Tax Reforms and Income Distribution: An Assessment Using Different Income Concepts

Anders Björklund*, Mårten Palme** and Ingemar Svensson***

Summary

■ Using the technique of Kakwani (1984) we analyse the equalising effect of income taxes as well as child and housing allowances in 1967, 1975, 1978 and 1980–1992. Three distinctive income concepts are used: annual actual income, annual full income and lifetime income. It is found that due to decreased tax progressivity, the equalising effect of income taxes decreased continuously between 1975 and 1985. The increase in income inequality due to reduced tax progressivity of the 1991 tax and benefit reform was totally offset by increased child and housing allowances. This result holds for several sensitivity analyses, including the use of "full income" as an income measure. However, it does not hold within all groups of households for households with the same number of children. It is also found that the equalising effect of income taxes is not affected to any large extent if the income concept is extended from annual to "lifetime" income. ■

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In 1981 Sweden had an income tax system with higher marginal tax rates than any other Western industrialised economy. These high marginal tax rates for high-income earners reflected very high ambitions to equalise disposable incomes among the population. At this time, however, the Swedish tax system was attacked not only by traditional critics among the political right and many economists, but also by representatives on the left of the political scale. As early as 1978,[1] in an article that attracted much public attention, Gunnar Myrdal argued that extremely high taxes had "turned the Swedes into a nation of wanglers". Myrdal's point was different from the traditional economic critique that had emphasised the efficiency losses due to the disincentive effects of high marginal tax rates. He claimed that the Swedish tax system no longer did what it was supposed to do, namely to redistribute income from the rich to the poor. The reason was that extremely high marginal income taxes created incentives to avoid taxes. Effective income tax paid could be reduced through various deductions allowed by the system and by shifting income between sources of income with different tax rates. Of course, taxes could also be evaded by turning to the "underground economy". Tax avoidance was likely to create a large discrepancy between the actual and intended distributions of the tax burden. People in approximately equivalent situations were not treated equally by the tax rules because they had different

[1] See Myrdal (1978).

abilities (and perhaps also different morals!) to handle available ways of reducing the effective tax rate. So-called horizontal inequity arises when equals are treated differently by a tax system.

This kind of criticism paved the way for a first "minor" tax reform that went into effect stepwise during the period 1983–85. Two main ingredients of this reform were reductions in the highest marginal tax rates (to 70 per cent) and in the value of some deductions. However, the reform did not ignore concerns about income distribution; to alleviate the distributional consequences of lower marginal taxes in the highest brackets, the child allowance was raised. In particular, a progressive child allowance (*flerbarnstillägg*) that provides a higher amount for the third, fourth, etc. child was introduced.[2] The general child allowance was raised from SEK 3,000 per child and year in 1982 to SEK 4,800 in 1985.

This first "minor" reform did not satisfy all former critics of the Swedish tax system. More or less the same type of criticism as had preceded the first reform was repeated by many economists and the political parties to the right of the Social Democrats. In a report for a public tax commission, Hansson and Norrman (1986) presented some results that questioned whether the tax system did a good job in redistributing income. They found that deductions seemed to make the actual progressivity of income taxes much less than intended. Further, they questioned whether equalisation of annual disposable incomes is even desirable. They suggested that more appropriate targets for distributional policy should take voluntarily chosen differences in working hours into account and include income over the whole life cycle, i.e., a concept of potential lifetime income. Some of their other results indicated that the Swedish tax system might actually be proportional if such an income concept were used instead of the more traditional concept of annual disposable income. The latter income concept was also questioned at this time in the international literature; see, for example, Rosen (1984).

In 1988 some influential Social Democrats – in particular the Minister of Finance Kjell-Olof Feldt and his Deputy Minister Erik Åsbrink – joined the critical choir. They argued that the existing tax system was "sick" and in need of radical reform, with a reduction in the highest marginal taxes as a key ingredient. Even the leader of the Swedish Confedera-

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[2] The progressive child allowance was introduced in 1982 and provided a 25% extra benefit for the third child and 50% extra for each subsequent child. In 1983 these additional benefits were raised to 50 and 100%.

tion of Trade Unions, (LO) Stig Malm, claimed that the system was "rot-ten". Such opinions helped to establish another political agreement between the Social Democratic Party and the Liberal Party on a "major" tax reform – "the tax reform of the century" – that was fully implemented in 1991. The most important ingredients were again lower marginal tax rates (the maximum rate was reduced to 50%), a reduction in the value of deductions, and substantially higher general and progressive child al-lowances.[3] Further, the tax base was broadened by making certain fringe benefits taxable and extending the coverage of capital income taxation to make it more neutral between various sources of capital income. In addi-tion, means-tested housing allowances (*bostadsbidrag*) were raised.

The aim of this study is to assess empirically how Swedish income tax-es and child and housing allowances have affected income distribution over the period 1967 to 1992, with special emphasis on the impact of the major tax (and benefit!) reform of 1991. We focus on two concepts of eq-uity: vertical and horizontal. Vertical equity is the notion that people with high pre-tax income should pay more than proportional income tax-es, i.e., that taxes should be progressive. Horizontal equity implies that people in equivalent situations should be treated equally.

We use a method first proposed by Kakwani (1984) to decompose the equalising impact of a tax and benefit system on income distribution into two components, one measuring vertical equity and the other horizontal equity. The vertical component for taxes measures the extent to which tax burden is transferred from those with relatively lower pre-tax income to those with relatively higher pre-tax income. Horizontal equity is meas-ured as the amount of reranking that takes place between pre- and post-tax and benefit income. In our view this rather simple technique can pro-vide an efficient way of clarifying some of the basic issues in the Swedish tax debate. First, we obtain a measure of the total equalising effects of taxes and benefits. We can also characterise and compare the magnitudes of these effects for both taxes and benefits. Does the shift from income taxes to child and housing allowances make sense from a distributional point of view? Second, we can investigate whether the old Swedish tax system had really lost its ability to redistribute incomes and whether hori-zontal inequity, or reranking, had increased. How "rotten" was the old tax

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[3] For example, from 1989 to 1991 child allowances rose from SEK 5,820 to SEK 9,000 for one child, from SEK 20,370 to SEK 31,700 for three children and from SEK 57,036 to SEK 72,000 for five children.

system in this sense, and did the tax and benefit reforms really reduce the amount of reranking? When we use the method we first investigate the effects of taxes and then the additional effects of housing and child benefits, i.e., the two major benefits that were involved in the reforms.

Our study entails a number of problems. First, there are analytical problems in defining appropriate income concepts and practical problems in computing these from available Swedish data sources. Second, we had to determine ways of comparing the income of individuals living in different types of households.

As regards the first problem of appropriate income concepts, we began with the classical definition that is often referred to as the Haig–Simons definition.[4] According to this definition, an individual's income over a period of time is the value of his/her consumption plus any increase in real net wealth. Here the source of income is irrelevant and all deductions and exclusions are seen as erosions of the tax base.

However, the Haig–Simons definition may be interpreted in several different ways; it also meets with measurement problems when it is applied empirically. First, it is difficult to measure changes in an individual's real wealth. For example, there are considerable fluctuations in the market prices of owner-occupied homes and other durable goods owned by the individual. Second, some sources of income are difficult to evaluate. In-kind transfers from the public sector and, if the income concept is extended to "full income", leisure, are two examples. Third, it is not obvious that the accounting period should be restricted to one year, which is the period used by the tax authorities. For instance, an individual may chose education for a period, i.e., invest in human capital, and thereby increase his/her earnings capacity afterwards. The value of human capital accumulation is difficult to measure in an empirical study of tax equity.

Our contribution is to provide a menu of analyses based on different concepts of income. We began with the "official" definition of annual disposable income that is used by Statistics Sweden in their regular income distribution study, HINK.[5] We calculated measures of horizontal and vertical equity for each year from 1975 to 1992 and complemented them with data from the Level of Living Surveys to obtain a point of observation for 1967.

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[4] See Haig (1921) and Simons (1938). Swedish economists, especially those connected with Uppsala University, are eager to emphasize the early contributions to this discussion by David Davidson (1889). See also Lindahl (1933).
[5] HINK = *Hushållens INKomster* (income of households).

According to the ideal Haig–Simons definition of annual income, capital gains should be included on accrual and a value of the consumption services from real capital should be included in income. Due to measurement problems, the HINK definition of household income is not in line with these principles. We therefore carried out some complementary analyses in order to come closer to the Haig–Simons definition.

In a similar analysis regarding an income concept that includes the value of leisure, we used the Becker (1965) concept of "full income" as an alternative concept of pre-tax income. For individuals whose hourly wage rate and number of working hours could be observed, we simply added earnings from potential working hours not spent at work. For non-working individuals, we imputed missing wages, using estimated wage equations corrected for "sample selection bias".

We also present an analysis that extends the accounting period from one year to a much longer period. The motivation is that human capital investments in formal schooling or on-the-job training during a specific year constitute increases in an individual's human capital and hence, according to a proper definition, should be part of income for that year. This problem can be circumvented by making the accounting period long enough to include periods when the returns from such investments are realized. The ideal would have been lifetime income, but we only had access to data for the period 1974–1991, i.e., 18 years. Even though this is far from a lifetime, it is unusual to be able to analyse the distributional impacts of taxes for such a long period. For convenience, we call this income concept "lifetime income".

Our second major problem concerned how individual needs should be taken into account. There is no obvious solution to this problem and it is also a matter of value judgement. We adopted what we regard as the most common approach in applied income distribution research today, i.e., we used the household as the "unit of income" and the individual as the "unit of analysis". This means that, for a married (or cohabiting) couple, we added up the incomes of both spouses and divided their total income by the number of "equivalent adults" in the family. The amount obtained in this way (which we call equivalent income) was allocated equally to each person in the household. We then computed our measures of inequality among all persons (not households) in the population.

We performed one type of sensitivity analysis on this point, related to the "need" for income that children cause. As a matter of fact, it is not obvious that more children increase the "needs" of adults in the house-

hold because it can be argued that the number of children is voluntarily chosen, and the joy of having children thus compensates for lower consumption of other goods.[6] However, we decided not to follow this approach. We believe that most Swedes find it "fair" that a family with many children has a higher disposable income than a family without children. In order to investigate the extent to which the results are affected by the choice of equivalence scales, we report results using two different scales, one which permits rather significant "economies of scale" with respect to the number of household members and one which does not.

Our approaches to these two problems are crucial to the study, in particular regarding the impact of income taxes. We investigate how the tax system redistributes income according to another concept of income (in the cases of full income and lifetime income) and another "unit of income" than those used in the tax rules. This discrepancy is, of course, a major potential source of horizontal inequity in our analyses.

It should be made clear at the outset that our study shares some of the limitations found in many other studies of income distribution. First, we have no model of the behavioural consequences of the taxes and benefits at our disposal, so we have to confine ourselves to "mechanical" comparisons between income before and after taxes and benefits. Second, we make no attempt to measure activities in the underground economy. Hence, we cannot say anything about inequalities caused by tax evasion. On the other hand, we emphasise the consequences of deductions. Third, we have nothing to say about equality between men and women. Fourth, we do not take into account the changes in indirect taxes and subsidies that were part of the Swedish tax reform. Therefore, in particular, some distributional effects among individuals with different housing arrangements are not captured by our analysis.

The rest of the paper is organised as follows. The data and our calculations of the different income concepts are presented in Section 1. Section 2 focuses on the Kakwani technique and Section 3 on the determinants of vertical equity and sources of horizontal inequities. The empirical results are contained in Section 4. The results are discussed in Section 5.

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[6] This statement holds only if the analysis focuses on income distribution among adults. It does not hold if children are included in the population under analysis because children do not choose the number of their siblings. We do not focus on the income standard of children, but children are included in the population that we study. Björklund and Freeman (1995) and Jäntti and Danziger (1994) focus on this issue in a Swedish context.

1. Alternative income concepts and equivalence scales

1.1. Annual actual income

In regard to annual actual income, we rely mainly on the annual income survey (HINK) provided by Statistics Sweden. It is available for the years 1975, 1978 and 1980–1992. We complemented this with data from the Swedish Level of Living Survey[7] for 1967.

Our sample includes individuals aged between 25 and 64 years and the members of their household (including children). We exclude individuals in households where any member is a farmer or self-employed in some other way. The reason for the age restriction is that annual income of young people, due to studies or irregular life habits, is weakly relevant to the equity issue examined in this study.[8] The weak relevance of the annual income concept is also the reason for excluding those who are self-employed. Johansson and Hedström (1979) concluded that annual income statistics on self-employed individuals provide very limited information about actual economic resources for this group.

Before-tax income is calculated as the sum of wage income,[9] capital income, realised capital gains, pensions, sick pay, unemployment benefits, parents allowance and some other minor transfer payments. Our analysis of the distributional effects of taxes and the two major benefits (child and housing allowances) that were involved in the tax and benefit reforms was carried out in two steps. First, we investigated the distributional effects of income taxes by comparing inequality of income before and after taxes. We then investigated the effects of the benefits involved in the tax reform.

The current tax base for each year was used to delimit each of the market income components. The reason is that income tax assessments form the basis of the income statistics, and normally no attempt is made to impute income components that are not liable to tax a given year. The implication of this measurement procedure is that the income measure is not fully consistent between different years. Up until 1989, the differenc-

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[7] See Erikson and Åberg (1987) for a detailed description of the Swedish Level of Living Surveys.
[8] Björklund (1993) shows that there is a very weak correlation between annual income of young people and their actual lifetime income.
[9] We also include self-employment income for those who are classified as employees but have some additional income from self-employment.

es are probably of minor importance. The 1990–1991 tax reform, however, causes a problem in this respect, since a major broadening of the tax base was part of the reform. For this reason, attempts have been made by Statistics Sweden to impute incomes for the years 1989 and 1990 which are liable to tax in the post-reform tax system but not in the pre-reform system. The empirical foundation for these imputations is fairly weak, however, so the imputations are, by necessity, rather speculative. The most important imputed income components are realised capital gains that formerly were partially tax exempt, interest income on accounts that were formerly not liable to tax, income rents from owner-occupied houses and several fringe benefits of wage earners that were included in the post-reform tax base.[10]

Including realised capital gains in annual income can cause a significant discrepancy from a measure which is guided by the Haig–Simons principle. Ideally, realised capital gains should be replaced by accrued real capital gains each year. Such imputations, however, are beyond the scope of the present study. In order to get an indication of the importance of this measurement problem for our results, we also analysed the case where capital gains are set equal to zero. Taxes are then recalculated to simulate the hypothetical situation with no income from capital gains.

According to the Haig–Simons definition of income, the values of consumption services from owner-occupied housing, and other physical assets such as cars and other consumer durables, are also part of income. As regards consumer durables, Statistics Sweden adheres to a recommendation from the United Nations concerning the definition of "total available income". According to that definition, no attempt is made to impute a positive income of capital from such goods but, on the other hand, interest payments for consumption credits are not deducted from income. For owner-occupied houses, the UN guidelines recommend using "the difference between the gross imputed rents of the dwellings and the sum of expenditures on current maintenance and upkeep and mortgage interest paid" as the appropriate income measure. The gross imputed rents "should be put equal to paid rents for similar dwellings". Statistics Sweden has not tried to follow this recommendation, mainly for reasons of data availability, but also because of the less liquid character of income

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[10] See our background working paper, Björklund, Palme and Svensson (1995), for more details regarding the data, income concepts, results, etc. analysed and reported in the subsequent text.

from owner-occupied housing. This is a deliberate deviation from the comprehensive Haig–Simons income concept.[11] In their main definition of income, Statistics Sweden imputes no income from owner-occupied housing and mortgage interest paid is not deducted from income.[12] For reasons of time and data availability, we adhered to Statistics Sweden's definition in our main calculations. It should be noted that mortgage interest as well as interest on consumer credits are deductible items and thus lower the tax paid, although the tax value of these deductions has been reduced in several stages, beginning with the 1983–1985 tax reform.

The measure of capital income that we had to use due to data availability is thus not the ideal measure from a theoretical point of view. If the market value of all real capital goods owned by individuals were available, we could have added up the market return on real capital along with other positive and negative capital income components. This would have given us the desired capital income part of the Haig–Simons income measure.

It is constructive to consider cases where the approach adopted by Statistics Sweden works well and where it does not. Their approach gives the correct income measure before taxes in the case of an individual who has no net wealth and positive income from real capital which is not registered; for such an individual one income component is not included in income, but this is offset by not deducting the negative income from debt interest. In at least two main cases the approach does not work well. The first case is where the individual does not own any real capital corresponding to financial debt, but instead has financial capital the interest of which is recorded in the HINK data. In this case we record a positive nominal interest income from capital but *not* a corresponding negative interest income. Second, the method will in general not work well for those whose net wealth is not zero. For those with financial wealth, interest income is overestimated because we record nominal rather than real interest income. For those with wealth mainly in real capital, the income from this wealth is underestimated.

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[11] See Wahlström (1984) who discusses this issue in a Swedish setting.
[12] Statistics Sweden also calculates an alternative income measure using the imputed income from owner-occupied housing for tax purposes. This measure is not useful for our purposes, since it uses a purely fiscal concept and cannot be expected to correspond with the desired income measure.

In order to ascertain how our results might have been affected by deficiencies in the capital income measure, we made alternative calculations for the years 1989, 1991 and 1992. In these calculations we used a measure of income from capital that is equal to the maximum of positive interest income and dividends and a rate of return on observed net wealth equal to 3 percent per year.

The possibility of using deductions for interest payments as a means of tax planning was part of the criticism of the tax system that led to the reforms. Apart from the practical problems of measuring a more traditional economic concept of income, our (and Statistics Sweden's) way of handling these deductions should be useful in clarifying the equity effects of the tax system. The income of individuals who make large deductions for tax planning purposes is not reduced on this account in our measurements.

The magnitudes of various deductions are presented in Table 1. The total amount of deductions increased from 7.7 to 9.7 percent between 1975 and 1990. Table 2 has been constructed to show the size of deductions in different parts of the income distribution. We divided the population into deciles with respect to before tax and benefit equivalent income and calculated the total deductions as a percent of before tax and benefit income. (We explain how we computed equivalent income in Section 1.4 below; here we have applied the Swedish equivalence scale.) This means that the income concept used in Table 2 is the same as that used in our analysis. The 1992 deductions are not comparable with those for 1975–1990 because of the changes in income concepts for tax purposes after 1990. Table 2 shows that the relative size of deductions is largest in deciles 1–4 and decile 10, and that this pattern is the same for the period 1975–1990. In 1992, with the new tax system, the higher share in decile 10 has disappeared. The large share of deductions in the lower deciles can probably be explained, in part, by the fact that families with many children are overrepresented in these deciles, and that such families tend to be homeowners. Table 2 also shows that the increase in deductions between 1975 and 1990 occurs in all deciles.

Table 1. Taxable income and deductions as percent of total gross income

	1975	1980	1985	1990	1992
Total gross income (*Sammanräknad inkomst*)	100.0	100.0	100.0	100.0	100.0
Deductions for deficits on home ownership	2.9	4.3	4.9	4.6	
Deductions for other deficits	0.9	2.0	2.8	4.0	
Deductions for all deficits	3.8	6.3	7.7	8.6	
Deductions for capital loss					7.5
Other deductions (*Allmänna avdrag*)	3.9	1.5	1.0	1.1	0.9
Taxable income (*Statligt taxerad inkomst*)	92.3	92.2	91.3	90.3	
Taxable income from work					94.3
Taxable income from capital					4.6

Source: Own computations from HINK, Statistics Sweden.

Note: The total sample is used.

Table 2. Total deductions as percent of income before taxes and benefits. By decile in the before tax and benefit equivalent income distribution

	1975	1980	1985	1990	1992
Decile 1	9.6	10.6	15.3	15.0	13.1
Decile 2	10.0	9.2	10.5	13.4	10.9
Decile 3	9.3	10.3	12.3	11.6	11.9
Decile 4	9.0	9.8	11.0	12.8	12.5
Decile 5	8.8	8.3	10.6	10.6	10.9
Decile 6	8.0	9.8	9.0	10.8	9.9
Decile 7	7.3	8.7	8.9	9.9	9.9
Decile 8	7.5	7.9	8.9	10.4	9.1
Decile 9	6.2	7.5	8.3	10.1	9.0
Decile 10	8.4	10.2	11.5	11.0	8.5

Source: Own computations from HINK, Statistics Sweden.

Note: The same sample as in our analysis (described in the beginning of this section) is used. Equivalent incomes were calculated using the Swedish equivalence scale.

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1.2. Annual full income

The measure of full income was calculated using data from the 1968, 1981 and 1991 Swedish Level of Living Surveys (*SLLS*). The *SLLS* sample is well suited for obtaining information on hourly wages for all individuals in the sample as it contains detailed information on working hours and earnings. In the *SLLS* surveys the sampled individual, but not all individuals in the household, is interviewed. There is, however, supplementary information about the spouse of the individual in the sample. The three samples used in our study are random samples of about 6,000 individuals living in Sweden (approximately 0.1 per cent of the Swedish population). The samples used in our analysis are restricted to individuals between the ages of 20 and 64. Furthermore, farmers, the self-employed, students and those in military service are excluded. The reason for excluding these groups from our sample is that it is very hard to obtain accurate observations on their hourly wage rate.

An obvious problem is that we cannot observe hourly wages for those who are not working, including the unemployed. Our strategy for handling this problem was to use wage equations estimated on the rest of the sample to impute missing wages. A problem with this strategy is that the sample of working individuals is self-selected. Various methods have been developed to correct for sample selection bias of this type. We apply Heckman's (1979) two-step method.[13]

The pre-tax and benefit incomes were calculated as follows. First, we used data from tax registers that are matched with the *SLLS* sample to obtain pre-tax and benefit incomes. We used the same definitions as described in Section 1.1. We then subtracted the actual earnings from labour and added "potential" earnings from labour. Potential labour income was calculated as the gross hourly wage rate multiplied by the potential number of hours of work. The potential number of working hours per week was set at 40, or 2,080 hours per year.[14]

It would have been advantageous to calculate the "potential" income for the spouse as well as the individual in the sample to obtain information on the potential income of the entire household. However, a lack of

[13] See Björklund, Palme and Svensson (1995) for more details on method and results from the estimation of the wage equation.
[14] It could be argued that the expression "earnings capacity", which has been used by e.g. Haveman and Buron (1993), is more appropriate. However, we decided to use the "classical" expression "full income".

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information in the *SLLS* sample prevented us from doing this (the 1991 sample did not contain detailed information on the spouse's hours of work). Furthermore, we did not have enough variables to be used as instruments in the selection equation. Therefore, we used two different procedures to calculate vertical and horizontal equity using this income concept. First, we restricted the analysis to the individual and, as child allowances are directed to the household, we also restricted the analysis to income taxes. Second, we selected the females in the samples, calculated their potential labour income and, for those who are married or cohabiting, we assumed that their spouses work a potential number of hours and simply included their actual labour income.

Information on income tax payments and housing allowances was obtained from register data. Child allowances were imputed using information on the number of children living in the household as stated in the interview.

1.3. Lifetime actual income

Our longitudinal series of income data also originates from the Level of Living Surveys. We were able to construct series of individuals' and households' income and taxes for the time period 1974–1991 from the register data tied to these surveys. Of course, this period is not long enough to justify the label "lifetime", but we use it to illustrate our ambition.

We used a sample of individuals who were 18–47 years of age in 1974. This means that our sample contains groups of individuals who were students during the first part of the period and workers during the latter. This enables us to see how the progressive tax system works when there is heterogeneity of this type in the sample. We confined the analysis of this income concept to taxes and neglected benefits. Moreover, only the individual was used as the "unit of income".

1.4. The equivalence scales

We used two different equivalence scales. One of them is the square root of the number of members of the household. This equivalence scale implies significant economies of scale in the whole range of household sizes. It is quite commonly used in the international literature. The other equivalence scale – the "Swedish scale"– is an approximation to one often used by Statistics Sweden. It is derived from recommendations of the National Board of Health and Welfare (*Socialstyrelsen*) on the level of social

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Table 3. The two equivalence scales

Number of persons in the household	"The Swedish scale"		"The square root scale"	
	Marginal scale	Total	Marginal scale	Total
1	1.00	1.00	1.00	1.00
2	0.58	1.58	0.41	1.41
3	0.52	2.10	0.32	1.73
4	0.46	2.56	0.27	2.00
5	0.46	3.02	0.24	2.24
6	0.46	3.48	0.21	2.45
7	0.46	3.94	0.20	2.65
8	0.46	4.40	0.18	2.83

welfare allowance for different types of households. The total and marginal weights for different numbers of household members for the two scales are shown in Table 3.

The "Swedish scale" has a degree of political acceptance since it is derived from official recommendations on levels of welfare allowance. It is also commonly used in studies of income distribution in Sweden. The lack of economies of scale for households with many children is notable, however, and open to criticism. Because parts of the reforms we are studying (changes in the levels of child and housing allowances) are important for households with children, and especially for households with many children, it is important to check how sensitive our results are to the choice of equivalence scale by performing the analysis using both scales.

2. Measuring vertical and horizontal equity

The decomposition method proposed by Kakwani (1984) starts from the equalising effect of a tax system, measured as the difference between the Gini coefficients of the pre- and post-tax distributions of incomes.[15] This effect is decomposed into one term representing vertical equity and another for horizontal equity. In the case of benefits, the method applies the pre- and post-benefit distributions of incomes.

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[15] A generalised version of the technique does not rely on the Gini coefficient. It has been applied to Swedish data by Palme (1995). Lambert (1989) provides a good overview of techniques for measuring redistribution of taxes and benefits.

The Gini coefficient can be geometrically defined by means of a Lorenz diagram, shown in Figure 1. In a Lorenz diagram the shares of the population are arranged in ascending order, from the poorest to the richest in terms of the income measure used. The vertical axis shows the share of total income received by the bottom x per cent. The diagonal line represents a situation of total equality – all individuals have the same income. For all situations that do not correspond to this, the Lorenz curve will be located below the diagonal line. The Gini coefficient is calculated as the ratio between (i) the area between the Lorenz curve and the diagonal line and (ii) the area below the diagonal line. The coefficient has several appealing properties. It is zero for a situation of perfect equality and it is one for a situation of perfect inequality (one person gets all income in society). Assume that we calculate the Gini for two income distributions, where the only difference between the two distributions is that a small share of income is transferred from a relatively poor individual to one who is relatively well off. The Gini will then take a larger value for the latter distribution independently of where in the income distribution the two individuals are located.

In order to explain the decomposition of the equalising effect, we need to introduce two additional concepts: the concentration curve and the concentration index. The concentration curve shows the share of the total amount of a *component* of the income received by the x per cent of the population with the lowest income. Note that the ordering of the individuals is based on income, not the component of income measured by the concentration curve.

Figure 2 shows three hypothetical concentration curves (A, B and C) and one Lorenz curve (L) for pre-tax income. Curve A is located above the diagonal line, which means that those with relatively low incomes receive on average a larger share of the sum of this income component. Curves B and C are located on each side of the hypothetical Lorenz curve for pre-tax income and represent a regressive and a progressive income tax. A concentration curve for a proportional income tax coincides at each point with the Lorenz curve for pre-tax income, i.e., the individuals in each income level pay the same share of the total tax payments as their share of total pre-tax income. Curve C represents a tax system where, for each income level, those with lower income pay a smaller share of the total tax payments than their share of the sum of pre-tax income. Thus, the concentration curve for such an income tax departs from that corresponding to a proportional tax.

Figure 1. The Lorenz diagram

Share of total income

Proportion of income recipients
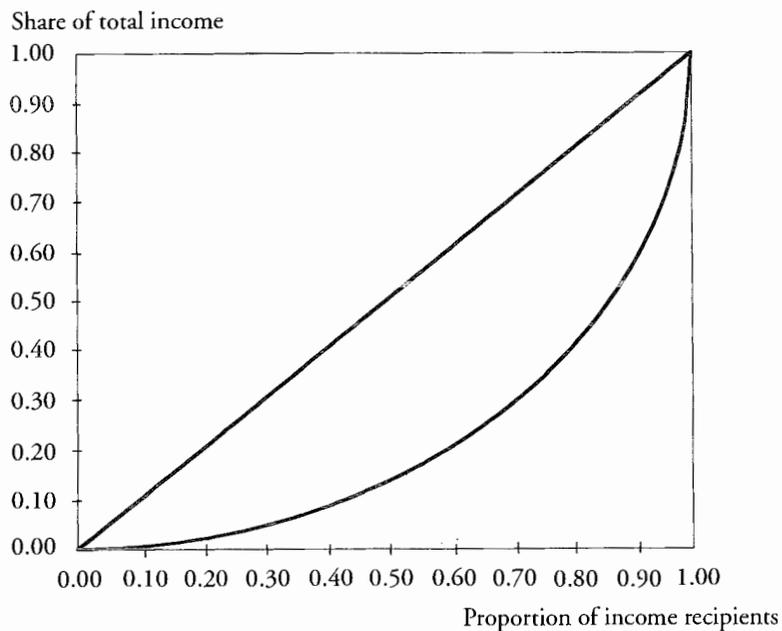
Figure 2. Concentration curves

Share of income component

Proportion of income recipients

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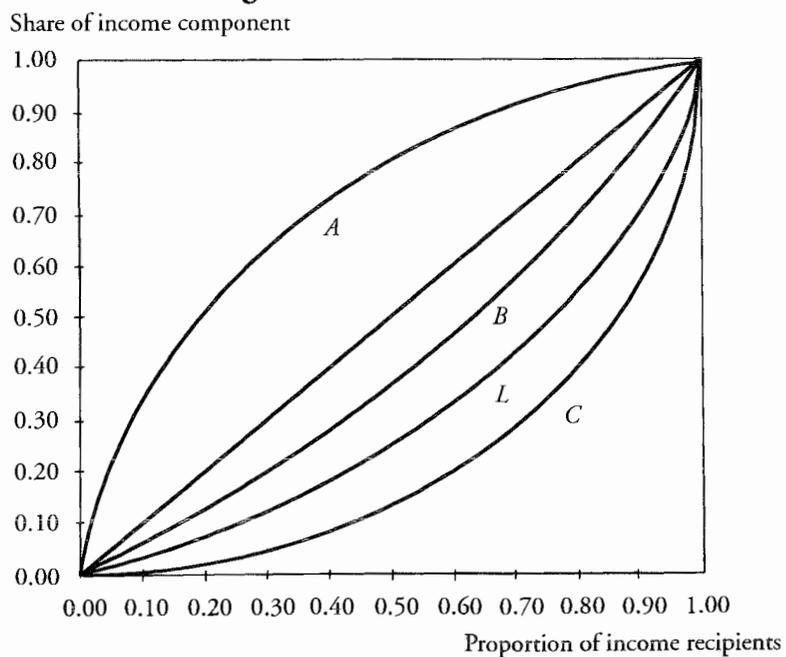
It can be shown (see Kakwani, 1980) that the concentration curve for an income component is always above or coincides with the Lorenz curve for the same income component. If the income component studied generates the same ordering of the individuals as the income concept used for ordering the concentration curve, the concentration curve and the Lorenz curve for the income component will coincide. If, however, the ordering is altered (i.e., there is reranking) the concentration curve of the income component will be located above the Lorenz curve in at least one point.

The information contained in a concentration curve can be summarised in a numerical measure, a concentration index. The concentration index can be defined geometrically in the same way as the Gini coefficient.

Kakwani (1984) shows that the difference between pre- and post-tax income can be decomposed as follows:

$$G_X - G_{X-T} = \frac{t}{1-t} \ \ (_X C_T - G_X) + (_X C_{X-T} - G_{X-T}) \tag{1}$$

where G is the Gini coefficient, C is the concentration index and t is the average share of the pre-tax income paid in taxes; the first subindex on the concentration index represents the variable used for ordering, X is pre-tax income, T tax payments and $X-T$ is post-tax income. The decomposition shows that the equalising effect is determined by three properties of the tax system. The first is the overall tax rate, t. The second is the tax progressivity, or more generally the departure from proportionality, $_X C_T - G_X$. These two properties determine the first term of the decomposition which can be called the vertical component of tax equalisation. The third property is the reranking in the transition from the distribution of pre-tax to post-tax income. This is the horizontal term that we use to measure horizontal inequity. This term is always non-positive. A large amount of reranking can thus counteract the equalising effect of a progressive tax system.

Reranking as a measure of horizontal equity has been criticised (see e.g. Kaplow, 1989). The concept of horizontal equity is open to many interpretations, among other things because the criterion of equal position could be different (see e.g. King, 1983). Which definition and measure to use is a matter of value judgement. According to the Kakwani measure, as used in this study, the criterion of equal position is "equal pre-tax equivalent income". Given this criterion, if two households change rank when we compare the pre-tax with the post-tax income dis-

tribution, it is evident that the principle of equal treatment of equals has been violated by the income tax system. This rank reversal will also be detected by our measure of the extent of horizontal equity. On the other hand, if unequal treatment does not lead to rank reversals, but to "near reversal", it will not be detected by the measure of horizontal equity but will instead affect the vertical component.

A corresponding decomposition can be made for benefits instead of taxes, i.e.

$$G_{X-T} - G_{X-T+B} = \frac{b}{1+b}(_{X-T}C_B - G_{X-T}) + (_{X-T}C_{X-T+B} - G_{X-T+B}) \qquad (2)$$

where the same convention for subindices as in equation (1) is used; B is benefits and $X-T+B$ is income after taxes and benefits. Equation (2) shows that the equalising effect of benefits is determined by three properties of the benefit system: first, the overall relative size of the benefits, b, second, $_{X-T}C_B - G_{X-T}$, the extent to which the distribution of the benefits departs from proportionality and third, $_{X-T}C_B - G_{X-T}$, the extent of rerankings caused by the benefits.

3. Determinants of vertical and horizontal equity

The income tax system is designed to be progressive. Therefore, if we use the same definition of pre-tax income as the tax authorities, i.e., "annual taxable income", we will probably get an estimate of tax progressivity that is very close to the formal progressivity and detect very little reranking, at least for the pre-reform income tax because income from capital and labour were taxed equally. However, if we use different income concepts and units of analysis than the tax authorities, there are several reasons why the formal progressivity may differ from the actual one and why "equals" (i.e., individuals with the same pre-tax income) are not treated equally by the income tax system. Of course, these properties will differ among the different income concepts used in this study. We will discuss the most important sources of such inequities in terms of sources of income, family characteristics, disposition of income and intertemporal patterns of income.[16]

One source of horizontal inequities and a reason for differences between formal and actual tax progressivity is that the tax system does

[16] We have borrowed the first three terms from Gravelle (1992) but have added the fourth in order to emphasise the choice of time unit in our analysis.

not treat different *sources of income* uniformly. The 1991 tax reform implied that nominal income from capital is taxed proportionally at a rate of 30 per cent. Before the tax reform, nominal income from capital was added and taxed together with income from labour. The tax rates on income from capital apply to nominal income. Hence, the real tax rate that should be used according to the Haig–Simons definition, depends on the rate of inflation. Also, income from different sorts of capital is taxed very differently. Income from real capital is generally not taxed at all. An exception is owner-occupied housing that is taxed at a low effective rate. Primarily in the pre-reform income tax system, the right to deduct negative income from capital implied large incentives to borrow money and buy low-taxed real capital, e.g. real estate.

It is well known that many labour contracts involve "fringe benefits", i.e., compensation typically not given in monetary terms that could be very complicated to tax. The 1991 tax reform implied that e.g. company cars for private use and lunches paid by the employer are included in the tax base.

Leisure time is not taxed. If the income concept is extended to include "full income", this implies that those who choose to work less and consume more leisure will be taxed at a lower rate than those who work more even if the wage rate is the same.

For several reasons, individuals can be treated differently by the tax and benefit systems because their *family characteristics* differ. In most of the income concepts used in this study the household is the unit of income, while income taxes in Sweden, after the 1971 reform on separate taxation of spouses, have individual income as the tax base.[17] This means that, as the income tax schedule is progressive, the distribution of pre-tax and benefit income between spouses may influence the overall income tax of the household. Thus, two households with the same total pre-tax and benefit income may have different income taxes.

Furthermore, differences in the number of children might create horizontal inequities of both taxes and transfers. The Swedish income tax system does not take the number of children into account. Therefore, two families with the same gross income per equivalent number of adults might pay different taxes with horizontal inequity as a consequence. The child allowance, on the other hand, takes household size into account,

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[17] Wealth tax has the wealth of both spouses as its tax base.

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but not the income of the household. In terms of annual disposable income this benefit has the potential to increase vertical equity. However, some reranking might also show up; if members of a family with children have the same equivalent income before child allowances as a family without children, they will have equal pre-benefit incomes but different after-benefit incomes. In general, the equalising impacts of child allowances can be expected to be greater in terms of annual income than in terms of lifetime income. In a given year these benefits will redistribute from those without children in this year to those who have children. Because most equivalence scales, including those that we use, imply a significant economic cost of a child, child allowances will be paid to families with low pre-benefit income per equivalent number of adults. In a life-cycle perspective, the distributional profile of child allowances is more difficult to examine. The issue involves the income elasticity of children with respect to lifetime income and we abstain from making any statement about the likely consequences.

The *disposition of income* also affects the effective tax rate. Parts of the tax and benefit system could be seen as implicit or explicit subsidies to different kinds of consumption, the most important of which is housing consumption. Housing allowances are explicit subsidies of housing consumption directed to households with low income, while deductions for interest payments and low tax on income from real capital could be seen as an implicit subsidy of housing to households who own their houses or apartments. Thus, households with large housing consumption could be subsidised either through the tax or the benefit system. This may, of course, generate both horizontal inequities and affect the actual progressivity of the tax system.

The actual Swedish tax system is not neutral with respect to the *intertemporal pattern* of income. Everything else equal, a person with an even distribution of income over the life cycle will pay less total taxes over the life cycle than a person with an uneven distribution of income over the life cycle. This property of a tax system based on annual income is a source of horizontal inequities when the system is evaluated according to lifetime income. There are a number of reasons for an uneven intertemporal pattern of income, but the most important ones are probably those caused by investments in human capital. Participation in formal schooling is the most obvious case, but differential investments in on-the-job training can also give rise to different life-cycle patterns of earnings and hence different payments of income taxes over the life cycle.

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Different intertemporal patterns of incomes from capital gains may also generate different income taxes. Before the 1991 tax and benefit reform, income from capital gains was added and taxed together with income from other sources. As the income tax schedules were highly progressive, there were incentives to realise capital gains evenly over time. However, as some types of real capital have high transaction costs, all households could not follow this strategy. Therefore, depending on the difference in the intertemporal pattern of capital gains, the tax rate differed between different households if lifetime income is used as an income concept. As income from capital gains is taxed proportionally after the 1991 tax and benefit reform, this source of horizontal inequity has been removed.

Finally, it should be noted that to at least some extent, different tax treatments are internalised in the price formation of, primarily, real capital. Assume, for example, that houses painted blue are taxed more heavily than, say, houses painted red. Disregarding any price differences due to aesthetical differences, the equilibrium price differences between the blue and red houses will fully offset the unequal tax treatment. An analogous analysis could, of course, be applied to different tax treatment of different forms of compensations on the labour market. Feldstein (1976) criticises the conventional idea of horizontal equity from this point of view.

4. Results

4.1. Annual actual income

Figures 3–5 reveal the main results from the analysis of annual actual income for all the years included in the study. Figures 3a and 3b show the Gini coefficients for the distribution of equivalent pre-tax and benefit income (G_X), post-tax income (G_{X-T}), and post-tax and benefit income (G_{X-T+B}) for the two equivalence scales. The equalising effect of taxes is, as noted in Section 2, measured as the difference between the Gini coefficients for the distribution of pre-tax and benefit income and post-tax income, respectively $(G_X - G_{X-T})$; the results are shown in Figure 3c. The equalising effect of benefits $(G_{X-T} - G_{X-T+B})$ is shown in Figure 3d and for both taxes and benefits $(G_X - G_{X-T+B})$ in Figure 3e. The Kakwani components of the equalising effects are shown in Figure 4 (taxes) and Figure 5 (benefits).

The large number of estimates makes it impossible to comment on all the results. However, there are a few key results that should be emphasised.

(i) The curves with the estimates of the Gini coefficients in Figures 3a and 3b for all income concepts and both sets of equivalence scales provide an overall picture of the evolution of income inequality over the period. The figures have two marked "jumps": the first in 1986 and the second in 1991. The latter jump is most likely explained by anticipated changes in the tax legislation on realised capital gains. We examined the data for 1986 in order to find an explanation for this jump as well. We found that this jump is mainly attributable to dividends and interest income. The difference between the 1989 and 1991 estimates of the Gini coefficient for pre-tax and benefit income distribution is reduced by about a third if capital gains are excluded.

(ii) Figure 3c shows an increase in the equalising effect of taxes in 1975 compared to 1967,[18] a decrease from 1975 until 1985, a slight increase between 1986 and 1990, and a marked decrease between 1989 and 1992, following the 1990–1991 tax and benefit reform. The background to this course of events may be studied in Figure 4. Figure 4b shows that the overall tax rate had been almost stable between 1975 and 1990, while tax progressivity decreased steadily until 1986 and could thus explain the decrease in the equalising effect of income taxes. The increase in horizontal equity between 1981 and 1987 partially offsets the effect of decreased income tax progressivity. Figure 4b shows that the overall tax rates decreased sharply between 1989 and 1992, while income tax progressivity was almost constant between these years. The sharp increase in horizontal equity of the 1991 tax reform partially offsets the decrease in the equalising effect of income taxes.

To sum up, the increase in the equalising effect of income taxes between 1967 and 1975 and the decrease between 1990 and 1992 are explained by changes in both average tax rates and income tax progressivity. The decrease in the equalising effect of taxes between 1975 and 1985 and the increase from 1985 to 1990 is mainly explained by changes in income tax progressivity.

(iii) Figure 3d shows a slight decrease in the equalising effect of child and housing allowances from 1975 until 1990 and a marked increase af-

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[18] Taxes in 1967 are not completely comparable with taxes in 1975 and onwards because some transfers (in particular unemployment and sickness benefits) were tax exempt before 1974. For 1967 we have included the net amounts of these transfers in pre-tax income.

ter the 1991 tax and benefit reform. Figure 5, in particular Figure 5b, shows that this is primarily explained by changes in the overall average benefit level. Figure 3d also shows that the estimated equalising effect of benefits is much larger when the "Swedish equivalence scale" is used rather than the "square root scale". This is explained by the fact that the "Swedish scale" gives more weight to children, as shown in Section 1.4. Child and housing allowances are, explicitly and implicitly, directed towards households with children; thus, the departure from proportionality will be greater, as can be seen in Figure 5a, if households with children are considered to have lower equivalent income.

(iv) It is also instructive to consider the total equalising effect of taxes and benefits in Figure 3e. We can see that this effect declined continuously from 1975 to 1986. From then on it has been more or less stable, including the years surrounding the 1991 tax reform. Therefore our analysis suggests that the reform was neutral with respect to overall income inequality.

Following the discussion in Section 1.1, it is not obvious how income from real wealth should be calculated when the Haig–Simon's income definition is applied. In order to investigate the extent to which the results are affected by the way we measure capital income, we applied alternative methods for the years surrounding the 1991 tax and benefit reform. In addition to the "base" calculation, i.e., the income definition used in the results given above, we repeated the calculation (i) when income from realised capital gains is not included, (ii) when we have replaced the Statistics Sweden measure of income from capital with a 3 per cent real return on the estimated market value of wealth, and (iii) when we use the maximum of income from capital measured by Statistics Sweden and a 3 per cent real return on the estimated market value of wealth.

The main results concerning the 1991 tax and benefit reform hold when all three alternative income concepts are used. First, the equalising effect of taxes has decreased after the 1991 reform, resulting from decreased progressivity and overall mean tax rates. Second, the amount of reranking decreased after the reform. Third, the equalising effect of child and housing allowances has increased, and has totally offset the decreased equalising effect of income taxes, after the reform.[19]

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[19] We also examined whether our results were sensitive to our decision to analyse taxes in a first step and benefits in a second. It turned out that our main results are not affected by this procedure.

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Figure 3. The impact of taxes and benefits on income distribution

a) Gini coefficients for (i) income before taxes and transfers, (ii) income after taxes and (iii) income after taxes and benefits. Swedish scale
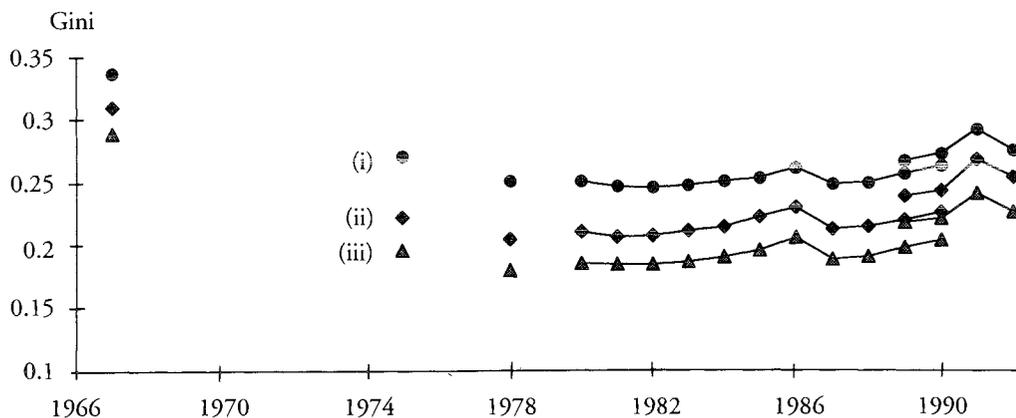
b) Gini coefficients for (i) income before taxes and benefits, (ii) income after taxes and (iii) income after taxes and benefits. Square root scale

Continues

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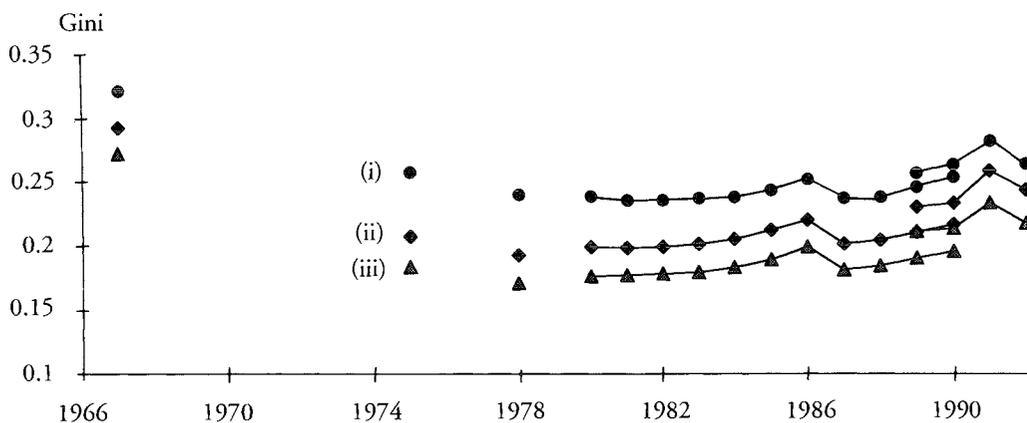
Figure 3. Continued

c) Difference between Gini coefficient before taxes and benefits and Gini coefficient after taxes
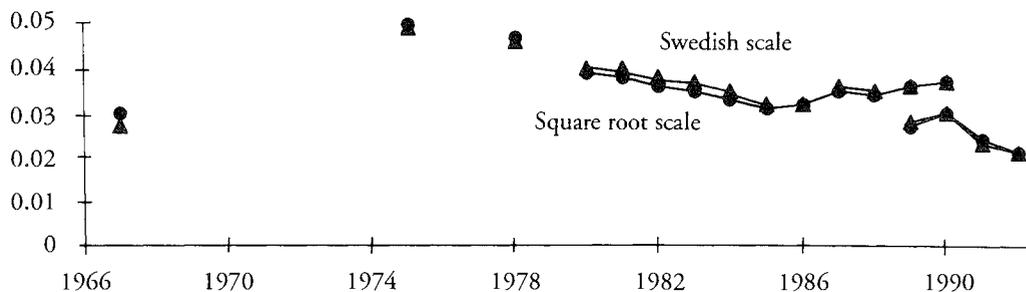
d) Difference between Gini coefficient before and after benefits
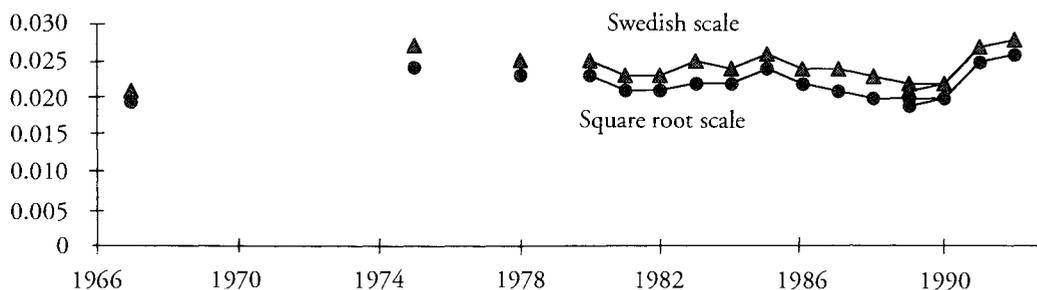
e) Difference between Gini coefficient before taxes and Gini coefficient after taxes and benefits

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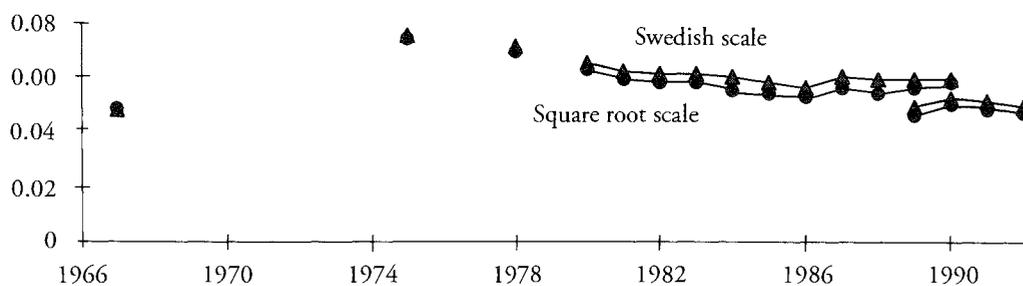
Figure 4. Kakwani components for income taxes

a) Tax progressivity
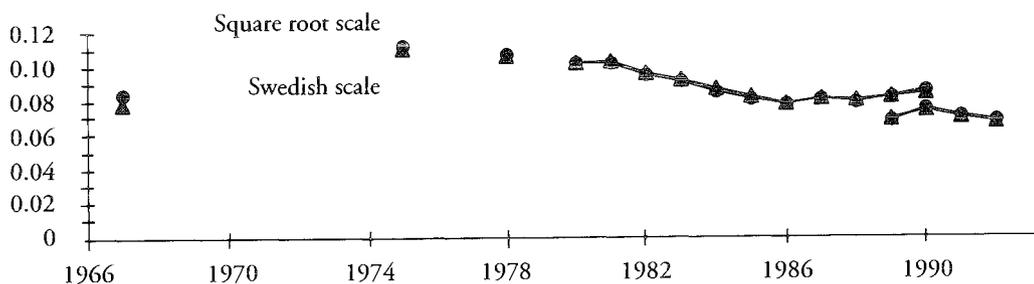
b) Tax level
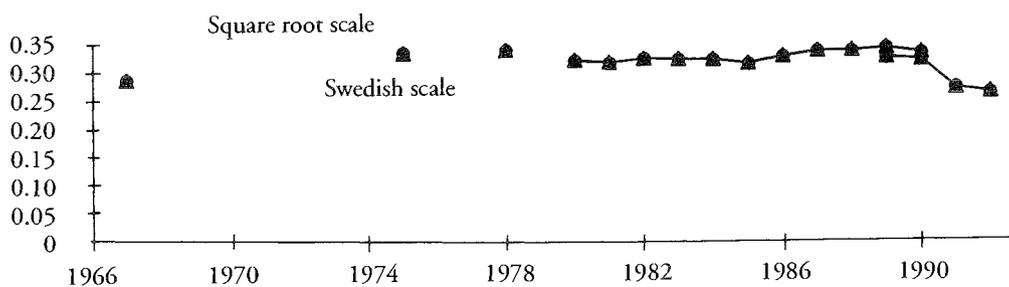
c) Reranking
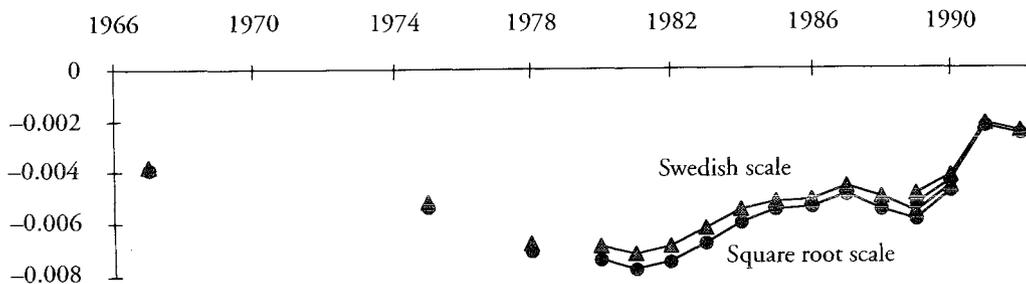
Figure 5. Kakwani components for benefits

a) Departure from proportionality
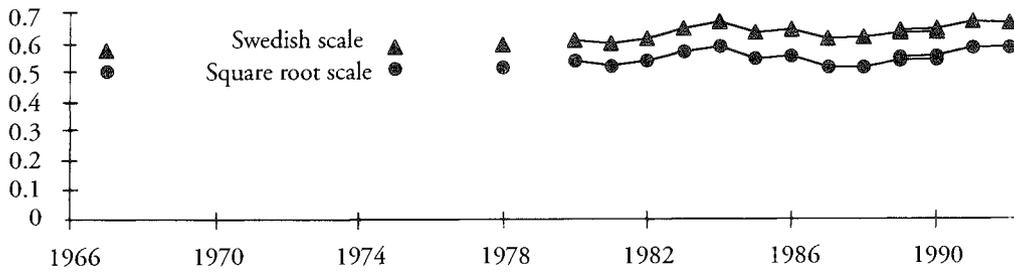
b) Benefit level
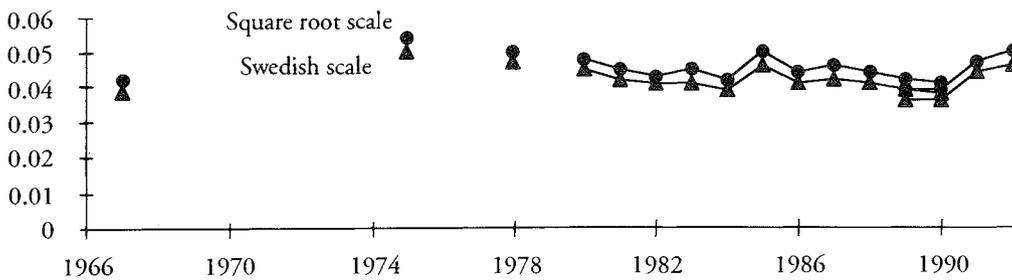
c) Reranking
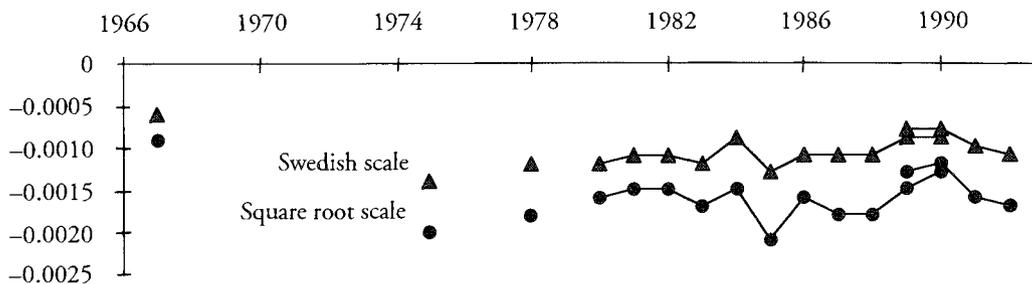
For the years surrounding the 1990–1991 tax and benefit reform, we also analysed equalising effects within seven groups with the same demographic composition in terms of number of children and cohabiting status. Within such groups, the result that the decreased equalising effect of income taxes was offset by an increased equalisation of child and housing allowances does not hold. Within the groups of households with less than two children, the equalising effect of taxes and benefits decreased after the reform. However, for households with two or more children, the equalising effect of taxes and benefits increased slightly.[20]

4.2. Annual full income

The results for full income as an income concept are shown in Tables 4, 5 and 6. Table 4 reports the decomposition of the equalising effect of income taxes for individual incomes and Table 5 (a and b) of household incomes (see Section 1.2). Table 6 (a and b) shows the decomposition of the effect of benefits for the sample of household incomes. The results for actual annual income are shown along with the results for full income to facilitate comparisons. The results from the sample of household incomes are reported for two sets of equivalence scales.

The distribution of full income is, as expected, more equal than the distribution of actual annual income. The difference is very large for the 1967 sample. For this year, and the sample of individuals, the Gini coefficient of pre-tax income is almost halved compared to the results of actual annual income given as a reference in Table 4. For the 1981 and 1991 samples, the difference between the distribution of full and actual income is much smaller, probably reflecting the fact that female labour force participation has increased considerably over time.

Two sets of results using full income should be noted.

(i) Progressivity is affected only slightly, or even increased somewhat in the 1981 and 1991 samples when full rather than actual annual income was used. However, as mean income is larger for full income, so that the overall mean tax rate is smaller, and rerankings increase, the equalising effect of taxes decreases for all samples. The overall equalising effect turned out to be negative for the samples of individual incomes.

A slightly different outcome can be seen for benefits. The equalising effect of benefits is lower for full than for actual income. This reduction,

[20] See Table B4 in Björklund, Palme and Svensson (1995).

Table 4. Kakwani decompositions for the impact of income taxes on annual and full income. Individuals

Year	Pre-tax Gini	Post-tax Gini	Diffe-rence	Tax pro-gressivity	Tax level	Vertical comp.	Re-ranking
Annual actual income							
1967	0.4482	0.4134	0.0348	0.0903	0.300	0.0386	−0.0038
1981	0.2816	0.2446	0.0370	0.0898	0.325	0.0432	−0.0061
1991	0.2602	0.2399	0.0202	0.0670	0.296	0.0305	−0.0026
Annual full income							
1967	0.2245	0.2362	−0.0118	0.0774	0.208	0.0203	−0.0320
1981	0.1692	0.1776	−0.0084	0.0939	0.275	0.0355	−0.0439
1991	0.1792	0.1725	0.0067	0.0687	0.226	0.0215	−0.0140

Table 5a. Kakwani decompositions for the impact of income taxes on annual and full income. Households. The Swedish scale

Year	Pre-tax Gini	Post-tax Gini	Diffe-rence	Tax pro-gressivity	Tax level	Vertical comp.	Re-ranking
Annual actual income							
1967	0.2996	0.2581	0.0415	0.1135	0.290	0.0464	−0.0049
1981	0.2606	0.2348	0.0257	0.0755	0.319	0.0353	−0.0096
1991	0.2596	0.2457	0.0140	0.0411	0.318	0.0191	−0.0052
Annual full income							
1967	0.2280	0.2110	0.0170	0.1098	0.202	0.0277	−0.0107
1981	0.2129	0.1926	0.0203	0.0929	0.273	0.0353	−0.0096
1991	0.2157	0.1990	0.0167	0.0668	0.262	0.0238	−0.0071

Table 5b. Kakwani decompositions for the impact of income taxes on annual and full income. Households. The square root scale

Year	Pre-tax Gini	Post-tax Gini	Diffe-rence	Tax pro-gressivity	Tax level	Vertical comp.	Re-ranking
Annual actual income							
1967	0.2854	0.2421	0.0434	0.1178	0.290	0.0482	−0.0048
1981	0.2447	0.2185	0.0261	0.0783	0.318	0.0365	−0.0104
1991	0.2416	0.2258	0.0159	0.0465	0.318	0.0217	−0.0058
Annual full income							
1967	0.2158	0.1984	0.0173	0.1122	0.201	0.0282	−0.0109
1981	0.1970	0.1772	0.0198	0.0954	0.272	0.0356	−0.0158
1991	0.1946	0.1751	0.0194	0.0761	0.262	0.0271	−0.0077

Table 6a. Kakwani decompositions for the impact of benefits on annual and full income. Households. The Swedish scale

Year	Pre-benefit Gini	Post-benefit Gini	Diffe-rence	Departure from pro-portionality	Benefit level	Vertical comp.	Re-ranking
Annual actual income							
1967	0.2581	0.2389	0.0192	0.5002	0.0413	0.0199	−0.0007
1981	0.2348	0.2091	0.0258	0.6225	0.0448	0.0267	−0.0009
1991	0.2457	0.2111	0.0346	0.6453	0.0588	0.0358	−0.0012
Annual full income							
1967	0.2110	0.2008	0.0102	0.4240	0.0255	0.0106	−0.0004
1981	0.1926	0.1748	0.0179	0.5409	0.0360	0.0188	−0.0009
1991	0.1990	0.1738	0.0252	0.6095	0.0449	0.0262	−0.0010

Table 6b. Kakwani decompositions for the impact of benefits on annual and full income. Households. The square root scale

Year	Pre-benefit Gini	Post-benefit Gini	Diffe-rence	Departure from pro-portionality	Benefit level	Vertical comp.	Re-ranking
Annual actual income							
1967	0.2421	0.2287	0.0134	0.4158	0.0347	0.0139	−0.0005
1981	0.2186	0.1989	0.0196	0.5611	0.0378	0.0204	−0.0008
1991	0.2258	0.2001	0.0257	0.5681	0.0495	0.0268	−0.0011
Annual full income							
1967	0.1985	0.1902	0.0083	0.3283	0.0275	0.0088	−0.0005
1981	0.1772	0.1614	0.0157	0.4627	0.0384	0.0171	−0.0014
1991	0.1751	0.1529	0.0223	0.5182	0.0488	0.0241	−0.0018

however, is partly explained by a decrease in the departure from proportionality. This result is probably explained by the fact that households which receive the benefits have children and therefore have a lower labour supply than other households.

(ii) The main conclusions concerning the effects of the 1991 tax and benefit reform apply even when household full income is used as an income concept. The overall equalising effect of taxes decreases after the 1991 reform. The explanation for this result is, as for annual actual incomes, reduced tax progressivity and lower overall mean tax rates, which are partially offset by a reduction in rerankings. An increase in the equalising effect of benefits offsets the reduction in the equalising effect of income taxes.

Table 7. Kakwani decompositions for the impact of income taxes on annual and lifetime income (discount rate 3%). Individuals

Year	Pre-tax Gini	Post-tax Gini	Diffe-rence	Tax pro-gressivity	Tax level	Vertical comp.	Re-ranking
1974	0.4060	0.3667	0.0393	0.092	0.33	0.0443	−0.0051
1975	0.3790	0.3352	0.0439	0.102	0.33	0.0496	−0.0057
1976	0.3571	0.3127	0.0444	0.103	0.33	0.0518	−0.0074
1977	0.3357	0.2969	0.0388	0.098	0.33	0.0479	−0.0091
1978	0.3223	0.2791	0.0432	0.094	0.34	0.0481	−0.0049
1979	0.3156	0.2786	0.0370	0.082	0.34	0.0420	−0.0049
1980	0.3033	0.2702	0.0331	0.081	0.33	0.0391	−0.0060
1981	0.3030	0.2795	0.0236	0.063	0.32	0.0300	−0.0065
1982	0.2992	0.2705	0.0287	0.074	0.32	0.0359	−0.0062
1983	0.2979	0.2671	0.0307	0.075	0.32	0.0359	−0.0052
1984	0.2876	0.2574	0.0302	0.073	0.33	0.0354	−0.0052
1985	0.2838	0.2566	0.0272	0.065	0.33	0.0322	−0.0050
1986	0.2876	0.2560	0.0315	0.070	0.34	0.0367	−0.0051
1987	0.2828	0.2481	0.0347	0.074	0.35	0.0399	−0.0052
1988	0.2820	0.2456	0.0364	0.077	0.35	0.0421	−0.0057
1989	0.2836	0.2481	0.0355	0.074	0.35	0.0407	−0.0052
1990	0.2828	0.2554	0.0374	0.079	0.35	0.0419	−0.0046
1991	0.2944	0.2617	0.0328	0.077	0.32	0.0366	−0.0038
1974–91	0.2718	0.2396	0.0322	0.071	0.33	0.0349	−0.0027

Source: Own computations from the Level of Living Surveys.

Note: The sample used is restricted to those who were 18 to 47 years of age in 1974 and lived in Sweden all years 1974–91. The sample size is 2877.

4.3. Lifetime actual income

The results for lifetime actual income are presented in Table 7. Kakwani components for single years and for the discounted value of income for all years are shown. The results refer to individuals and only consider the impact of income taxes. The samples for the single years are also different from those in Section 4.1 because here we follow a group of individuals, aged 18 to 47 years in 1974, over time.

There are three basic messages in the table. First, the equalising effect of taxes for single years is of about the same magnitude as in the analysis of annual actual income with the household as the unit of income. The difference between the pre- and post-tax Gini is between 0.03 and 0.04, with slightly higher figures for the early 1970s. The corresponding numbers in Figure 3, however, were lower during the late 1980s and early 1990s. Second, the reranking term for the single years is around −.005

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which is (absolutely) slightly lower than for annual actual income with the household as the unit of income. This is not surprising since household composition is a source of reranking and horizontal inequity. The most important result is the third one. When we compared the equalising effects for the single years with those for the whole period 1974–1991 there is hardly any difference. Hence, the tax system has an equalising impact also in terms of income over longer periods of time. Further, the reranking component is lower for the longer period than for the single years. Therefore, contrary to our *a priori* beliefs, the intertemporal pattern of income is not a source of horizontal inequities.

5. Conclusions and suggestions for further research

In the debate which preceded the tax and benefit reforms in Sweden in 1983 and 1991, the pre-reform tax regime was criticised because it no longer equalised income – it had become "sick" or "rotten". To some extent our results support this view. Income tax progressivity and the equalising effect of taxes decreased considerably from 1975 to 1985, which includes periods when the formal progressivity of the tax system did not decrease. The amount of reranking increased in the period from 1975 to 1981 and also between 1987 and 1989, i.e., the periods that preceded the tax reforms. A possible explanation for this outcome – not shown by us, however – is that households adapted their economic behaviour to tax legislation. As income from real capital was (and still is) taxed much lower than income from other sources and as negative income from financial debt was fully deductible, it was profitable to take loans and buy real capital, primarily owner-occupied houses.

On the other hand, our results also show that the income tax system before the 1991 tax and benefit reform did in fact make income distribution more equal, even if the income concept is extended to "lifetime" income or to household "full income". This is contrary to what was previously found by Hansson and Norrman (1986).[21] They examined the 1982 HINK survey and found that the equalising effect of income taxes was substantially reduced when they used an income concept that they considered equivalent to household lifetime income. Furthermore, when they also corrected for differences in hours of work, i.e., calculated what they denoted as

[21] Their results are also reported and emphasized in McLure and Norrman (1995).

"potential lifetime income", they concluded that the income tax was in fact regressive. There are, however, large methodological differences between our studies, which we discuss in Björklund, Palme and Svensson (1995).

Our major conclusion concerning the effect of the 1991 tax and benefit reform on income distribution is that a decreased equalising effect due to decreased income tax progressivity and lower overall average income tax rates was offset by increased horizontal equity of income taxes and increased child and housing allowances. However, the results were not uniform within groups of households with similar demographic characteristics. The equalising effect of taxes plus benefits *within* such groups has declined from 1989 to 1992 for groups without children or with one child, while it has increased in groups with two or more children.

It is interesting to note that the result whereby the reform was neutral with respect to overall income distribution also holds when we use two alternative income concepts for actual annual income and when we use our measure of "full income". The reform could not be analysed using our measure of "lifetime" income. However, it should be stressed that parts of the tax reform were omitted of the analysis, e.g. the broadening of the tax base for VAT and increased taxes on real estate.

We conclude this study by considering some of its limitations and mentioning some important tasks for future research. First, we should re-emphasise that our analysis is completely mechanical in the sense that we did not take any behavioural effects of the taxes and benefits into account. We simply compared income distributions before and after taxes and benefits, and claimed that the effects of taxes and benefits can be described by the differences between these distributions. Those who believe that labour supply is not affected to any large extent by the changes in taxes and benefits due to the Swedish reforms might not regard this assumption as serious. However, not only behavioural mechanisms such as changes in labour supply are neglected in our analysis. We also neglect changes in prices of goods, services, factors of production and real capital. A long-run goal would no doubt be to build a general equilibrium model that takes such mechanisms into account and generates distributions of income before and after taxes and benefits. The decomposition technique that we have used could then be applied to the distributions that are generated by such a model.

Another extension of our study might be to learn more about the mechanisms that generate discrepancies between formal and actual tax progressivity as well as rerankings. Both empirical and theoretical research

is called for. It would, for example, be possible to identify the characteristics of individuals in our data sets who have moved markedly upwards (or downwards) in the distributions because of taxes and transfers. More formal analysis is also required to find out how a tax system that is based on annual income affects the distribution of lifetime income.

Further, the income concepts that we have used can definitely be improved. As regards annual actual income, we believe that income from real capital is the most serious problem. Better information on such capital in the annual income surveys of Statistics Sweden would bring us closer to our ideal income measure, i.e., the Haig–Simons income concept.

Our measure of "full income" would benefit from more information on the determinants of individual wages. We would also come closer to "lifetime income" if the period for which data are available could be extended. It should also be noted that a long-run goal would be to compute "full lifetime income" but, needless to say, the data requirements are gigantic.

To sum up, this study provides several distinctive results, although much research remains to be done in this area. Within our analytical framework it is possible to use better measures of the income concepts, alternative and more general summary measures of income inequality, and other sets of equivalence scales. Our framework should also be extended to include secondary, "general equilibrium" effects of changes in the tax and benefit system on income inequality.

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