rates could best achieve these social aims (Banks and Diamond 2010). The resulting tax structures may sometimes be quite complicated, but they certainly serve – with suitable modifications such as administrative constraints – as a yardstick to which actual tax systems can be compared.

This framework embeds the problem of designing low-income support (transfers to those who do not work or work very little) into the general problem of choosing an optimal income tax system. The optimal system typically includes a guaranteed minimum income for those who do not work and rising average tax rates with increasing income.

#### 3.1 *The basic analysis*

The analysis in Mirrlees (1971) requires modelling of the social preferences, underlying pre-tax income differences, assumptions on the revenue requirement of the government, and ideas on the distortions the tax system creates. The latter are often modelled via labour supply decisions, where higher taxes reduce labour supply; but in a more recent analysis, other distortions are examined as well. Because of higher tax rates, individuals may exert less effort per working hour, which would then be reflected as a lower hourly wage rate, or acquire less formal education. High tax rates can also diminish the incentives to switch to better-paying jobs, which would be desirable from the point of view of enhancing overall productivity in the economy. In principle, all these distortions are captured in the notion of taxable income elasticity discussed in more detail in Section 4.2 – under certain conditions, taxable income elasticity is a sufficient statistic of all tax-generated distortions.

Optimal tax results have been reviewed by e.g. Tuomala (1990) and Salanié (2003). According to the basic analysis, the overall tax rates tend to increase if

- pre-tax income distribution becomes more unequal – this is the distribution the government attempts to correct
- labour supply decisions become less elastic – the distortions the tax system creates become smaller
- the government’s preferences become more egalitarian
- the revenue requirement of the government increases

These general principles are intuitive, but they tell relatively little about the actual marginal tax rate at different income levels, i.e. about the shape of the marginal tax rates over gross income.

A key factor affecting that shape is the underlying income (or skill) distribution. Marginal tax rates ought to be high in those areas of skill distribution where there are few

taxpayers, because then the number of people facing severe distortions is limited. On the other hand, marginal tax rates should be high at those income levels above which many taxpayers are situated. For these people, the high marginal tax rate at a smaller income level only creates an income effect, and hence it is not distortive. The marginal tax rate at a given income also depends on the societal value of additional income to persons at that income level: with redistributive preferences, the marginal value of additional income is declining in gross income. And of course, the optimal marginal tax rate for a given skill group is also affected by the magnitude of the taxable income elasticity in this skill group.

These observations imply that optimal marginal tax rates can easily reach high levels at small incomes: at these income levels, there are few taxpayers, but many taxpayers are situated above them in the income distribution. This also means that transfers given to those who do not work at all are tapered off relatively rapidly (although below in Section 3.3. we note that this result does not hold if labour force participation is particularly elastic). Optimal marginal tax rates could then be relatively low at middle income levels (where the majority of tax payers are situated) and they would rise again for high enough income levels (because then they affect fewer persons and the social marginal value of their income is small). This would then lead to a U shaped marginal income tax rate curve over income (Brewer et al.2010).<sup>14 15</sup>

One issue not studied in the analysis above is income uncertainty. Real-world educational decisions to acquire income-earning abilities entail a substantial amount of uncertainty on, for example, the returns to education. Progressive taxation combined with a social security system provides a kind of insurance system against negative realisations of income shocks, which is valuable to individuals. These concerns tend to increase the desired progressivity of the tax system (Mirrlees 1974, Pirttilä and Tuomala 2007).

### *3.2 Optimal tax rate at the top of the distribution*

A particular question concerns the appropriate marginal tax rate at the highest incomes, i.e. at the top. One approach is to try to find the level of the highest marginal tax rate which would raise the maximum amount of tax revenues. This notion of the top tax rate is consistent with a Rawlsian social welfare function where the welfare effects of the rich do not count, all that matters is the tax revenue that can be collected from them (to distribute to those who are less well off). It can be also defended on the grounds that with a high level of income, the social valuation of additional income for that person is likely to be small, at the limit negligible.<sup>16</sup>

The revenue-maximising top tax rate will only depend on the distortions taxes create and on the number of persons at the top of the distribution, i.e. how large the income differences are. The consensus among most tax economists is now that the relevant distortion at the top of the income distribution is the response in taxable income. This notion covers not

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<sup>14</sup> However, the study of the shape of optimal marginal tax rates is quite complicated and Tuomala (2010) derives tax rates that are fairly flat for reasonable assumptions about income distribution.

<sup>15</sup> If the skill distribution is bounded from above, the marginal tax rate at the top should be zero. However, this result is a technical curiosity and of no relevance to practical tax policy: there is no way to know what would be the highest possible actual skill level (see e.g. the discussion in the preface in Mirrlees (2006). See also the discussion in Saez (2001).

<sup>16</sup> If someone already earns 10 million crownes a year, an additional 100 crown for him or her means very little.

only labour supply decisions, which are likely to be of minor importance for this part of the population, but also issues such as tax avoidance, a more relevant margin for these persons. The optimal tax rate at the top is the higher, the less the taxable income of top-income earners reacts to tax increases. The optimal tax rate is also the higher, the more unevenly the pre-tax income is distributed.

### *3.3 Taxing low incomes*

The analysis described above builds on the traditional Mirrlees approach, where individuals can freely select hours of work – even a couple of hours in a week – with no additional constraints. The bulk of the recent empirical work suggests, however, that in reality individuals typically work either 0 hours, take a part-time job (with e.g. 20 hours a week) or they work full time. It appears that there are significant fixed costs in participating in the labour market and to overcome these, those who do work do not typically supply a few hours of work. Restrictions on the chosen hours may also arise from the employers' side. This so-called extensive margin, as opposed to choosing the number of hours conditional on working (the intensive margin), has also been found more elastic for some groups of workers (see the discussion in Section 4).

A fairly elastic extensive margin has two important potential consequences (Saez 2002). First, the optimal transfers given to those who do not work but would be able to do so is substantially reduced. Second, the marginal tax rates for small incomes are also reduced; it is also possible to optimally subsidise labour supply for low-income earners.<sup>17</sup> These observations lend support to the so-called in-work benefits or making-work-pay policies that were first implemented in the Anglo-Saxon countries (the EITC in the US and the WFTC in the UK) and that have now become popular in other welfare states as well. In these policies, transfers are not only given to the unemployed but also to workers with low incomes.

An alternative complication is a situation where individuals differ in both their income-earning abilities and tastes regarding the valuation of leisure. One approach then is responsibility sensitiveness: individuals should be held responsible for those features that are under their control (tastes) but they should be compensated for differences that are beyond their control (innate skill differences). Fleurbaey and Maniquet (2006, 2007) introduce this notion to optimal tax analysis. They point out that favouring the hard-working low-skilled further supports the idea of in-work subsidies.

### *3.4 Tagging*

The discussion above only used one source of information (on income) in designing tax policies. If individuals differ with respect to other relevant observable characteristics that are also correlated with income-earning abilities, the government could also base its tax and transfer policy on this information. This idea is known as 'tagging' and it was first examined by Akerlof (1978). An example might be that there could be two groups, a disadvantaged one and a fully able one. If the disadvantage is clearly observable and if people cannot themselves

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<sup>17</sup> The same outcome is, however, found when the government minimises the income poverty of those below the poverty line and pays no attention to the disutility of labour (Kanbur et al.1994).

affect their disadvantages, the government can easily design separate tax schedules for the two groups. If information on this categorical information or the 'tag' or is observed erroneously or if people can partially overcome their disadvantages, the problem obviously becomes more complicated. In comparison to a solution where information on disability is not used, separate tax and transfer schedules allow more redistribution for the disadvantaged or smaller tax distortions or both (Immonen et al.1998). One policy relevant application of tagging is age-contingent taxation; an idea that in the Swedish system is used in payroll taxation and in personal taxation (higher tax credit for elderly workers).

### *3.5 Focusing on households rather than individuals*

The discussion above focused extensively on individuals, whereas the issues related to the taxation of couples was omitted. This is serious shortcoming, since real tax policies must deal with this issue in fact for the majority of the taxpayers. Kleven et al.(2009a) offer a very useful study of family taxation where the secondary earner only chooses whether to work or not, whereas the primary earner also chooses the hours of work. They show that the marginal taxes are higher at the optimum for the secondary earner whose spouse earns more. This is so because conditional on spousal earnings, two-earner couples are better off than one-earner couples. Then the government would like to redistribute towards one-earner couples, and the value of this redistribution is higher at the bottom of the distribution. This rather unexpected result is actually compatible with many real-world tax and transfers systems, where individuals are taxed separately, but transfers are means-tested against family income. The tapering off of transfer payments then creates the higher effective marginal tax rates for couples where the primary earner earns less.

### *3.6 The role of salience in the tax system*

The standard economic analysis of taxation assumes that individuals are fully aware of the tax code and can optimise their labour supply and other decisions without any friction. Recent work in behavioural public economics – which draws heavily on findings in psychology – has, however, demonstrated that these assumptions are not necessarily innocuous.

For example, Chetty and Saez (2009) examine how information provision on the EITC in the US affects labour supply decisions. According to earlier studies, workers eligible for the EITC typically know about the existence of the subsidy system, but they are not fully aware of all the effects of the programme on effective marginal tax rates in its phasing-in and phasing-out regions. The authors therefore designed an experiment where the persons assisting the individuals to prepare their tax files advise the taxpayers about the EITC system so that half of the taxpayers get the treatment and the other half was randomly assigned to the control group. After the experiment it turned out that not all tax preparers had complied with the experimental design (they preferred to always encourage their clients to earn more even if that would have led to the phase-out region of the subsidy). The clients of the complying tax preparers were statistically significantly less likely to report very small incomes (presumably to qualify for the phase-in part of the system). Since the earnings are reported by a third party (their employers) and they are therefore difficult to falsify, this change probably reflects a real

behavioural change in labour supply. Chetty and Saez point out that information appears to have a quantitatively important effect, roughly comparable to a one third increase in the monetary value of the EITC.

A related idea, but one that goes in another direction, is related to the notion of hidden taxes. Evidence seems to suggest (Blumkin et al.2009) that individuals find it harder to understand the tax burden created by indirect taxes as opposed to the more salient direct income taxes. This would mean that some of the harmful behavioural effects of taxation could actually be lessened by hiding part of the tax burden in instruments such as indirect taxes and the employers' social security payments.

Chetty (2009) highlights the role of decision-making frictions for tax analysis. He seeks to build a bridge between diverging lessons from micro-level empirical tax analyses (that typically find modest behavioural responses to tax changes) and to macro-level studies, such as Prescott (2004), claiming that taxation could have major effects on the overall economy when one considers all possible channels of influence. The existence of frictions can explain why changes to small tax reforms may be negligible if the gains from changing one's behaviour exceed the costs of re-optimisation and therefore people do not find it worthwhile to react. However, large tax differences, which exist, for example, between countries, lead to re-optimisation and reactions among the taxpayers. Chetty et al.(2010) find support for this idea using Danish data on income tax changes where elasticities estimated from the larger tax changes tend to be higher than elasticities estimated only from small changes (more on this below in Section 4).

Taken together, the discussion above means that to create major impacts on labour supply, in-work-benefits should be sizable and easily understandable in order to be likely to actually affect labour supply.

### *3.7 Taxation in an open economy: the role of migration*

A common concern is that the increasing mobility of the highly skilled may lead to tax competition for high-income taxpayers similar to that in the location decisions of multinationals. The Nordic countries are especially vulnerable to this kind of tax competition, since higher education is virtually free of charge, wage dispersion is relatively narrow and labour income is taxed more progressively than in some competitor countries, notably the Anglo-Saxon countries. Even if the mobility of high-income taxpayers is relatively small, that would still lead to large losses in tax revenues since these individuals are large net payers to the government.

While migration decisions depend on many other things than simply tax rates, there is still some evidence that countries have attracted highly skilled individuals with lower taxes on labour (Egger and Radulescu 2008)<sup>18</sup>, and these forces could intensify in the future. A simple intuition suggests that the progressivity of labour income taxation must then be reduced. This intuition is confirmed by a fully-fledged optimal tax analysis by Simula and Trannoy (2010) who show that when setting the optimal marginal tax rate, the government must consider an

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<sup>18</sup> Kleven, Landais and Saez (2009b) find a large migration elasticity for a specific group (international-level football players); of course, the external validity of this finding is open.

additional responsive margin, emigration. If emigration is a concern for France, it is certainly also so for the Nordic countries. Thus the revenue-maximising top tax rate could be somewhat below the one derived in a closed economy setting.

### *3.8 Other tax instruments*

Is it sufficient to confine redistribution to be dealt with in income taxation, or should the government use other tax instruments (notably commodity taxes and the pricing of publicly provided goods) in its redistributive policy? The key to this answer is the role of information: if, for example, commodity purchases provide additional information on the underlying skill of the household (that is not revealed by gross income levels), commodity taxation can have a potentially useful role in tax policy.<sup>19</sup> For example, if preferences differ so that those who work more, holding income constant, consume more of some goods than those with more leisure, introducing a small subsidy to goods that in conjunction with labour supply can increase welfare by making labour supply more desirable and thereby reducing the distortions created by the income tax. Similarly, goods that are complementary to leisure ought to be taxed, and publicly provided goods that support labour supply (such as day care) should be provided at a reduced fee. However, if the commodity purchases at a given income level do not depend on labour supply, differentiated commodity taxation is not needed from a labour supply perspective (Atkinson and Stiglitz 1976, Kaplow 2006).

Crawford et al.(2008) examine this issue empirically using UK data. They confirm the intuition that commodity purchases do indeed differ depending on labour supply decisions (consider for example travel costs that arise from commuting), but they claim that the empirical magnitude of these effects is modest. Taking into account administrative costs would then speak in favour of uniform commodity taxation. However, there is some evidence that at least housing and capital income are negatively related to labour supply (Gordon and Kopczuk 2008) and that the use of day care services has a positive relation to it (Pirttilä and Suoniemi 2010), suggesting that gains could be derived from specific considerations of these items in supporting labour supply.

An especially relevant issue is the tax treatment of services that are substitutes for household production (such as cleaning and home repair services). The analysis in Kleven et al.(2000) confirms the intuition that such services should be favoured by the tax system if doing so significantly increases labour supply (people can work full time if they do not need to repair their houses themselves).<sup>20</sup> Applied to the real world, two key issues in favouring these services are to what extent tax cuts are actually related to reductions in consumer prices and tax evasion. Firstly, while the supply, for example, of cleaning services is probably quite elastic, the availability of skilled house repairers can be scarce, and then tax reductions in the latter sector perhaps mainly lead to a rise in pre-tax prices and therefore the absolute demand for these services does not necessarily increase (Uusitalo 2005). This would mean that one needs to carefully select the services where the scope for actual increases in the equilibrium amount is large. The case for subsidising the services is also the higher, the more their supply

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<sup>19</sup> This large literature was started by Christiansen (1984), Boadway and Keen (1993) and Edwards, Keen and Tuomala (1994). For an impressive recent contribution, see Blomquist et al.(2010).

<sup>20</sup> This interpretation is also compatible with lessons from such optimal commodity tax analysis where the time use of consumption is taken into account (Boadway and Gahvari 2006).

is low-skilled labour intensive – then subsidies are an indirect way to increase the relative wages in the sector (Naito 1999). However, even if the official use of skilled house repairers would not appear to increase, it might be the case that moonlighting could go down, and hence the tax revenue loss in granting the deduction can be (at least partly) offset. The trouble is that the empirical analysis of the shadow economy is by definition difficult.

Finally, although not a tax instrument, an important additional way to affect the distortions created by the tax and transfer system is activation requirements for those who obtain unemployment assistance or other transfers. Activation policies mean that in order to be eligible for the benefits, the unemployed must participate in training or guided job search programmes. This implies that the unemployed do not enjoy much more pure leisure than workers do and the potential moral hazard problems inherent in unemployment insurance systems (as in any insurance situation) can be mitigated. Therefore, activation requirements can be regarded as a substitute for reducing the guaranteed income (or transfers): both policies can increase the willingness to take a job, but with different implications for the income level of the unemployed (Andersen and Svarer 2007).

#### **4. Empirical findings on the employment effects of labour income taxation**

##### *4.1 Empirical studies on labour supply*

The idea that taxes can influence the amount of work done through labour supply decisions was already mentioned in the introduction. Recall now that that an increase in the marginal tax rate has two effects on the number of hours worked:

(i) *The substitution effect* is the change in labour supply that is due to the change in the relative price between consumption and leisure: when leisure becomes cheaper the agent ‘purchases’ more leisure (i.e. works less). Hence, this effect works in the direction of *lowering* labour supply.

(ii) *The income effect* is the change in labour supply that occurs owing to the fact that disposable income has decreased. If leisure is a normal good<sup>21</sup> the individual will supply more work hours as a consequence of the imposition of the tax. Intuitively, she needs to work more hours to achieve a given level of utility.

Accordingly, the substitution and income effects typically work in opposite directions and the net effect is theoretically undetermined. Empirical evidence is needed to tell in which direction the net effect goes. Income effects can also arise when the individual’s non-labour (the amount of money that she can consume when she works 0 hours) changes.

Perhaps the most important labour supply decision is the participation decision. The individual chooses to participate if the utility level at 0 work hours, where she only consumes her non-labour income, is less than the utility level she would attain if she chose to work. Note that participation may entail significant fixed costs of work, such as commuting, child care costs etc. that can imply that the individual either chooses to work a lot of hours per

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<sup>21</sup> If the demand for a good increases when income increases, then this is a ‘normal good’

week (from 20 to 40) or then not at all. The incentives for participation in Sweden were measured above in Section 2 in the form of participation tax rates.

The table below collects results from studies on labour supply conducted on Swedish data.<sup>22</sup>As often in economics, we express the responsiveness of labour supply as elasticities: labour supply elasticity with respect to the net wage measures the total percentage change in hours of work when the take-home pay (1-marginal tax rate) increases by one per cent. The non-labour income elasticity measures in turn the percentage change in hours of work when the person's non-labour income increases by one per cent.

Table 4.1: Some structural Swedish studies on labour supply

Study	Data	Elasticity with respect to net wage	Non-labour income elasticity
Blomquist (1983)	Married men, Level of Living Survey, 1974	0.08	-0.04
Blomquist and Hansson-Brusewitz (1990)	Married men and women, Level of Living Survey, 1981	0.08 to 0.12 (men), 0.38 to 0.79 (women) <sup>23</sup>	-0.13 to 0.02 (men), -0.24 to -0.03 (women)
Blomquist and Newey (2002) <sup>24</sup>	Married men, Level of Living Survey, 1974, 1981 and 1991.	0.04-0.08	-0.02
Flood et al.(2007)	Single mothers, LINDA data, 1999	0.62	
Flood et al.(2004)	Married men and women, the Swedish Income Distribution Survey (HEK), 1993-1999.	0.05 (men), 0.10 (women)	

A common result in labour supply studies is that women are found to have higher wage elasticities than men -- both along the participation margin and the continuous hours margin. This is not specific to Sweden, but is true for most countries. Historically, there has been considerably more variation over time in female participation rates and also in the choice on working hours as many women have chosen to work half time. In Sweden, it has historically

<sup>22</sup> . A related recent survey -- which involves somewhat more technicalities -- of Swedish studies on labour supply and taxation is provided by Aronsson and Walker (2010).

<sup>23</sup> Interestingly, Blomquist and Hansson-Brusewitz found similar elasticities for males and females when evaluating the elasticities at the same level of hours and wages. These results run counter to the common notion that female labour supply is more responsive to taxes than male labour supply.

<sup>24</sup> Liang (2009) extends the estimation framework of Blomquist and Newey (2002) by allowing for non-participation in the labour force. This is done on Swedish survey and register data, again from the Swedish Level of Living Survey (the 1974, 1981, 1991 and 2000 waves). Liang studies how married women respond to income taxation and finds an aggregate uncompensated wage elasticity of 0.9 for marginal tax changes in low and medium income brackets. These elasticities are roughly equally driven by the participation margin and the continuous hours margin. In high income brackets, he finds an elasticity of 1.4.



been the case that participation among men is high and that most men work full time. Whether the quantitative constraints (fixed hours contracts) should be seen as an explanation for or an outcome of the low labour supply elasticities for males is an open issue.

Labour supply models can also be used to study the effects of policy changes. Ericson et al.(2009) offer an *ex ante* simulation – meaning a forecast on likely effects of a policy change – of the Swedish EITC reform as of 2007.<sup>25</sup> The data comes from the 2006 wave of LINDA. While taking the tax law changes implemented in 2007-2009 into account the authors conclude that the reforms led to an increase in labour supply – both via the participation and the hours-of-work decision. Sacklén (2009) uses a similar model and estimates labour supply for different demographic groups based on HEK data from 2004. He finds quite low participation elasticities (0.12 for women and 0.08 for men).<sup>26</sup> His simulations suggest that men should increase their working hours by 1.9 percent and women by 2.8 percent in response to the reforms occurring between 2007 and 2009. Most of the response is driven by changes along the extensive margin. Aaberge and Flood (2008) also evaluate the 2007 reform for single mothers. The authors find an increase in labour supply among single mothers, which makes the reform almost self-financing for this group.

The abovementioned studies are all part of the so-called *structural* tradition of labour supply estimation. These works aim at estimating individuals' preferences for leisure and consumption so that it is possible to simulate the welfare consequences of actual tax policy reforms. Some empirical researchers, however, tend to think that some of the statistical assumptions inherent in this tradition are problematic.

Since the 1990's a new *quasi-experimental* literature on labour supply and taxes has emerged. To a large extent, this literature centres on various earned income tax credit policies. A common strategy has been to compare labour market outcomes of eligible and non-eligible to income tax credits with data from before and after a policy-reform and employ the so-called *difference-in-difference method*. Simplistically put, the basic idea behind this method is to compare the average level of working hours (or participation) for a treatment group and a control group before and after a policy reform. The validity of the results from these studies typically depends on other sets of assumptions when compared to works in the structural tradition.

The EITC in the U.S., which in contrast to its Swedish counterpart is a refundable tax credit, dates back to 1975. A sequence of expansions has taken place since then, most importantly in 1986, 1990, 1990 and 1993. In a well-known paper Eissa and Liebman (1996) analyse the effects of the 1986 EITC expansion on the labour supply of single women with children. The 1986 reform affected labour supply incentives for this group, but did not affect incentives for single women without children. Eissa and Liebman compare the relative labour supply outcomes of single women with and without children. They find that the reform increased labour force participation by up to 2.8 percentage points among single women without children.

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<sup>25</sup> Flood and Ericson (2009) assess the optimality of the Swedish tax system using this method.

<sup>26</sup> Here the participation elasticity is defined as the percentage change in the number of persons in employment in response to a percentage increase in the financial gain for working full time.

These main results for the U.S. – that there is a sizeable effect from the EITC along the participation decision but that there are only small, if any, effects on the hours of work on those who were already working – are not specific to the Eissa and Liebman (1996) paper, but echo as a general theme in a wide variety of research on the EITC.<sup>27</sup>

Empirical research on Swedish data on labour supply responsiveness to income taxation has traditionally not been conducted in this difference-in-differences setting. An exception is Klevmarcken (2000), who utilizes the Swedish tax reform act of 1991 to study labour supply among both males and females on a smaller panel data set (HUS). Klevmarcken's results are broadly consistent with the results obtained in other studies on Swedish labour supply. Females appear to be more responsive than males. Women increased their working hours by 10 per cent owing to the reform, whereas working males probably changed their working hours little.

Selin (2009) exploits the 1971 move from a joint to a separate system in family taxation to examine how sensitive the employment decision is to changes in the net-of-tax share (1- the average tax rate) and the non-labour income. Before 1971 the earnings of each spouse were added together and taxed according to a steeply progressive tax schedule. This meant that the average tax rate for the housewife was a function of the 'last-krona' marginal tax rate of her husband. After the reform, the link between the husband's earned income and the wife's average tax rate was in principle abolished. The study uses a LINDA sample of 18,069 wives. Selin obtains statistically significant estimates of the employment elasticities both with respect to the net-of-tax share and with respect to non-labour income. The former is 0.46 and the latter is -0.14. The simulations suggest that employment among married women would have been 10 percentage points lower in 1975 if the 1969 statutory income tax system had still been in place in 1975.

#### 4.2 Taxable income elasticity

In the labour supply literature it has been implicitly assumed that the *choice of working hours* is the relevant margin to study if one is to understand how income tax reforms affect individual behaviour. However, it is not farfetched to believe that individuals might respond to income tax reforms by adjusting their behaviour along other margins. Suppose that the marginal tax rate decreases. Then the individual might increase her *work effort* per hour and thereby increase her hourly wage rate. Another possibility is that she accepts job offers that she would otherwise reject or that she puts more effort into wage bargaining. She might also lower the resources spent on tax avoidance or tax evasion since the marginal gain from sheltering money decreases on the margin.

All these effects are captured in the taxable income the individual supplies. Therefore, the elasticity of taxable income with respect to the net-of-tax rate (1- marginal tax rate) is a wide measure of the distortions taxation creates (Feldstein 1995, 1999). In contrast to individuals' preferences between work and leisure that underlie labour supply behaviour, taxable income elasticity, however, is not a parameter that would be beyond the government's control via other means than taxation. Slemrod (1998) points out that making avoidance more

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<sup>27</sup> Eissa and Hoynes (2005) provide an interesting survey.

difficult by better monitoring and detection, for instance, is one way to reduce the elasticity of taxable income at a given tax level.

Much of the evidence on taxable income elasticity is based on examining how individuals react to tax reforms where different taxpayers face different rate changes. One key issue is how to take into account non-tax factors affecting income growth. If these are not accounted for, the researcher may incorrectly ascribe income growth to tax changes.

Saez et al.(2009) survey the international literature on the topic. An important study by Gruber and Saez (2002) obtained a preferred estimate of the overall taxable income elasticity of 0.4 when using U.S. data from the 1980's. This is an estimate well above the traditional labour supply elasticity estimates obtained for married males (that has usually been estimated to be around 0.1). However, it appears as if most of the response stems from changes in deduction behaviour. When Gruber and Saez estimate the response in a broader income measure that does not include deductions the overall elasticity reduces to 0.12 and is insignificantly different from 0. The importance of deductions has also been confirmed by Kopczuk (2005), who disentangles taxable income responses to changes in marginal tax rates and in changes in the tax base.

Another interesting lesson from the U.S. literature is that it appears as if the response is concentrated on the top of the income distribution. This is natural, since low and middle income earners receive more income in the form of wage income that is not so easily manipulated. High income taxpayers have more ample opportunities to engage in different kinds of tax avoidance strategies (like changing the form of compensation).

There are also a number of Swedish studies on taxable income elasticity. Many base their analysis on the 1991 tax reform, when a dual income tax system (labour income is taxed progressively whereas capital income is subject to a proportional tax rate) was introduced in Sweden (Agell et al.1998). The reform combined sharp cuts in top marginal tax rates with base broadening measures. The pre-reform five-bracket central government tax system with marginal tax rates ranging from 0 to 42% was replaced with a two-bracket central government tax with two brackets, where the marginal tax rates were set at 0 and 20 %. Since the mean local tax rate was around 31 % during this period, the top marginal tax rate applying to labour income fell from 73 % in 1989 to 51 % in 1991. However, if one considers the whole series of income tax reforms occurring in Sweden during the 1980's the decline in top marginal taxes is even more striking. As can be seen from *Figure 4.1* the top marginal tax rate amounted to 85 % in 1981.

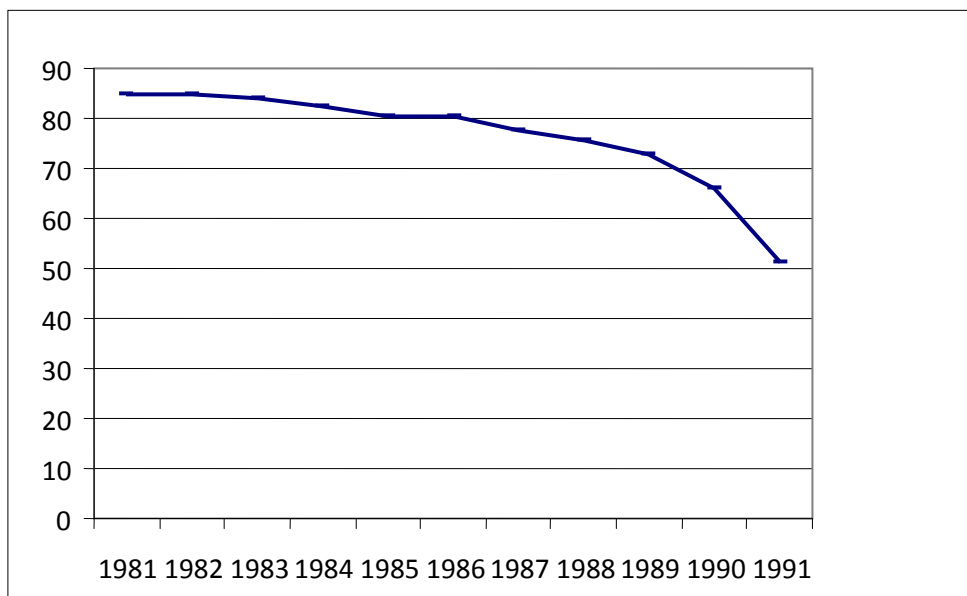


Figure 4.1. Top marginal tax rates 1981-1991 in percent by year.

Different taxpayers were affected differently by the 1991 reform. Those at the top of the income distribution experienced large tax cuts, whereas those at the bottom of the income distribution were subject to considerably smaller tax changes. It is noteworthy that those in the middle-income ranges also faced quite large marginal tax cuts. This is because the pre-1991 central government tax system was very progressive, even at modest income levels.

There are several papers that examine the taxable income response to the 1991 reform from different angles. These are summarized in Table 4.2 below.

Table 4.2: Some Swedish studies on the elasticity of taxable income

Study	Data	Elasticity
Selen (2005)	Household income survey (HINK)	0.2 – 0.4
Hansson (2007)	LINDA	0.4 – 0.5
Ljunge and Ragan (2006)	LINDA	0.35 – 0.6

This basic analysis is complemented by Gelber (2010), who allows spouses to respond to each other's marginal tax rates. *The own elasticity* is the percentage change in own earned income to a percentage change in the own net-of-tax rate. *The cross elasticity* is the percentage change in own earned income when the spouse's net-of-tax rate changes by one percent. Gelber's central estimate of compensated own elasticity is 0.25 for husbands and

0.49 for wives. He finds compensated cross elasticities of 0.048 and 0.051 for husbands and wives respectively.

Blomquist and Selin (2010) study how taxable labour income and hourly wage rates respond to changes in marginal tax rates and base their work on a different data source. They use the 1981 and 1991 waves of the Swedish Level of Living Survey ('Levnadsnivåundersökningarna'). As can be seen from *Figure 4.1*, top marginal tax rates declined continuously during the 1980's. Blomquist and Selin exploit this sequence of tax reforms and their data source combines survey and register data. As a result, Blomquist and Selin are able to describe the budget constraints of the individual with a high degree of precision. The estimates of the hourly wage rate elasticity with respect to the net-of-tax rate range from 0.14 to 0.16 for married males and from 0.41 to 0.57 for married females. Seen from the perspective that wage rates traditionally have been assumed to be exogenous in labour supply models these estimates must be thought of as surprisingly large.

For married men Blomquist and Selin obtain taxable labour income elasticities of around 0.19-0.21. For women the corresponding estimates range from 0.96 to 1.44. In general, the estimates are more reliable for males. Taxable labour income is defined as the earnings net of costs of earning the income. Blomquist and Selin also study non-labour income elasticities. This elasticity answers the question 'by how many percent does taxable labour income change when the non-labour income changes by one percent?' For males they find a statistically significant non-labour income elasticity with expected sign: -0.07. The corresponding estimates for females are not significantly different from zero.

Holmlund and Söderström (2007) also examine how taxable labour income responds to changes in marginal tax rates. They distinguish between *long-run elasticities* and *short-run elasticities*. The data span the time period 1991 to 2002, a period with some changes in the top marginal tax rates ('värnsskattereformer'). The long-run elasticities they obtain hover between 0.2 and 0.3. The short-run elasticities are smaller and more imprecisely estimated.<sup>28</sup>

One important point related to examining taxable income within the dual income tax system is the interaction between the labour income and the capital income tax bases. If labour taxation is increased, individuals who have some leeway to affect the tax bases, such as entrepreneurs, may try to take out more capital income and less labour income. This is called income shifting and it has been found to be an important consequence of the Finnish move to the dual income tax in 1993 (Pirttilä and Selin 2010). Therefore, it is not necessarily sufficient to only examine the consequences of tax changes on the 'own tax base'. An objective of the current Swedish government has been to stimulate self-employment. Taxes have been lowered for owners of closely-held corporations. Undisputedly, the threat of income shifting has consequences for how one should design the taxation of small firms.

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<sup>28</sup> As an extension to the paper, Holmlund and Söderström also perform calculations of the fiscal consequences of reducing the top central government tax rate from 25 % to 20 % in 2002. Since the mean local tax rate was 30.52 % in 2002, 5.8 % of taxpayers with a positive taxable income faced a top marginal tax rate of around 55.5% this year. They assess the change in revenue from lowering the top rate while considering both the mechanical effect on revenues, which has a negative effect on revenues, and the effect that comes from the behavioural response, which has a counteracting positive effect. When also taking the effects on the base for the payroll tax into account they find that the reform is revenue neutral if the elasticity is higher than 0.161. According to their computations, a higher elasticity implies a revenue shortfall, and a lower one should lead to revenue gain.

What has actually been learned from the Swedish studies on the taxable income elasticity? Undoubtedly, the studies that exploit the ‘tax reform of the century’ of 1991 show that those who faced the largest reductions in their marginal tax rates also had the largest increase in their taxable income. The response implies elasticities that are considerably higher than the traditional labour supply elasticities. Moreover, the elasticities are higher for women than for men. The elasticity estimates from the 1991 reform should, however, be used with caution when predicting the consequences of marginal tax changes in the current Swedish tax system.

The reason is that the 1991 reform was a profound tax reform that involved radical changes not only to marginal tax rates on labour income. Other important components were base broadening (both in the area of personal and corporate taxation) and a reform in capital taxation. Such a large reform is likely to trigger avoidance responses. It is still not clear if the relatively large estimated taxable income elasticities are driven by real changes in work effort or by tax avoidance responses. As noted above, if the latter is the case then the adequate policy to increase tax revenues is not necessarily to cut marginal tax rates, but to have an income system with few loopholes.

One might expect high-income taxpayers to be more responsive than lower-income taxpayers. However, we know quite little about the taxable income elasticities at different income levels. This is regrettable. In Section 5 we will analyse the optimal level of the top marginal tax rate. Then the relevant taxable income elasticity is the one that applies to the top of the income distribution. Also, knowledge about the responsiveness among middle-income taxpayers to changes in marginal tax rates is a key issue when considering the pros and cons of a phase-out region of the Swedish EITC. We know quite little about this as well.

#### *4.4. Labour demand and the role of low-wage subsidies*

An alternative to the EITC policies for cutting taxation of low-income individuals is to implement policies that favour low-paid work via the employers’ side. This raises the question as to which is the best way to implement the targeted tax cuts. Phelps (1994, 1997) and Dreze and Malinvaud (1994), for instance, argue that a subsidy given to the employers of low-skilled workers could be more effective in increasing the demand for those workers than a reduction in the taxes paid by the employees. The reason is that if wages are rigid downwards, the subsidy reduces labour costs and therefore increases labour demand more than a reduction in the labour income tax paid by the employees themselves.<sup>29</sup>

Low-wage subsidies, in the form of targeted cuts in employers’ social security contributions, have also been implemented in practice, for example in Belgium, France and Finland. In some other countries, notably Germany, there is a debate on introducing low-wage subsidies.<sup>30</sup>

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<sup>29</sup> A related idea is to enhance employment in remote areas by regional subsidy systems. The empirical literature on the impacts of regional employment subsidies includes among others Korkeamäki and Uusitalo (2009) and Bennmarker et al. (2009). Both of these studies found that regional payroll tax cuts did not lead to increased employment, but part of the benefit was reaped by the workers in the target areas when their wages increased more than the wages of similar persons in comparison regions.

<sup>30</sup> See, for instance, Knabe and Schöb (2008), which builds on the theoretical analysis in Knabe et al. (2006).

Low-wage subsidies typically have a phase-in and phase-out region, This means that low-wage subsidies tend to increase the progressivity of the overall tax burden on labour if many workers are situated in the phase-out region of the system. In standard labour supply models, such a structure would typically lead to a reduction of hours worked on the intensive margin, but if imperfections on the labour market are considerable, increased progressivity can actually boost employment. For example, in union models, a revenue-neutral increase in tax progressivity can increase employment, since it renders nominal wage increases less profitable for the unions, tilting the balance between employment and high wages in favour of increased employment (see e.g. Koskela and Vilmunen 1996 and Holmlund and Kolm 1995). This is a relatively robust result that has garnered some empirical support, and it also holds under different labour-market imperfections (see e.g. the discussion in Sørensen 1997).

Kramarz and Philippon (2001) provide an econometric evaluation of the well-known French low-wage subsidy system. They base their evaluation on household survey data and examine the effects of changes in minimum labour costs - hence capturing the effects of both the minimum wage changes and the changes in payroll tax subsidies at the minimum wage level. By comparing workers affected by the minimum wage increases with workers just above the new minimum wage, they show that increases in labour costs increase transitions to non-employment. However, their analysis regarding the effects of a decrease in the labour costs due to an increase in the payroll tax subsidy reveals no significant employment effects. The authors measure this as an increase in minimum-wage workers coming from non-employment.

Huttunen et al.(2009) evaluate the ongoing Finnish low-wage subsidy scheme, where employers' social security contributions are reduced for workers who work full time and earn less than 2,000 euro per month and who are also over 54 years of age. The design of the Finnish low-wage subsidy scheme provides a good basis for a reliable evaluation, since one can find several comparison groups for the targeted workers. Researchers can then simultaneously control for any permanent differences across the eligible and ineligible groups and take into account time-varying differences in labour demand for different skill groups. The latter, particularly, may be quite important if skill-biased technical change or globalisation changes the relative productivity of different workers.

According to the results in Huttunen and others, the current effects of the Finnish subsidy system have been quite disappointing. The results indicate that the subsidy scheme was not effective in increasing the employment of eligible workers. However, it might have led to increased working hours in the industrial sector by making some former part-time workers work full-time. The results regarding the impacts on wages are somewhat ambiguous: monthly wages rose, but hourly wages (in comparison to wages in the control groups) seem to have dropped in some cases. This is interesting because it is, in fact, one of the theoretical predictions of the impacts of progressive taxes under imperfectly competitive labour markets. Cumbersome bureaucracy related to applying for the subsidies may be one of the reasons behind the poor employment effects of the system.

On the whole it appears that while the idea of a low-wage subsidy system tends to make a lot of sense, the question on its empirical track record is still open.

#### *4.5 Relation to macroeconomic studies*

As mentioned in the introduction, there is a large discrepancy between some of the macroeconomic work and microeconomic evidence on the employment effects of taxation of labour income. Some papers, starting from Prescott (2004), argue that tax differences explain virtually all the differences in working hours between the US and Europe. Other important studies include the work by Rogerson and Wallenius (2009) and Olovsson (2009). The former adds a life-cycle perspective to a macro model and is able to explain how taxes mainly affect employment rates at the beginning and end of working age, whereas the labour supply of prime-aged workers is more similar between the US and European countries. Olovsson includes the possibility for home production and notices that Europeans spend less time in market work than Americans. In Europe home production is more attractive since market work is heavily taxed.

Many of the macro studies are based on simple cross-country comparisons and they assume large values for behavioural elasticities. The studies do not typically pay attention to endogeneity issues, such as the possibility that if the economy performs badly and unemployment rises, countries need to raise taxes to balance budgets. And they often omit other potential explanatory variables that could affect employment. Nickell (2006) concludes that when other potential explanations for employment behaviour (such as differences in wage setting frameworks and social security systems) are accounted for, a 10% difference in taxes on labour income explains roughly 2 per cent of cross-country variation in employment rates.

Is it then clear that macro evidence would be less reliable than evidence from microeconomic work? Sørensen (2010), for example, warns that drawing policy conclusions based on large elasticities can lead to underestimations of tax revenue losses following tax reductions that can jeopardize fiscal stability. The issue, however, is far from settled. The reason is that while micro evidence has paid a lot of attention to carefully estimating the causal effects of specific tax changes, these tax changes are often too small to generate really large society-wide impacts, and these impacts would not even be measured by looking at the behaviour of the ‘treatment’ group (that is, households affected by the tax change) only.

This point is forcefully demonstrated in the remarkable work by Chetty et al.(2010): in their model, if taxation of households creates economy-wide structures, employers are likely to cater for employees’ desires by offering compensation packages that suit the majority of the workforce. They also provide evidence from Denmark, where a lot of taxpayers (and in particular in occupations where compensation packages can be tailored well) bunch at income levels where they just avoid paying an increased state-level marginal tax rate. Chetty et al.(2010) also show how smaller tax changes which do not affect all tax payers generate much smaller behavioural elasticities than that single large increase in the marginal tax rate at the country level. Another explanation why smaller tax changes produce smaller elasticity estimates is inattention due to optimisation frictions as discussed above in Section 3.4. They then conclude that taking these issues seriously makes it understandable why the underlying, true, macro elasticities are larger than one would deduce based on standard microeconomic work, although not as large as some of the macro work suggest.



This work is very recent and it is likely to attract more research on this exciting topic. We are not in a position to draw definite conclusions from this discussion and therefore this chapter largely concentrates on microeconomic work.

## **5. An assessment of the present Swedish tax system and the scope for reform**

Sweden is a country with one of the largest shares of the public sector of the economy in the world; yet its employment levels have been high, at least on a European scale. Many Swedish institutions support favourable employment, such as a strong reliance on active labour market policies, activation of welfare recipients, public employment and public provision of services that enable labour force participation, notably heavily subsidised day care services. In fact, the large day care subsidies have in many ways functioned as an earned income tax credit, and are a likely explanation for the rapid increase in female labour force participation during the post-war era.

While the large share of the public sector necessarily implies that not all taxes can be low, it seems that the current tax system is designed tolerably well from the employment point of view. In particular, the simulations on participation tax rates presented in Section 2 above reveal that few individuals face a severe unemployment trap, that is a situation where taking a job would not (or would only very slightly) improve the disposable income as opposed to staying unemployed or outside of the labour force. Moreover, the simulations on marginal effective tax rates, which measure the benefit of acquiring small additional earnings, suggest that very few persons face marginal effective tax rates that would rise to 80 -100 per cent. For low-income households, such a situation could, in turn, be described as a poverty trap.

Because of these observations, there is probably now less need for a thorough tax reform than before 1991, at least from the employment perspective. The question as to whether the tax system should be reformed for other reasons (such as preserving the international competitiveness of the taxation of firms) is, on the other hand, beyond the scope of the present chapter. Large system-wide tax cuts would, in turn, almost certainly require drastic reductions in welfare spending, and that would presumably go against the redistributive tastes of many Swedes.

However, we have identified some possibilities for smaller-scale improvements within the tax system. Below we attempt to offer food for thought when considering these reforms.

### *5.1 The earned income tax credit*

#### *5.1.1 Expected effects from economic theory*

The most important tax policy measure to affect work incentives is arguably the earned income tax credit. To begin with, we describe in an intuitive way what kind of effects on labour supply one should expect from the current Swedish EITC policy if one adopts a supply side perspective. A more technical exposition is provided in Appendix 2. Remember from Section 2 that the tax credit is phased in up to a level of SEK 334,000 (Figure 2.1). This is an income level that approximately corresponds to the yearly earnings of a full-time working white-collar worker in the private sector with a median wage for that category. Let us divide

taxpayers into two groups. Those whose yearly earnings fall below SEK 334,000 are in group A, whereas those whose earnings fall above the same level are in group B.<sup>31</sup>

In group A individuals will get an increase in their net-of-tax share, i.e. the share that they keep when supplying an extra ‘krona’ of before-tax income. As remarked in Section 4, the price effect can be decomposed into two components. The substitution effect works in the direction of increasing labour supply. The income effect, on the other hand, decreases labour supply if leisure is a normal good. At these income levels, empirical studies typically find that the substitution effect dominates. However, the story does not end here. Middle-income taxpayers may also face an increase in their disposable income which is independent of the decrease in their *marginal* tax rate. This is because the taxation of low incomes has decreased owing to the introduction of the EITC. This income effect is likely to reduce labour supply among middle-income earners. Taken together, for middle-income earners it is far from clear whether the current design of the EITC on the margin increases or decreases labour supply among middle-income tax payers.<sup>32</sup> In group B the *marginal* gain from working is unaffected by the EITC. Still, lower levels of earnings have been taxed more leniently because of the EITC and, therefore, their disposable income has increased. These large tax subsidies to high-income earners should, according to standard economic theory, lead to a reduction in working hours and taxable income supply. If one, in addition, considers that married or cohabiting spouses often pool some fraction of their income, one soon recognises that the tax credit of the spouse is likely to have a negative impact on the labour supply of the spouse – in particular if both spouses belong to group B. Two married high-income earners in group B get a total lump-sum transfer of SEK 42,000 in 2010 owing to the EITC. Presumably, these tax cuts could be directed to other groups if the goal is to increase the aggregate number of hours worked in the economy.<sup>33</sup>

With respect to the extensive margin -- the decision whether to work or not -- the predictions are more unambiguous. The EITC should lead to increased incentives to participate in the workforce at all levels of income via the reductions in the participation tax rates – the effect is the greatest for those who would earn low incomes if they had chosen to work. A caveat is that the participation decision also depends negatively on the individual’s non-labour income. If the spouse’s income is considered to be part of non-labour income the EITC may have a negative effect on employment as the individual’s non-labour income then increases.

### 5.1.2 Directions of possible EITC reforms

The micro-simulations reported in Section 2 revealed that one of the key reasons why currently few individuals face an unemployment trap is the introduction and expansion of the EITC. This can be seen in particular from Table 2.5, which shows the development of participation tax rates for those who are on disability pension. Since the disability pension

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<sup>31</sup> We abstract from the minor reforms that have taken place in the central government tax schedule.

<sup>32</sup> The stylized graphical example of Figure A.1. of Appendix 2 abstracts from this last effect, but only considers the price effect.

<sup>33</sup> It should be noted that it is not necessarily desirable to increase the aggregate number of hours worked according to optimal tax theory as reviewed in Section 3. Individuals tend to value leisure positively, at least if they have a job.

system has been kept the same over the years considered, the radical drop in the participation tax rates – around 10 percentage points in the lowest deciles – can be attributed to the EITC. The existence of the EITC system is therefore very well justified.

This does not necessarily mean, however, that the current design of the EITC is optimal. Based on the figures in Table 2.5, the participation tax rates for the most important group, the unemployed, are the highest among low-income individuals. Participation tax rates are also higher for people with children, both for single parents and those living with a spouse. What kind of guidance does optimal tax theory offer us for the design of tax incentives for labour force participation and taking up jobs offered?

First, there is the issue of targeting: participation tax rates should be smaller for groups whose participation elasticities are typically high. These elasticities are most probably the greatest among low-income individuals, single parents, and secondary earners with a couple with children. From this perspective, the current incentives for work are the poorest among those whose employment is probably affected most by the tax and transfer system. This implies that the EITC could be redesigned so that its magnitude for the low-income individuals would be increased and it would then be phased out when income increases.

The earned income tax credit could also be higher for parents (both single parents and those living with a spouse). One reason for high participation tax rates for people with children is that these groups to a large extent receive means-tested transfers. Rather than cutting these benefits, a more humane way to improve work incentives would therefore be an additional tax credit for parents with low labour income. It could easily be connected to the EITC by increasing its maximum amount for people with children. This argument is also well in line with the notion of ‘tagging’ in tax theory. Using categorical information, such as the number of children in a family, in designing the tax and transfer system, can lead to the same redistribution but smaller distortions than a system without tagging.<sup>34</sup> A larger EITC among low-income households and households with children would improve participation incentives among the groups whose participation elasticities are the highest.

Second, implementing these ideas would lead to increasing marginal tax rates at middle-income levels, and then we need to ponder how serious a drawback this is. To what extent increasing progressivity is optimal or not depends on how elastic the supply of taxable income is over middle-income ranges. The conventional wisdom in the taxable income literature is that the responsiveness is considerably higher at the top than in the middle of the income distribution.<sup>35</sup> If taxable income elasticities are low in these intervals, it may be that the distortion created by the phase-out region is smaller than the gain of increasing the support for low-income workers.<sup>36</sup> An additional, potentially important, benefit of phasing out the EITC would be to eliminate the feature of the current design that for high-income individuals, the EITC only implies a positive income effect, which is likely to reduce their

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<sup>34</sup> One should note, however, that the heavy Swedish day-care subsidies makes the case for a more generous EITC for parents weaker in Sweden than in many other countries.

<sup>35</sup> Unfortunately, this issue has not been examined in a systematic way on Swedish data.

<sup>36</sup> A caveat to this statement is that participation tax rates for those who are on sickness insurance are high among middle-income levels. However, most of the potential additional workers are probably among the unemployed; even if many among those on sickness insurance could work, some must also be genuine ill and therefore cannot and should not work.

labour supply. To assess the quantitative importance of income effects should be an important task for empirical public economists.

Third, the narrow wage distribution in countries such as Sweden complicates the design of EITC policies. This means that phasing out creates more distortions than it would create in a country with wider pre-tax income differences. Immervoll et al.(2007) found that EITC type of policies imply small distortions in most EU countries, but not in Sweden and Finland, specifically because of the narrow wage distribution. It is also understandable that when the government already distributes income to a large extent, additional progression to the tax system – what phasing out would imply -- is relatively costly in terms of efficiency (Immervoll and Pearson 2009). De Mooij (2008) provides a useful analysis of the impacts of different types of EITC design in the Netherlands. His results show that a steep phase-out at income levels just above the minimum wage would reduce the overall hours of work (because many part-time Dutch workers are located on those income levels). All this suggests that the phasing-out in Sweden should probably not be very steep and one of the main arguments for its introduction is to reduce the difference in the participation tax rates over the income schedule.

There are earlier analyses of the potential consequences of introducing a phase out to the EITC. Flood (2010) analyses the consequences of a phasing-out interval that starts at a yearly income of SEK 480,000, and therefore increases the METR:s among high income earners. He analyses behavioural responses by exploiting the microsimulation model, SWEtaxben, which rests on a discrete choice labour supply model. He finds that, if one considers behavioural responses, the phasing-out leads to a revenue shortfall. This, however, is not the type of phasing-out that we consider in our discussion here.

A more interesting idea would be to phase out the EITC over middle-income ranges (which is currently the case in Finland, although it is not clear either that the Finnish system is optimal).<sup>37</sup> Computations indicating that this would have negative effects on aggregate employment have been made by the National Institute of Economic Research for the 2008 annual report from the Swedish Fiscal Policy Council (Finanspolitiska rådet 2008, Chapter 8). They analyse a phasing-out region that starts at a yearly income of SEK 180,000 and that increases effective marginal tax rates with 5 percentage points for middle-income earners. They find that the reform alternative containing a phase-out, for instance, had a lower self-financing ratio than the reforms that have recently been launched in Sweden. This was true both for the case with constant and falling participation elasticities. Throughout, they assume an intensive margin labour supply elasticity of 0.1. As we understand, they do not consider an alternative where the phase-out is combined with a higher tax credit for low income earners. Unfortunately, from the 2008 Fiscal Council Policy Report it is not very clear what kind of mechanism is driving the revenue responses.<sup>38</sup>

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<sup>37</sup> In Finland, an EITC is granted against the central government income tax. The credit is calculated on the basis of taxpayers' earned income. In 2009 the credit amounts to 5.2 per cent of income exceeding EUR 2 500, until it reaches its maximum of EUR 600. The amount of the credit is reduced by 1.2 per cent of the earned income minus work related expenses exceeding EUR 33 000. The credit is fully phased out when a taxpayer's income is about EUR 88 000 (OECD 2009).

<sup>38</sup> We contacted the Swedish Fiscal Policy Council for further documentation of the computations, but we have not been given any more detailed descriptions.

One should also note that the two simulation exercises described above were made for the current, complicated, Swedish tax code, where the EITC interacts with the basic deduction. If one were to abolish the basic deduction, which presently contains a phase-out region, (along the lines sketched below in Section 5.1.3.) the conditions might no longer be the same. This suggests that there presumably is scope for additional simulations.

### *5.1.3 Remarks on the technical design*

A common critique against the Swedish EITC in the popular debate is that the technical design of the tax credit, especially its interaction with the basic deduction, is non-transparent. This criticism is justified: Its design is quite complicated to understand even for a tax economist. In a recent report the Swedish National Audit Office (Riksrevisionen 2009) discusses this issue and also reports results from two surveys where Swedish individuals are asked about their knowledge about the EITC. The first survey had the form of an extension to the regular Labor Force Survey (the interviews were made between 2 October and 16 November 2009). Of the total population aged 15-74, 40.4 % stated that they knew about the existence of the EITC. Of these, 11.1 % stated that they knew the EITC well. Interestingly, the ignorance about the EITC is the greatest among groups with the lowest attachment to the labour market. Only 29.3 % of the unemployed knew about the EITC.<sup>39</sup> From the perspective of increasing participation it is clear that complexity and limited knowledge could reduce the effectiveness of the system. Therefore, one should consider alternative ways to design the system and, once the system is ready, spend resources on advertising it to taxpayers.

It is not difficult to envisage a technical construction of the EITC that would have a more transparent impact on the individual's budget constraints. In fact, the present EITC for elderly workers (aged 65 and older) is considerably simpler than the scheme for prime-aged workers: for elderly the EITC is not a function of the local tax rate or the basic allowance. A straightforward way to improve transparency would be to abolish the basic deduction and phase in (and perhaps also phase out) the EITC over the income range where only the proportional local tax is levied. Of course, abolishing the basic allowance would raise distributional issues. Some groups receiving large amounts of taxable transfers would lose from such a reform, but these could be compensated through reforms in the transfer system.<sup>40</sup>

Finally, the current EITC is based on annual income as is the whole tax system. However, in principle it could also be dependent on monthly income and the hours worked within a week or a month (The British WFTC is granted only if a person works a minimum number of hours). Adding a similar constraint to the Swedish system would increase its administrative burden.<sup>41</sup> However, it might also be beneficial by targeting the credit at the genuinely low-income workers, who work full time or almost full time. It would exclude some part-time workers such as students, whose working may not be desirable at all. Making

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<sup>39</sup> As a complement to this survey, Statistics Sweden has carried out a postal survey. Here the response rate was considerably lower – 40.2 %. The answers are, however, well in line with the results from the Labor Force Survey.

<sup>40</sup> Sørensen (2010) comes to the same conclusion regarding the simplification of the EITC design. Where our analyses differ is in that we recommend a phase-out range.

<sup>41</sup> One problem is that it is notoriously problematic to monitor actual working hours among the self-employed.

the EITC conditional on monthly working hours is therefore an idea that should not be dismissed immediately.

5.2. Taxation of top income earners

Heavy taxes on labour income, both taxes that are paid by the employer and income taxes paid by the employee imply that the overall marginal tax rates within the Swedish system are high among the highest income earners. In addition, when a person earns additional income, the taxes he or she pays when consuming the earnings via expenditure taxation must also be taken into account in the actual tax burden. While in general tax cuts do not fully pay back the lost revenues via the so-called dynamic effects (e.g. increased labour supply or investment), the taxable income of top taxpayers can be fairly elastic. If tax rates are high, it may be that the tax revenues do not drop much, or they can actually increase, if top tax rates are reduced.

According to the calculations in Appendix 3, the present highest marginal income tax rate is roughly 73% in Sweden. The Appendix also calculates the tax rate that would maximise the tax revenues gathered from those who pay the highest marginal tax rate. For a value of the so-called Pareto parameter of 1.9 and a taxable income elasticity of 0.2 the revenue maximising marginal tax rate would be 0.72. In fact, this figure is very close to the present actual Swedish top marginal tax rate if one also takes the VAT rate and the payroll tax into account (see Appendix 1). Remember from the discussion in Section 4.2 that an elasticity of 0.2 is in the lower range of estimates (for the total population) obtained by researchers using the Swedish 1991 tax reform as a natural experiment. It may be that the relevant elasticity is even higher among high income earners.

Table 5.1. Revenue maximising asymptotic marginal tax rates

	e	0,2	0,3	0,4	0,5
a	1,7	0.75	0.66	0.60	0.54
		[0.60]	[0.46]	[0.36]	[0.27]
	1,9	0.72	0.64	0.57	0.51
		[0.55]	[0.43]	[0.31]	[0.22]
	2,1	0.70	0.61	0.54	0.49
		[0.52]	[0.38]	[0.27]	[0.19]
e = elasticity of taxable income. a = Pareto parameter. The implied top statutory marginal tax rate (local tax rate + central government tax rate) for current values of the payroll tax rate and the VAT rate is reported in square brackets.					

If one assumes a taxable income elasticity of 0.5 the top rate becomes considerably lower. Thus, using the Swedish income distribution data and plausible values for the elasticity of taxable income, the current top tax rate can easily be higher than the revenue-maximising

tax rate. This means that if the highest marginal tax rate were dropped, the government could collect more, not less, revenues via income tax.

Therefore, even if one does not place any value on the utility of the highest taxpayers, their marginal tax rates should not be increased. The movement should rather be downwards. If the social planner puts value on the utilities of high income earners the top METR should even be lower. Therefore, the revenue maximising top tax rate can be viewed as an upper bound for the optimal top tax rate. This raises the question whether one could abandon the upper, 25% state income tax bracket.<sup>42</sup> This would, incidentally, be in line with the content of the Swedish reform of 1991.

### *5.3 Tax reductions for household services*

As mentioned in Section 2, there are now two tax reductions in Sweden (RUT and ROT avdrag) intended to boost the demand for household services. The key issues in the effectiveness of these tax concessions are whether they lead to a genuine increase in the employment of these sectors or if they just increase the price of the services. If the supply of workers is fairly elastic, tax cuts can lead to better employment effects than in the case of inelastic supply. If it is the case that the supply of cleaners is more elastic than the supply of skilled house repairers, then the RUT reduction (targeted at cleaners) could lead to greater employment gains than the ROT reduction (targeted at house repairs), but we do not really have evidence on the relative supplies. In any case, both reductions can also help fight tax evasion.

One further issue is that the building and repair sector is highly cyclical, and therefore supporting it can be motivated from the stabilisation point of view. In fact this reduction could be a candidate for a tax reduction that would be tied to the overall business cycle in the economy. It would then be a new way of automatic stabilisation that would be in line with the argumentation by Blanchard et al.(2010).

Between 1 July 2009 and 30 June 2010 the Swedish Tax Agency paid out tax credits for household services (RUT) amounting to SEK 904 million. During the same period 238,583 buyers claimed tax reductions. The services were produced by 11,398 firms.<sup>43</sup> As can be seen from Table 5.1, during the tax year of 2008 the total value of the tax reductions amounted to SEK 442 millions.<sup>44</sup> Thus, without doubt the popularity of the tax reduction for household services has increased since it was introduced on 1 July 2007. To the best of our knowledge, there is no evaluation of decent quality of this policy experiment available.<sup>45</sup> It would be valuable not only to know about the employment effects among the service

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<sup>42</sup> Sørensen (2010) also favours the abolishment of the värmskatt.

<sup>43</sup> This information was collected from the webpage of the Swedish Tax Agency. <http://www.skatteverket.se/omskatteverket/press/pressmeddelanden/riks/2010/2010/narmare67000foretagharutforrtrotochhushallsarbeten.5.1a098b721295c544e1f80002738.html> .

<sup>44</sup> From 1 July 2009, the firm is given the credit automatically by the Tax Agency. Thus, the buyer's bill is already adjusted for the tax credit. Before that date, the buyer had to apply for the reduction when filing in the income tax return for the relevant year.

<sup>45</sup> We are not aware of any empirical study on the efficiency of tax policies to boost the demand for these services in Sweden. Flipo, Fougère and Olier (2007) study the impacts of tax concessions for household services using French data. Their results support the idea that the demand for household services is fairly elastic: a 10% increase in the tax reduction would mean that 13.5% more of the households would start to use the services.

providers, but also about the labour supply response among those who buy these services. Of course, since 'employment' in the informal sector is impossible to observe in publicly held registers, it is very difficult to assess the employment and tax evasion effects of the reform.

We do, however, observe personal characteristics of those who claimed tax reductions for household services in 2008. Only 1 % of the total population received a tax reduction for household services. It is interesting that the fraction of the population claiming tax reductions was larger among those aged 65 and older than among those of working age (20-64). In the former age group 1.7 % received the tax credit whereas 1.1 % in the latter group received the credit. This indicates that the tax reduction to some extent is exploited by groups who are not in the labour force.

The most striking pattern in Table 5.1 is that both the fraction of individuals making the tax reduction and the mean value of the tax reduction (conditional on making a positive tax reduction) is increasing in the individual's income level, at least from an income level of SEK 200,000. Among individuals with a taxable labour income exceeding SEK 1 million the fraction is 15 % and the mean value of the tax reduction is SEK 10,600. Conversely, in low income groups the fraction utilising this opportunity is very low. At first sight, it therefore appears as if high income earners have benefited more from the reform. If so, the policymaker would be faced with a trade-off between distributional concerns and efficiency considerations (i.e. increasing formal employment among workers with lower education). However, to properly assess the distributional effects of the reform it is also relevant to know about individuals' pre-reform and post-reform purchases of household services, both in the formal and informal sector.

The Swedish Tax Agency reports that the value of the tax reductions paid between 1 July 2009 and 30 June 2010 was SEK 10,339 million. This figure is considerably larger than the corresponding figure for RUT (SEK 904 million). In total, 55,367 firms provided ROT-services and 647,935 buyers have received the tax reduction during the same period. This makes the so-called *ROT-avdrag* quantitatively very important.

#### *5.4 Payroll tax reductions for young and old workers*

If nominal wages are rigid downwards, payroll tax reductions can more easily lead to reductions in employers' labour costs. Such tax reductions are also motivated by the idea of tagging: holding other things constant, the group with a more elastic labour supply should have lower tax rates. Young and old workers, who are currently favoured in Swedish payroll taxation, are clearly reasonable groups for which this statement might be true.



Table 5.2. Tax reduction for household services in 2008.

	Number of individuals	Number of individuals claiming tax reduction	% of popul. claiming tax reduction	Mean value of tax reduction (>0) (in SEK 1,000)	Total value of tax reductions, (in SEK 1,000,000)
All individuals	9,455,023	92,470	0.978	4.8	442.4
Men	4,712,592	39,518	0.839	5.2	206.7
Women	4,742,431	52,952	1.117	4.5	235.7
Age 20-64	5,526,793	63,309	1.145	5.5	345.4
Age 65-	1,728,954	29,156	1.686	3.3	97
Income groups					
0	2,528,131	376	0.015	7.5	2.8
1-39,000	425,881	379	0.089	3.9	1.5
40,000-79,000	745,425	3,817	0.512	2.9	11.1
80,000-119,000	672,175	4,929	0.733	2.8	13.9
120,000-159,000	749,037	6,124	0.818	2.9	17.6
160,000-199,000	760,038	6,717	0.884	3.1	20.7
200,000-239,000	789,171	6,627	0.840	3.3	22.1
240,000-279,000	729,441	6,322	0.867	3.4	21.5
280,000-319,000	594,041	6,504	1.095	3.7	24
320,000-359,000	455,310	6,735	1.479	4.1	27.9
360,000-399,000	276,895	5,629	2.033	4.3	24.1
400,000-499,000	359,684	11,318	3.147	5	56.5
500,000-599,000	160,783	7,910	4.920	5.7	45
600,000-799,000	124,777	8,798	7.051	6.5	57.2
800,000-999,000	42,140	4,113	9.760	7.6	31.4
1,000,000 -	42,094	6,172	14.662	10.6	65.2
Source: Statistics Sweden. Income groups are defined based on taxable labour income ('beskattningsbar förvärsinkomst').					

However, the empirical findings from both regional reductions in payroll taxation and the new evidence from the Finnish experiment on low-wage subsidies are disappointing. From the employees' point of view, payroll tax reductions are also less salient. In

uncompetitive markets they might also lead to higher profits for the recipient firms (although such evidence has not really been presented).

In principle the outcomes of the targeted payroll tax cuts in Sweden can be analysed by standard difference-in-differences methods. Such evidence is clearly needed to be able to draw conclusions on the efficacy of these tax reductions. As discussed above, individuals aged 65 and above have since 2007 been eligible for large tax reliefs both in personal taxation and in payroll taxation. In Appendix 4 we describe the rule changes in more detail. In addition, we conduct a simple regression analysis on aggregate data from the Labor Force Survey where we compare employment rates in the age group 65-74 with employment rates of those aged 55-64. The results indicate that employment increased by 19 % more among those aged 65-74 from January 2007 than among the younger group, which could well be a sign of positive employment effects arising from a lower overall taxation of labour for this particular group. However, we would like to emphasize that further research, preferably conducted on micro data resources, is needed before firmer conclusions can be drawn.

### *5.5 Commodity taxation*

We have not been able to discuss this area very broadly. In principle it does not make much difference whether income or consumption is taxed; both forms of taxation create a wedge between the purchasing power of net income and the employers' labour costs. The Mirrlees Review chapter for commodity taxation (Crawford et al.2010) therefore concludes that the employment gains from moving from income taxation to the taxation of consumption are likely to be small.<sup>46</sup> Sørensen's (2010) calculations reveal that the marginal deadweight loss of consumption taxation is smaller than that of labour income taxation, mainly because consumption taxes are also paid by inactive members of the population (pensioners, the unemployed). However, if the increase in the tax burden of these groups is deemed unacceptable, then the compensations via increased transfer payments cancel out the difference in the excess burden of commodity versus income taxations. Sweden already relies heavily on taxation of consumption, and therefore no major general movement to more consumption-based taxation appears to be needed.

Environmental taxes in Sweden are already high, and the effective burden of energy use could also increase if pollution permits become more expensive in the future following tighter control of CO<sub>2</sub> emissions via tradable permits. The scope for a 'green tax reform' is probably smaller in Sweden than in countries where environmental taxation is at lower levels. But a full analysis of this issue is beyond the scope of this study. The main message in Sørensen (2010) regarding environmental taxes is that they should be motivated by environmental concerns, not by aims to alleviate general tax burden.

One special issue in commodity taxation is whether it makes sense to apply lowered VAT rates to some labour intensive service sectors. Finland has experimented with lowered VAT rates on hairdressers, but that has not led to a consistent drop in the consumer price of

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<sup>46</sup> A survey by Myles (2009) suggests, on the other hand, that relying more on consumption taxation than on the taxation of income could raise economic growth according to cross-country growth regressions. However, in these studies is difficult to control for causality: it may be the case that when GDP growth and government finance prospects are bleak, income taxation is raised more often than commodity taxation.

these services (Kosonen 2010). The VAT on restaurant food was also lowered in Finland starting from July 2010. Preliminary analysis by Harju and Kosonen (2010), which is based on a difference-in-differences setting where restaurant prices in Finland are compared to restaurant prices in Estonia and to hotel prices in Finland, reveals that only one third of the VAT cut was actually shifted to prices. Since price changes have been smaller than they could have been, demand changes must also be modest in comparison to the case where tax cuts would have been shifted in full to the prices. As in the case of payroll tax reductions, the evidence favouring special tax reductions in value-added taxation of services is not strong.

### *5.6 Financing tax reductions*

Implementing some of the above ideas might lead to smaller tax revenues. Although part of the tax revenues would return via the so-called dynamic effects of increased economic activity, tax cuts do not typically finance themselves completely. Then either public expenditure must be cut or some other taxes must be raised.

Candidates for taxes whose level could be raised include the lowered VAT categories and property taxation. Taxing food at a lower rate is an inefficient means of redistribution (Crawford et al.2008). As also recommended by Sørensen (2010), the VAT on food could be raised to the standard level and the losses could be compensated to low-income households via increasing transfers or lower taxes on small income and the government would still gather extra tax revenue.

One of the best forms of taxation for an open economy is taxation of property. Sweden's current taxes on property are low. Moreover, there is a monetary ceiling on the maximum value of the property tax. This cap leads to regressive property taxation and could easily be removed, and the property tax rates could also be reconsidered.

Finally, a tax instrument many economists favour is inheritance taxation, which is nowadays non-existent in Sweden. If top tax rates on labour income are cut, a measure that would compensate the effects on income distribution could be a reintroduction of an inheritance tax. Applied at moderate rates (exceeding a threshold leaving typical inheritances untaxed) on a broad base, it could also raise some tax revenue, although not huge amounts, in a socially equitable manner.<sup>47</sup>

## **6. Summary**

In this report we discussed some of the main challenges involved in designing a well-functioning tax system from the employment point of view. In general, we think that the Swedish system works fairly well, given the overall high level of taxes that are needed to fund the large public sector. There is definitely no need for a thorough tax reform in the spirit of the Swedish 1991 reform. However, this does not mean that there is no room for improvement. This is especially true for the design of the earned income tax credit (EITC), which has been the main focus of this report. Our view is that this is by far the most important issue in today's Swedish tax policy debate and our conclusion is that the existence of the

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<sup>47</sup> In 2008, Finland gathered 650 million euro from its gift and inheritance tax with a highest marginal tax rate of 16% for close relatives. A similar tax in Sweden could gather, say, SEK 10 billion; assessing whether this is a small or large amount is left to the reader.

EITC is desirable. However, it could probably be designed more efficiently if its goal is to increase employment. We suggest that further investigations should be undertaken in the following directions. First, should increases in the EITC be targeted at certain demographic groups? Second, should the EITC be phased-out? In this report we have reasoned along the lines that the answer to both these questions might be ‘yes’.

We have also commented on the top marginal tax rate. Our computations suggest that the top marginal tax rate could probably be lowered. In addition, we have reviewed the evidence on the effects of targeted pay-roll tax cuts, where the results so far have been quite disappointing from the employment perspective. The current Swedish lower payroll taxes paid for the young and elderly workforce should naturally be evaluated. In this report we have plotted employment rates for different groups of prime-aged and elderly workers based on aggregate data and, in addition, performed simple difference-in-difference regressions. The results from this exercise do not contradict the idea that the tax cuts directed towards the elderly have been effective. Further research in this area, however, is needed. Finally, tax reductions for household services are likely to be a minor issue, but can potentially lead to an increase in legal employment.

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## Appendix 1. Microsimulations

### 1. Data issues in the microsimulations

To obtain PTR:s and METR:s for different groups we used the FASIT microsimulation model. FASIT was developed by the Swedish Ministry of Finance and Statistics Sweden. In principle, FASIT takes the complete tax and transfer system into account. In the simulations we used data from the Swedish Income Distribution Survey (HEK). Individuals aged 20 to 64 were included. The simulations for 2007 and 2008 were conducted on actual data for these years, while income forecasts were used to obtain the 2009 and 2010 simulation results. Most of the changes in PTR:s and METR:s between the years reflect rule changes. However, to a slight extent they might also reflect demographic changes. In essence, we followed the procedures described in Eklind et al.(2004). Therein the PTR:s are referred to as “tröskeleffekter”, whereas METR:s are referred to as “marginaleffekter”.

The labour income measure was obtained in the following way. For those who work actual labour income is used. For those who do not work labour income was replaced by the labour income the individual plausibly would have earned if she had chosen to work. In the simulations it is assumed that those presently non-working would earn income according to their ‘sickness benefit qualifying annual income’ (SGI) if he/she were working. The sickness benefit qualifying income (SGI) is used by the Swedish authorities to compute, for instance, the individual’s entitlement to sickness benefits. SGI is based on actual wage income. If the individual is unemployed and actively search for a new job he/she keeps the old level of the SGI. If the individual’s work ability is reduced he/she also retains his/her SGI on sick leave. In some respects (e.g. for students) the rules regarding the SGI are complex. Only those with labour income exceeding one price base amount take part in the simulations.

### 2. How do indirect taxes affect the PTR:s and METR:s?

One should keep in mind that METR:s reported in Table 2.6 do not include the value added tax (VAT) and payroll taxes. A measure of METR, which includes indirect taxes can be calculated as

$$1 - \{(1 - t + (1 - m) \times s^b) / [(1 + s^b + s^T)(1 + \tau)]\},$$

where  $t$  is the METR reported in Table 2.6.,  $s^b$  refers to the benefit component of the ‘payroll tax rate’ and  $s^T$  refers to the tax component of the ‘payroll tax rate’.  $\tau$  is the consumption tax rate and  $m$  is the marginal tax rate on the social benefit. This formula for METR is derived from a static model, where the individual is assumed to consume all her income and the wage benefit. Suppose that the individual’s consumption is  $C$ , the individual’s taxable income is  $W$  and that  $W^s = (1 + s^b + s^T)W$  is the employer’s wage cost. Then a (linearized) budget constraint of the individual can be written

$$(1 + \tau)C = \frac{W^s}{1 + s^b + s^T} - t \frac{W^s}{1 + s^b + s^T} + s^b \frac{W^s}{1 + s^b + s^T} - m \times s^b \frac{W^s}{1 + s^b + s^T}.$$

Hence,

$$C = \frac{(1-t) + (1-m)s^b}{(1+\tau)(1+s^b + s^T)} W^g = (1 - METR_{indirect\_taxes\_included}) W^g .$$

The effective VAT rate is currently approximately 0.21, while the total payroll tax rate is 0.32 in 2010. Below the ceiling of the social security system (7.5 price/income base amounts) the payroll tax generates social benefits. As reported in Section 2.3 the tax component of the social security contributions has often been estimated to be around 60 %. Accordingly, an individual with a METR of 29 percent when payroll taxes are *not* considered (i.e. someone in the 6<sup>th</sup> decile of Table 2.6) under these assumptions face a METR (including indirect taxes) of  $1 - \{(1 - 0.29 + (1 - 0.29) \times 0.4 \times 0.32) / [(1 + 0.32)(1 + 0.21)]\} = 0.50$ .<sup>48</sup> Someone with a METR of 0.54 in Table 2.6, and who earns an income exceeding the ceiling of the social security system, has a METR (including indirect taxes) of  $1 - \{(1 - 0.54) / [(1 + 0.32)(1 + 0.21)]\} = 0.71$ .

How do indirect taxes affect the PTR:s reported in Table 2.5? We state the definition of the PTR in somewhat more formal terms. Let  $T(W, Y)$  be the difference between household transfers received and taxes paid in the state of work, where the individual earns  $W$  crowns.  $Y$  is other before-tax household income. Let  $T(0, Y)$  be the difference between transfers received and taxes paid when the individual does not work. The PTR can then be defined as

$$PTR = 1 - \left\{ \frac{\overbrace{W + Y - T(W, Y)}^{\text{household income when the individual works}}}{W} - \frac{\overbrace{Y - T(0, Y)}^{\text{household income when the individual does not work}}}{W} \right\} = \frac{T(W, Y) - T(0, Y)}{W}$$

Taking VAT into account affects the PTR:s in the following way. The budget constraint when working is  $(1 + \tau)C_w = W + Y - T(W, Y)$  and when unemployed  $(1 + \tau)C_o = Y - T(0, Y)$ . Solving these for the financial gain we obtain  $C_w - C_o = \frac{W + Y - T(W, Y) - [Y - T(0, Y)]}{(1 + \tau)}$ . Therefore, the PTR with consumption taxes is

$$PTR_{VAT\_included} = 1 - \frac{\overbrace{W + Y - T(W, Y) - [Y - T(0, Y)]}^{\text{financial gain}}}{W(1 + \tau)} = \frac{\tau}{1 + \tau} + \frac{1}{1 + \tau} \frac{T(W, Y) - T(0, Y)}{W}$$

According to our own computations based on the Swedish Household Budget Survey (HUT), the effective consumption tax rate is 21% (this takes into account the fact that part of the consumption like food is purchased at a lowered VAT rate). To obtain a PTR that includes VAT one should therefore use the formula  $PTR_{VAT\_included} = \frac{\tau}{1 + \tau} + \frac{1}{1 + \tau} PTR_{VAT\_not\_included}$ ,

<sup>48</sup> We then assume that  $m$  is also 0.29.

where  $PTR_{VAT\_not\_included}$  is the PTR reported in Table 2.5. If  $PTR_{VAT\_not\_included}$  is 1 the two measures coincide. A  $PTR_{VAT\_not\_included}$  of 0.7 (0.5) generates a value of  $PTR_{VAT\_included}$  of 0.75 (0.59).

If the payroll tax is assumed to be a constant and not to have a benefit component, the PTR is unaffected if one were explicitly to take the payroll tax into account. The payroll tax then simply enters  $W = \frac{W^s}{1+s^T}$ , which is already included in the definition of the PTR. If a benefit component is assumed, then one also needs to include this benefit in the  $T(W,Y)$  function. This was not done in the simulations presented here. Taking the benefit component into account would probably slightly lower PTR:s. However, since social benefits are taxed and unemployment insurance income and sickness insurance income generate pension benefits as well, it is far from clear that this effect is large.

## Appendix 2. Predictions from theory

### 1. Behaviour on the intensive margin

To graphically illustrate some of the main points we draw a budget constraint with two segments in *Figure A1*. Taxable earned income  $z$  is measured along the horizontal axis, whereas consumption (disposable income) is measured along the vertical axis. This is an example of a piece-wise linear budget constraint. The slopes of the budget constraint on the two segments are given by  $1-t_L$  and  $1-t_H$  respectively. There is also a virtual income,  $R$ , associated with each segment of the budget constraint. For the first segment the virtual income is the non-labour income  $R_L = y$ . For the second segment virtual income is given by  $R_H = y + [(1-t_L) - (1-t_H)] * l$ , where  $l$  is the kink point. A common approach in labour supply and taxable income estimation is to linearize the budget constraint of the individual around the optimal point. The individual is then considered to act *as if* the budget constraint were linear. Thus, an individual on the first segment will set her optimal taxable income supply as a function of  $1-t_L$  and  $R_L$ :  $z = z(1-t_L, R_L)$ , while an individual on the upper segment will have the optimal taxable income supply function  $z = z(1-t_H, R_H)$ .

We will now study a tax reform that lowers the marginal tax rate on the first segment, but leaves the marginal tax rate on the second segment unchanged. This can be thought of as an extremely rough approximation of the Swedish EITC reform of 2007-2010. *Figure A.1* illustrates the effect on taxable income supply for an individual on the first segment. The price change both induces a substitution effect (illustrated by the arrow to the right) and an income effect (arrow to the left). If the indifference curves exhibit standard properties, the substitution effect will always be positive. Given that the individual reduces her taxable income supply when the non-labour income increases, the income and substitution effects will work in opposite directions. Thus, the net effect is theoretically undetermined for an individual on the first segment.

*Figure A.2* demonstrates the situation for an individual in the second segment. Since the marginal tax rate is unchanged this individual will not experience any substitution effect. However, the upward shift in  $R_H$  will induce the individual to supply less taxable income given that taxable income is a ‘normal bad’. Thus, given standard assumptions, this individual will reduce her taxable income supply in response to the reform.

It is common in the labour supply literature to include the income of the spouse in the non-labour income measure  $y$ . Via this channel the EITC brings about an increase in the individual's non-labour income, see *Figure A.3*. Regardless of whether the individual is located on the first or the second segment this mechanism amplifies the income effect. The magnitude of the upward shift in non-labour income is determined by the income of the spouse.

*2. Behaviour on the extensive margin*

When choosing whether or not to work the individual compares the utility level at zero hours of work with the utility level that can be achieved on all other segments of the budget constraint. For singles the EITC reform should unambiguously increase the probability of participating in the labour force since their non-labour income is unaffected by the reform, whereas disposable income when at work has increased in all segments of the budget constraint. For married or cohabiting persons, non-labour income at zero hours of work is not kept constant (given that at least some of the income is pooled). Hence, for this group the effect of the EITC on participation is expected to work in two opposite directions.

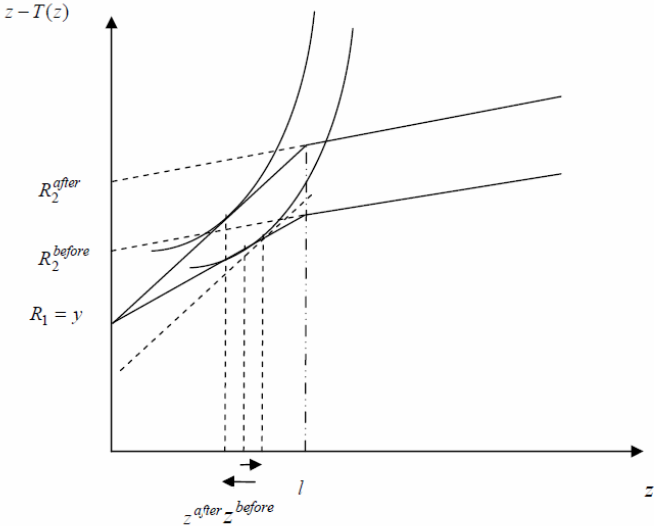


Figure A1. Budget constraint with before-tax income along the horizontal axis and after-tax income along the vertical axis.

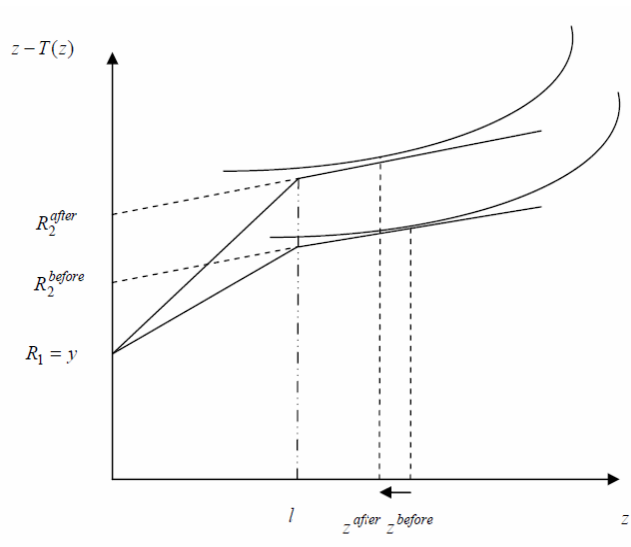


Figure A2. Budget constraint with before-tax income along the horizontal axis and after-tax income along the vertical axis.

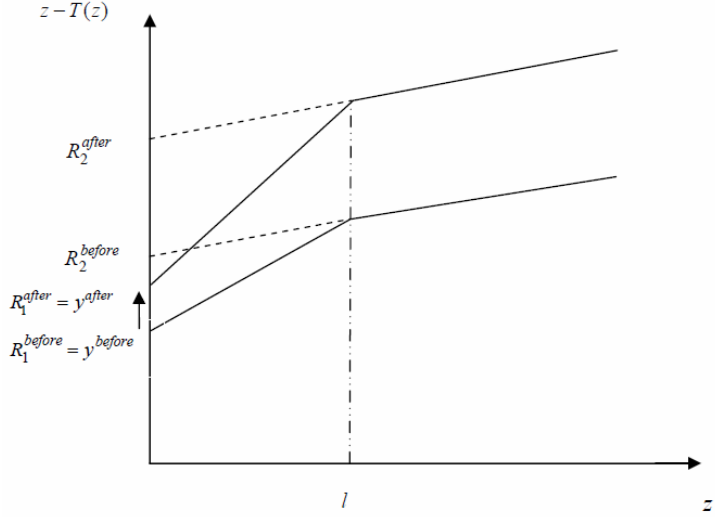


Figure A.3. Budget constraint with before-tax income along the horizontal axis and after-tax income along the vertical axis.

### Appendix 3: Calculating the revenue-maximising marginal tax rate in top incomes

For every additional 100 crown a taxpayer at the top bracket earns, he must pay 56.56 per cent in income taxes. In addition, his employer pays on average 32% payroll tax. When the person spends the money, he also pays VAT and other tax consumption taxes. According to our calculations based on the Swedish Household Budget Survey (HUT), the effective consumption tax rate is 21% (this takes into account the fact that part of the consumption is purchased at a lowered VAT rate). Taking into account all these taxes, the sum of taxes paid, calculated as a percentage of the labour costs, is 72.8%. This is calculated as  $1 - \{(1-t)/[(1+s)(1+\tau)]\}$ , where  $t$  is the top income tax rate,  $s$  refers to the payroll tax rate and  $\tau$  is the consumption tax rate. Payroll taxes are here regarded as genuine taxes since at these income levels, additional income is no longer connected to future benefits.

The revenue-maximising tax rate at the top depends both on the elasticity of taxable income ( $e$ ) and the number of individuals at high income levels, which depends on the shape of the income (or skill) distribution. The formula for the optimal tax rate is  $1/(1+a*e)$ , where  $a$  refers to the Pareto parameter when the distribution of top income tax earners is modelled using the Pareto distribution (as is often done, see e.g. Brewer et al.2010). The Pareto parameter for the Swedish income distribution can be calculated using the top income shares reported in Roine and Waldenström (2008) in a way suggested by Atkinson (2004). The Pareto parameter for factor income distribution has varied from 1.7 – 2.1 in Sweden in recent years. For these Pareto parameter values (rows) and for different values for the elasticity of taxable income (columns), the optimal taxes at the top are given in the table below.

	e	0,2	0,3	0,4	0,5
a	1.7	0.75	0.66	0.60	0.54
	1.9	0.72	0.64	0.57	0.51
	2.1	0.70	0.61	0.54	0.49

For the actual Swedish top tax rate 72.8% to be optimal, the elasticity of taxable income at the top should not increase 0.2. However, some Swedish studies have found an elasticity figure well above it and this elasticity is often thought to be the highest among high-income earners. This discussion therefore suggests that the tax rate at the top should be lowered.

Some caveats need to be considered, though. First, emigration concerns of high-income earners tend to reduce the optimal tax rate at the top. A point drawing in the same direction is that if the Pareto parameter was calculated from labour income, not from factor income as above, it would probably be higher and the tax rate then smaller. However, as argued in Saez et al.(2009) when there are spillover effects between different tax bases, the optimal tax rate would be higher (this would also be the case in Sweden if part of the tax revenues that escape labour income taxation are recouped in the capital income tax base). And finally, the parameters above were estimated based on income, not skill, distribution, as should be the case in theory. Taking all these points into consideration suggests that the optimality figures reported above must be interpreted with caution.

**Appendix 4. Employment rates among the elderly.**

As noted in Section 2.1, reforms were made in the taxation of elderly workers 2007-2010. Important changes have taken place both in personal taxation and in payroll taxation.

Individuals who turned 65 before 1 January were eligible to a more generous earned income tax credit than prime-aged workers from 2007 and onwards. The special tax credits for the elderly are shown in Figure A.1.<sup>49</sup> In 2007 and 2008 the tax credit was constructed in the same way as the credit for prime-aged workers. However, the first phase-in range was wider. In 2009 and 2010 a simplified schedule applies. The simplified new credit for elderly is not a function of the basic allowance or the local tax rate. On the other hand, the basic allowance changed for the same population in 2009 and 2010. As described in Section 2.1, the basic allowance is based on both earned income and taxable transfers (including pension income). In 2007 and 2008 both elderly and prime-aged workers were subject to the same basic allowance schedule. In 2009 a new more generous basic allowance was introduced for individuals aged 65 and above. Further steps in the same direction were taken in 2010.

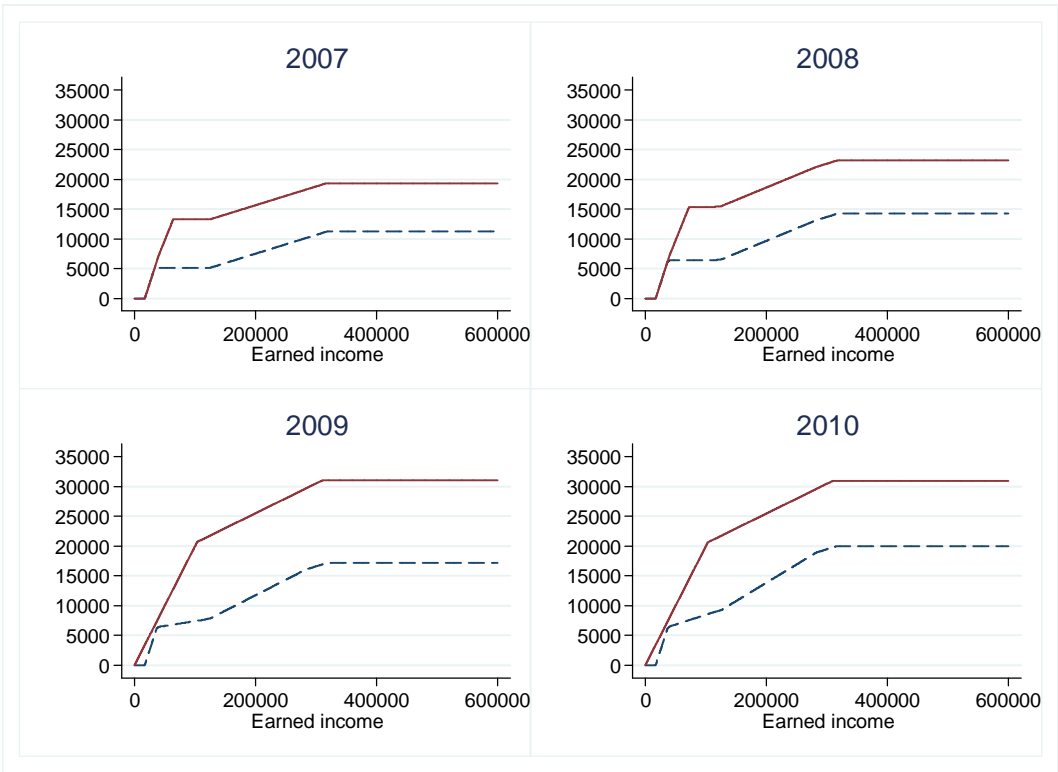


Figure A.4. Earned income tax credit for individuals aged 65 and over (solid line) and for individuals aged under 65 (the broken line). The tax credit is computed under the assumption that the individual receives no taxable transfers. The tax credit is expressed at the price level of 2007.

<sup>49</sup> Figure A.4. plots the tax credit given the assumption that the individual receives no taxable transfers. This is a strong assumption with respect to individuals aged 65 and over since old age pension benefits are taxable transfers.

The second major reform area is payroll taxation. Table A.1. reports the different payroll tax rates between 2001 and 2010. Over a longer time period, different rates have applied to those born in 1937 and earlier. The reason is that the 1937 cohort is the last cohort to be unaffected by the new Swedish pension system. Most importantly, in 2007 the payroll tax rate was reduced for those born in 1941 and earlier (i.e. those who had turned 65 before January 1). Thus, the payroll tax for 65-year-olds decreased from 32.42 % in 2006 to 10.21 % in 2007. This meant that those who had turned 65 before 1 January 2007 were both exposed to a more generous EITC schedule and a reduced payroll tax. The payroll tax rate for individuals aged 65 and over (but born after 1937) has been constant since 2007. In 2008 the payroll tax rate for individuals born in 1937 and before was completely abolished.

Table A.1. Payroll tax rates in percent of the gross wage 2001-2010.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Pay-roll tax I (%)	24.26	24.26	24.26	24.26	24.26	24.26	24.26	0	0	0
Pay-roll tax II (%)	-	-	-	26.37	26.37	26.37	10.21	10.21	10.21	10.21
General payroll tax (%)	32.82	32.82	32.82	32.70	32.46	32.28	32.42	32.42	31.42	31.42

Pay-roll tax I ('särskild löneskatt') applies to individuals born in 1935 (1936) and earlier in 2001 (2002). From 2003 and onwards it applies to individuals born in 1937 and earlier. Pay-roll tax II applies to those born 1938 in 2004, 1938-39 in 2005 and 2006, 1938-41 in 2007, 1938-42 in 2008, 1938-43 in 2009 and 1938-44 in 2010.

For descriptive purposes it can be interesting to examine how employment rates for different age categories evolved before and after 2007.<sup>50</sup> Figure A.5. shows employment rates for individuals of both genders aged 45-54, 55-64 and 65-74. The vertical line marks the 'reform year' 2007. The figure shows that employment increased at the beginning of the period in the age categories 55-64 and 65-74, while there was a decrease in employment rates among individuals aged 45-54. The employment rates for 2004-2006 were fairly stable among 55-64 year olds, while there was a slight decrease among individuals aged 65-74. Interestingly, between 2006 and 2007 there was an employment increase of approximately 1 percentage point in the age group 65-74, whereas the increase among individuals aged 55-64 was smaller.

It is interesting that employment rates did *not* go down among 55-64 year olds and 65-74 year olds between 2008 and 2009 – despite the severe financial crisis. Figure A.6 and Figure A.7. show the same graphs, but for each gender separately.

<sup>50</sup> These statistics were downloaded from the homepage of Statistics Sweden. The employment-population ratios reported here are unaffected by the changes of definitions of variables in the Labor Force Survey in recent years.



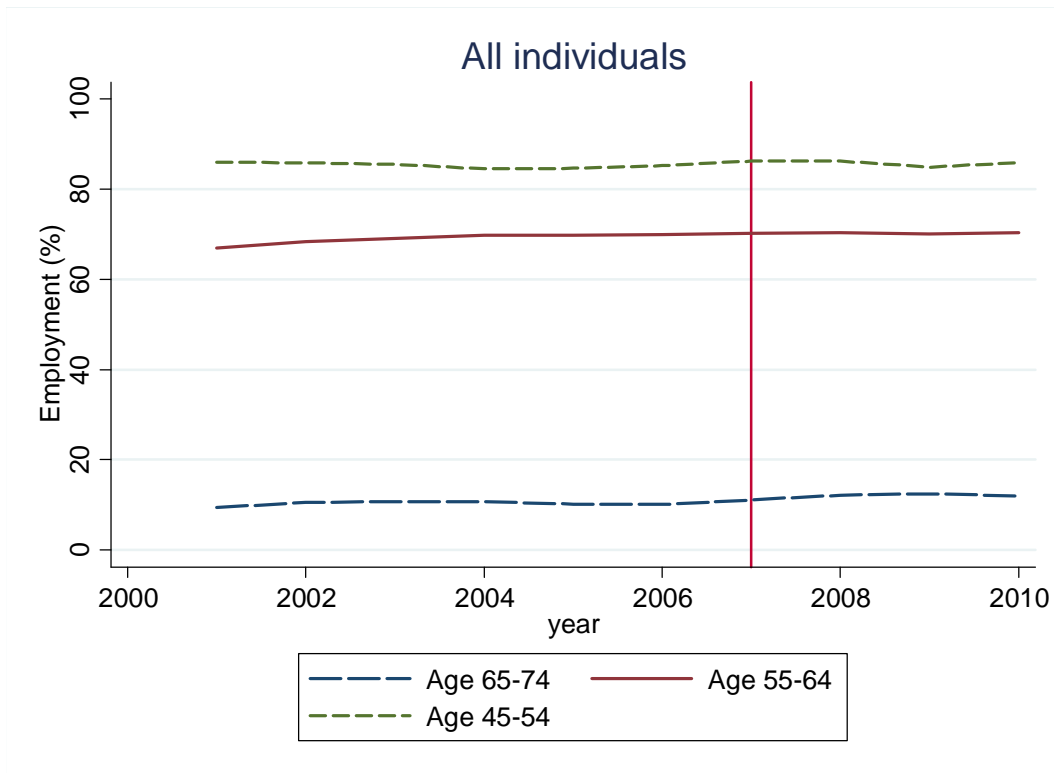


Figure A.5. Mean yearly employment rates 2001-2010 (based on monthly averages) for different age groups. The figure for 2010 builds on monthly averages for January to April.

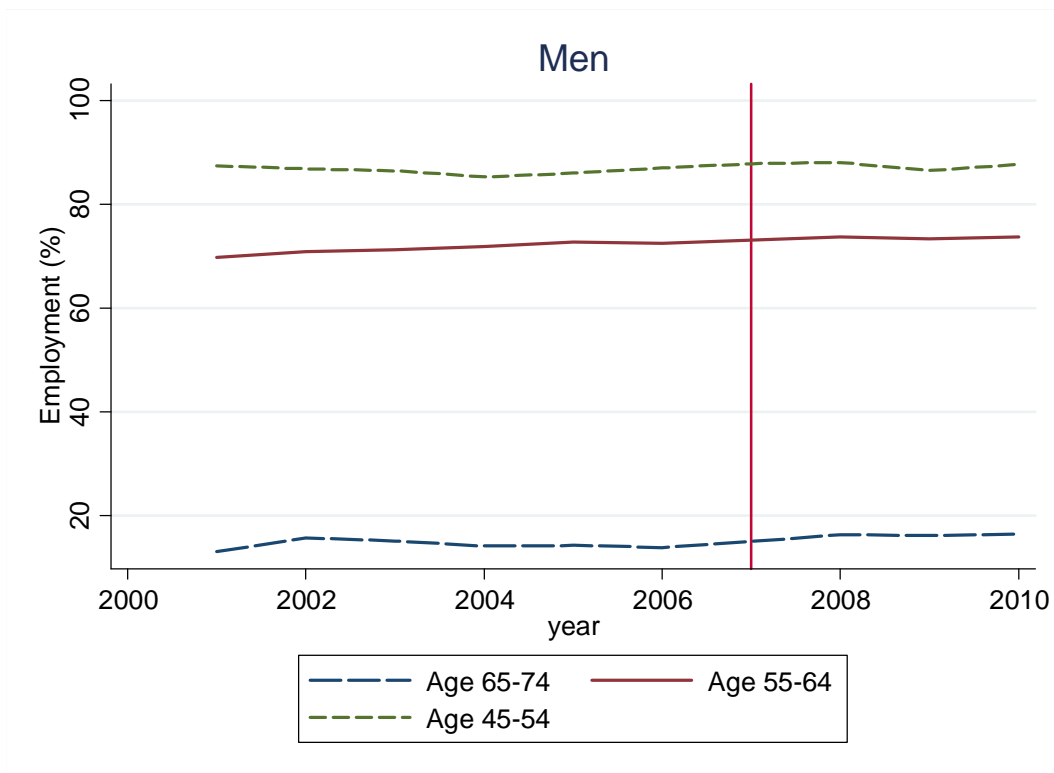


Figure A.6. Mean yearly employment rates 2001-2010 (based on monthly averages) for different age groups of men. The figure for 2010 builds on monthly averages for the period January to April.

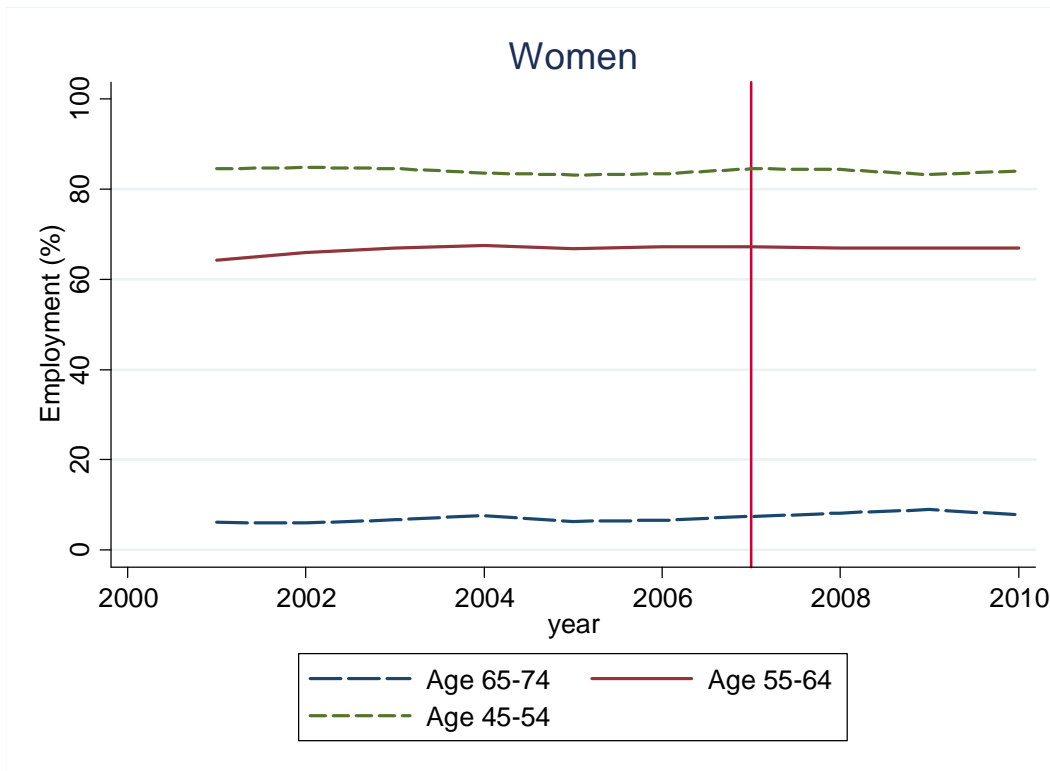


Figure A.7. Mean yearly employment rates 2001-2010 (based on monthly averages) for different age groups of women. The figure for 2010 builds on monthly averages for January to April.

As a final exercise, again for descriptive purposes, we perform difference-in-difference regressions on monthly aggregate data from the Labor Force Survey spanning the time period January 2001 to April 2010. In these regressions we let the 65-74 year olds be the ‘treatment group’ and the 55-64 year olds be the ‘control group’.<sup>51</sup> The ‘reform dummy’ is an interaction term that takes a value of 1 if the month is January 2007 or later and the age group is 65-74. Following Huttunen et al.(2009) we report regressions including an age-specific linear time trend.

Columns 1 and 2 show the estimation results for all individuals with and without an age specific linear time trend. Without the trend there is an insignificant positive ‘reform effect’. With the trend included we find a significant ‘effect’ of 2 percentage points. Since the mean pre-reform value of overall employment 2001-2006 was 10.3 percent of the population aged 65-74, the increase must be thought of as large in percentage terms – 19.4 %.

The age specific time trend takes into account that there was a decrease in employment rates among 65-74 year olds in the years preceding 2007. With a linear time trend included in the specification the results for males and females are rather similar to those for all individuals. The importance of the inclusion of the linear age-specific time trend suggests that the common trend assumption is problematic here. The results for females are also, however, significant and positive without including a time trend.

<sup>51</sup> One should remember that the ‘control group’ also underwent incentive changes during the period 2001-2010. Most importantly, a new public pension reform has been gradually phased in.

We would like to emphasise that this exercise should not be interpreted as a proper evaluation of the government's reforms in the area of labour supply of the elderly. It does, however, add to the description of employment rates for these age groups and also points in interesting directions for future work.

Table A.2. Difference-in-differences estimates on employment rates.

	All		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
'Reform dummy'	0.392	1.971	-0.389	1.777	0.979	2.166
	(0.258)	(0.427)***	(0.373)	(0.624)***	(0.303)***	(0.527)***
Month dummies	Yes	Yes	Yes	Yes	Yes	Yes
Age dummy	Yes	Yes	Yes	Yes	Yes	Yes
Age-specific trend	No	Yes	No	Yes	No	Yes
Observations	224	224	224	224	224	224
Adjusted R-squared	1.00	1.00	1.00	1.00	1.00	1.00

Standard errors are in parentheses. \* denotes significance at 10%, \*\* significance at 5% and \*\*\* significance at 1%. Employment rates are expressed in percent of the total population. The estimation sample consists of monthly data from January 2001 to April 2010 for the two age groups 55-64 and 65-74. The reform dummy is defined as the interaction between month dummies from January 2007 and onwards and the age dummy for those aged 65-74.