

Gustafsson, Bjorn; Aguilar, Renato

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## Public Sector Transfers and Income Taxes: An International Comparison with Micro Data

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# Luxembourg Income Study Working Paper Series

Working Paper No. 10

Public Sector Transfers and Income Taxes: An  
International Comparison with Micro Data

Renato Aguilar and Björn Gustafsson

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*(scanned copy)*



**PUBLIC SECTOR TRANSFERS AND IN-  
COME TAXES. AN INTERNATIONAL COM-  
PARISON WITH MICRO DATA.\***

Renato Aguilar  
Björn Gustafsson  
December 1987

Department of Economics  
University of Göteborg  
Viktoriagatan 30  
S - 411 25 Göteborg  
Sweden

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## Abstract

The importance of public sector transfers and income taxes in the process of income formation of families is studied. Estimations were made using micro data about Canada, Israel, Sweden, Switzerland, United Kingdom, the US and West Germany.

Results show that public sector transfers and income taxes play quite different roles in the different countries covered by this study. The fraction of families paying income taxes as well as the marginal tax rates varies between countries. Large public sector transfers seem to go together with an economic well-being not far from the national average for those strongly depending on public sector transfers. The opposite is the case in countries with small public sector transfers. However, some similarities were also found. For example, a majority of aged families generally receives more in transfers than it pays in income taxes.

## 1. Introduction

It is widely recognized that the role of the public sector in the process of income formation varies in time and between countries. International comparisons are often made on the basis of aggregated variables showing, for example the size of total public sector expenditures. Further insight might be gained by looking at the various channels through which firms and families are affected. This article addresses the question of how important direct government measures are in the income formation process to families in different countries. We investigate the role of public sector transfers and income taxes in eight countries at the beginning of the 1980's

Few attempts have been made to measure and compare internationally the role played by public sector transfers and income taxes. <sup>1</sup>This might be due to the low degree of comparability between countries of income data at the family level. However, a new data base, the Luxembourg Income Study (LIS), with higher comparability of data has recently become available. In this paper we explore the data on Canada, Israel, Norway, Sweden, Switzerland, United Kingdom, US and West Germany.

We focus our attention on four interrelated questions: How important are public sector transfers as a source of income for families? How are income taxes paid, and what are the marginal tax rates and income tax elasticities in the different countries included in the study? What is the relationship between factor income and disposable income? Which is the level of economic well-being of those strongly depending on public sector transfers, as compared to other people?

It should be stressed that we are describing a real situation and not explaining differences and similarities. When interpreting the results, it should be remembered that the public sector can influence the economic position of

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<sup>1</sup> Compared to the recent study of Rainwater, L, Rein, M. & Schwartz, J. (1986), which might cover the hitherto most ambitious attempt using micro-data our article has several advantages: We are covering eight nations, not only Great Britain, US, and Sweden. Our results concerns the whole population, not only those having heads 25 - 54 years. Data in LIS is about one decade newer. However, the most important difference is that in the other study only the role of transfers, not income taxes are examined.

families by other means than public sector transfers and income taxes. Examples of this are indirect taxes, social security contributions and provision of public consumption. The importance of these channels varies between the countries, thus helping to explain the different roles played by public sector transfers and taxes. Our purpose is not to provide a general comparison of the distribution of the economic well-being in the different countries covered by the study. Our interest is limited to measure the relative economic well-being of those depending greatly on public sector transfers.

The paper is arranged in the following way: In the next section we discuss the system of public sector transfers and income taxes and assumptions used for the comparisons. Section 3 is a description of the data base used for our computations. The results of our computations on public sector transfers are reported in Section 4. Section 5 presents results indicating how income taxes are paid. The relationship between factor income and disposable income is discussed in Section 6. Estimations of the level of economic well-being of those strongly depending on public sector transfers are reported in Section 7. The paper ends with a summarizing discussion.

## **2. The Transfer Income Tax System and Assumptions.**

Public sector transfers and income taxes to and from the families is a subset of all public sector transactions. What distinguishes them from other public sector transactions is the counterpart (families) and the fact that they are made without a requirement for direct services in return

The concepts of public sector transfers and income taxes seem to be unambiguous. However, to define precisely a line of demarcation between what should be considered as a public sector transfer and what should not is troublesome. It may be difficult to differentiate between transfers and wages. Some activities, such as compulsory military service, are remunerated but they are not based on a normal work contract. The distinction between public lending and transfers are sometimes difficult to set. Students may, for example, be given loans on favorable conditions. Whether or not those transactions should be considered as transfers is an open question.

It may be noted that many payments, normally considered as transfers, are based on the activities of the recipients during earlier periods. The size of the social security payments are, in many instances, affected by the size of the wages during earlier periods.

The following identities show how public sector transfers and income taxes participate in the income formation process:

$$(1) \quad \text{GROSS INCOME} = \text{FACTOR INCOME} + \text{PUBLIC SECTOR TRANSFERS}$$

$$(2) \quad \text{DISPOSABLE INCOME} = \text{GROSS INCOME} - \text{INCOME TAXES}$$

The formation of income is a complex problem including many interdependent variables. In this way, disposable income, public sector transfers and factor income may be thought of as affecting each other. However, this study is limited to direct and immediate effects.

To some extent, factor income is partially a result of the existence of a system of public sector transfers and income taxes. Furthermore, we are also - somewhat unrealistically - assuming that the size of public sector transfers are unaffected by how income taxes are levied. It is easy to think of examples where policy makers design transfer payments conditioned on if and how the benefits are to be taxed. It should be noted that family formation might also be affected by public sector transfers and income taxes.

Given the limitations imposed upon our study, several manners of analyzing data on the variables in (1) and (2) are possible. One possible approach is to compute inequality indexes for the variables mentioned in identities (1) and (2) and then comparing the results internationally. A large number of such indexes are mentioned in the literature.<sup>1</sup> Unfortunately, these indexes do not necessarily give a unique result, and may point in different directions when reporting the distributional properties of public sector transfers and income taxes. Thus, the choice of appropriate indexes is a very important issue.

The Gini coefficient is probably the most widely used inequality index. It is not difficult to find studies of the role played by public sector transfers and/or income taxes comparing Gini coefficients for the distribution of various income variables. For example, Musgrave & Thin (1948) proposed this approach when analyzing income taxes, and named it effective progression.<sup>2</sup> A further insight might be obtained by decomposing such inequality indexes. For example Kakwani (1984) proposed a decomposition of the inequality index into: the size of income taxes, horizontal inequality and progressivity.

Here, we shall not follow the path suggested by Kakwani. Instead, we define a number of simple variables in order to study the relationship between the different income variables.

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1 For surveys on this literature see for example Cowell (1977) or Nygård & Sandström (1981).

2 The term "progression" may be somewhat misleading, because at least two other sets of indexes have been labeled as progression measures. These are local measures presented by the same authors and summary indexes such as suggested by Suits (1977) and Kakwani (1977 and 1984). For a survey of the literature on measures of tax progression see Pffingsten (1986).



The importance of public sector transfer to the incomes of a family may be studied by computing its relation to gross income:

$$(3) \quad a = s / z$$

Where  $s$  stands for public sector transfers and  $z$  for gross income. Assuming that factor income is non-negative, variable  $a$  should assume values that lie between 0 and 1.<sup>1</sup> We believe that there is no commonly accepted name for variable  $a$ . A related term was put forward by Rainwater, Rein and Schwartz (1986) who studied the different components of gross income as "income packages". In the following, we shall label variable  $a$  as "transfer intensity". Families for whom the transfer intensity is greater or equal to 0.5 will be called mainly depending on transfers. Families with a transfer intensity of at least 0,9 will be called heavily depending on transfers.

Considered as a measure of how important public sector transfers are to the process of income formation, our variable transfer intensity has a serious limitation. In our computations we are not considering the possibility that transfer payments might be taxed consistently differently than factor income. Especially public sector transfers might not be taxed at all, or taxed at lower rates than factor income. When that is the case, transfer intensity underestimates the importance of public sector transfers.

The role played by income taxes might be studied by computing tax rates  $b$  for families. It is not selfevident what should be the tax base, but given that public sector transfers might be taxed, we relate income taxes to gross income:

$$(4) \quad b = t / z$$

Where  $t$  stands for income taxes.

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<sup>1</sup> This restriction can safely be assumed for our computations, because only few observations with negative factor income were found in the data base.

### 3. The Data.

In this section we describe the data used and discuss its limitations.<sup>1</sup> The central idea of the Luxembourg Income Study (LIS) is to assemble at one location data sets collected at a micro level in different countries. These data sets are, then, reorganized in order to meet certain standards with respect to the definitions of the variables and the manner in which they are recorded. In this way, comparisons between different countries, based on data with a higher quality than that used in earlier research efforts, might be performed.

/Table 1 about here/

Table 1 gives an overview of the data sets included in the LIS database at the date when we used it in January of 1987. The table shows data sets by name and size, income year, data sampling frame and representativeness with respect to total population. Half of the data sets are for 1979. The exceptions are the Canadian, Swedish and German data sets which are for 1981, and the Swiss data set which is for 1982. Most data sets are constructed with the help of annual income data surveys. The exceptions is the British data set, which is derived from an expenditure or budget survey, and the Norwegian data set, derived from a sample of tax files.

Sample sizes vary widely between the different data sets. The American and Canadian data sets are very large, allowing detailed income and demographic breakdowns of the variables. On the other hand, the German and the Israeli data sets allow only gross breakdowns of the variables without heavy losses in statistical significance.

All the data sets, with the exception of the Swiss data set, exclude institutionalized and homeless people. The Israeli data set excludes rural population and those living in kibbutz. The German data set excludes foreign heads of household.

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<sup>1</sup> Most of the arguments and information offered in this section are taken from Smeeding, Schmaus & Allegrezza (1985) and O'Higgins, Schmaus & Stephenson (1985).

We are using the family as the income unit in our study. However, the definition of a family may vary considerably from country to country. For example, a family cannot contain more than two adults in Sweden, and a person is considered adult after his or her 18th birthday. Grown children living with their parents, or elderly persons living with their children, are thus considered separate families. This very limited definition does not hold for other countries.

Breakdowns of the sample after age of the head of the households and type of family, are reported in the appendix. Consequently, a warning must be issued about the results; because of different definitions of the family in different countries, the results might be somewhat misleading. For example, the proportion of families with a family head of under 26 years, varies from 4.6 percent in Israel to 15.9 percent in Switzerland. These differences represent, partly, true demographic differences but also differences in the definition of a family.

It is difficult to assess how the quality of the data varies between the different countries. Some of the problems affecting the quality of the data are of a more general nature. For example, a problem common to all income studies is the underreporting of factor income and public sector transfers. Other problems are of a more country specific nature. For example, non-taxable public sector transfers are excluded from the Norwegian data set, thus leading to underestimations of the role played by public sector transfers. The quality of the German data set has been considered a serious problem by the organizers of LIS, leading to several revisions. We have used the third version. However, some of the results reported below for Germany may be interpreted as due to the poor quality of the data.

#### 4. Public Sector Transfers.

In this section we report on the results of our computations of transfer intensity for the different countries covered by our study. We start with an overall review, and then show how demographic factors and transfer intensity are related.

The eight countries included in this study may be ranked according to how large, on average, public sector transfers are in relation to gross income. These figures are reported in Table 2. The ranking starts with Sweden, followed by the United Kingdom, West Germany and Norway. These four countries will subsequently be labelled countries with a well developed welfare state. There is a large difference between Sweden and the other countries.<sup>1</sup>

/Table 2 about here/

According to our results, Canada, Israel and the US are countries with a less developed welfare state. We have not included Switzerland in this group, although the corresponding index shows values very near those reported for the countries in this, latter group. The reason for this exclusion is that the Swiss system is very different. In Switzerland payments such as sickness benefits, family allowances, etc. are legally imposed but not administered by the public sector. In Switzerland, public sector transfers play a very limited role for families with members in the labor force.

The variable transfer intensity for families,  $a$ , shows a bimodal distribution in all the countries included in the study, with a peak at zero or very close to zero, and another peak very close to one. However, we see in Table 2 that the proportion of families not receiving any public sector transfers varies very much between the different countries. For instance 68.5 percent of the families in Switzerland, and 59,3 percent in the US do not receive any public sector transfers at all. On the other hand, the corresponding two proportions is 18,0 percent of the families in Great Britain, and 7,0 percent in Sweden.

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<sup>1</sup> Because of the reasons discussed above, table 2 might attribute an excessively low position to Norway.

It is difficult to relate the classification of the countries in countries with developed and countries with less developed welfare systems to the variation in the proportion of families which do not receive public sector transfers. In general countries with a developed welfare system have a higher proportion of families mainly depending on public sector transfers than countries with a less developed welfare system. In fact, in countries with a developed welfare system more than one out of four families depend mostly on public sector transfers. The corresponding proportion for Switzerland is very close to that for the US, which in turn has a higher proportion than other countries with a less developed welfare system.

Inequality in the distribution of transfer intensity, as measured by the coefficient of variation, is also reported in Table 2. We see that this inequality varies negatively with the relative size of public sector transfers. This relationship is well defined. Israel is the only exception with a relatively low inequality in transfer intensity. We may conclude that, as a rule, in nations with large public sector transfers they are also widely spread.

Let us now turn our attention to how variable transfer intensity is related to demographic factors. Firstly, we investigate the relationship between transfer intensity and the age of the head of the household. From a life-cycle theory perspective it is natural to assume an U-shaped relationship. This feature is partially present in our data. The right branch of the U is easily detected in all countries covered by the study. However, this is not the case for the left part of the U.

/Table 3 about here/

The relationship between the age of the head of the family and variable transfer intensity was studied by means of the following procedure. Firstly, for each country, the sample was split up into six subsamples according to the age of the head of the family. Then transfer intensity was regressed on age of the head of the family for each subsample. Ordinary Least Square estimates of this relationship are reported in Table 3. We can see that transfer intensity increases with age for those families with heads in the age intervals 56 to 65 years and above. In three of the countries covered by the study (Sweden, West Germany and Switzerland) transfer intensity also increases with age for those families with heads in the age interval 46 to 55 years.

A negative effect of the age of the head of the family on transfer intensity in the age interval up to 25 years has been found in five countries. In three countries we have found negative coefficients with t-statistics greater than two for families with heads in the age interval 26 to 35 years. For families with heads in the age interval 36 to 45 years, one negative coefficient and one positive coefficient with t-statistics greater than two were found.

We may now turn our attention to the problem of how large the fraction is of families that are mainly depending on public sector transfers for different types of families. As shown in Table 4 most elderly families are mainly depending on public sector transfers with the exception of Israel. As shown in the Appendix the aged are a majority among those mainly depending on public sector transfers in all countries. The proportion of families with elderly heads depending mainly on public sector transfers is highest for countries with a well developed welfare state. In Sweden almost all elderly families depend mainly on public sector transfers. Switzerland, with 66.1 percent of the elderly families depending on public sector transfers, ranks higher than all the countries in the group with a less developed welfare state.

/Table 4 about here/

In almost all countries, a considerable fraction of single parents are mainly depending on public sector transfers. With the exception of Switzerland, the proportion of single parents mainly depending on public sector transfers varies between 23 and 37 percent. However, single parent families are not very frequent in any country, thus as showed in the appendix, single parents only account only for a low proportion of all families mainly depending on public sector transfers. The distinctions between less developed and well developed welfare states is not very helpful in analyzing the variation across countries in the fraction of single parents mainly depending on public sector transfers. <sup>1</sup>

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<sup>1</sup> However, this lack of a pattern might be due to methodological limitations. For instance, the category family with a single parent is not defined in the same way in the various nations. In some countries just a few observations are present for this category of families (Israel and West Germany), rendering those results less reliable.

A sizable proportion of non aged single persons without children depends mainly on public sector transfers. In countries with a well developed welfare state at least every fifth single person depends mainly on public sector transfers. The corresponding figure is lower for countries with a less developed welfare state.

Generally, few non aged couples depend mainly on public sector transfers. For couples without children, the fraction mainly depending on public sector transfers seems to follow the classification between well developed and less developed welfare state. However, the same cannot be said about couples with children. Families with one or two children also have the lowest fraction of families mainly depending public sector transfers in almost all countries.<sup>1</sup>

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<sup>1</sup> The only exception, Norway is very small, and might be caused by data quality as discussed in Section 3.

## 5. Income Taxes

In this section we explore how income taxes are paid in the different countries included in our study. We report, for example, on the fraction of families in the whole population and in various family types not paying any income tax. Furthermore we report on marginal income tax rates and tax elasticities obtained from estimated tax functions.

/ Table 5/

Table 5 gives an overview of the income taxes in the different countries covered in our study. The first column reports the average tax rates. The highest figure, 29,6 percent of the gross income, is for Sweden, followed by 28,7 for Israel. The lowest average income tax rate is for Canada with 15,2 percent. The distinction between well developed and less developed welfare countries is not helpful when illustrating the variation of average tax rates between countries.

The distribution of families according to their income tax rates, as defined in section 2, presents two different patterns in the different countries covered by this study. In most countries the distribution is bimodal, with one peak at zero and the other at a higher positive value. However, both in Sweden and in Switzerland the distribution is unimodal. Thus only 1.8 percent of the Swiss families and 5.3 percent of the Swedish families pay no income taxes. The corresponding figures for the other nations are greater than 15 percent and up to 33 percent for West Germany.

In some countries, there are no families paying income taxes equal to or greater than 50 percent of gross income. The highest proportion of such families are found in Israel and Sweden, followed by West Germany.

The last column of Table 5 shows the redistributive effect of income taxes, based on inequality indexes for two income concepts as they are reported by O'Higgins, Schmaus & Stephenson (1985).<sup>1</sup> The largest redistributive effect is

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<sup>1</sup> The effect is obtained after calculations of Gini coefficients for disposable family equivalent income for persons and family equivalent gross income for persons.



found in Sweden, followed by Norway, Israel and the US. By far the smallest redistributinal effect recorded is for Germany. According to this table, it seems that the larger income taxes are in relation to gross income, the larger are the redistributinal possibilities of income taxes. However, West Germany might be an example showing that large income taxes may go together with relatively small redistributinal effects.

/Table 6 about here/

Table 6 provides a description of those families who are not paying income taxes. In all countries included in this study, the aged families are the family type with the highest proportion not paying any income tax. In all countries with a less developed welfare state, a majority of aged families do not pay income taxes. Among countries with a developed welfare state the proportion of aged families not paying income taxes varies considerably, ranging from 87.9 percent in West Germany to 11.5 percent in Sweden. The lowest fraction of aged families not paying income taxes, 3.6 percent, is found in Switzerland.

A sizable proportion of single, non-aged adults with or without children are not paying any income taxes in several countries. The major exceptions being Switzerland, followed by Sweden. Generally, couples pay income taxes. Our computations show only a small proportion of families in those categories paying no income taxes.

Let us now see the amounts paid as income tax by different types of families. Obviously the size of income is a important factor. However, it is not self evident what income concept is the most relevant for the analysis. As public sector transfers might be taxed, we have studied the relationship between gross income and taxes payed. The following regression model was applied for each family type in each nation:

$$(5) \quad t_i = \alpha + \beta_1 z_i + \beta_2 z_i^2 + \epsilon_i$$

The parameters of this equation were estimated using Ordinary Least Squares. The estimated parameters were used to compute marginal tax rates, which, according to our specification, might vary with gross income. We report our result as marginal tax rates evaluated at the mean value of gross income:

$$(6) \quad \frac{\partial t}{\partial z} = \beta_1 + \beta_2 \bar{z}$$

International comparisons of taxes and tax rates are regularly published by OECD. However, these estimates refers to ex ante tax rates and are based on tax schedules and separate information about income levels. Our measure refers to the ex post situation, that is to what is actually paid. Thus our results, to some extent, take account of the effect of the different deductions which are difficult to consider in ex ante studies.

/Table 7 about here/

Our results on marginal tax rates are reported in Table 7. All entities in this table are positive, indication that taxes are an increasing function of gross income. Firstly, let us comment on the variation of this variable across family types. National averages show that couples with no, or at most two children, have the highest marginal tax rates, and the lowest marginal tax rates are found among aged and single parents families. However, this structure does not show up generally. In general, the type of family paying the highest marginal tax rate varies from country to country.<sup>1</sup>

Let us now comment on the differences in marginal tax rates between countries. It is difficult to find a global ranking of the countries included in our study valid for all family types. However, we might mention that, for all family types, Sweden has higher marginal tax rates than the US, Great Britain, Canada and Switzerland. Israel has higher marginal tax rates than the US, Great Britain, Canada and Switzerland. Israel has higher marginal tax rates

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<sup>1</sup> Consistently with the variation in the proportion of families not paying income taxes the results show that the marginal tax rates for families with aged heads varies considerably from country to country. For most countries, marginal tax rates are very similar for couples with children. The exception are Germany and Norway, and we suspect that these results might be severely influenced by the quality of data.

than Great Britain, the US and Canada, also for all family types. Finally Switzerland has higher marginal tax rates than Great Britain and Canada for all family types.

The figures in Table 7 might justify a classification of the countries covered by our study according to marginal tax rates into four groups. The first group consists of Sweden, Norway and Israel; countries with high marginal tax rates. The second group includes Switzerland and the US with middle sized marginal tax rates. Great Britain and Canada form a third group with low marginal tax rates. The fourth group consist of West Germany where, according to Table 7, marginal tax rates vary considerably between family types.

Tax elasticities may also be computed using the estimates of the parameters of the tax function presented earlier:

$$(7) \quad \left( \frac{\partial t}{\partial z} \right) / \left( \frac{\bar{t}}{\bar{z}} \right)$$

/Table 8 about here/

With only one exception, possibly caused by bad data quality, all entries in Table 8 are greater than 1. Thus, we conclude that, on average, the income tax systems in all countries covered by our study is progressive in the above sense. In general we found that the highest tax elasticities are among aged families, followed by single parents. This structure was found in six out of the eight countries. The exceptions are West Germany and Norway and it might be attributed to bad data quality.

When comparing tax elasticities between countries it turns out that the US has a special position with very high tax elasticities. In fact, tax elasticities in the US are, for all family types, greater than those for Switzerland, Great Britain, Canada, Sweden and West Germany. This result fits nicely with those reported in Table 5, where it was shown that the redistributinal effect of income taxes in the US were similar in size to those of Israel, although the income taxes are considerably smaller.

As a whole we have not found the distinction between developed and less developed welfare states very useful in this section. Thus, it seems that the relative size of public sector transfers are not very well linked to the structure of the income tax system.

We have not yet discussed national differences in progressiveness due to the income tax system. This is because the term "progressive" has been used to denote very different mathematical expressions. Thus the countries in our study may be ranked very differently if we change the definition applied. For example, when comparing inequality indexes we might report Sweden as having the highest effective progressiveness. On the other hand, if we used Kakwani's new measure of progressiveness, we might report Sweden as the nation with the least progressive income tax.<sup>1</sup>

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<sup>1</sup> For Kakwanis new measure se Kakwani 1984 or 1986

## 6. The Relationship between Factor Income and Disposable Income

In this section, we are interested in the effects of public sector transfers and income taxes on disposable income. Firstly, we study their combined effects with the help of the following equation, estimated for each country considered in our study, and relating disposable income to factor income.

$$y_i = \gamma_0 + \gamma_1 x_i$$

This equation was estimated using Ordinary Least Squares. The expression  $(1 - \gamma_1)$  may be interpreted as a marginal wedge between remuneration in the sphere of production and the possibilities of consumption defined by public sector transfers and income taxes. For example, Lindbeck (1983) concluded that the purchasing power of families in developed welfare states is not closely connected with the contributions of families in the official production system. Our estimates tell us how close this connection is and allow us to compare it between the countries.

The coefficient of determination  $R^2$  may be interpreted as a measure of how well the distribution of factor income fits the distribution of disposable income. In this sense, it could be used as a measure of horizontal inequality caused by public sector transfers and income taxes. However, it should be noted that some of the re-ranking due to public sector transfers and income taxes is, to some extent, intentional. For example, aged are given pensions but not younger persons with the same factor income. Thus, it might be better to interpret  $R^2$  as an index of economic mobility.

/Table 9 about here/

The results from our estimations are shown in Table 9. The ability of factor income to explain disposable income as measured by the  $R^2$  index ranges from

66 percent in Sweden<sup>1</sup> to 98 percent in West Germany. These two countries also show the highest and lowest elasticities for the relationship between disposable income and factor income. For West Germany this elasticity is very close to one, and for Sweden it is equal to 0.5. For the other countries, this elasticity ranges between 0.69 and 0.78.

Another way to show the combined effect of public sector transfers and income taxes is to look at families which are receiving more than they are paying. We define as "winners" those who have received more in public sector transfers during a given period than what they have paid as income taxes. Other families can be labeled "losers". It should be noted that obviously the total number of winners in a country should be a function of the relationship between the total amount paid as transfers and total income taxes. Thus, the first column in Table 10 shows that as many as half of the British families are winners, while the corresponding proportion is less than 30 percent in the US and in Switzerland.

/Table 10 about here/

Generally, families with elderly heads are winners. The proportion ranges from 81.8 in Israel to 96.0 percent in Sweden. A majority of single parent families are winners in five out of the eight countries covered in the study. The exceptions are West Germany, the US and Switzerland.

Generally, substantial minorities are winners among single non aged without children and couples with many children. Almost generally, the smallest fraction of winners is found among couples without, or with up to two children.

Finally we investigated the ratio between public sector transfers received and income taxes paid. If this ratio is close to one we may label this situation as "circularity": Public sector transfers and income taxes do not have any real effect on the families economic situation. However, a ratio close to one is a necessary, but not a sufficient indicator of circularity. Transfers and income

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<sup>1</sup> How small 66 percent is obviously a matter of judgment given that R<sup>2</sup> has no known probability distribution. However, we think that this result may hardly motivate the following statement: "... very little correlation remains between income before and after taxes and transfers", Bosworth & Rivlin (1987).

taxes might refer to different time periods: Unemployment compensation for example might be paid during the beginning of the period being considered, while income taxes in an equivalent amount could be paid during a later part of the same period.

We define circularity as a situation where the ratio between income taxes and transfer payments lies in the arbitrary chosen range going from 0.75 to 1.25. The results in Table 11 show that the phenomenon of circularity might be present in every country. The largest figures are reported for the two countries where the welfare state seems to be the most developed: Great Britain and Sweden. Computations not reported here show that this ratio varies between family types following a very similar pattern in all countries. Figures smaller than the average are found for families with elderly heads. On the other hand figures higher than the average are obtained for not aged couples without children.

/Table 11 about here/

## 7. Economic Well-Being of Families Strongly Depending on Transfers

Finally, let us study the economic well-being of those depending strongly on public sector transfers. That is, those families for whom public sector transfers amount to at least 90 percent of their gross income. As shown in the Appendix the elderly are a majority in all countries among such families.

We measure "economic well-being" as:

$$(9) \quad w = y / e$$

where  $e$  is an equivalence scale assuming a value of 1 for a single person and of 1,7 for two persons, with 0,5 is added for each additional person.

As information on the age of the children is not available in all the data sets, it was not feasible to use an equivalence scale handling such sources of variation in the "needs" of the families. We assume that each member of a family experiences the same well-being, thus we may compute an average economic well-being for the individuals.<sup>1</sup> In Table 12 we report on the mean economic well-being for persons living in families strongly depending on public sector transfers. We also report on the size of the fraction of all families represented by those families strongly depending on public sector transfers.

/Table 12 about here/

As can be seen Great Britain has a rather low position when the countries in our study are ranked according to the proportion of families strongly depending on public sector transfers. This is in agreement with the result in the preceding section showing that circularity might be most prevailing in Great Britain.

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<sup>1</sup> Income distributions are not always analyzed in this manner. We think, as Danziger & Tausing (1979), that the unit of analysis should be the individual, not the family, although the family is the income unit.



The variation between countries in the relative economic well-being for those mainly depending on public sector transfers is great. The average Swedish family strongly depending on public sector transfers has an economic well-being which is 83 per cent of the national average. The corresponding percentage for the US and Canada is 40 and 41 percent, respectively. The variation between countries fits well into the classification less developed more developed welfare state. All nations with a developed welfare state, with the exception of Great Britain, have higher figures than the nations having less developed welfare states.

The average economic well-being of families strongly depending on public sector transfers is 52 percent of the national average in Switzerland. This figure is higher than the corresponding results found for countries with a less developed welfare state, and also somewhat higher than the value reported for Great Britain. If we consider that Great Britain was classified as a well developed welfare state, the level of economic well-being of British families strongly depending on public sector transfers is remarkably low.

It is interesting to compare the results reported in Table 12 to the proportion of persons with a economic well-being below 50 percent of the national average, as computed by Buhmann (1987). Such results (not available for Israel) show that the US and Canada have the highest proportions of the population experiencing a low economic welfare. Great Britain and Switzerland hold an intermediate position, while Sweden, Norway and West Germany have rather small proportions of their populations with low well-being. Thus it seems if a relatively high economic well-being for those mainly depending on public sector transfers goes together with a small number of persons with a relatively low economic well-being.

## 8. Conclusions

We have carried out a comparative study of the role played by public sector transfers and income taxes in eight countries. A limitation of our approach is that we have not considered secondary effects, i.e. effects on factor income of public sector transfers and income taxes. We have used a new data base in which serious efforts have been made to get a reasonable degree of comparability in the data sets for the different countries. However, differences in data gathering and also some variations in definitions exist between the data sets. Thus we have limited confidence in the results reported here. However, we believe that the results, in general, indicate real differences and similarities between Canada, Great Britain, Israel, Norway, Sweden, Switzerland, the US and West Germany.

Public sector transfers play quite different roles in the different countries. The total amount of public sector transfers received by the families is large in some countries, with almost all families receiving transfers and many families depending mainly on public sector transfers. In other countries, the amount of public sector transfers is small, with only a minority of the families receiving any transfers at all, and just a few families depending mainly on transfers. In order to measure the importance of public sector transfers, we have related the amount of the transfers received by each family to its gross income. Comparing the distribution across countries we found that the larger the amount, the smaller its inequality. Thus we conclude that the larger the amounts of transfers, the more they are spread.

When looking for those to whom the public sector transfers are important, a common pattern may be identified. We found an U-shaped relationship between the age of the head of the family and transfer intensity. The aged are generally in majority among those depending mainly on public sector transfers. A considerable fraction of all single parent families also depend mainly on public sector transfers in almost all countries. Generally, few not-aged couples with or without children depend mainly on public sector transfers.

In some countries almost all families pay income taxes. In other countries there are a sizeable proportion of families which do not pay any income tax at all. Typically, families with elderly heads or single parents do not pay any income tax. It was found that the redistributive effect of income taxes has a tendency to increase with the size of income taxes.

We used regression models in order to compute ex post tax rates and evaluated them at the average income. The computations were performed separately for different types of families. The countries included in this study could be ranked according to the size of their marginal tax rates. The main conclusion is that Sweden, Norway and Israel have the highest marginal tax rates. Switzerland and the US constitute a middle group, and the lowest marginal tax rates are found in Great Britain and Canada. It is very risky to make any statement about marginal tax rates in West Germany because they are highly dependent on the family type considered. When comparing tax elasticities evaluated at the mean income we found that about all were greater than one. The US can be singled out as the nation with the highest income tax elasticities

By regressing disposable income into factor income, we were able to obtain a measure of how closely the distribution of purchasing power follows the distribution of remunerations in the sphere of production. The lowest figure was obtained in Sweden and the highest in Germany. For each family we compared transfers received and income taxes paid. In all the countries considered in this article the majority of families with aged heads and in most of these countries the majority of single parents receive more public sector transfers than the sums they pay as income taxes. We also computed the ratio between income taxes and public sector transfers received for each family. A value close to one indicate that the system might not have any real effects on the income of the families. The estimates showed that such circularity might exist in all countries considered here.

The relative economic well-being of those strongly depending on public sector transfers was estimated for each country. This index presents large differences between the countries. Generally, in countries where public sector transfers are large, the economic well-being of families strongly depending on public sector transfers do not differ much from the national average. In countries with small public sector transfers, those families strongly depending on public sector transfers have a economic well-being much lower than the

national average. Thus we conclude that a classification based on the size of public sector transfers between less developed and more developed welfare states is useful. However, other results seem to indicate that this classification is less useful when comparing income taxes internationally.

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**Appendix A.**

**Table 13**  
**Families in Eight Countries.**  
**Percentual Distribution by Age of the Head of Huseholds.**

Country	-25 percent	26-35 percent	36-45 percent	46-55 percent	56-65 percent	66- percent
Sweden	15.6	17.5	15.8	12.4	14.3	24.5
West Germany	6.4	16.0	19.7	17.7	14.0	27.2
United Kingdom	7.2	10.6	16.4	15.2	16.1	24.4
Norway	8.2	20.9	13.9	14.0	17.4	25.6
Canada	11.9	24.5	18.1	15.7	14.0	15.9
US	12.5	22.5	16.7	15.5	14.7	18.1
Israel	4.6	23.9	17.0	17.3	16.5	20.7
Switzerland	15.9	20.3	17.4	14.5	13.6	18.4
Average	10.3	19.5	16.9	15.3	15.1	21.9

**Table 14**  
**Families in Eight Countries.**  
**Distribution by Type of Family.**

Country	Aged percent	Single Parents percent	Single without children percent	Couples with no children percent	Couples with 1-2 children percent	Coup. with at least 3 children percent
Sweden	25.7	4.4	34.2	15.4	16.9	3.3
West Germany	28.4	3.2	17.3	20.7	26.1	4.4
United Kingdom	26.0	4.3	14.7	20.6	27.0	7.3
Norway	27.3	8.4	18.0	10.8	24.7	10.8
Canada	17.2	5.4	23.1	20.3	26.7	7.3
US	19.5	8.0	23.7	19.0	22.6	7.1
Israel	22.8	2.4	9.9	16.9	28.8	19.2
Switzerland	19.5	4.0	37.9	15.6	18.0	5.1
Average	23.3	5.0	22.4	17.4	23.9	8.1

**Table 15**  
**The Composition of Families Mostly and Strongly Depending on Public Sector Transfers after Type of Family**

Country	Aged	Single Parent	Single without children	Couples without children	Couples with - 2 children	Couples 3+ children
<b>M o s t l y   d e p e n d i n g ( <math>\alpha \geq 0.50</math> )</b>						
Sweden	65.7	3.4	22.9	5.2	2.0	0.8
United Kingdom	72.4	5.6	11.4	4.7	3.2	2.7
West Germany	74.5	2.4	13.7	7.4	1.7	0.4
Norway	74.8	7.6	12.8	2.6	1.5	0.9
Canada	62.0	10.9	16.5	4.2	4.5	2.0
Israel	65.9	6.5	13.8	3.3	4.9	5.7
US	68.3	12.1	11.0	4.5	2.5	1.6
Switzerland	74.3	1.3	20.3	3.7	0.3	0.1
Average	69.7	6.2	15.3	4.5	2.6	1.8
<b>S t r o n g l y   d e p e n d i n g ( <math>\alpha \geq 0.90</math> )</b>						
Sweden	73.6	2.3	20.5	3.1	0.2	0.2
United Kingdo	73.9	6.4	12.6	3.2	1.5	2.3
West Germany	77.5	1.2	14.3	5.7	1.2	0.2
Norway	76.3	3.7	16.9	2.5	0.5	0.2
Canada	58.6	13.3	20.1	3.3	3.5	1.3
Isarael	73.1	4.6	13.1	1.8	2.8	4.7
U S	62.7	15.3	15.7	3.2	1.8	1.3
Switzerland	66.0	1.1	31.4	1.5	0.0	0.0
Average	70.2	6.0	18.1	3.0	1.4	1.3



**Table 1**  
**AN OVERVIEW OF LIS DATASETS.**

Country	Dataset Name, Income Year (and Size) <sup>a</sup>	Population Coverage <sup>b</sup>	Sampling Frame <sup>c</sup>
US <sup>d</sup>	Current Population Survey, 1979 (69,000)	97.5	Decennial Census
Israel <sup>e</sup>	Income and Expenditures Survey, 1979 (2,300)	89.0	Electoral Register
Norway <sup>d</sup>	Norwegian Tax files, 1979 (10,400)	98.5	Tax Records
Canada <sup>d</sup>	Survey of Consumer Finances, 1981 (37,900)	97.5	Decennial Census
U. K. <sup>f</sup>	Family Expenditure Survey, 1979 (6,900)	96.5	Electoral Register
Germany <sup>g</sup>	Transfer Survey, 1981 (2,800)	91.5	Electoral Register
Sweden <sup>d</sup>	Household Income Survey (HINK), 1981 (9,600)	98.0	Total pop. Register
Switzer- land <sup>h</sup>	Income & Wealth Survey, 1982 (7,100)	95.5	Electoral Register

- a. Number of actual household units surveyed.
- b. As a percent of total national population.
- c. Sampling frame indicates the universe from which the relevant household sample was drawn.
- d. Excludes institutionalized and homeless populations.
- e. Excludes rural population (those living in places of 2 000 or less), institutionalized, homeless, people in kibbutz and guest workers.
- f. Excludes those not on the electoral register, the homeless, and the institutionalized.
- g. Excludes households with foreign-born heads, the institutionalized, and the homeless.
- h. Excludes nonresident foreigners but includes foreign residents, and institutionalized people if they have the right to vote and be elected.

**Table 2****Public Sector Transfers in Eight Countries.  
Size and Characteristics of Transference Intensity.**

Country	Total Transfers <sup>b</sup>	Proportion Families with a=0	Families with a>=0.50	Coefficient of Variation
Sweden	29.2	7.0	37.3	97
United Kingdom	17.2	18.0	26.4	112
West Germany	16.5	25.5	31.6	123
Norway	14.1	28.4	28.1	134
Canada	9.1	20.3	15.7	170
Israel	8.3	19.1	13.6	153
US	8.0	59.3	17.2	285
Switzerland	8.3	68.5	17.5	177
Average	13.8	30.8	23.4	156

b. Ratio of total transfers to total gross income.

**Table 3****Transfers Intensity in Eight Countries.  
Relationship to the Age of the Head of the Household<sup>a</sup>**

Country	Age of the Head of the Household						Total
	-25	26-35	36-45	46-55	56-65	66-	
Sweden	0.0	-0.4	0.9 <sup>b</sup>	0.9 <sup>b</sup>	5.2 <sup>b</sup>	0.3 <sup>b</sup>	1.2 <sup>b</sup>
United Kingdom	-2.2 <sup>b</sup>	0.0	0.0	0.3	4.4 <sup>b</sup>	1.0 <sup>b</sup>	1.1 <sup>b</sup>
West Germany	-3.0 <sup>b</sup>	-0.3 <sup>b</sup>	0.3 <sup>b</sup>	0.8 <sup>b</sup>	6.7 <sup>b</sup>	0.6 <sup>b</sup>	1.7 <sup>b</sup>
Norway	-1.0	-0.2	-0.0	0.2	2.0 <sup>b</sup>	1.6 <sup>b</sup>	1.3 <sup>b</sup>
Canada	-0.2	0.0	0.1	0.1	2.1 <sup>b</sup>	1.0 <sup>b</sup>	0.9 <sup>b</sup>
Israel	-2.7 <sup>b</sup>	0.0	0.0	-0.2	3.2 <sup>b</sup>	1.6 <sup>b</sup>	0.8 <sup>b</sup>
US	-1.2 <sup>b</sup>	-0.4 <sup>b</sup>	0.0	0.0	3.0 <sup>b</sup>	0.9 <sup>b</sup>	0.9 <sup>b</sup>
Switzerland	-1.8 <sup>b</sup>	-0.1 <sup>b</sup>	0.0	0.2 <sup>b</sup>	3.5 <sup>b</sup>	1.1 <sup>b</sup>	0.6 <sup>b</sup>
Average	-1.5	-0.2	-0.1	0.3	3.8	1.0	1.1

a. The effects reported here represent the effect of one year of age of the head of the household on the transfer intensity index. These effects have been computed by estimating a linear regression of age of the household on the transfer intensity index. The effects have been multiplied by 100.

b. t-statistics greater than or equal to 2.

**Table 4**

**Transfers Intensity in Eight Countries.  
Proportion of Families Depending Mainly on Public Sector Transfers<sup>a</sup> by Type  
of Family.**

Country	T y p e o f F a m i l y					
	Aged	Single Parent	Single without children	Coup no child	Coup 1or2 child	Coupl 3 + child
Sweden	94.5	28.5	24.7	12.2	4.3	9.0
U K	73.6	34.3	20.7	6.0	3.1	9.9
West Germany	83.1	23.4	25.1	11.3	2.0	2.5
Norway	77.3	25.2	20.3	6.7	1.8	1.5
Canada	56.0	31.4	11.2	3.3	2.7	4.0
Israel	39.4	36.6	18.4	2.8	2.3	4.3
US	59.7	26.0	8.0	4.0	1.8	3.7
Switzerland	66.1	5.5	9.6	4.0	0.3	0.4
Average	68.7	26.4	17.7	6.3	2.3	4.4

a. Those families with  $\alpha \geq 0.5$  (See section 2 for definition).

Table 5

## Income Taxes and Income Tax Rates in Eight Countries.

Country	Average tax rate <sup>a</sup> percent	Families paying no taxes percent	Families with tax rate $\geq$ 50 percent	Redistributional effect of income taxes <sup>b</sup> percent
Sweden	29.6	5.3	3.4	17.7
U K	16.9	19.9	0.1	8.1
Germany	21.7	33.3	1.7	3.4
Norway	25.3	14.9	0.5	15.9
Canada	15.2	22.8	0.0	8.6
Israel	28.7	16.4	4.1	12.8
US	21.0	15.1	0.4	12.1
Switzerland	19.9	1.8	0.0	n.a.
Average	22.3	16.2	1.3	11.2

a. Ratio between total income taxes and total gross income.

b. Calculated as one minus the quote between the Gini coefficients of Family Equivalent Net Income, Persons, and Family Equivalent Gross Income, Persons as reported by O'Higgins, Schmauss & Stephenson (1985).

**Table 6**  
**Income Taxes in Eight Countries.**  
**Families Not Paying Income Taxes by Type of Family.**

Country	Aged percent	Single parents percent	Single without chil. percent	Couples without chil. percent	Couples with 1, 2 chil. percent	Couples with 3 or more children percent
Sweden	11.5	6.4	5.3	0.4	0.5	1.6
United Kingdom	48.2	37.9	19.3	4.7	4.4	9.3
West Germany	87.9	27.5	27.2	9.3	2.5	4.2
Norway	36.5	18.2	14.3	2.3	1.6	2.2
Canada	60.3	2.5	23.6	9.2	7.4	11.1
Israel	53.7	25.4	20.5	4.1	1.2	2.5
US	52.1	20.1	9.5	3.1	1.2	2.6
Switzerland	3.6	2.5	1.5	0.4	0.0	0.0
Average	44.2	17.6	15.2	4.2	2.4	4.2

**Table 7**

**Income Taxes in Eight Countries.  
Marginal Income Tax Rates by Type of Family.**

	Aged	Single parents child.	Single without child.	Couples without child.	Couples with 1, 2 child.	Couples with 3+
Sweden	45.2	35.7	43.2	43.2	42.3	42.1
United Kingdom	21.9	26.2	15.9	25.9	25.3	24.0
West Germany	2.6	33.8	20.6	29.0	45.7	28.1
Norway	35.5	30.1	39.6	46.4	46.6	21.1
Canada	14.2	18.8	22.4	22.9	22.6	24.1
Israel	28.9	32.6	37.7	44.7	44.7	47.9
US	16.0	15.7	25.4	31.8	31.5	31.5
Switzerland	33.3	24.3	24.2	38.6	31.1	30.7
Average	24.7	27.2	23.5	35.3	36.2	31.2

**Table 8**

**Income Taxes in Eight Countries.  
Tax Rate Elasticities by Type of Family.**

Country	Aged percent	Single Parents percent	Single without childr percent	Couples with no childr percent	Couples with 1-2 childr percent	Coup. 3 + childr perc
Sweden	2.0	1.8	1.6	1.4	1.4	1.6
United Kingdom	2.3	1.9	1.3	1.3	1.4	1.5
West Germany	1.4	1.1	1.4	1.1	1.6	1.3
Norway	2.3	1.6	1.4	1.6	1.7	0.8
Canada	2.2	1.7	1.4	1.5	1.5	1.6
Israel	2.1	2.2	1.5	1.4	1.4	1.6
US	4.7	2.0	1.7	1.5	1.6	1.8
Switzerland	2.6	1.7	1.4	1.5	1.5	1.6
Average	2.5	1.8	1.5	1.4	1.5	1.5



**Table 9****Estimates of the Relationship between Disposable and Factor Income.**

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Country	$\gamma_1$	$\gamma_1 / (\bar{Y} / \bar{X})$	R <sup>2</sup>
Sweden	0.507	0.510	0.662
United Kingdom	0.720	0.717	0.886
West Germany	0.936	0.998	0.979
Norway	0.618	0.711	0.856
Canada	0.724	0.777	0.943
Israel	0.559	0.718	0.838
US	0.599	0.697	0.843
Switzerland	0.608	0.693	0.875
Average	0.659	0.728	0.860

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Table 10

**Public Sector Transfers and Income Taxes in Eight Countries.  
Families Receiving Public Sector Transference Greater than Income Taxes Paid  
by Type of Family.**

Country	Aged	Single parents	Single without child.	Couples without child.	Couples with -2 child.	Couples 3+ child.	Total
Sweden	96.0	58.1	34.5	21.6	19.0	35.0	46.0
U. K.	93.2	77.2	41.5	22.2	31.2	44.3	50.1
West Germany	93.7	44.5	36.2	19.6	7.4	27.0	41.4
Norway	87.7	51.4	24.0	14.8	6.2	9.0	36.8
Canada	92.0	62.0	27.8	17.0	21.3	35.8	37.4
Israel	81.8	72.7	34.1	8.8	4.7	24.0	31.3
US	87.6	42.0	14.3	11.1	7.1	12.2	29.3
Switzerland	93.1	12.6	17.2	9.5	1.8	2.4	27.2
Average	90.6	52.3	28.7	15.6	12.3	23.7	37.4

Table 11

**Circularity in Eight Countries.  
Families where the ratio between income taxes and transfers is between 0.75  
and 1.25.**

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Country	Percent
Sweden	8.3
United Kingdom	9.9
West Germany	4.8
Norway	4.3
Canada	6.0
Israel	5.1
US	6.1
Switzerland	5.2
Average	6.2

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Table 12

**Economic Welfare in Families Strongly Depending on Public Sector Transfers. <sup>a</sup>**

Country	Proportion of Families percent	Economic well-being as a proportion of average percent
Sweden	17.8	83.2
United Kingdom	14.2	48.3
West Germany	25.4	67.2
Norway	16.0	67.7
Canada	8.5	41.3
Israel	7.3	49.6
US	9.5	39.9
Switzerland	4.5	51.9
Average	12.8	56.1

a. Those families with  $a \geq 0.90$ .