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INCOME MOBILITY IN SWEDEN

A study on immigrants and native Swedes

Abstract

This paper derives and compares income mobility of immigrants and native Swedes during the periods 1980-84 and 1992-96. A general review of the concept of income mobility is conducted, as well as a theoretical examination of possible determining factors and consequences of the income mobility concept. The empirical analysis is deduced by using a database, consisting of approximately 600 000 individuals whose incomes can be followed since 1968. The results demonstrate greater income mobility for immigrants than for native Swedes during the years 1980-84. It is found that during the transition years, between the first and the second time period, income mobility in absolute terms increased for both immigrants and native Swedes. It is also found that, in relative terms, the increase was greater for native Swedes than for immigrants.

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1 Introduction*

Several studies in recent years show that income inequality in Sweden, in accordance with the international trend, rose during the 1980's and the 1990's.[1] It has also been shown that the labor market situation, in terms of pretax income levels, significantly deteriorated for immigrants. While income differences became greater, many immigrants stayed at the bottom of the economic ladder, and the gap between the average income levels for native Swedes and immigrants widened.[2]

Within and outside the world of economics the concept of income inequality has always played an important role in the policy making process. Traditional policies to fight injustice and poverty are often based on the measured or estimated level of income inequality.

The problem with the traditional view of income inequality is that it only considers the income at a "snapshot" in time, normally the income during one single year. In recent years it has frequently been argued by economists that a more dynamic perspective on income must be used to complete the picture of social injustice. The concept of income mobility – the movements by individuals, in relative or absolute terms, on the income level scale - provides an additional view, and a helpful analytic tool when a period of time longer than one single year is considered. A high (or low, but increasing) static income inequality does not necessarily imply a high (or rising) inequality when a period of several years is considered, if it is accompanied by high (or low, but increasing) income mobility.

This addition of the dynamic view makes income mobility an important factor to consider for policy makers. The level of income mobility provides a way to measure the possibilities of individuals to improve their financial situation through their own efforts. Therefore, in the process of designing policies to help people at the lower levels of the economic scale, the concept of income mobility may be useful.

Even though the existing empirical research on income distribution and inequality is very extensive, empirical studies focusing on income mobility are rarely conducted. The income mobility of immigrants living in Sweden is briefly considered in some general studies on Swedish income mobility, but is not in any way thoroughly examined.

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[1] Among other reports, this is shown in Björklund & Fritzell [1992], LO[2000] and SOU 2000:3.

Therefore, to form a dynamic view on the income inequality situation for immigrants, a profound examination of the income mobility is needed.

The purpose of this paper is to examine the income mobility of native Swedes and immigrants in Sweden. In particular, the study aims to answer the following two questions; **Does income mobility of immigrants and native Swedes differ? Did income mobility of immigrants change from the beginning of the 1980's to the mid 1990's?**

Related to welfare aspects of the labor market are both the employment situation and the income situation. The income situation can be divided into a static view, focusing on static distribution and inequality, and a dynamic view, focusing on lifetime distribution and mobility. This paper deals only with the concept of income mobility, and no attempt is made to give a full picture of social welfare. Consequently, only individuals employed during the periods of study are included in the considered populations. To complete the picture on welfare, findings on the employment situation and the static income situation have to be added and taken into consideration.

Another delimitation is that only first generation immigrants (here defined as individuals born in another country than Sweden) are considered. There are two main reasons for not studying second generation immigrants (individuals born in Sweden, but with one or two parents born in another country). The first reason is that data is more difficult to find for second generation than for first generation immigrants. The second reason is that the majority of the second generation immigrants during the periods of study were, because of their young age, not well established on the labor market.[3]

1.1 Method

Most studies on income mobility focus on either absolute or relative mobility. Absolute mobility of an individual describes how much the income has changed in relation to the initial income, while relative mobility describes how much the individual's income has changed relative to the other individuals in the population.

In this paper both absolute and relative mobility, in terms of labor market income,[4] are considered. For the examination of relative mobility, transition matrices are used. For each transition matrix, a specific period of time is studied, and for the first and the last year of the period, the considered population is divided into income quintiles. The matrix then shows, in aggregated form, how the individuals in each initial income quintile are distributed at the end of the period. The method of transition matrices, which is a commonly

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[2] Scott [1999] shows how the labor market situation, in terms of income level differences, deteriorated for immigrants during the late 1970's and the 1980's.

[3] A description of the demographics of second generation immigrants in Sweden can be found in Ekberg & Gustafsson [1997].

[4] The income concept used, labor market income, is described in section 3.1.

used method for the study of income mobility,[5] gives an overview picture of what has happened during the considered period of time. However, there are two basic problems with the method. First, because of the fixed quintile boundaries, individuals at an initial income position close to a boundary will in general show up as more mobile than individuals closer to the middle of a quintile. Secondly, when measuring mobility in relative terms, there is a possibility of overestimating the level of mobility in a country with a low level of income inequality.

Therefore, in order to give a more complete picture of the income mobility, measures of absolute mobility have to be added. In this paper, absolute mobility is measured by looking at the share of the population that has experienced upward income mobility of 10 and 30 per cent during the considered periods of time. Obviously, looking only at these two levels does not give a perfect description of the level of absolute mobility. However, together with the transition matrices, this should give a good overall picture of the income mobility.

1.2 Outline of the paper

This paper contains three additional chapters. In the following chapter a theoretical overview of income mobility is given, and the possible implications of income mobility on economic well being are discussed. An overview of previous empirical findings provides the basis for a discussion about possible determining factors of individual income mobility, and the way these factors affect mobility of immigrants. Chapter two ends with the formation of three hypotheses. In chapter three an empirical application examines the validity of these hypotheses. Finally, in chapter four the conclusions from the theoretical examination and the empirical application are presented.

[5] Among other studies, the method of transition matrices is used in Gittleman & Joyce [1999] and Hungerford [1993].

2 Theory and previous research

2.1 Income mobility and social welfare

In the empirical part of this paper the level and the structure of income mobility in Sweden is examined and analyzed. However, in order to use the concept of income mobility in the policy making process, the implications and the importance of an existing mobility also have to be examined. Income mobility, if existing, is usually implicitly treated as something positive, and few remarks are raised opposing this view. However, both positive and negative implications exist, and for the policy maker it is important to be aware of and consider the arguments given from both sides.

The pro-stance on income mobility is summarized in Aaberge et al [1996], with three main arguments. The first is the efficiency argument, saying that mobility leads to a flexible and adjustable economy, where labor resources are allocated to where they are needed. The second is the opportunity argument, an important part of the traditional liberal definition of justice. In a society with a high level of income mobility, the individual's future actions are more important than his/hers income background. Hence, it is possible for him/her to improve a poor financial situation through his/her own efforts. This is congruent with the liberal idea of a just society as one in which the individuals are born with the same possibilities. The third argument is that income mobility with time equalizes incomes, and therefore makes yearly redistribution less necessary. This is argued in Bergström & Gidehag [2001, p 1], where it is stated that, "One of the consequences of income mobility is that much of the redistribution that is being done is unnecessary, and variations in incomes may be handled with insurance programs".

Among the economists arguing that income mobility is not necessarily something positive, two main arguments are used. The first one is a criticism of the use of total income during a period as the only way of measuring social welfare. This is expressed in Shorrocks [1978, p 392]; "it seems likely that individuals are concerned with both the average rate of income receipts and the pattern of receipts over time", meaning that the shape of the income profiles might affect total welfare. *Ceteris paribus*, it is both possible and probable for individuals to prefer a constant (or constantly growing) income to a fluctuating one.

The second argument opposing the importance of observed income mobility is a critique of the third pro-argument. The critics of the idea of spontaneous redistribution usually

point out that income movers usually do not move very far on the economic ladder; many of the individuals that have moved out of poor financial situations fall back into poverty again. This, claim the critics, means that income mobility does not necessarily lead to lower inequality when the considered time period is extended.

Whether the criticism towards the importance of income mobility is justified or not depends on preferences in terms of theoretical reasoning. It is theoretically possible to create models of societies with individual preferences that make social welfare decrease with higher mobility.[6] However, with certain restrictions given to the social welfare function, it is possible to show that income mobility leads to lower inequality when the considered period of study is extended. Furthermore, if the social welfare function is restricted to consider total income during a period of time as the only independent variable, welfare increases with income mobility. Appendix 2 gives a mathematical proof, supporting this statement.

2.2 Previous findings on income mobility

As already mentioned, the existing empirical research on income mobility is not very extensive. Most studies have been carried out with data from the US, but studies focusing on income mobility in Sweden also exist. Mobility of ethnic groups and immigrants has been studied, but only with ethnic belonging or country of birth as one determining factor out of many.

Using panel data from the US in the 1960's, Anthony Shorrocks found weak evidence supporting his theories about decreasing inequality with income mobility. This is shown in Shorrocks [1978], where also the differences between black and white males are considered. Periods of two and three years are used to calculate income rigidity (the opposite of mobility), with results indicating greater mobility of young white men, compared to their black counterparts. However, when individuals at the age of 30 or above are considered, no significant difference in mobility between blacks and whites is found.

In Gittleman & Joyce [1999] it is concluded that the general level of family income mobility in the 1980's differed little from the level of mobility in the 1970's. Race is analyzed as one of the determining factors of income mobility, and it is concluded that families headed by blacks have a more difficult time moving upward, compared to families headed by whites. These findings are consistent with Duncan, Rodgers & Smeeding [1993],

[6] See Shorrocks [1978] for the derivation of a social welfare function that not necessarily increases welfare with income mobility.

where a similar study of racial differences is presented. However, even though racial differences are analyzed, neither in Gittleman & Joyce [1999] nor in Duncan, Rodgers & Smeeding [1993] the mobility of immigrants is analyzed.

Two other studies on income mobility in the US are Veum [1992] and Hungerford [1993]. These studies do not look explicitly at racial or ethnical differences, but they do analyze changes over time. According to Hungerford [1993] mobility was more or less the same in the 1980's as in the 1970's, which is consistent with the findings in Gittleman & Joyce [1999]. However, Veum [1992] reaches another conclusion; general income mobility decreased from the beginning of the 1970's to the 1980's.

The American studies, from the 1970's and later, all use the Michigan Panel Study of Income Dynamics (PSID), a database containing the incomes of approximately 5 000 families, chosen to give a representative sample of the nation. In Sweden, different databases have been used for the study of income mobility. In Björklund & Fritzell [1992] the Level of Living Surveys (Levnadsnivåundersökningarna) are used. These surveys consist of interviews with approximately 6 000 randomly chosen individuals. One conclusion in Björklund & Fritzell [1992] is that the lifetime income distribution is significantly more equal than the yearly distribution, indicating a high level of income mobility. However, it is also concluded that when only individuals with the age of 30 and above are considered, the correlation between life-time and annual incomes is quite strong, indicating a lower level of mobility for the part of the population that is already established on the labor market. Finally, it is found that between the 1970's and the 1980's, the income mobility increased in Sweden.

Other studies on income mobility in Sweden are done with information from databases of greater extent than the American PSID and the Level of Living Surveys. SCB [1998] uses information from the LOUISE database, with approximately 100 000 randomly chosen individuals between the ages of 18-61. SCB [1998] considers the income mobility between 1991-94, and finds that there was considerable mobility (both upwards and downwards) even during this period of recession and deteriorating labor market conditions. Some determining factors of income mobility are considered, among them country of birth. Income mobility is found to be greater for immigrants than for native Swedes. It is also found that the income mobility differs between European and non-European immigrants, with higher levels for non-European immigrants.

A third study of income mobility in Sweden is Bergström & Gidehag [2001], where the database LINDA, also used in this paper, is applied. Like in SCB [1998], but unlike the results in Björklund & Fritzell [1992], it is found that income mobility is common.

Income mobility is also found to be increasing since the beginning of the 1980's, with a possible explanation being changes in marginal tax effects. One particular conclusion is that the groups that have permanently low incomes, and therefore cannot be considered temporarily poor, are relatively few. Bergström & Gidehag also enter the policy discussion, arguing that the concluded high level of income mobility implies that much of the annual redistribution in Sweden is unnecessary.

Finally, income mobility is considered as a part of Uddhammar [1997], using a combination of different databases from Statistiska Centralbyrån (SCB), with a total of about 200 000 individuals. Mobility is analyzed during the years 1985-91, for individuals with the age of 18 and above. It is found that mobility is common; only 20 per cent of the individuals with low incomes (defined as less than half of the median income) were still low-income takers after six years. However, since the study includes individuals between the ages of 18-30, a large portion of the found income mobility can probably be ascribed to individuals who lacked employment at the beginning of the time period.

Together, these four Swedish studies show that there is no consensus concerning the extent and the effects of income mobility. In addition, when it comes to determining factors and income mobility of specific groups, we still do not know much about the situation in Sweden. The income mobility of immigrants is considered in SCB [1998], but only as one out of many determining factors. In addition, there are certain problems with the conclusions drawn from the results. When SCB [1998] finds that income mobility is greater for immigrants, it is done without taking into account that during the period of study (1991-94) the unemployment rose more for this group than for native Swedes.[7] Employment status is not considered (that is, both employed and unemployed are studied within the same category), therefore individuals that went to or from employment during the period contributed significantly to the measured level of income mobility. Hence, the resulting high level of income mobility for non-European immigrants is expected. The findings reveal little about the actual mobility of the individuals employed during the entire period of study. In order to characterize the structure and the effects of income mobility of immigrants compared to native Swedes, a more thorough examination is necessary.

2.3 Determining factors of income mobility

[7] A description of the changing labor market situation for immigrants and natives in Sweden in the beginning of the 1990's can be found in Scott [1999].

There are a variety of possible determining factors of income mobility and of the possible differences between immigrants and native Swedes. Some of the factors are included in the data set and explicitly considered in parts of this study. Other factors are not included in the dataset, and therefore they constitute possible hidden explanations to the empirical findings. In this section, the factors included in the data set are briefly presented. Following this presentation, possible factors explaining differences between native Swedes and immigrants are presented and analyzed more extensively.

Demographics. Both age and sex are explanatory factors, influencing income mobility in different ways. Several Swedish studies show that mobility decreases with age (SCB [1998], Uddhammar [1997]). Regarding the differences between men and women, no consensus can be found among the empirical findings. In Bergström & Gidehag [2001] and Uddhammar [1997] higher levels of mobility for women are found, whereas the findings in SCB [1998] indicate the opposite. In this paper, demographic factors will be controlled for. Therefore, in the analysis of differences between natives and immigrants, age and sex do not constitute possible hidden factors explaining differences.

Sector. Whether the income mobility differs for people employed in the public and the private sector has not been examined in any of the studies mentioned above. However, for Sweden, it is shown in SOU 2001:53 that with the increasing income differences experienced in the 1980's and 1990's, the income situation deteriorated for those employed within the public sector and the already existing income gap between the two sectors became wider. This should imply that during these two decades the level of income mobility, at least upward mobility, was lower for the public sector. In the empirical part of this paper, sector as a determining factor will be controlled for.

When it comes to explaining the differences between natives and immigrants within the same demographic group and sector, possible determining factors can be found both in the labor market supply and the demand side. Many studies on economic assimilation focus mainly on the labor supply, using a human capital approach. The following two determining factors, both possible to derive from within an extended framework of the human capital theory, are discussed in terms of labor supply characteristics. [8]

Risk-taking. One argument supporting the notion of immigrants as a positively selected group with higher income mobility is that many immigrants, already by making the decision to migrate have shown a willingness to take risks. With a higher willingness to take

[8] For a further understanding of the human capital theory, the authors recommend Becker [1980]. For extensions of the human capital theory on immigrants, see Scott [1999].

risks follows a greater chance of moving both upwards and downwards on the income scale, and consequently a greater chance of income mobility.

Determination to succeed. A second possible argument supporting the notion of immigrants as more income mobile than native Swedes stems from the determination of the immigrant to succeed. This determination is a necessary trait while enduring the many times long and difficult process of immigrating. In order to overcome the obstacles involved in immigration, an immigrating person has to be motivated and convinced that the new country offers more possibilities than the old country. This determination to succeed implies that, after arrival to Sweden, the immigrant is motivated to work hard, to learn the language and to understand the culture. Unlike the argument of risk-taking, which can be used to explain both upward and downward income mobility, this high motivation to succeed provides an argument only for upward mobility.

The main problem with the two given arguments for greater income mobility among immigrants is that they are valid and logical when it comes to economic migration – that is, when people choose to migrate for economic reasons. However, they do not make sense in the same way when it comes to political migration. This means that the two arguments might be valid as determining factors for the immigrants who came to Sweden before the 1970's, while for the immigrants who came in the 1980's and the 1990's, when the immigration to Sweden was mainly political,[9] these arguments are probably not the most significant determining factors for the level of income mobility - additional determinants have to be considered.

Educational level. Within most income mobility theory it is taken for granted that upward mobility increases with higher education. None of the Swedish studies mentioned above deal with educational level as a determining factor. However, for the US it is proven in Gittleman & Joyce [1999] that the income mobility is higher for college graduates than for the rest of the population. Therefore, one can suspect this will be the case also for Sweden. How this affects the measuring of income mobility of immigrants is not perfectly clear, though. Several studies show that the general educational level of the immigrant population does not differ significantly from the educational level of the population of native Swedes,[10] and any income mobility differences found by studying aggregated data can therefore not be derived from differences in education. However, differences in educational level between subgroups

[9] The migration to Sweden is described in Ekberg & Gustafsson [1995] and Scott [1999]. An overview is given in Appendix 3.
[10] The educational level of different immigrant groups in Sweden is described in Ekberg & Gustafsson [1995].

within the immigrant population do exist, which gives a possible explanation to differences in mobility between ethnic subpopulations.

The three possible factors given above - "risk-taking", determination to succeed" and "educational level" - all apply exclusively to the characteristics of the labor market supply side. However, differences in income mobility between immigrants and natives might be derived also from characteristics of the labor market demand. Therefore, let us now turn to the determining factors including the values and the characteristics of both the supply and the demand side.

Asymmetry of information. A third argument (after the "risk-taking" and the "determination to succeed" arguments) proposing a higher general level of income mobility for immigrants, compared to natives, is that there will always be a certain amount of asymmetry of information on the labor market. The immigrants, of course, know a lot about themselves and their ethnic group, but the employers do not know equally as much. Therefore, employers might view immigrants as members of a homogenous group. Subsequently, many immigrants are bound to commence their employment at the same (low) level. Since the immigrant population in reality is all but homogeneous, this asymmetry should lead to a relatively high level of income mobility, especially with many upward income movers. Related to this by asymmetry forced income career are the findings of Barry Chiswick on economic assimilation of immigrants in the US. The conclusion in Chiswick [1978] is that immigrants in general start with lower incomes than the natives, but the incomes then rise rapidly, and eventually many immigrants have incomes above the average of the native population. A problem with this as an explicatory factor of income mobility in Sweden is the extensive labor market framework of regulations that might have made it difficult for employers to let immigrants begin at low income levels.[11] Instead of a path with low initial income and thereafter upward mobility, initial unemployment and thereafter labor market alienation is a possible scenario. Nevertheless, for some parts of the labor market, especially the parts where the power of the labor union is not very extensive, it is possible that the upward income mobility is higher for immigrants due to the asymmetry of information aspect.[12]

Post-industrial demands. The possible determinants previously accounted for suggest that income mobility should be higher for immigrants. However, strong arguments

[11] In this paper, this discussion exclusively applies to the effects of labor market regulations on income mobility. No attempt is made to fully evaluate the welfare consequences of labor market regulations.
[12] For a more extensive discussion on labor market asymmetry, see Stark [1991].

proposing a lower level of mobility also exist. One of the strongest arguments is given by the post-industrial changes of the Swedish labor market, leading to changing demands for language proficiency and cultural understanding. These new post-industrial demands have been thoroughly examined by Kirk Scott, with the general conclusion that "The Swedish economy of 1993 demanded a totally different type of labor than it did in 1970, with increased emphasis on informal, country-specific skills" (Scott [1999, p 1]). A more informal organization has replaced the rigid hierarchy, inherent in the traditional industrial structure. In the new way of organizing work, more emphasis is placed on interpersonal skills. An industrial worker in the traditional structure did not necessarily have to communicate well in Swedish. The job assignment was well defined and delimited, and the instructions were easy to follow. However, to adapt well and to succeed at a work place with new concepts such as job rotation and workgroups, more interpersonal skills are necessary. For income mobility this means that upward mobility should be less likely for immigrants, since the lack of language skills and cultural knowledge makes it harder to be productive, which in turn makes it harder to receive a promotion or a qualified job where an income career is possible. Especially for the 1990's, this is a possible important determinant of income mobility differences between immigrants and native Swedes. Therefore, differences between the income mobility in the 1980's and in the 1990's can be expected.

Discrimination. Another factor that may create a negative difference in upward mobility (from the immigrants' perspective) is discrimination. Because of the existence of the other determinants already described in this section, negative differences between natives and immigrants with regard to their level of mobility cannot be directly derived from discrimination. However, recent studies have shown that there are considerable amounts of discrimination on the Swedish labor market,[13] and the expected effect on income mobility is of course a lower level of upward mobility for immigrants.

In addition to what has been described, there probably exist other factors influencing the empirical results from investigating income mobility of immigrants. The way in which the composition of the immigrant population changed in the 1980's and the 1990's is likely to have an effect on the measured level of income mobility, when aggregated data for the whole immigrant population is used. A greater **cultural distance** in the 1980's between the native Swedes and the arriving immigrants probably amplified the negative effects on the upward income mobility, which came with the post-industrial changes in labor market demands. Also, the changing **macro-economic climate** during the recession in the beginning

of the 1990's might have had effects on the possibilities of immigrants to move upwards on the income scale.[14]

When it comes to determinants suggesting increasing income mobility of immigrants, the increasing level of **self-employment** needs to be taken into consideration. The self-employment ratio for immigrants compared to native Swedes rose from 75 to 101 percent between 1980 and 1990 (Scott [1999]). With the exception of Iraq, the relative ratio increased for all groups of immigrants during this period, and it is possible that this higher level of self-employment led to higher levels of market income mobility of immigrants.

2.4 Hypotheses

Following the theoretical evaluation of income mobility and the possible differences between immigrants and native Swedes, three hypotheses are formed:

1. In the early 1980's the income mobility was higher for immigrants than for native Swedes.
2. The absolute upward income mobility increased for all demographic and sectorial groups of immigrants and native Swedes, from the early 1980's to the mid 1990's.
3. The upward income mobility of immigrants in relation to native Swedes declined from the early 1980's to the mid 1990's.

The first hypothesis stems from the determining factors "risk taking", "determination to succeed" and "asymmetry of information" (all three are explained above), all suggesting a higher mobility for immigrants. This hypothesis is also supported by the findings in Chiswick [1978].

According to the results in Bergström & Gidehag [2001], the general increase in absolute upward income mobility in Sweden, between the 1980's and 1990's, was remarkably large for all demographic groups. Hence, higher levels of absolute upward mobility can be expected, also for the subpopulations considered in this paper.

The third hypothesis finds support from the notion of new post-industrial demands. Furthermore, when aggregated data is considered, the greater cultural distance

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[13] The authors recommend Öhman [2000] for an examination of discrimination on the Swedish labor market.

[14] For further discussions regarding the greater cultural distance experienced between immigrants and native Swedes, and the consequences of the changing macro-economic climate, see Scott [1999], Ekberg & Gustafsson [1995] and SOU 2000:37. An overview is given in Appendix 3.

experienced between newly arrived immigrants and native Swedes in the early 1990's render theoretical support to this hypothesis.

Even though these factors seem to be the factors most likely to dominate, the outcome is not perfectly clear. It is possible that discrimination kept the upward income mobility down for immigrants already in the 1980's, and the higher level of self-employment in the 1990's might have boosted mobility for immigrants, leading to higher mobility in the 1990's, also when immigrants are compared to native Swedes. Let us turn to the empirical application to examine the validity of the hypotheses.

3 Empirical application

3.1 The data

The database used in the upcoming empirical analysis is named LINDA, a longitudinal income database containing register data on income, taxation and transfers for approximately 600 000 individuals during the years 1968-96. The database, described in Bergström & Gidehag [2000], aims to give a representative view of income, taxation and transfers during the period. All the individuals included in the database are assigned an individual number, which makes it possible to follow every person during different time periods. The database also contains information on age, residential location, and sector of occupation. The variable used in this analysis when studying income is annual market income (MINK). By excluding taxes and transfers, MINK measures pure gross income from the labor market. In order to conduct studies over time, the MINK variable is adjusted for economic growth and inflation. This is accomplished by using an index based on prices and GDP in 1999. [15]

In terms of characteristics of the population used in the analysis, two delimitations are imposed. The population sample is narrowed down by only using individuals between the ages of 30 and 60,[16] and by setting a minimum level of gross earnings (MINK) of 50 000 Swedish crowns (SEK), a level chosen *ad hoc* to exclude individuals who went to and from unemployment during the periods of study. These delimitations render a total number of approximately 200 000 individuals in the analysis. Furthermore, the population is divided into two subpopulations: native Swedes and immigrants. For both subpopulations, the income mobility is studied between 1980 and 1984, and between 1992 and 1996. Immigrants are compared to native Swedes within as well as between the two time periods. The exact composition of the population sample in relation to age, sex and sector follows in *Table 1* and *Table 2.*

3.1.1 Critique of data and variables

Several problems with the data set and the used variables can be identified. Primarily, the choice of market income (MINK) as the backbone variable implies both pros and cons when attempting to deliver a valid final analysis of the processed data. By excluding redistributing

[15] For more information about the LINDA database, contact Helena Sjödin at Statistiska Centralbyrån (SCB).
[16] The minimum age of 30 was considered the first year of the periods of study, and the maximum age of 60 was considered the last year of the periods of study.

factors, such as taxes and transfers, the MINK variable supplies a picture of people's self supporting ability. Consequently, the variable facilitates the policy-making process concerning the setting of appropriate levels of redistribution in a society (discussed more extensively in section 2.1). Conversely, the negative aspect of choosing the MINK variable concerns the weakness of not accounting for the actual disposable income. Hence, if one attempts to study changes in standard of living, taxes and transfers have to be added to the MINK variable.[17]

Secondly, the absence of variables of interest in the database should be accounted for. The inclusion of variables asserting the amount of hours worked and the educational status would have contributed to the strength of the explanatory power in the analysis.

Finally, a general problem when attempting to study income arises. The fact that the analyzed income levels are derived from officially reported income forms, means that non-taxed incomes are excluded. Incorporating estimates of the magnitude of this income would be both time consuming and speculative, and in this paper no attempt will be made to pursue this aspect further.

TABLE 1. DEMOGRAPHIC DISTRIBUTION OF THE SAMPLE

		Men		Women	
Period	Age Groups	Natives	Immigrants	Natives	Immigrants
1980-84	30-39	48 945	4 519	38 614	3 783
	40-49	31 029	3 412	23 766	2 835
	50-60	20 997	1 584	14 446	1 426
	30-60	95 119	8 854	72 311	7 539
Total Number of Individuals = 183 823					
1992-96	30-39	36 401	3 090	30 521	2 982
	40-49	37 609	3 329	32 341	3 113
	50-60	17 327	1 794	15 026	1 475
	30-60	84 922	7 648	72 468	7 043

[17] Another alternative to the MINK variable is an income variable excluding general taxes and transfers, but including wage related insurances, such as sickness benefits and parental allowances. The inclusion of these insurances would probably lead to lower levels of measured income mobility.

Total Number of Individuals = 172 081

TABLE 2. SECTORIAL DISTRIBUTION OF THE SAMPLE

Period	Sex	*Public Sector* Natives	Immigrants	Private Sector Natives	Immigrants
1980-84	**Women**	42 488	3 694	27 087	3 645
	Men	27 966	1 817	62 010	6 620
Total Number of Individuals = 183 823					
1992-96	Women	46 727	3 924	24 746	2 986
	Men	24 372	1 851	57 938	5 447

Total Number of Individuals = 172 081

3.2 Relative income mobility

The empirical examination of relative mobility is summarized in *Table 3* and *Table 4*, both displaying transition matrices for 1980-84 and 1992-96. *Table 3* and *Table 4* show matrices for native Swedes and immigrants respectively, and *Table 5* shows the immobility means, calculated as the arithmetic means of the matrix diagonals.

When analyzing the results, we see first of all that during the period 1980-84 the immobility mean was significantly lower for immigrants than for natives, indicating greater income mobility for immigrants. During the years 1992-96 the immobility mean was still lower for immigrants, but the gap had decreased (*Table 5* shows the increase in the relative value from 0.92 to 0.96).

These findings on the immobility means support both hypothesis one and three. What happens if only individuals with low wages – that is, the individuals in the bottom

quintile – are considered? During the period 1980-84, the level of income mobility for the individuals initially located in the bottom quintile was substantially higher for immigrants than for natives (immobility 55.1 per cent for immigrants, compared to 63.6 per cent for natives), but during the period 1992-96 there was almost no difference at all (immobility 59.4 per cent for immigrants, compared to 60.0 per cent for natives). Both hypothesis one and hypothesis three hold, also when only the individuals initially located in the bottom quintile are considered.

TABLE 3. QUINTILE MOBILITY RATES FOR NATIVE INCOME
(Values in %)

	Quintile at End				
***Quintile at* Start**	Bottom	Second	Third	Fourth	Top
1980-84 Transition Matrix					
Bottom	63.6	25.6	7.4	2.5	1.0
Second	24.2	47.5	19.6	6.8	1.9
Third	7.5	18.7	49.7	20.4	3.8
Fourth	3.5	5.7	20.3	54.4	15.9
Top	1.7	2.2	2.9	15.9	77.4
Immobility mean = 58.5					
Number of observations = 167 430					
1992-96 Transition Matrix					
Bottom	60.0	25.1	8.9	4.3	1.7
Second	21.6	47.5	21.5	7.2	2.1
Third	8.8	19.3	46.5	21.3	4.1
Fourth	6.0	5.8	9.6	51.4	17.1
Top	3.1	2.5	3.5	15.7	75.2
Immobility mean = 56.1					
Number of Observations = 157 390					

TABLE 4. QUINTILE MOBIILITY RATES FOR IMMIGRANT INCOME
(Values in %)

	Quintile at End

***Quintile at* Start**	Bottom	Second	Third	Fourth	Top
1980-84 Transition Matrix					
Bottom	55.1	29.0	10.1	3.7	2.0
Second	23.6	45.4	21.7	6.9	2.5
Third	9.0	19.9	45.7	21.3	4.1
Fourth	4.7	7.4	20.5	50.3	17.1
Top	2.8	3.3	4.2	15.6	74.1
Immobility mean = 54.1					
Number of observations = 16 393					
1992-96 Transition Matrix					
Bottom	59.4	23.3	9.9	5.3	2.2
Second	22.6	47.1	20.5	7.9	1.8
Third	11.5	18.7	43.9	21.4	4.4
Fourth	7.8	7.1	20.7	47.9	16.6
Top	5.1	3.2	4.8	17.1	69.8
Immobility mean = 53.6					
Number of observations = 14 691					

TABLE 5. RELATIVE IMMOBILITY MEANS
(Values in %)

	Immigrants	Natives	Relative Value
Immobility means 1980-84	54.1	58.5	54.1/58.5 = 0.92
Immobility means 1992-96	53.6	56.1	53.6/56.1 =0.96

3.3 Absolute income mobility

For absolute mobility, a presentation of the results is given in *Table 6* and *Table 7*. *Table 6* displays, for different demographic groups, the shares of native Swedes and immigrants that have experienced upward real income mobility of 30 per cent or more during 1980-84 and 1992-96, while *Table 7* contains upward real income mobility of 10 per cent or more.

First, as a general result, in accordance with previous findings, we see that income mobility decreases with age. We can also see that mobility is higher for women than for men, in accordance with the findings in Bergström & Gidehag [2001] and Uddhammar [1997], but not with SCB [1998]. One possible explanation to this difference could be that

more women than men have gone from part time to full time employment. Since the lower limit of market income of individuals included in the sample is chosen as low as 50 000 SEK, changes from part to full time are included in the sample, and therefore registered as mobility. In addition, the exclusion of wage related insurances probably increases the difference, between men and women, in measured income mobility.[18]

Looking only at the male part of the population, we see that, for all age groups, during the period 1980-84, income mobility was greater for immigrants than for natives. From 1980-84 to 1992-96, absolute mobility increased for both natives and immigrants, with a greater increase, calculated as a percentage, for natives. All of this together implies that for men, all three hypotheses receive support from the empirical findings.

When looking at the absolute mobility levels for women, the empirical findings give a different picture. Upward absolute mobility increased for all age groups between 1980-84 and 1992-96. Hence, hypothesis two holds, also for women. However, the mobility levels are, for both time periods, basically the same for native and immigrant women, which implies that for women, neither hypothesis one nor hypothesis three is valid.

What can explain the failure of hypothesis one and three for women? One possible explanation could be that higher shares of women than men are employed within the public sector, where the wages to a higher extent than within the private sector are standardized.

TABLE 6. UPWARD INCOME MOBILITY 30%, DEMOGRAPHIC GROUPS
(Values in %)

		Men		Women	
Period	Age Groups	Natives	Immigrants	Natives	Immigrants
1980-84	30-39	8.0	13.3	22.4	22.1
	40-49	5.3	9.3	13.1	12.9
	50-60	4.0	4.8	6.2	6.6
	30-60	6.4	10.5	16.5	16.4
1992-96	30-39	17.5	21.4	25.2	25.5
	40-49	9.6	13.3	13.3	15.0
	50-60	6.0	6.6	6.5	6.0
	30-60	12.2	15.1	16.8	17.2

[18] In general, women receive sickness benefits and parental allowances to a greater extent than men (Riksförsäkringsverket).

TABLE 7. UPWARD INCOME MOBILITY 10%, DEMOGRAPHIC GROUPS
(Values in %)

Period	Age Groups	*Men* Natives	*Men* Immigrants	Women Natives	Women Immigrants
1980-84	30-39	18.7	25.8	36.0	35.8
	40-49	12.1	17.6	24.1	23.8
	50-60	8.5	10.6	12.8	13.4
	30-60	14.7	20.5	28.1	27.7
1992-96	30-39	37.1	40.8	46.6	44.9
	40-49	24.1	29.0	30.6	31.2
	50-60	15.7	17.8	16.1	17.2
	30-60	27.8	31.3	34.1	33.5

Table 8 and *Table 9* summarize absolute upward mobility of immigrants and natives, divided into sector of employment: public or private. First of all, as a general finding, we see that income mobility is greater within the private sector, and that this result holds for all considered groups (women and men, immigrants and natives).

When analyzing the validity of the hypotheses, we see that the earlier results hold for both men and women. For men, the income mobility levels were significantly higher for immigrants than for natives during the period 1980-84, within both the public and the private sector. Also, income mobility increased for all groups of men between 1980-84 and 1992-96, with a greater increase for natives than for immigrants. We conclude that, for men, all three hypotheses hold for both the public and the private sector.

For women, the level of income mobility, both during 1980-84 and 1992-96, is found to be basically the same for immigrants and natives, within both sectors. This confirms the earlier findings in this section about the failure of hypothesis one and hypothesis three for women. However, the suggested explanation to this failure turns out to be false. The levels of income mobility for women are similar for immigrants and natives, within the private as well as the public sector - that is, the fact that higher shares of women than men are employed within the public sector does not explain the small (or non existing) differences in mobility levels between native and immigrant women.

Finally, we see that for women employed within the public sector, the increase in absolute mobility is valid only when upward mobility of ten per cent is considered – that is,

it became more common also for women within the public sector to increase their income, but only with movements of minor magnitude.

TABLE 8. UPWARD INCOME MOBILITY 30%, SECTORS
(Values in %)

		Public Sector		*Private Sector*	
Period	Sex	Natives	Immigrants	Natives	Immigrants
1980-84	Women	15.6	15.2	17.7	17.2
	Men	3.3	8.7	7.0	10.2
1992-96	Women	14.8	15.2	20.4	19.7
		8.5	12.6	13.5	15.3
	Men				

TABLE 9. UPWARD INCOME MOBILITY 10%, SECTORS
(Values in %)

		Public Sector		*Private Sector*	
Period	Sex	Natives	Immigrants	Natives	Immigrants
1980-84	Women	26.6	25.3	30.0	29.8
	Men	7.6	15.9	16.7	20.9
1992-96	Women	32.1	30.1	38.1	37.9
		22.3	26.2	30.1	32.6
	Men				

3.3.1 Logistic regressions on absolute income mobility

Four logistic regressions, conducted in order to examine income mobility differences between different groups of immigrants, form the final part of the empirical application.[19] *Table 10* shows the result of these regressions, with two dependent/explained variables (upward income mobility of 30 per cent and upward income mobility of 10 per cent), and four independent/explanatory variables (Age, Sex, Sector and Place of Birth). For each independent variable, there is one reference category, and one or more additional categories, which are compared to the reference category. The odds ratios in *Table 10* should be interpreted as relative risks (that is, risks relative to the reference category) for the events

[19] All four regressions are computed as standard logistic regressions with Stata 5.0. The R^2-values of the regressions are all between 0.05 and 0.1, suggesting that most of the income fluctuations cannot be explained by the independent variables presented in *Table 10*.

corresponding to the dependent variables, given that the category corresponding to the considered odds ratio is true.

Even though the first three independent variables are not the focus of this study, a few comments can still be made. First, the regressions confirm the earlier findings on mobility being higher for women than for men, and they confirm the findings on decreasing mobility with age. For the Sector variable, the regression suggests higher income mobility within the private sector, which also confirms the findings in the previous section.

The variable of focus, Place of Birth, is divided into six categories. These categories, all including several countries, are ranked according to an intuitive understanding of their distance from Sweden at a cultural level.[20] The results of these different Place of Birth categories all support hypothesis one, that income mobility was greater for immigrants than for native Swedes during the period 1980-84, with strongest significance for the two categories ranked as most culturally distant from Sweden (categories Southern Europe and Non-Europe). Hypothesis three, that upward income mobility for immigrants relative to natives decreased between 1980-84 and 1992-96, receives support from the regression results of all categories except for the one representing the smallest cultural distance from Sweden (category Nordic Countries). We also see that the greatest relative decrease in absolute mobility was experienced by the immigrants coming from countries outside of Europe (category Non-Europe).

TABLE 10. LOGISTIC REGRESSION RESULTS: ODDS RATIOS

	Upward mobility 30%		Upward mobility 10%	
Independent Variables	1980-84	1992-96	1980-84	1992-96
Sex				
Women (ref)	1	1	1	1
Men	0.30**	0.61**	0.37**	0.67**
Age				
30-39 (ref)	1	1	1	1
40-49	0.55**	0.48**	0.57**	0.53**
50-60	0.27**	0.24**	0.28**	0.26**

[20] The cultural distance ranking of countries is based on the ranking used in Scott [1999]. The countries included in the different categories can be found in Appendix 1.

Sector				
Public (ref)	1	1	1	1
Private	1.38**	1.43**	1.52**	1.34**
Place of Birth				
Sweden (ref)	1	1	1	1
Nordic Countries	1.04	1.02	1.10	1.04
Western Europe	1.27*	1.23*	1.10	1.15
Eastern Europe	1.15	1.11	1.09	1.05
Southern Europe	1.48**	1.10	1.31**	1.00
Non-Europe	2.38**	1.42**	1.85**	1.19*
Levels of Significance:	* = p<0.01	** = p<0.001		

4 Conclusions

This paper examines income mobility of immigrants and native Swedes, during the periods 1980-84 and 1992-96, using a processed population sample from the extensive database LINDA.

The measuring of relative income mobility, with transition matrices, reveals substantially greater income mobility for immigrants than for native Swedes during the years 1980-84. However, the large income mobility gap diminished between the two time periods of study. This convergence renders only a minor income mobility gap between native Swedes and immigrants in the years 1992-96.

The measuring of absolute income mobility shows that absolute mobility increased for all demographic and sectorial groups of immigrants and native Swedes, between 1980-84 and 1992-96. The findings on absolute mobility also show that the relative differences, between immigrants and native Swedes, are found only within the male part of the population. For women, no differences can be found between immigrants and native Swedes. The explanation to these findings cannot be derived from the data sample. Therefore, further research is required in able to derive acceptable explanations to this intriguing result.

This paper promulgates two main theoretical explanations to the experienced relative decrease in immigrant income mobility. The first explanation concerns the post-industrial demand changes experienced in the labor market of the 1980's and 1990's. The demands for cultural specific skills made it more difficult for immigrants on the Swedish labor market. The second explanation intertwines neatly with the first explanation. An increasing cultural difference between immigrants and native Swedes, directly derived from a changing ethnic background of the immigrants in Sweden, amplified the process significantly. This argument, proposing substantial synergetic effects originating from post-industrial demand changes and increased cultural differences, receives support from the regression findings. Clearly, immigrants originating from non-European countries experienced a greater decrease in income mobility than their European counterparts.

Finally, the authors identify two topics of interest, related to this paper, deserving further attention and examination. The concept of household income mobility, analyzed in, among others, Gittleman & Joyce [1999], constitutes an interesting variable when measuring income mobility in a society. Given that incomes are generally shared within a family, a focus on the income of the family rather than the income of the individuals would

render additional information of interest, when trying to ascertain welfare consequences of income differences and income mobility.

Furthermore, another interesting addition to this paper would involve the inclusion of a variable focusing on the length of time each immigrant has resided in Sweden. This information could render additional explanatory power to the derived results, in terms of differences in income mobility in relation to the time period spent in the country. Hence, this factor could contribute when trying to depict the structure and the consequences of the income integration process in Sweden.

Bibliography

Aaberge, R, Björklund, A, Jäntti, M, Palme, M, Pedersen, P, Smith, N & Wennemo, T, [1996], "Income Inequality and Income Mobility in the Scandinavian Countries Compared to the United States", Discussion Papers No 168 Statistics Norway, Research Department.

Becker, G, [1980], *Human Capital*, 2nd Edition, University of Chicago Press, Chicago.

Bergström, F & Gidehag, R, [2001], "Redistribution and Income Mobility", Handelns Utredningsinstitut (HUI), Stockholm.

Bergström, F & Gidehag, R, [2000], *Utjämningspolitiken och dess effekter på inkomstutjämningen och inkomströrligheten*, SAF, Stockholm, p 56-57.

Björklund, A & Fritzell, J, [1992], "Inkomstfördelningens utveckling", Långtidsutredningen 1992, Bilaga 8, Allmänna Förlaget, Stockholm.

Chiswick, B, [1978], "The Effects of Americanization on the Earnings of Foreign-born Men", *Journal of Political Economy*, vol 86, nr 5, p 897-921.

Duncan, G, Rodgers, W & Smeeding, T, [1993], "W(h)ither the middle class? A Dynamic View", in Papadimitriou, D & Wolff, E (editors), *Poverty and Prosperity in the USA In The Late Twentieth Century*, St Martins Press, New York, p 240-271.

Ekberg, J & Gustafsson, B, [1995], *Invandrare på arbetsmarknaden*, SNS Förlag, Stockholm, p 15-30, 33-61, 80-102.

Gittleman, M & Joyce, M, [1999], "Have Family Income Mobility Changed?", *Demography*, vol 36, nr 3, p 299-314.

Hungerford, T, [1993], " U.S. Income Mobility in the Seventies and Eighties", *Review of Income and Wealth*, series 39, nr 4, p 403-417.

LO, [2000], *Inkomster och inkomstfördelning*, Stockholm.

Riksförsäkringsverket, *Socialförsäkringsstatistik*, different issues.

SCB, [1998], " Labour Market Development and Income Mobility – a Study in Sweden in the Early 1990s", Stockholm.

Scott, K, [1999], *The Immigrant Experience: Changing Employment and Income Patterns in Sweden, 1970-1993*, Lund University Press, Lund, p 1-119.

Shorrocks, A, [1978], "Income Inequality and Income Mobility", *Journal of Economic Theory*, vol 19, p 376-393.

SOU 2000:3, *Välfärd vid vägskäl – utvecklingen under 1990-talet*, Kommittén Välfärdsbokslut.

SOU 2000:37, *Välfärdens förutsättningar: Arbetsmarknad, demografi och segregation*, Kommittén Välfärdsbokslut.

SOU 2001:53, *Välfärd och arbete i arbetslöshetens årtionde*, Kommittén Välfärdsbokslut.

Stark, O, [1991], *The Migration of Labor*, Blackwell, Oxford, p 373-379.

Uddhammar, E, [1997], *Arbete, Välfärd, Bidrag: En dynamisk analys av folkets välstånd och välfärdsforskningens missförstånd*, City University Press, Stockholm, p 64-81.

Veum, J, [1992], "Accounting for Income Mobility Changes in the United States", *Social Science Quarterly*, vol 73, nr 4, p 774-785.

Öhman, H, [2000], "Discrimination of Second Generation Immigrants", Research Report S53, Handelns Utredningsinstitut (HUI), Stockholm.

Appendix 1 – Logistic regression data

TABLE A1. STANDARD ERRORS FOR THE ODDS RATIOS

	Upward mobility 30%		Upward mobility 10%	
Independent Variables	1980-84	1992-96	1980-84	1992-96
Sex				
Men	0.005	0.009	0.005	0.008
Age				
40-49	0.010	0.007	0.008	0.006
50-60	0.008	0.006	0.006	0.004
Sector				
Private	0.023	0.022	0.020	0.015
Place of Birth				
Nordic Countries	0.036	0.036	0.029	0.028
Western Europe and USA	0.091	0.096	0.064	0.069
Eastern Europe	0.090	0.078	0.068	0.058
Southern Europe	0.101	0.077	0.073	0.056
Non-Europe	0.350	0.101	0.241	0.071

TABLE A2. EXPLANATORY POWER OF THE REGRESSIONS

Regression	R^2-*value*
1980-84, Upward mobility 30%	0.07
1980-84, Upward mobility 10%	0.07
1992-96, Upward mobility 30%	0.05
1992-96, Upward mobility 10%	0.05

TABLE A3. COUNTRIES INCLUDED IN PLACE OF BIRTH CATEGORIES

Variable	*Countries*
Nordic Countries	*Denmark, Finland, Norway*

Western Europe and USA	*Great Britain, (West) Germany, USA, Austria*
Eastern Europe	*Estonia, Hungary, Russia (Soviet Union), Romania, Poland, Czech Republic (Czechoslovakia)*
Southern Europe	*Italy, Turkey, Yugoslavia, Greece*
Non-Europe	*Ethiopia, Chile, Colombia, India, Sri Lanka, Iran, Iraq, Lebanon, Syria, Thailand, Korea*

Appendix 2 – Decreasing inequality with income mobility[21]

Even though the definition of income mobility - changes in income of individuals through time – is simple, there is no single way to measure mobility that gives a perfect answer. In order to answer the question of whether mobility leads to spontaneous redistribution, income mobility is here measured in a theoretical way as the reduction of income inequality when the considered time period is extended.

Consider a population with n individuals and an arbitrary social welfare function $W = F(\mathbf{u})$, with vector $\mathbf{u} = (u_1, u_2, \ldots, u_n)$ containing the utilities of the n individuals. Under the assumption that only the total amount, and not the chronological structure of the income flow is what matters to the individuals, the social welfare function becomes

$$W = F(Y_1, Y_2, ..., Y_n) = F(\mathbf{Y})$$

with Y_i denoting the total income for individual i during the considered period. Now let Y_e denote the equally distributed equivalent income – that is, the income that, if received by all individuals, produces the same level of welfare as the real distribution of income, **Y**. The social welfare function can then be written

$$F(Y_e, Y_e, ..., Y_e) = F(\mathbf{Y})$$

The welfare function is then assumed to be:

- Continuous – the level of welfare as a function of income follows a smooth curve, meaning that there cannot exist sudden "welfare jumps" at any income level.
- Strictly monotonic - with a higher income, received by any one of the n individuals, a higher social welfare will always follow.
- Symmetric – two individuals with the same level of income will always contribute to total welfare in the same way.

With these assumptions, the equivalent income can be written as another continuous, strictly monotonic and symmetric function

$$Y_e = f(\mathbf{Y}) > 0$$

The next assumption that has to be made in order to define a proper inequality index is that for the same amount of income increase, the increase in total welfare will always be higher with lower initial income of the receiving person. This means for the social welfare function that F(**Y**) is strictly quasi-concave, and it is now possible to define an inequality index by

$$I = 1 - \frac{Y_e}{\mu} = 1 - \frac{f(\mathbf{Y})}{\mu}$$

where $\mu = \sum Y_i/n$ is the mean value of the income distribution. The quasi-concavity of F(**Y**) implies that f(**Y**) will be quasi-concave, Y_e will always be lower than μ and I will take values only within the range [0,1). Equalizing the income distribution implies that Y_e from below approaches μ, and I can therefore be used to indicate the inequality of the distribution.

[21] This relationship was proven mathematically for the first time in Shorrocks [1978]. Added in this paper are interpretations of the basic assumptions.

A final restriction imposed on the social welfare function is that F(**Y**) is homothetic, which makes f(**Y**) homogeneous of first order. The inequality index then becomes mean independent, and can be written as

$$I = 1 - f\left(\frac{\mathbf{Y}}{\mu}\right)$$

To simplify the index, g(x) = 1 – f(x) is defined, and we write

$$I = g\left(\frac{\mathbf{Y}}{\mu}\right)$$

with g(x) easily proven to be a strictly convex function.[22]

Now consider a time interval $[t_0, t_m)$, divided into m sub-interval. $I[\mathbf{Y}(t_0, t_m)]$ denotes the real inequality for the whole time interval. To prove that inequality decreases when the considered time period is extended, we compare the real inequality to the sum of the inequalities registered for the sub-periods. Let $I[\mathbf{Y}(t_{k-1}, t_k)]$ denote the inequality for one period, and we are at the point where it is possible to state that

$$I[Y(t_0,t_m)] \le \sum_{k=1}^{m} w_k I[Y(t_{k-1},t_k)] \quad \text{with } w_k = \mu(t_{k-1},t_k)/\mu(t_0,t_k)$$

which by the convexity of g(x) can be proven in the following way

$$I[Y(t_0,t_m)] = g\left(\frac{\sum_k \mathbf{Y}(t_{k-1},t_k)}{\mu(t_0,t_m)}\right) = g\left(\sum_k w_k \frac{\mathbf{Y}(t_{k-1},t_k)}{\mu(t_0,t_m)}\right) \le \sum_k w_k g\left(\frac{\mathbf{Y}(t_{k-1},t_k)}{\mu(t_{k-1},t_k)}\right) = \sum_k w_k I[Y(t_{k-1},t_k)]$$

This proof implies that total inequality will always be less or equal to the sum of the yearly inequalities. Also, strict equality holds if and only if $\mathbf{Y}(t_{k-1},t_k)/\mu(t_{k-1},t_k)$ is independent of k. This since the strict convexity of g(x) ensures that equality holds if and only if $\mathbf{Y}(t_{k-1},t_k)/\mu(t_{k-1},t_k)$ is the same in each sub period.

[22] The convexity of g(x) is proved in Shorrocks [1978].

In the economic context this means that we have equality if and only if the relative incomes of the individuals do not change over time, with the implication that income inequality must be equalized when the considered time period is extended. The only way for equality not to decrease is if there is no change in relative income – that is, if there is no relative income mobility at all. Therefore it can be stated that, with the above given restrictions to the welfare function, income inequality decreases and social welfare increases with income mobility.

Appendix 3 – Overview of Immigration to Sweden

The ethnic origin of immigrants in Sweden has changed substantially over the years. Up until the 1930's, Sweden's migration flow was characterized by emigration rather than immigration. During the 1930's, a modest immigration surplus occurred mainly by immigrants returning from North America. During World War II, Sweden functioned as a safe haven for refugees from neighboring countries such as Finland, Norway, Denmark and the Baltic countries. The end of the war marked the beginning of a new type of immigration. Sweden's undamaged industries in conjunction with a strong demand following the war led to a need for foreign workers. In the 1960's guest work immigration was at its peak, when large groups of workers immigrated primarily from Yugoslavia, Greece, Turkey and the Nordic countries. Especially, Finnish immigration to Sweden remained large. For instance, during the years 1969-70 Finnish immigration to Sweden totaled around 80 000.

In the 1970's came the structural turning point of immigration in Sweden. The international recession of the early 1970's, culminating in the oil crisis of 1973, caused a large returning migration. In fact, in 1972 and 1973 Sweden became a net emigration country for the first time since the 1920's. Two types of immigration came to characterize the 1970's. The first type was the Nordic immigration. The second type was the refugee immigration. In the late 1970's and early 1980's, political and social upheavals in many parts of the world resulted in large refugee flows to Sweden. The largest groups that came were the Iraqis and Iranians from the Middle East, Chileans from Latin America, Ethiopians from Africa and Vietnamese from Asia. In the 1990's, the ongoing Balkan wars contributed predominantly to the labor migration inflows in Sweden.[23]

What was the situation like for these different streaks of immigration on the Swedish labor-market? In the wake of the war, Swedish industry experienced a high degree of demand for their products, which in turn created a stable labor-market situation. Hence, immigrants were integrated rapidly into the labor-market. Even though many immigrants were in the lower hourly income levels they compensated this by working long shifts, which often gave them a higher annual wage than the native population. As stated previously, this situation changed in the 1970's. Occupational rates and income of immigrants relative to the native population declined. Even the economic boom experienced in the late 1980's could not

[23] Further accounts of the changing composition of immigrants in Sweden can be found in Scott [1999] and Ekberg & Gustafsson [1995].

change this negative trend, which accelerated during the recession in the early 1990's. According to Scott [1999] and Ekberg & Gustafsson [1995], many immigrants arriving to Sweden during these decades originated from cultures that were very different from the Swedish. The greater cultural distance together with an augmenting demand for cultural specific skills in the labor market, are suggested explanations to the experienced alienation of immigrants on the labor market.