Evaluating Dominance Ranking of PSID Incomes by various Household Attributes

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Abstract

We examine the dynamic evolution of incomes, both disposable and gross, for several groups in the PSID panel data at several points from 1968 to 1997. We employ the extended Kolmogorov-Smirnov tests of First and Second Order Stochastic Dominance (SD) as implemented by Maasoumi and Heshmati (2000). They do not impose the Least Favorable Case (LFC) of the composite null hypotheses of SD orders. This is in contrast to simulation and bootstrap-based techniques that do so, resulting in tests that are not asymptotically similar or unbiased. Our approach is also different from the subsampling technique of Linton et al (2003) who obtain critical values for these tests under very general sampling schemes. We offer partial control for many individual/family specific attributes, such as age, gender, education, number of children, work and marital status, by comparing group cells. This avoids having to specify and estimate models of dependence of incomes on these attributes, but lacks the multiple controls that is the promise of such techniques. We find a surprising number of strong rankings, both between groups and over time, and in both gross income and 'disposable' incomes.

Keywords: Stochastic Dominance, Bootstrap, Income Distribution, Testing, PSID, Gender, education, age, marital status.

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1. Introduction

In this paper we examine the existence of uniform weak orders between welfare outcomes measured by total real incomes. Partial *strong* orders are commonly used on the basis of specific utility functions and their corresponding indices. The latter is the predominant form of evaluation and is done when one employs indices of inequality or poverty in welfare, mean-variance analysis in finance, or performance indices such as average scores or wages in program evaluation. Such strong orderings do not command consensus. Based on the expected utility paradigm, Stochastic Dominance (SD) relations of various orders attempt to resolve this problem. These relations are defined over relatively large classes of utility functions and represent "majority" preferences. In evaluating distributed outcomes, as in all program and event evaluation exercises, average outcomes mask the differential impact on different participants and render index based assessments as blunt instruments for policy analysis. SD analysis reveals all of the distributional changes, especially amongst the target groups.

In this paper we follow an alternative bootstrap procedure for estimating the probability of rejection of the SD hypotheses with a suitably extended Kolmogorov-Smirnov (KS) test for first and second order stochastic dominance. Alternative simulation and bootstrap implementations of this test have been examined by several authors including McFadden (1989), Klecan, McFadden, and McFadden (1991), and Barrett and Donald (2003). The most general approach to date is given by Linton et al (2003) who allow for very general sampling schemes based on subsampling. They prove the resulting test is consistent against all (nonparametric) alternatives. Their sampling scheme is quite general as they allow for general dependence amongst the variables, and for the observations to be autocorrelated over time. Accommodating generic dependence between the variables which are to be ranked is especially necessary in substantive empirical settings where incomes are compared before and after taxes (or some other policy decision), or returns on different funds are compared in the same or interconnected markets. But looking at i.i.d. observed waves of the PSID, separated by several years, likely removes the dependence problem in the cases we consider here.

Our approach is similar to Linton et al (2003) in one aspect. We too do not impose the boundary of the null of dominance. We obtain unconstrained estimates of the

probabilities of non-rejection in the actual samples. This allows a classical 'hypothesis testing' by confidence intervals that avoids the 'null hypothesis bias' of the frequentist method. All the other alternative implementations of the KS test, such as McFadden (1989), Barret and Donald (2003), and Chernozukov (2002), impose a subset of composite boundary of the null, the so called 'Least Favoarable Case' (LFC) of identical distributions, and estimate the asymptotic critical values of the classical KS test. Such tests would be biased and not `similar'.

Let X_1 and X_2 be two variables (incomes, returns/prospects) at either two different points in time, or for different regions or countries, or with or without a program (treatment). Let X_{ki}, i = 1, ..., N; k = 1, 2 denote the not necessarily i.i.d. observations. Let U_1 denote the class of all von Neumann-Morgenstern type utility functions, u, such that $u' \geq 0$, (increasing). Also, let U_2 denote the class of all utility functions in U_1 for which $u'' \leq 0$ (strict concavity), and U_3 denote a subset of U_2 for which $u''' \geq 0$. Let $X_{(1p)}$ and $X_{(2p)}$ denote the p-th quantiles, and $F_1(x)$ and $F_2(x)$ denote the cumulative distribution functions, respectively.

Definition: X_1 First Order Stochastic Dominates X_2, denoted $X_1\ FSD\ X_2$, if any of the following equivalent conditions holds:

(1) $E[u(X_1)] \geq E[u(X_2)]$ for all $u \in U_1$, with strict inequality for some u; or

(2) $F_1(x) \leq F_2(x)$ for all x with strict inequality for some x; or

(3) $X_{(1p)} \geq X_{(2p)}$ for all $0 \leq p \leq 1$, with strict inequality for some p.

Definition: X_1 Second Order Stochastic Dominates X_2, denoted $X_1\ SSD\ X_2$, if any of the following equivalent conditions holds:

(1) $E[u(X_1)] \geq E[u(X_2)]$ for all $u \in U_2$, with strict inequality for some u; or

(2) $\int\limits_{-\infty}^{x} F_1(t)dt \leq \int\limits_{-\infty}^{x} F_2(t)dt$ for all x with strict inequality for some x; or

(3) $\Phi_1(p) = \int\limits_{0}^{p} X_{(1t)}dt \geq \Phi_2(p) = \int\limits_{0}^{p} X_{(2t)}dt$ for all $0 \leq p \leq 1$, with strict inequality for

some value(s) p.

Weak orders of SD obtain by eliminating the requirement of strict inequality at some point. When these conditions are not met, as when Generalized Lorenz Curves of two distributions cross, unambiguous First and Second order SD is not possible. Any strong ordering by specific *indices* that correspond to the utility functions U_1 and U_2 classes, will not enjoy general consensus. Whitmore introduced the concept of third order stochastic dominance (TSD) in finance, see (e.g.) Whitmore and Findley (1978). Shorrocks and Foster (1987) showed that the addition of a "transfer sensitivity" requirement leads to TSD ranking of income distributions. This requirement is stronger than the Pigou-Dalton principle of transfers since it makes regressive transfers less desirable at lower income levels. Higher order SD relations correspond to increasingly smaller subsets of U_2.

Econometric tests for the existence of SD orders involve composite hypotheses on inequality restrictions. The literature divides according to whether the tests are designed to be consistent against all alternatives or whether the class of alternatives against which the test has power is essentially finite dimensional. Most of the large literature works with tests that have the more limited objective. Even in that case the statistical problems are quite formidable. See for example Anderson (1996), Davidson and Duclos (2000), Kaur et al. (1994), Dardanoni and Forcina (2000), Bishop et al. (1992), and Crawford (1999). Maasoumi (2001) contains a discussion of some of these alternative approaches. Davidson and Duclous (2000) is the most general example of formulating the SD nulls as multiple comparisons of partial moments and offers tests for higher order SD. The joint test of SD hypothesis based on quantiles follows the $\overline{X}^2$ distribution techniques; see Fisher, Wilson and Xu (1995). Tse and Zhang (2000) provide some Monte Carlo evidence on the power of some of these *alternative* tests. There are just a handful of papers that have pursued the more general objective of consistency against all alternatives, as in Linton et al (2003).

Since the asymptotic null distribution of these tests depends on the unknown distributions, McFadden (1989) and Klecan, McFadden, and McFadden (1991) proposed a Monte Carlo permutation procedure for the computation of critical values that is only useful for i.i.d. observations and exchangeable variables. Barrett and Donald (2003) propose an alternative simulation method based on an idea of Hansen (1996) for

deriving critical values in the case where the prospects are mutually independent, and the data are i.i.d. As noted above the methods relying on standard bootstrap or simulation typically try to mimic the asymptotic null distributions in the Least Favorable Case (LFC) of the equal distribution functions. However, even the boundary of the null hypothesis of SD is a set that is larger than the LFC region, thus such LFC-based tests are not asymptotically similar on the boundary of the null hypothesis. On the other hand, the LMW-test in Linton et al (2003) is based on a subsampling procedure which approximates the true sampling distribution under the composite null hypothesis and is asymptotically similar on the boundary. Consequently, the LMW-test might be asymptotically more powerful than the bootstrap (or simulation)-based tests for some local alternatives.

Our approach fixes the critical value (zero) at the boundary of our null, and estimates the associated `significance level' by bootstrapping the sample or its blocks. This renders our tests `asymptotically similar' and unbiased on the boundary. This is similar in spirit to inference based on p-values. This method could also be used to compare the two distributions up to any desired quantile, for instance, for poverty rankings.

2. The Test Statistics

We shall suppose that there are 2 prospects X_1, X_2 and let $A = \{X_k : k = 1,2\}$. Let $\{X_{ki} : i = 1,2,...,N\}$ be realizations of X_k for k=1,2. To subsume the empirically important case of "conditional" dominance, we suppose that $\{X_{ki} : i = 1,2,...,N\}$ might depend on an unknown finite dimensional parameter $\theta_{k0} \in \Theta_k \subset R^{L_k}$:

$$X_{ki} = Y_{ki} - Z'_{ki}\theta_{k0}$$

where the random variables $Y_{ki} \in R$ and $Z_{ki} \in R^{L_k}$ satisfy the linear regression relationship

$$Y_{ki} = \mu_{k0} + Z'_{ki}\theta_{k0} + \varepsilon_{ki}, E(\varepsilon_{ki} \mid Z_{ki}) = 0 \text{ a.s.}$$

for $\mu_{k0} \in R$, i =1, …, N and k=1,2. Therefore, X_{ki} can be viewed as an "intercept-adjusted" regression error with mean μ_{k0}. To allow for serial dependence of the realizations and for mutual correlation across variables will require versions of block

bootstrap or subsampling that are examined in Linton et al (2003). Let $X_{ki}(\theta) = Y_{ki} - Z'_{ki}\theta$, $X_{ki} = X_{ki}(\theta_{k0})$, and $\dot{X}_{ki} = X_{ki}(\dot{\theta}_k)$, where $\dot{\theta}_k$ is some sensible estimator of θ_{k0} whose properties we detail below, i.e., the prospects can be estimated from the data. Since we have a linear regression model, there are many possible ways of obtaining consistent estimates of the unknown parameters. The motivation for considering estimated prospects is that when data is limited one may want to use a model to adjust for systematic differences. In this paper we group the data into subsets, say of families with different sizes, or by educational attainment, and then make comparisons across homogenous populations. When data are limited this can be difficult. Such is not the problem in our applications.

For k=1,2 define

$$F_k(x, \theta) = P(X_{ki}(\theta) \le x) \text{ and}$$

$$\overline{F}_{kN}(x, \theta) = \frac{1}{N} \sum_{i=1}^{N} 1(X_{ki}(\theta) \le x).$$

We denote $F_k(x) = F_k(x, \theta_{k0})$ and $\overline{F}_{kN}(x) = \overline{F}_{kN}(x, \theta_{k0})$, and let $F(x_1, \ldots, x_k)$ be the joint c.d.f. of $(X_1, X_2)'$. Now define the following functionals of the joint distribution

$$d = \min_{k \ne l} \sup_{x \in X} [F_k(x) - F_l(x)]$$

$$s = \min_{k \ne l} \sup_{x \in X} \int_{-\infty}^{x} [F_k(t) - F_l(t)]dt$$

where X denotes a given set contained in the union of the supports of X_{ki} for k=1,2. Without loss of generality we assume that the supports are bounded. The hypotheses of interest can now be stated as:

$$H_0^d : d \le 0 \quad vs. \quad H_1^d : d > 0$$

$$H_0^s : s \le 0 \quad vs. \quad H_1^s : s > 0$$

The null hypothesis H_0^d implies that the prospects in A are not first-degree stochastically maximal, i.e., there exists at least one prospect in A which first-degree dominates the others. Likewise for the second order.

The test statistics we consider are based on the empirical analogues of (ref:d)-(ref:s). They are defined to be:

$$D_N = \min_{k \neq l} \sup_{x \in X} \sqrt{N} \left[\overline{F}_{kN}(x, \dot{\theta}_k) - \overline{F}_{lN}(x, \dot{\theta}_l) \right]$$

$$S_N = \min_{k \neq l} \sup_{x \in X} \sqrt{N} \int_{-\infty}^{x} \left[\overline{F}_{kN}(t, \dot{\theta}_k) - \overline{F}_{iN}(t, \dot{\theta}_l) \right] dt$$

We next discuss the issue of how to compute the supremum in D_N, S_N and P_N and the integrals in S_N and P_N. There have been a number of suggestions in the literature that exploit the step-function nature of $\overline{F}_{kN}(t, \theta)$. The supremum in D_N can be (exactly) replaced by a maximum taken over all the distinct points in the combined sample. Regarding the computation of S_N, Klecan et al. (1991) propose a recursive algorithm for exact computation of S_N, see also Barrett and Donald (2003) for an extension to third order dominance.

To reduce the computation time, it may be preferable to compute approximations to the suprema in D_N, S_N based on taking maxima over some smaller grid of points $X_J = \{x_1,....,x_J\}$ where $J < n$. Theoretically, provided the set of evaluation points becomes dense in the joint support, the distribution theory is unaffected by using this approximation.

In our applications we report Probability $\{D_N \leq 0\}$ and Probability $\{S_N \leq 0\}$ and are able to identify which distribution dominates, if any. These are the maximum test sizes associated with our critical value of "zero" which is clearly the boundary of our null that *includes* the LFC. Thus we are reporting the critical level associated with this non-rejection region. These critical levels can be shown as in Linton et al (2003) to be "conservative" since, in the limit, they are at least as large as the corresponding levels for the asymptotic test on the boundary. Importantly, we do not impose the LFC on our bootstrap resampling.

3. Testing for SD in PSID

3.1 Data

We compare five waves of the Michigan Panel Study of Income Dynamics (PSID)[1] in the years 1968, 1978, 1988, 1993 and 1997. Two definitions of income are used: gross and disposable incomes. For each year the 'gross income' represents 'husband and wife' or total family income including wages, interest, welfare payments, and unemployment receipts. 'Disposable income' is measured as gross income including transfer payments less family taxes. Incomes of spouses are added together and adjusted for family size to obtain per capita equivalent household incomes. Following a tradition in the literature we have chosen a weight of 1.0 for adult family members and 0.50 for children below the age of 18. Incomes and taxes are transformed to fixed 1993 prices using the urban consumer price index.

We do not have access to disposable income for 1993 and 1997 as these are not publicly available to download. The first 4 years are final releases, while the last, 1987, are early release data. The years were chosen to be representative as well as sufficiently far apart so that policy/events would have the time to produce measurable effects. Nevertheless, some of our "unconditional" comparisons reflect snap shots of points in time. In addition to unconditional comparison of household income distribution over time, incomes are compared conditional on a number of household characteristics. A household is identified by the household's head[2]. Head is defined as the husband in families with couples. When income distributions of groups are compared, the income variable is an average per capita income of individual/household head income over the period 1968-1993. Thus these comparisons are better than snap shots at points in time as they take out some transitory movements. This kind of aggregation is meant to avoid misleading results and follows the reasoning in mobility analysis with Maasoumi-Shorrocks-Zandvakili indices; see (e.g.) Maasoumi and Zandvakili (1990).

The household characteristics that we control for are: age, marital status, working status, racial status, gender, occupation, number of children, level of education, length of

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[1] The PSID data is available on http://www.isr.umich.edu/src/psid/ for free downloads. For a full description of the data please see the Guide to various interviewing years' procedures and codebooks.

[2] Some advocate the recent approach where the head is defined as the person with the highest income.

unemployment, and geographical mobility. Household characteristics are equivalent of the heads characteristics. Since these characteristics of head may differ over time, we have chosen to use the characteristics of head in 1993 as a reference, but mean gross and mean disposable incomes are defined as average of per capita income for the years 1968-1993 and 1968-1988, respectively. The 1997 gross income data were excluded as they are early release.

In defining age groups we have taken into account the productivity of age groups. The sample is divided into four groups: 18-35; 36-50; 51-65; and 66 and more. The heads by marital status are classified into three groups: married; single, widowed; and divorced, separated, or spouse absent. The working status includes three groups: working, temporarily laid off; unemployed; and retired, housewife, student and others. The racial stata are three: white; black; and "Indian, Spanish, Asian, others". Sex is the head of household gender: male and female. There are four occupational groups: professional and managers, self-employed unincorporated "businessmen", other occupations, and not in the labor force. The number of children is divided into 4 groups: families with no children; one child; two children; and three and more children. Education is the head's total years of schooling grouped into: 0-11 years; 12 plus grades; and college degree and higher. Unemployment is defined by the length of unemployment period in number of hours. The variable was transformed into months of unemployment (180 hours per months) divided into three groups: 0-1 month; 2-3 months; and more than 3 months. Finally, geographical mobility is classified into three groups: head living in the same *state* where he/she grew up; same *region* where grew up; and different state and region where grew up.

Our analysis is carried out in two parts. Part one is 'unconditional' tests for SD over the years for the entire distribution of incomes, with no controls for attributes, for both gross and disposable incomes. Part two is conditional by having controls for the above attributes. The analysis and comparison of results are carried out both with and without PSID population weights. The weight variable is the sampling weight provided by PSID meant to make these samples more 'representative' of the US population. They reflect the frequency of household types in the population and are used to produce unbiased estimation of the descriptive statistics.

Summary of the number of observations by income definition and various sub-groups of household is given in Table 12. Since not all the families are in all years, we take only a balanced panel. This results in reduction in the number of observations. The summary statistics (number of observations, mean and standard deviation) of the two income definitions in weighted and un-weighted forms including the number of balanced observations are given in the first part of the Tables 1-11.

3.2 Unconditional Analysis

Consider Table 1. This first part summarizes our data by years of observation. The balanced number of households observed all 5 years is 3897.[3] The mean real gross income is continuously increasing over time from $12483 in 1968 to $19632 in 1997, as is the dispersion in income increasing from $10818 to $20904 during the same period. Increases in the dispersion of income are more pronounced in 1988 and 1997. The coefficient of variation (standard deviation/mean) increased from 86.6 to 106.5 indicating growing income "dispersion". The level of real disposable income, ranging in the interval $11252-$12409, is 88-90% of gross income. It is increasing over time reflecting reduced share of income taxes and transfers. The dispersion in disposable income is somewhat smaller compared to those of gross income indicating income equalization effects of taxes and transfers.

Accounting for population weights increases both the gross and disposable mean incomes over time, in the interval $14786-$22231 and $13208-$18027, respectively. The temporal patterns are the same but level differences are large compared to the un-weighted summaries. The difference is a reflection of higher weights being associated with households with higher incomes.

Concerning temporal patterns of the household attributes we note that, the percentage share of households with zero income has increased from 0.1% in 1968 to 1.4% in 1993. Households without children or with less than two children has increased in number, while those with three or more children decreased. The share of female headed households is relatively constant and varies in the interval 28% to 31%. Significant variations in the age groups in form of a shift from the lower age groups to the upper

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[3] Elimination of the unbalanced households was necessary to conduct matched-bootstrapping, where we obtain re-samples of the same households over time.

age groups found over time. The relative share of blacks has been reduced over time, while those of other race groups (Indian, Spanish, Asian, others) is increasing. The share of working population is decreasing, while the share of unemployed and those not in labor force increasing. In recent years, fewer persons are living in marriage relation and unmarried, divorced and separated is increasing in number. The number of household heads with medium level of education is increasing significantly much more relative to those holding a college degree. Major changes in population occurs in the share of retired and those not in labor force. The share of heads with no unemployment record is decreasing, while those with more than 3 months of unemployment increasing. The within and between state mobility is constant while between state mobility is increasing at the expense of within region mobility. For frequency distribution by household characteristics see Table 12.

Results in Table 1 are based on data where household attributes are ignored. It provides test results for a selection of years (1968, 1978, 1988, 1993 and 1997). The years were chosen to be representative as well as sufficiently far apart such that there would be enough time for any enduring impact on income distribution to be measurable. It is to be noted that the consecutive time patterns of dominance using annual waves may differ from the current non-consecutive ones.

All results are based on 1000 bootstrap samples, 5% income partitions and with/without accounting for population weights. In comparing two distributions, the first group is denoted the "X" distribution, and the second by "Y" distribution. Thus, "FSDxoy" denotes "first order stochastic dominance of X over Y", and "SSDxoy" is similarly defined for second order dominance of X over Y. The "FOmax" and "SOmax" denote the joint tests of X vs. Y and Y vs. X., referred to as "maximality" by McFadden (1989).

3.2.1 Test results for the whole distribution over time

In the second part of Table 1, our test statistics are summarized by their mean and standard errors, as well as the probability of the test statistic being negative or zero (the null).

For (un-weighted) **gross income**, several cases (5 out of 10) of first order and second order (9 out of 10) dominance are observed for recent years over earlier years. The exceptions are 1968 vs. 1978, 1978 vs. 1988, 1988 vs. 1993 and 1993 vs. 1997 where

there is no FSD, while in the case of 1993 vs. 1997 no SSD either. The latter two years are found to be second order maximal (unrankable). The same patterns hold for **disposable** income distributions, where latter years SSD earlier years. One difference is that 1988 first order dominates 1978 at the 81% level. Type I error would be too large perhaps, but power is enhanced. Taxes and transfers appear to cause a general right separation in the CDFs, but we do not have formal tests of the significance associated with this aspect of what is depicted in Figures 1A-1D. The level of significance is higher in the disposable income cases compared to gross incomes. Figures 1A-1D depict the corresponding sample CDFs and cumulated CDFs which indicate *apparent* SD rankings or lack thereof.

The test results based on the population weighted data are basically the same as those from the un-weighted cases. A few distinctions to be mentioned are: First, we observe FSD of gross income in 1978 over 1968. Second, the degree of significance for weighted data is systematically higher compared to those for un-weighted data. It appears that, in the presence of dominance, "significance" is an increasing function of the number of observation (weights) in the annual samples. (see also Figure 1B)

3.3 Conditional Analysis

3.3.1 Introduction

As mentioned previously, the households are distinguished by the household heads characteristics in 1993, but mean gross and mean disposable incomes are defined as period average of per capita incomes. The characteristics that we condition on include head's: age, marital status, working status, race, gender, occupation, number of children, level of education, length of unemployment, and geographical mobility.

3.3.2 Test results for age groups

Table 2 summarizes the results for age groups (18-35, 36-50, 51-65, 65-), separately for weighted and un-weighted observations, and for gross and disposable incomes. The mean gross income is somewhat increasing with working age, but so is its dispersion. After taxes and transfers no notable change in this pattern is found. The mean disposable income constantly lies below gross income in all age groups. There are no cases of FSD between age groups. As expected the two middle age groups' gross

incomes SSD those of the very young, but this ranking vanishes with disposable incomes suggesting significant income equalization impact of transfers and taxes. The weighting of observations is inconsequential. For disposable incomes, however, we note an SSD of the weighted 18-35 over the 66+ age group. Without controlling for other factors, such as martial status, education or employment, it appears that the younger households are better off than the "retired". A further dis-aggregation of age groups might be necessary to reveal the existence and magnitude of further between group transfers. The disposable incomes of age groups are generally second order maximal, implying that they may be ranked only at higher levels than SSD. A neat result of Davidson and Duclos (2000) suggests that, if two distributions have an FSD ranking for some part of the (lower) support, they are rankable at some higher order. Figures 2A and 2B depict the corresponding sample CDFs and 2C-2D cumulative CDFs. They reveal a sometimes stark distinction between an apparent dominance and its lack of statistical significance. They also suggest, but we have not tested, the possibility that almost all the disposable incomes FSD or SSD the gross income distributions. With the exception of the peak income group, 36-55, this appears to cut across all age groups. It is worth recalling that SD rankings are transitive.

3.3.3 Test results by marital status

In Table 3 we report the test results for grouping according to the head's marital status classified into three groups: married; single or widowed; and "divorced, separated, or spouse absent". The mean gross and disposable incomes of the first two groups are somewhat higher than the third group who likely include many single mother families. In general the between group variations in mean and standard deviations are quite small. The pattern is very similar in comparing the samples with and without weighting. The married group second order dominates the unmarried at the 91% level. The unmarried/married and other groups are maximal. In the weighted case, again the married second order dominate the unmarried, while others also second order dominate the unmarried. There is no evidence of any statistically significant FSD or SSD in terms of disposable income unconditional on the number of children. Later we will be discussing disposable income conditional on the number of children. Sample CDFs are graphed in Figures 3A and 3B and cumulative CDFs in 3C and 3D.

3.3.4 Test results by working status

In Table 4 we report the test results by the working status of household heads. Households are divided into three groups: 1. Working or temporarily laid off; 2. unemployed; and 3. retired, housewife, student and others. The mean gross income of the first category is higher than that of remaining non-working groups. Given the tax structure in the US one might expect much larger income differences. The small difference might be due to the relatively short unemployment spells in the US and the averaging of incomes over this period. For these reasons, the working group has on average a slightly lower disposable income than the unemployed. When we do not account for weight differences, the gross income of the working group second order dominates the "others" not in labor force, while the working vs. unemployed and the unemployed vs. others are unrankable. This means that there are some welfare functions in our functional classes that are so equality preferring that make SD ranking of gross working incomes impossible. Clearly, there will be many indices in these situations that will provide complete ranking of these unrankable distributions.

The tests based on the un-weighted observations on disposable incomes show no first and second order dominance relationship. Similar patterns hold in the weighted case, with the exception that the "working" second order dominate "others" in terms of both incomes. In the definition of unemployment, one does not account for the length of unemployment. This might partially explain the absence of dominance relations by working status. Later we will investigate the role of unemployment distinguished by the length of the spell. Again for distribution of incomes by working status see Figures 4A to 4D.

3.3.5 Test results by racial status

The heads are classified into three groups: white; black; others including Indian, Hispanic and Asians. In looking at the statistical summaries given in the first part of Table 5, as expected the gross income of the whites is above the income level of the other groups when observations are not weighted. For the un-weighted observations the mean disposable income of blacks is the highest. This surely demonstrates one of the better known problems with the un-weighted PSID observations. In the weigthed form the position of groups is changed, "others" showing higher gross income than white and

blacks, respectively. The sample size is however small, and made smaller by our "balancing" over these many years, and might be affected by outlier and missing observations.

The test results provided in the second part of Table 5 show that un-weighted White gross income distribution second order dominates the Black incomes at the 92% level, but is unrankable in comparison with others. As mentioned above, accounting for taxes and transfers changes the dominance rankings. Blacks' disposable incomes second order dominate the White's at the 94% level.

When **weighted** data are used, the same relationship between gross incomes of Whites and Blacks holds, but others second order dominate the White distribution. Here, the White disposable income distribution second order dominates the corresponding Black distribution. See Figures 5A and 5B for sample CDFs and 5C and 5D for cumulative CDFs. Neglected within group heterogeneity might be another quite significant problem here.

3.3.6 Test results by gender

Table 6 indicates that mean gross incomes of males are greater than females' gross incomes, as is the within group income dispersions. In terms of disposable income the positions are reversed with almost equal income dispersion. The share of males is 70% of the total sample. The test results, based on un-weighted data, show that male incomes second order dominate the female incomes at 99% level, while no such dominance relation is found when disposable incomes are considered. With weighted data the males gross income still second order dominates females, but the position is reversed in favor of females when disposable incomes are considered. Welfare policies through taxes and transfers appear to have been successful in bringing about welfare parity between male and females. For graphs of the distributions see Figure 6A to 6D.

3.3.7 Test results by occupation

There are three occupation groups in Table 7: professional and managers; other occupations; and not in labor force. Again the mean incomes differ in terms of gross incomes by occupation in favor of professionals, but the differences between groups vanish in terms of disposable incomes regardless of whether any observation weights are used or not. The test results indicate that professionals and managers second order

dominate the remaining two groups when gross income is considered. The last two groups are not first and second order rankable, but clearly rankable at some higher level (see Figures 7A-7B). The same dominance relationship holds but stronger when weighted data are used. No first or second order dominance is found between disposable incomes. Again, higher order ranks cannot be ruled out. See Figures 7A-7D for sample CDFs and cumulative CDFs.

3.3.8 Test results by number of children

Summary of the results for households grouped by the number of children into households with no children, one child, two children; and three and more is found in Table 8. The mean gross income per capita and its dispersion are negative functions of the number of children. The relation is not obvious in disposable income terms. Despite the mean differences no group's gross or disposable incomes dominates another in the un-weighted form. In the weighted case there are two exceptions, where heads with no children second order dominate the groups with 1 and 2 children, but not those with 3 and more. Please see also the Figure 8A to 8D for sample CDFs and their cumulatives. It is to be noted that the results are in the line with the objectives of welfare policies to improve the living conditions of families with children, but at the same time quite surprising concerning absent of ant dominance relationship. Probably the results are influenced by grouping the households by characteristics valid for 1993, while incomes refer to the original periods. Presence of higher order ranks are possible.

3.3.9 Test results by years of schooling

Mean gross and disposable incomes are increasing function of years of schooling. Here education is defined as the head's total years of schooling grouped into: 0-11 years; 12+; and college degrees (Table 9). The test results indicate that medium education level second order dominates the low level, and is in turn second order dominated by the high level of education. This is valid for gross income in both un-weighted and weighted forms. The groups compared by un-weighted disposable income are maximal. For weighted observations on disposable incomes, the holders of a college degree turned out to dominate by second order the 0-11 schooling group at the 91% level. The remaining two groups are not first and second order rankable. In order to discern the effects of human capital on earnings one should use a finer grouping of the households, as well as

test for higher SD orders. This finding is consistent with regression-based results attributing certain returns to schooling since indices can be found to obtain complete rankings when FSD and SSD are not present. See also Figure 9A to 9D.

3.3.10 Test results by length of unemployment

Households are grouped by the length of unemployment period into: 0-1 month; 2-3 months; and more than 3 months. Mean and dispersion of gross incomes decreases by the length of unemployment spells. Test results provided on Table 10 indicate that the first group second order dominate the last group at 86% level. No dominance relation is found for the un-weighted disposable income data. The weight differences results in same relation in the case of gross income, while the second group second order dominates the first group in the case of disposable income. Other comparisons are first and second order maximal. For graphs of CDFs see the Figure 10A and 10B and cumulative CDFs the Figures 10C and 10D.

3.3.11 Test results by geographical mobility

The households by the last attribute, geographical mobility, are classified by location of the places they grow up into: living in the same state; same region; and different state and region (Table 11). Mobility affects positively the per capita gross incomes. The effect is however small. Head living in different state and region than they grow up second order dominates those growing up in the same state. Accounting for weight differences, produces similar result, but in addition we find also second order dominance of heads growing up in same region over those growing up in the same state. Non dominance relation is found in comparison of groups by per capita disposable incomes. See also Figures 11A to 11B for sample CDFs and cumulative CDFs.

In sum for the conditional analysis we find that first order dominance is very rare, but second order dominance holds in several cases when we consider per capita household gross income. In most comparisons there is no evidence of any dominance relationship in disposable income terms. Accounting for differences in weights improves the significance level and even frequency of second order dominance relationship. In several cases the patterns of results are quite similar regardless of attributes used to group households. It is surprising that effects of gender, education and number of children or seniority could be week on distribution of gross income. The post taxes

income show very similar mean and dispersion levels. This could be due to the effect of index applied or transformation of income in per capita equivalent or exclusion of new entry and exit to the annual samples for the reasons of the block bootstrapping.

4. Concluding Remarks

In contrast to subsampling and our approach, one has to impose the null hypothesis in most resampling schemes. The usual practice in the literature has been to impose the least favorable case where

$$F_i(x) = ... = F_k(x) \quad \text{for all} \ x \in X \ . \qquad \text{(LFC)}$$

This is easy to apply when the prospects are mutually independent and independent over time and there are no estimated parameters - you just pool the data into a common distribution and draw from that in the bootstrap case. Klecan et al.(1991) showed that with suitable modification this idea can be applied to the case where the prospects are mutually dependent as long as the dependence is of a specific variety called generalized exchangeable. The recentering suggested in Chernozhukov (2002) also imposes the LFC implicitly, and works in general provided it is combined with an appropriate resampling procedure.

When the variables are mutually *dependent* but i.i.d. within each sample, one might use the bootstrap procedure. described in Linton, Maasoumi and Whang (2003). Their procedure allows the variables to be residuals of certain general models which provide controls for any desirable attributes, and centers all the bootstrapped CDFs around their sample counterparts. In an obvious notation, the centered statistic for FSD is :

$$D_N^* = \min_{k \neq l} \sup_{x \in X} \sqrt{N} \left[\overline{F}_{kN}^{*c}(x) - \overline{F}_{iN}^{*c}(x) \right]$$

One can then compute the distribution of D_N^* conditional on the original sample and take the critical value from this distribution. This approximates the sampling distribution H_N of D_N by

$$\hat{H}_N(w) = \frac{1}{M} \sum_{i=1}^{M} 1(D_{N,i}^* \leq w)$$

where M is the number of bootstrap samples. Let $h_N(1-\alpha)$ denote the $(1-\alpha)-$th sample quantile of $\hat{H}_{N,b}(.)$, i.e.,

$$h_N(1-\alpha) = \inf\{w : \hat{H}_N(w) \geq 1-\alpha\}.$$

LMW (2003) call this the *bootstrap critical value* of significance level α. Thus, one can reject the null hypothesis at the significance level α if $D_N > h_N(1-\alpha)$. It can be shown that this test is consistent; LMW (2003) investigate the finite sample behavior of this procedure. The re-centering in D_N^* is crucial and is used to impose the LFC restriction. In the time series case, the resampling should be modified to account for the dependence. LMW (2003) describe the non-overlapping and overlapping block bootstrap procedures that can be used.

The test statistic D_N has a non-degenerate limit distribution on the boundary "$D_N^* = 0$" of our null hypothesis H_0^d. Note that "$D_N^* = 0$" is in fact a composite hypothesis and includes the least favorable case . Therefore, when LFC fails to hold but d=0 is true[4], then the test based on the bootstrap (or simulation) critical value would not have asymptotic size α. This implies that the latter test *is not asymptotically similar on the boundary*, which in turn implies that the test is biased, i.e., there exist alternatives under which acceptance of the hypothesis is more likely than in some cases in which the hypothesis is true, see Lehmann (1986, Chapter 4) for the concept of similarity and unbiasedness. On the other hand, the LMW test based on the subsample critical value is unbiased and *asymptotically similar on the boundary* since the subsampling distribution mimics the true sampling distribution everywhere on the boundary. Note that, in general, an asymptotically similar test is more powerful than an asymptotically non-similar test for some local alternatives near the boundary, see, e.g., Hansen (2001). We plan to compare these alternative procedures in future work.

Based on our implementation of the KS type FSD and SSD tests, we were able to show a perhaps surprising number of cases of dominance between unconditional income

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[4] For example, if K=3, this happens if $F_1(x) = F_2(x)$ for all $x \in X$ but $F_3(x)$ crosses with $F_2(x)$ and $F_2(x)$. More generally, this happens if $F_k(x) \leq F_1(x)$ with equality holding for x in $B_{kl} \in X$ for some pair (k,l) but there are crossings of the distributions (i.e., no FSD relationship) for the other pairs.

distributions, improving steadily until the 1990s. These rankings are due to many other factors that may explain income differentials between population subgroups. Ceteris paribus examination is offered here by conducting SD tests for incomes of different groups identified by numerous characteristics, including race, age, gender, and education. Future work will examine regression based simultaneous controls which avoid the problem of small cell sizes that would arise in our approach.

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Attributes:

Unconditional:
1. Year of observation (1968, 1978, 1988, 1993, 1997)

Conditional:
2. Age groups (18-35, 36-50, 51-65, 66-)
3. Marital status (married, unmarried, others)
4. Working status (working, unemployed, others)
5. Racial status (white, black, others)
6. Gender (male, female)
7. Occupation (professional, others, not in labor force)
8. Number of children (0, 1, 2, 3-)
9. Schooling years (0-11, 12+, college)
10. Length of unemployment (01-, 2-3, 3- months)
11. Geographical mobility (same state, same region, different state and region grew up)

Figure 1.A Unweighted CDF of gross (g) and disposable (d) incomes by years of observation.

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Figure 4.B Weighted CDF of gross (g) and disposable (d) incomes by working status.

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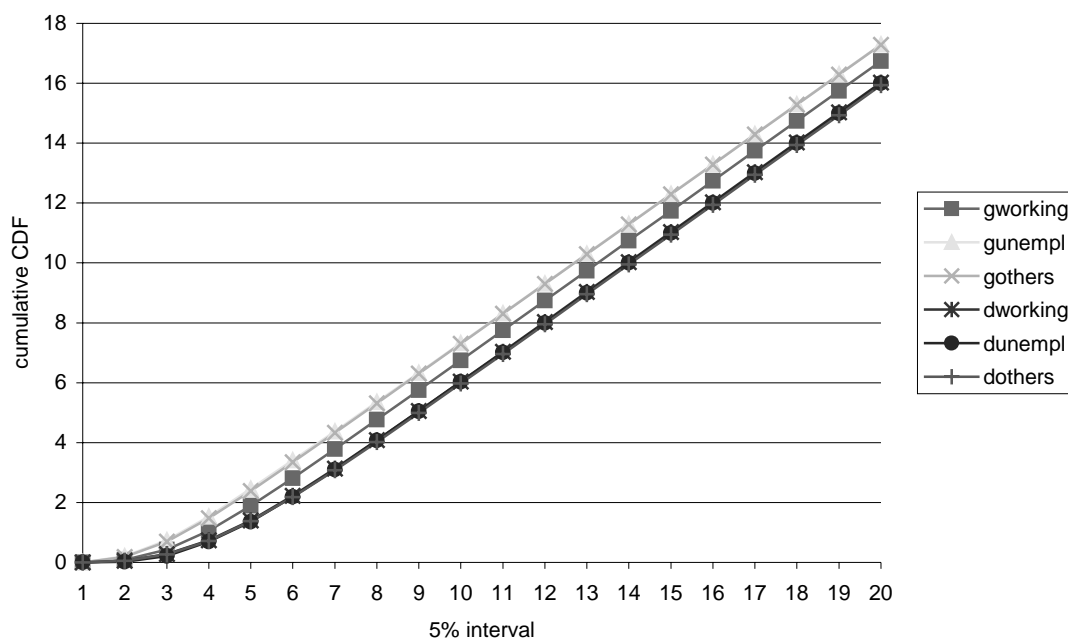
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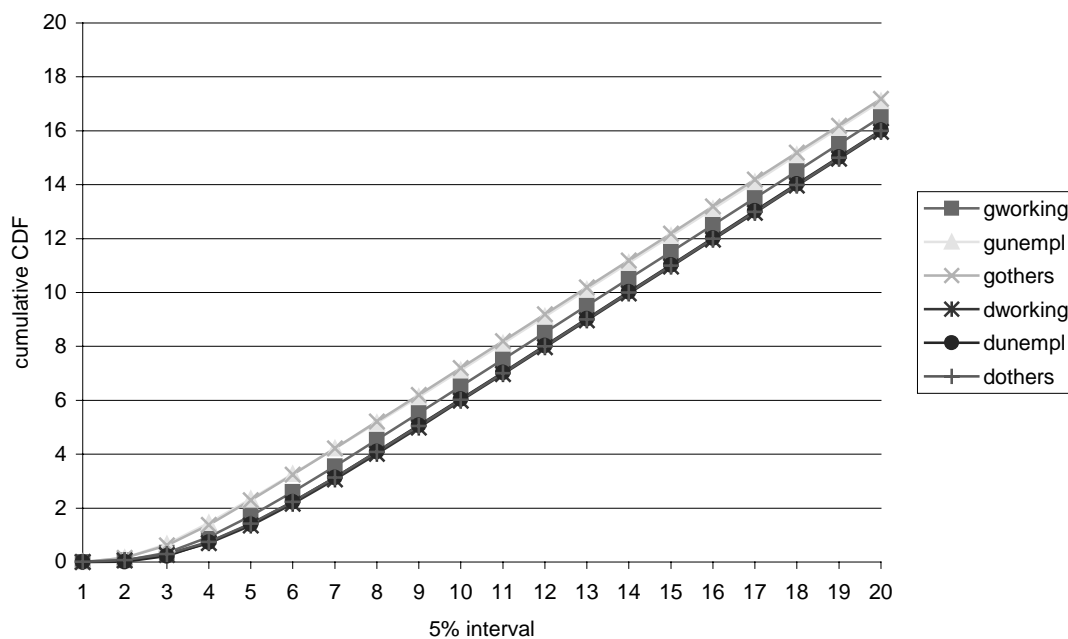
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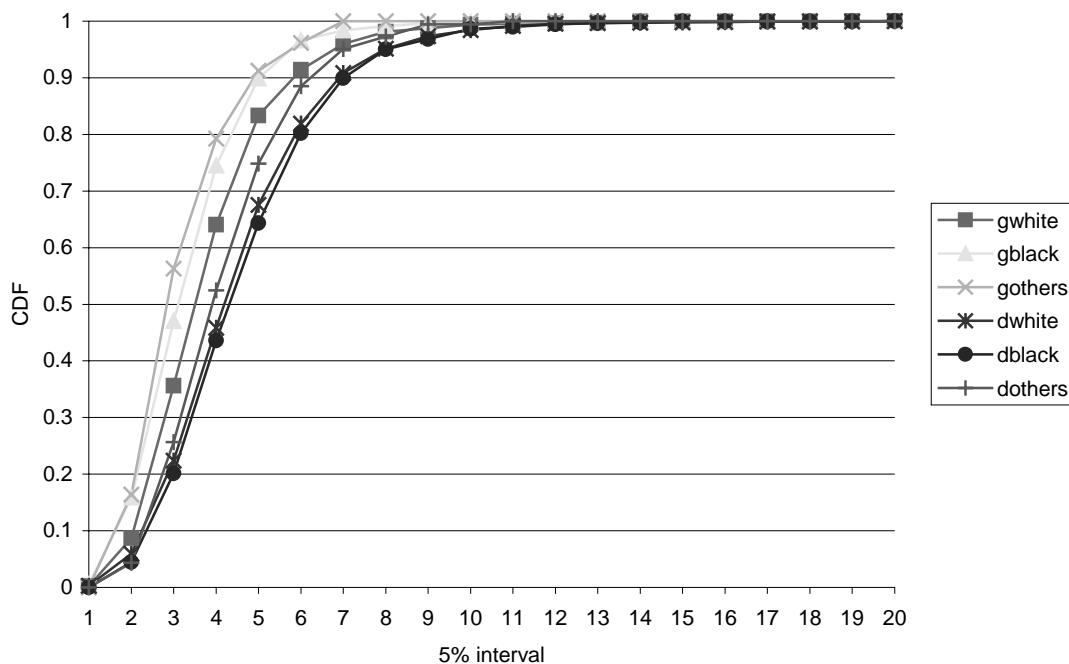
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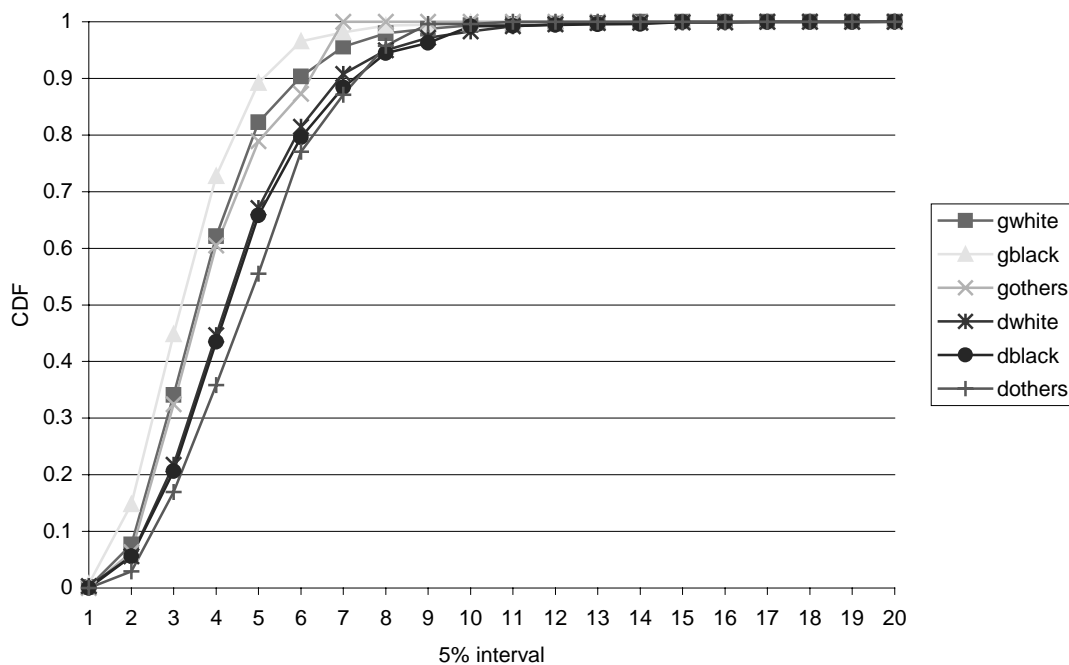
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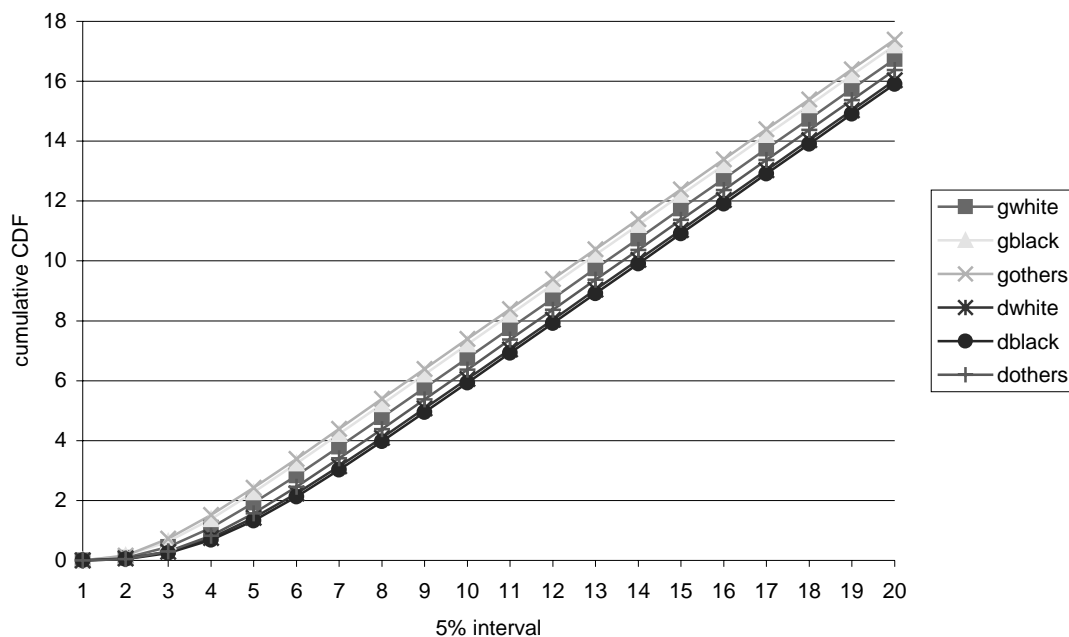
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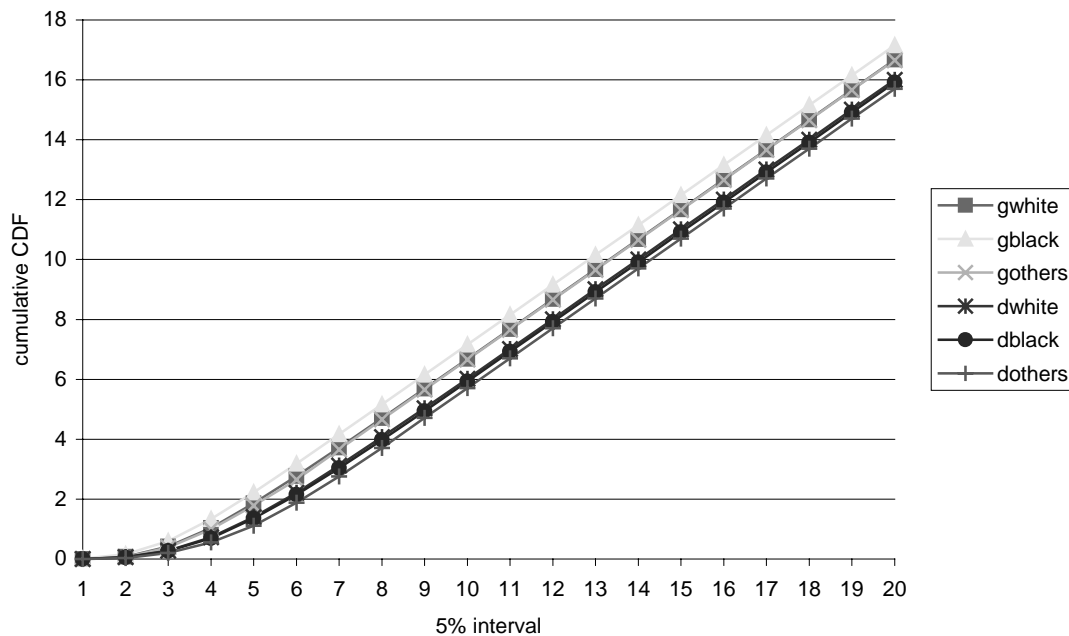
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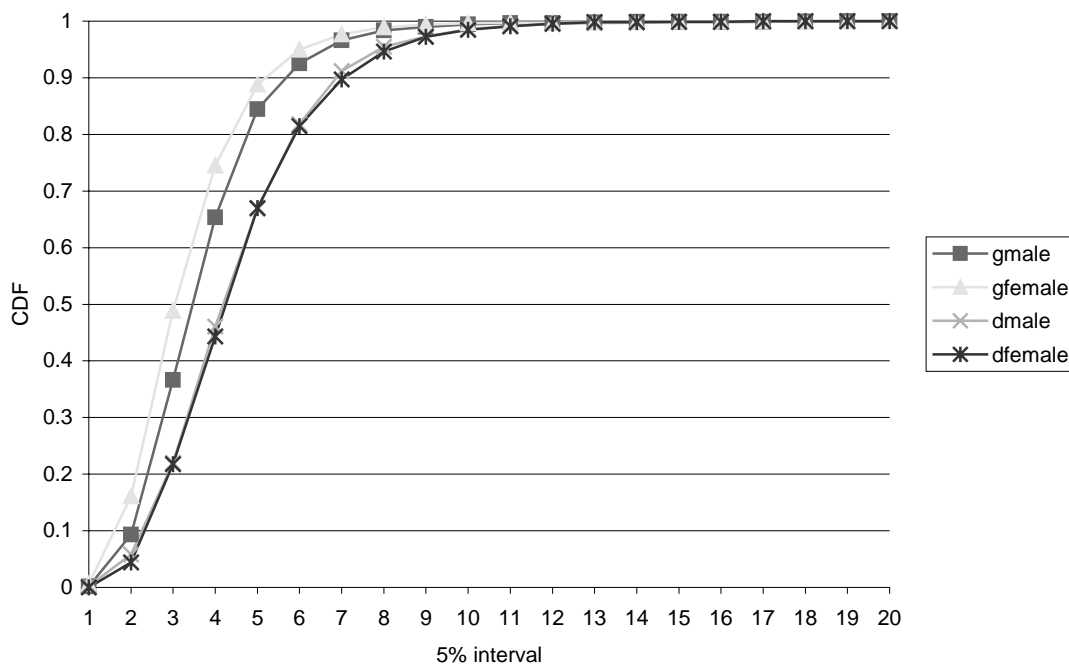
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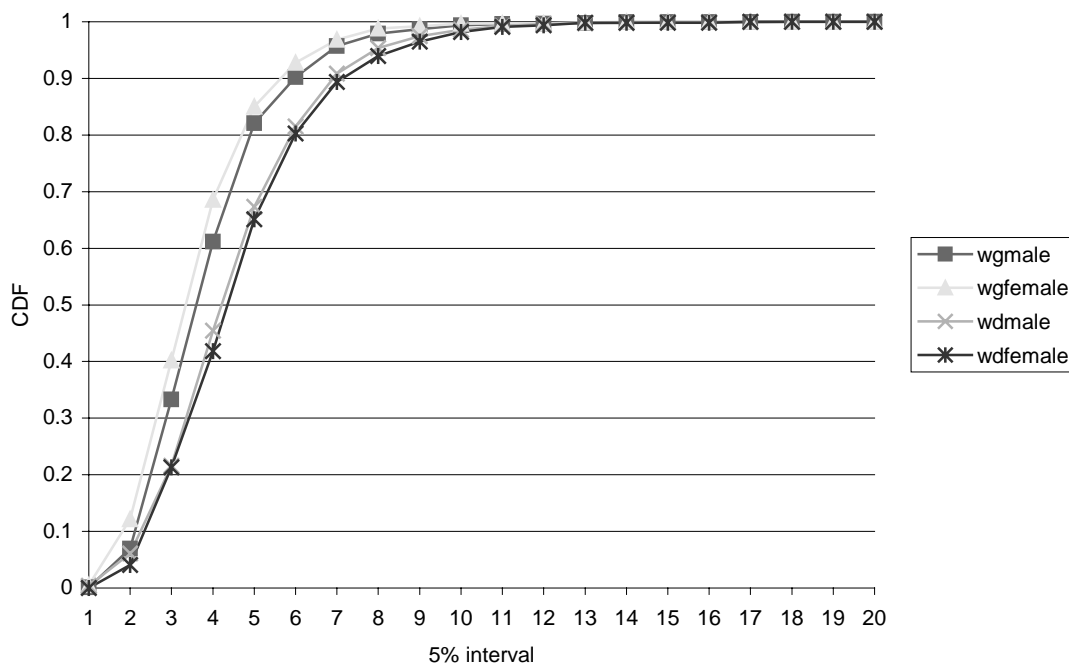
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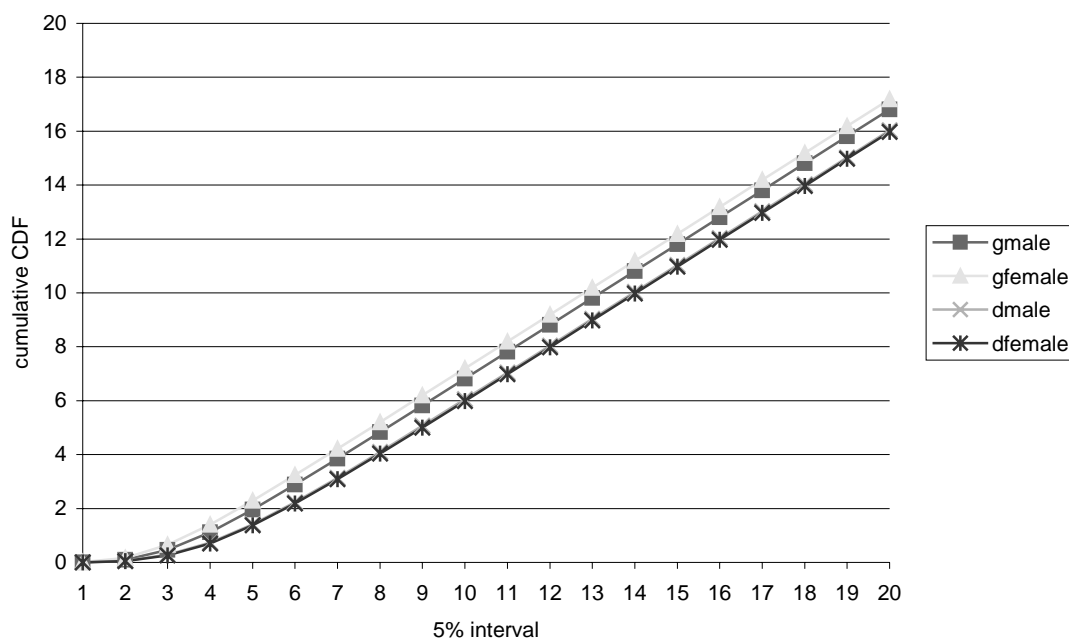
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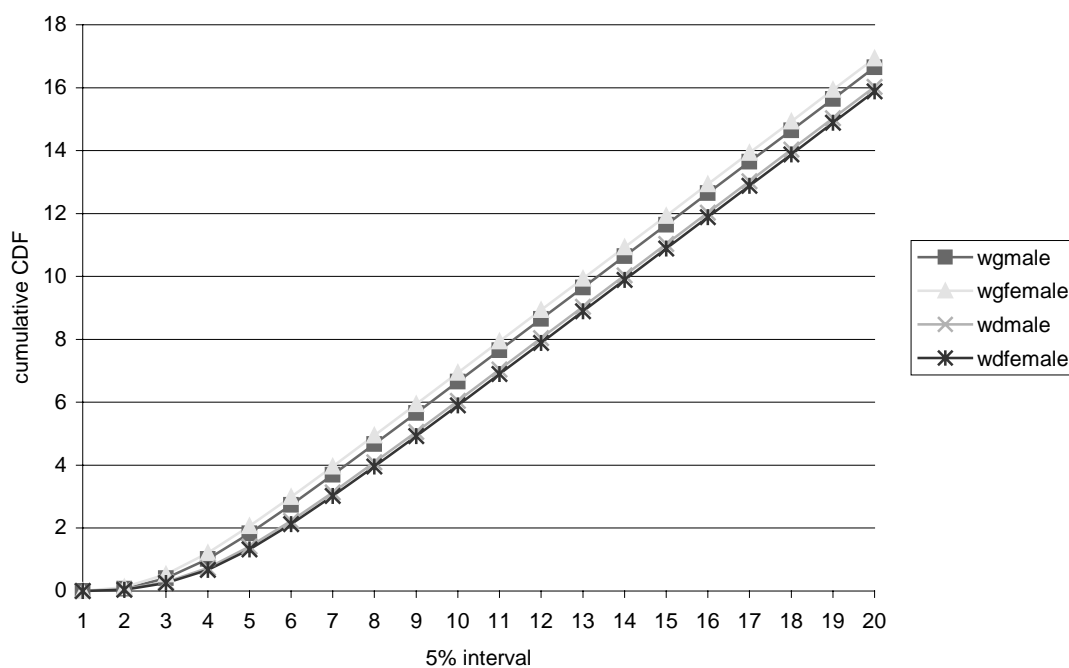
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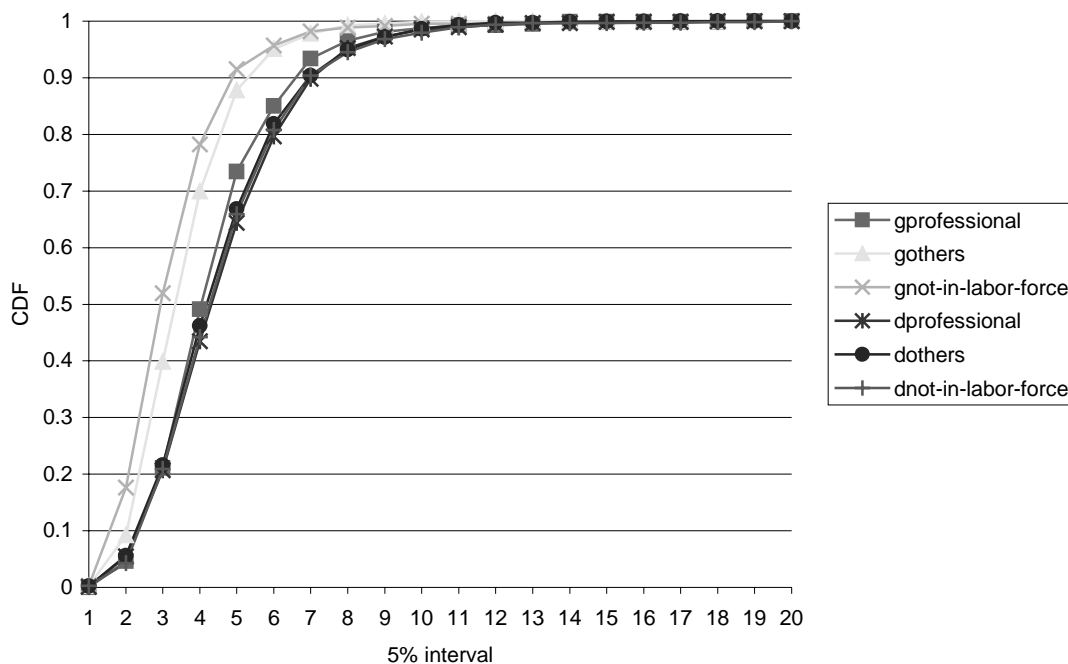
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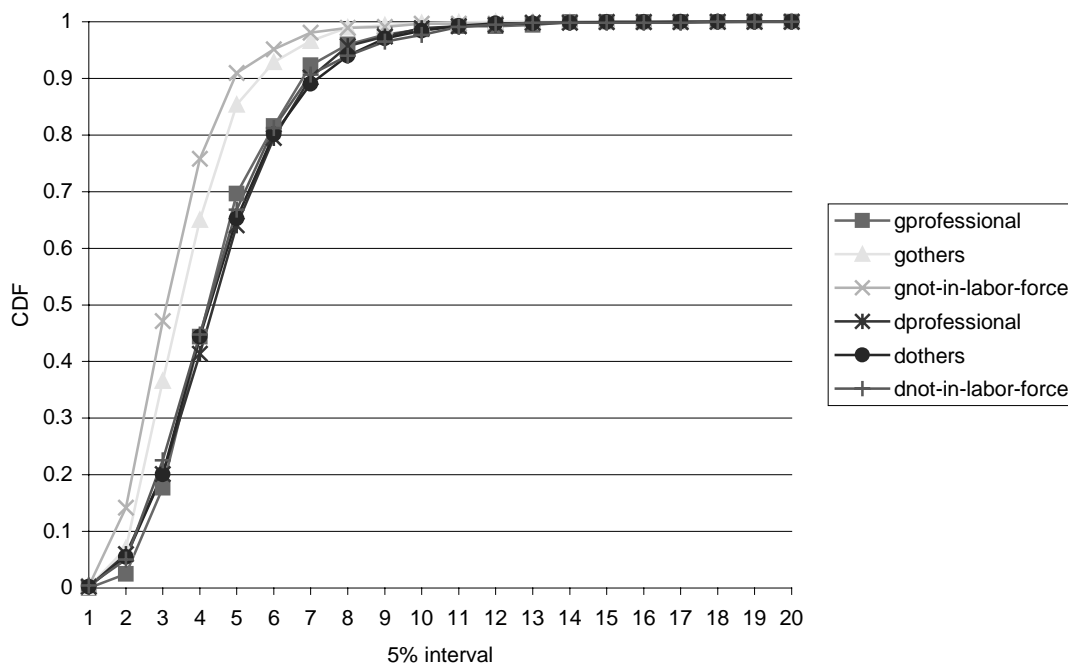
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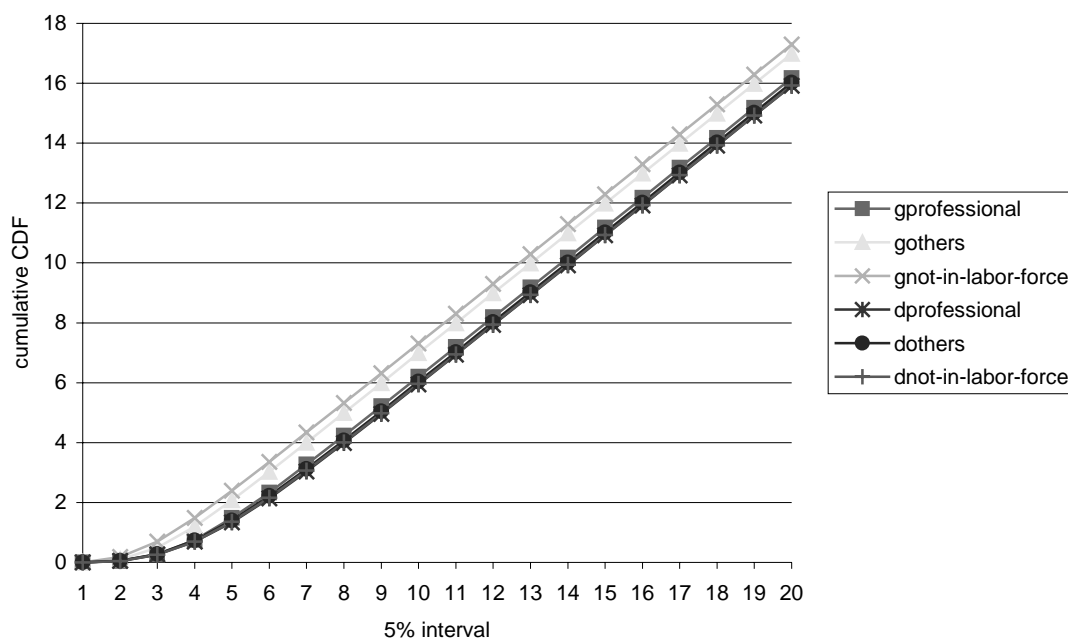
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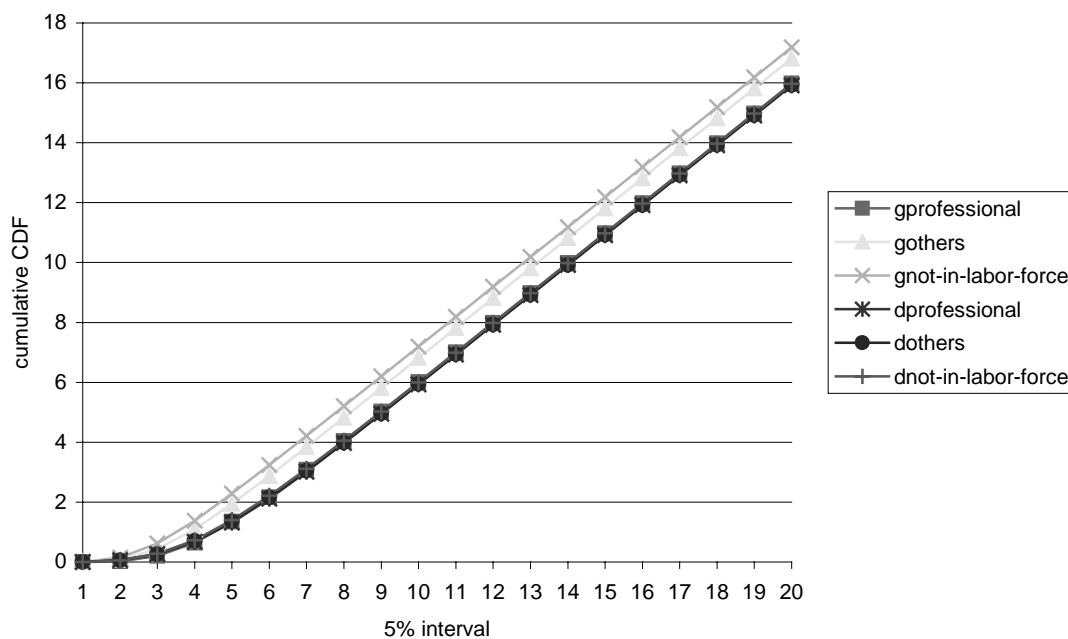
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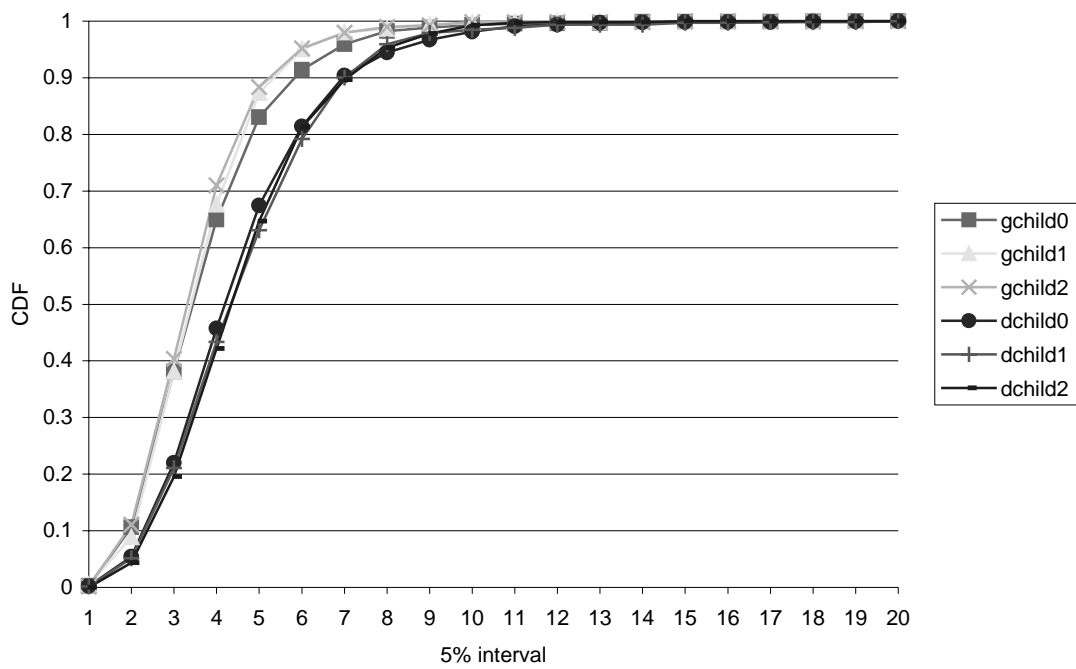
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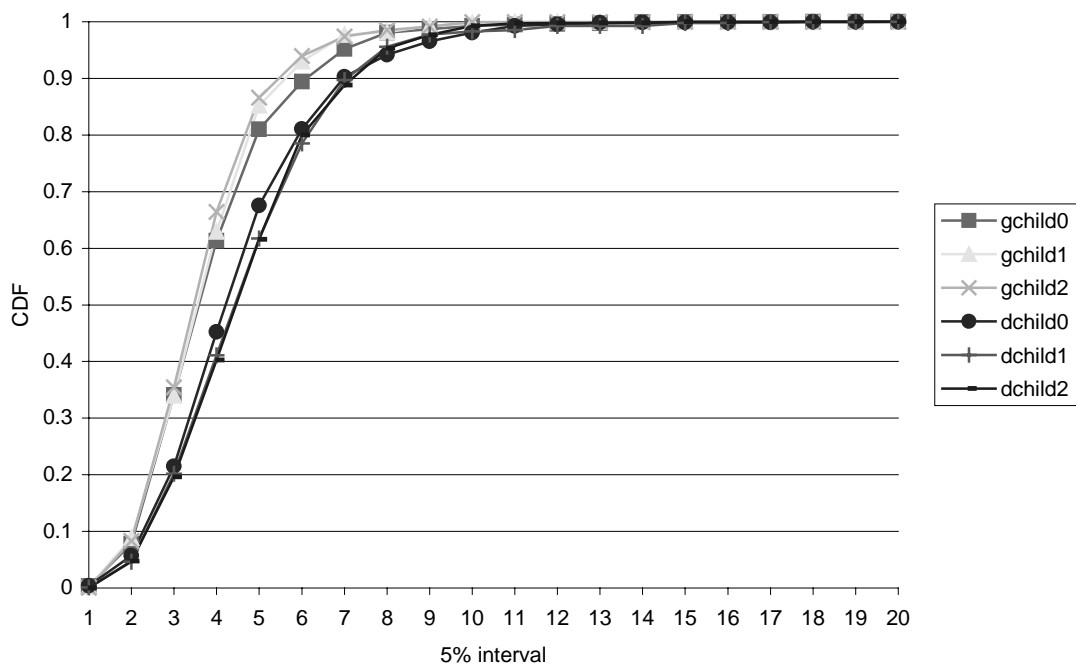
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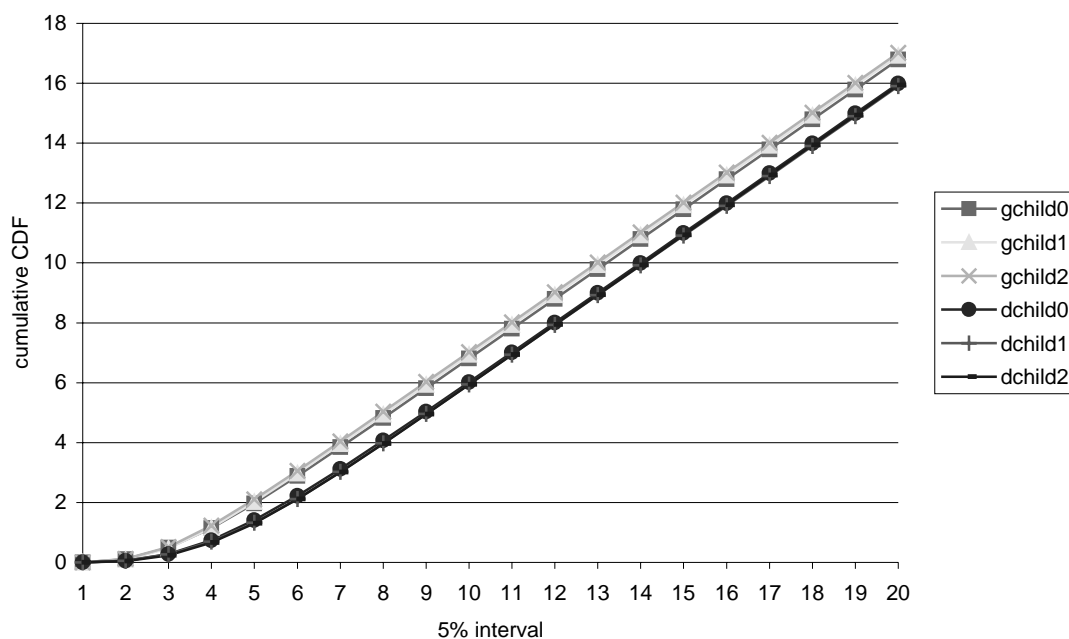
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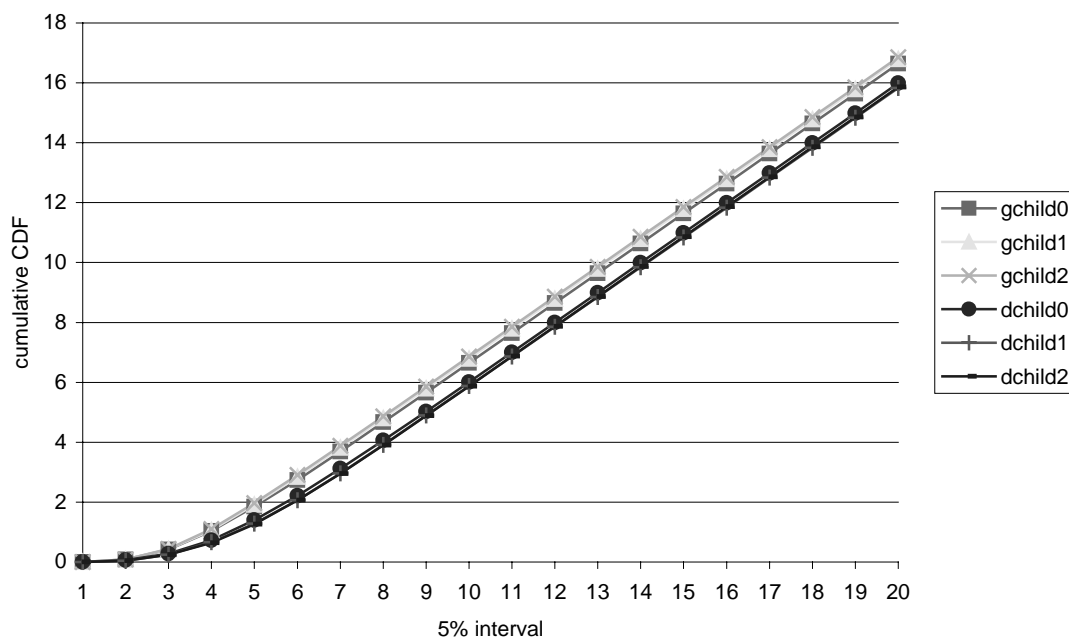
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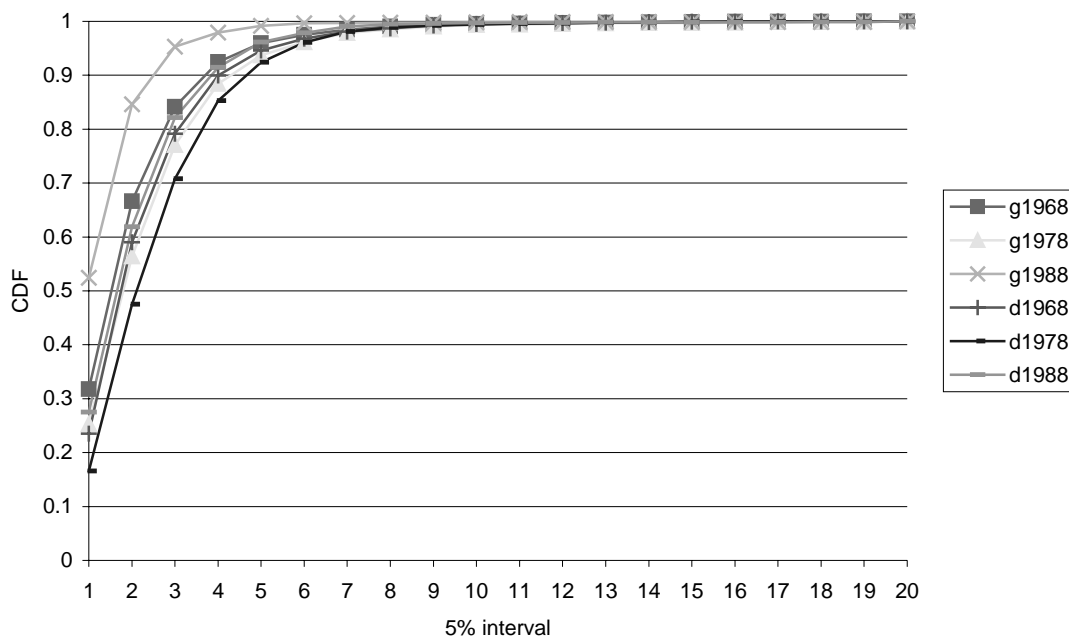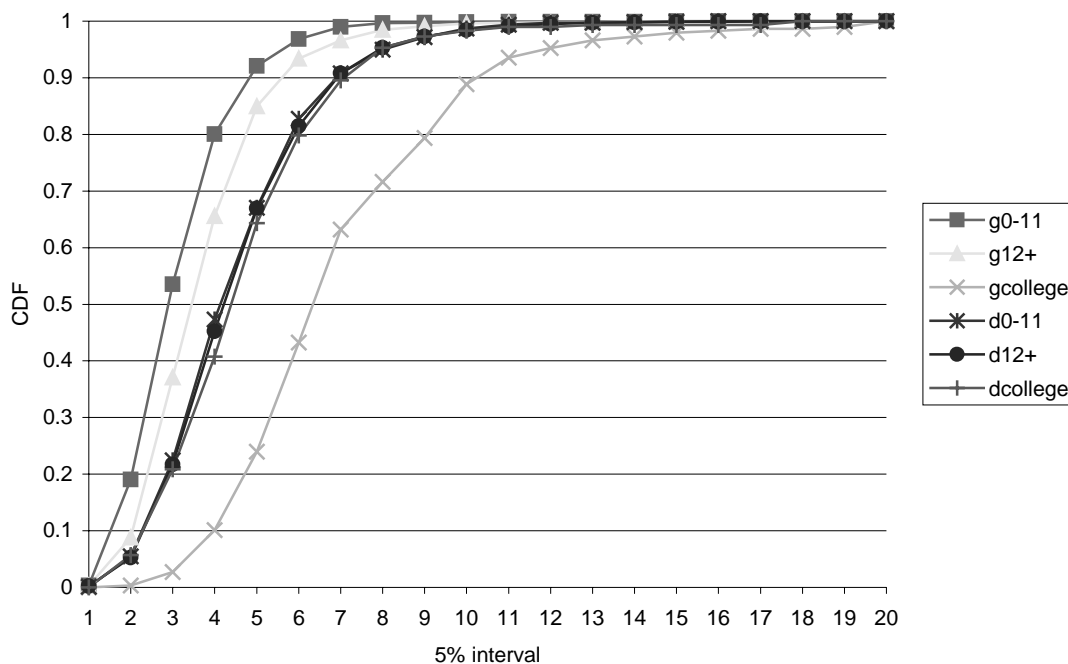

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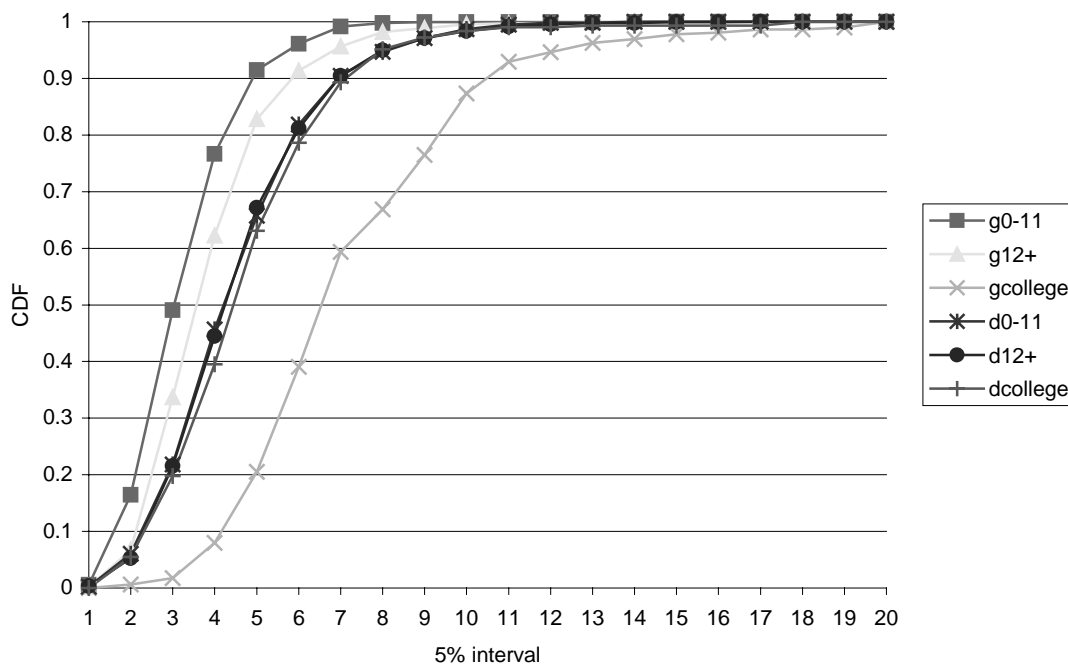
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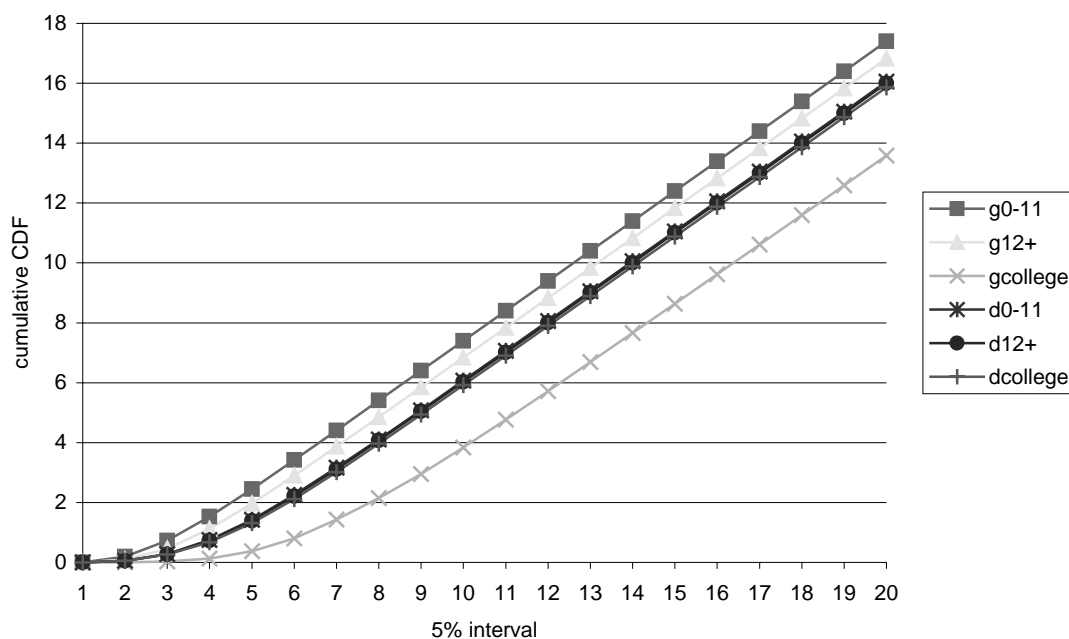
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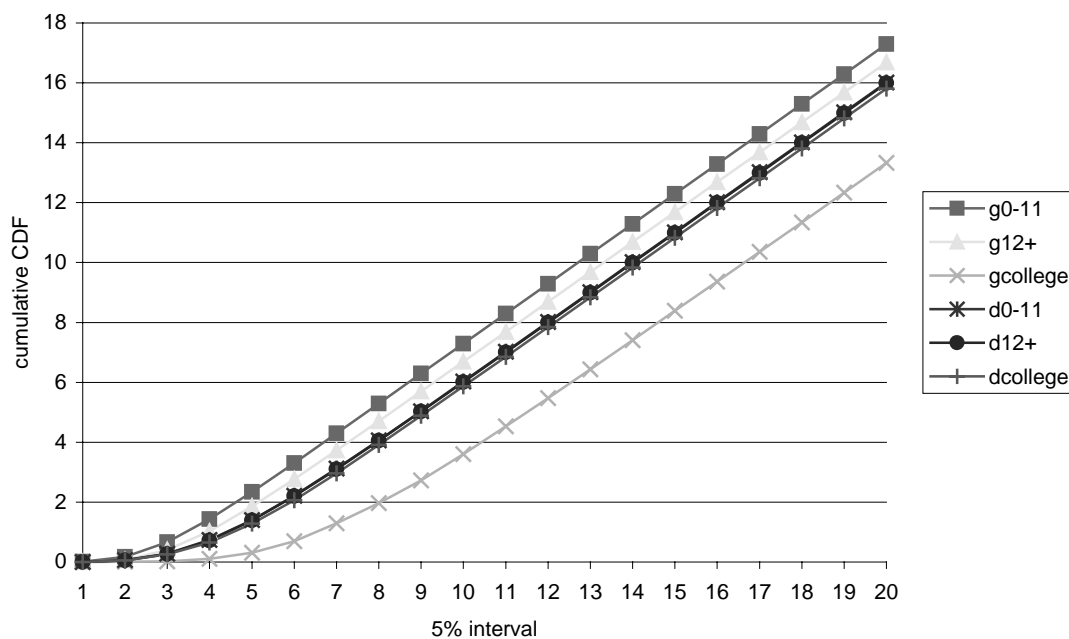
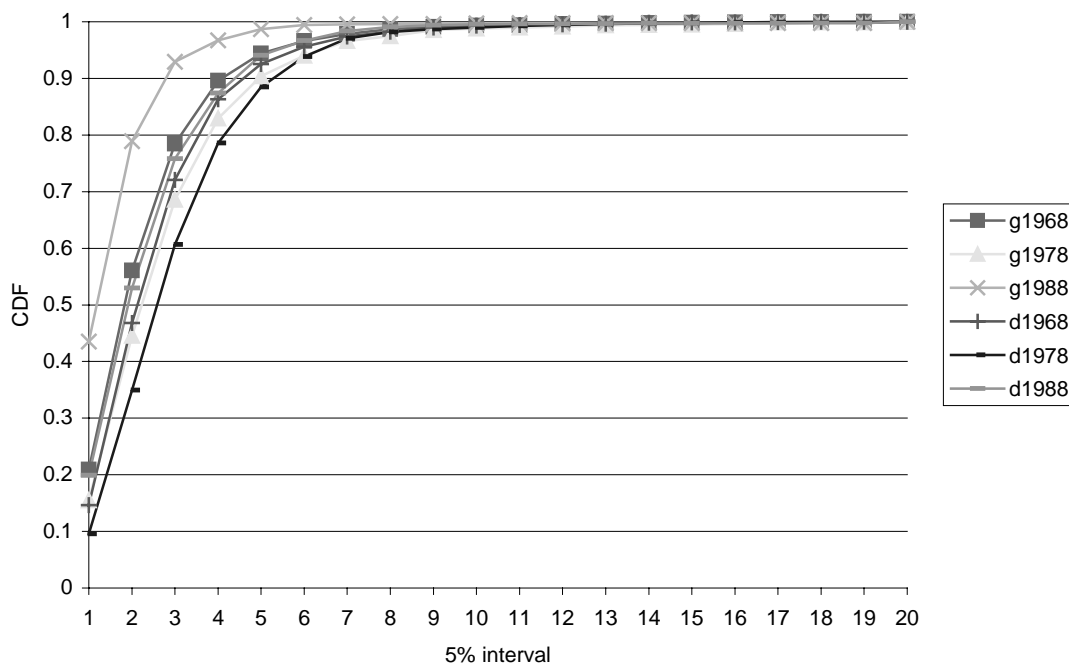Figure 10.A Un-weighted CDF of gross (g) and disposable (d) incomes by length of unemployment.
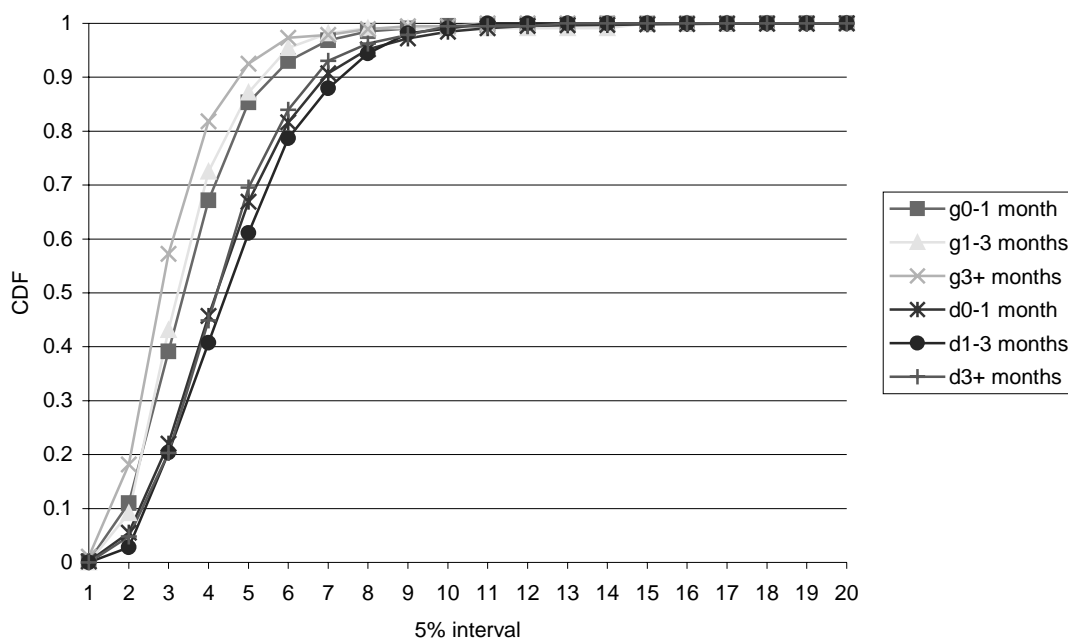
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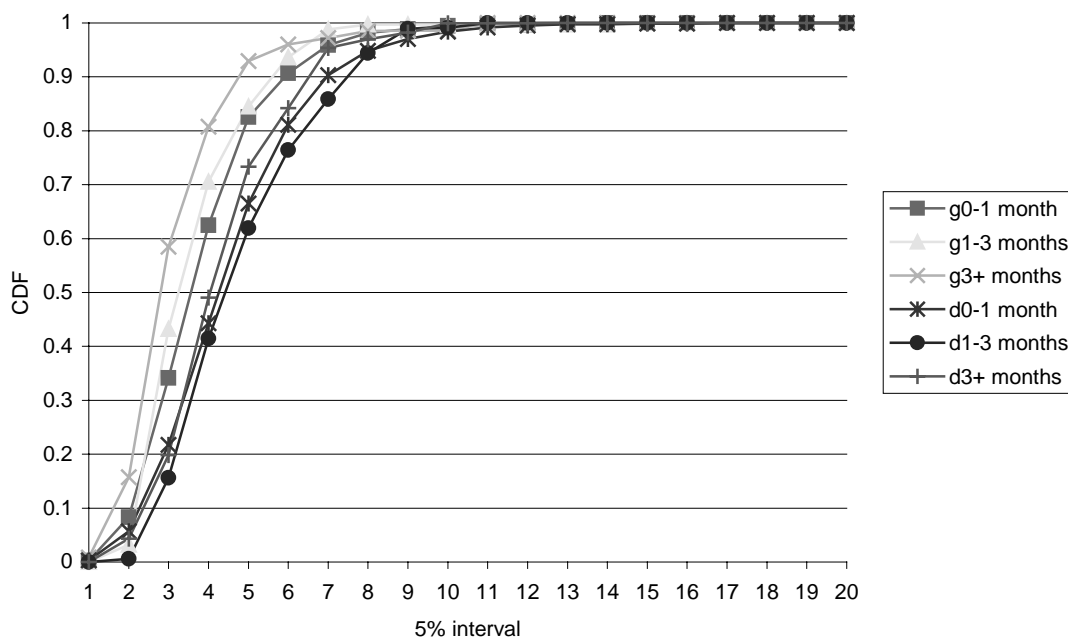
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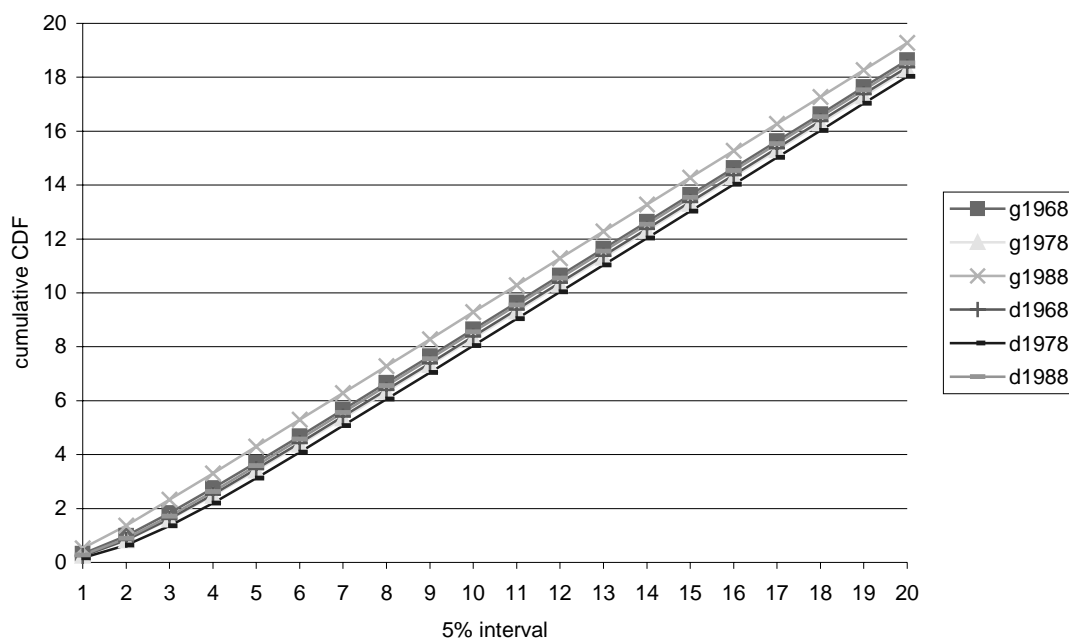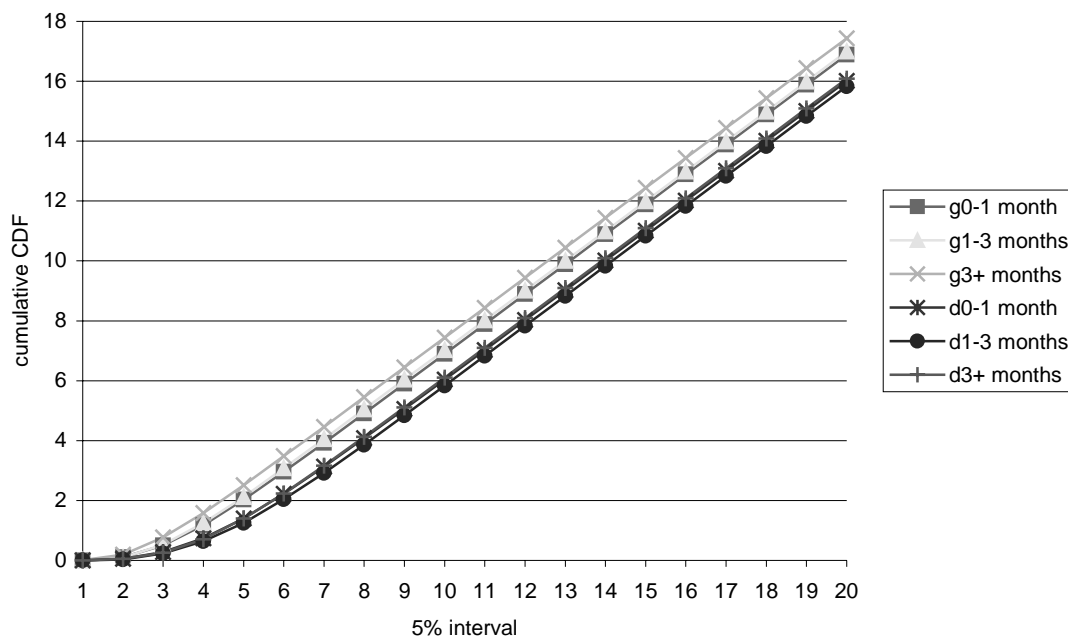

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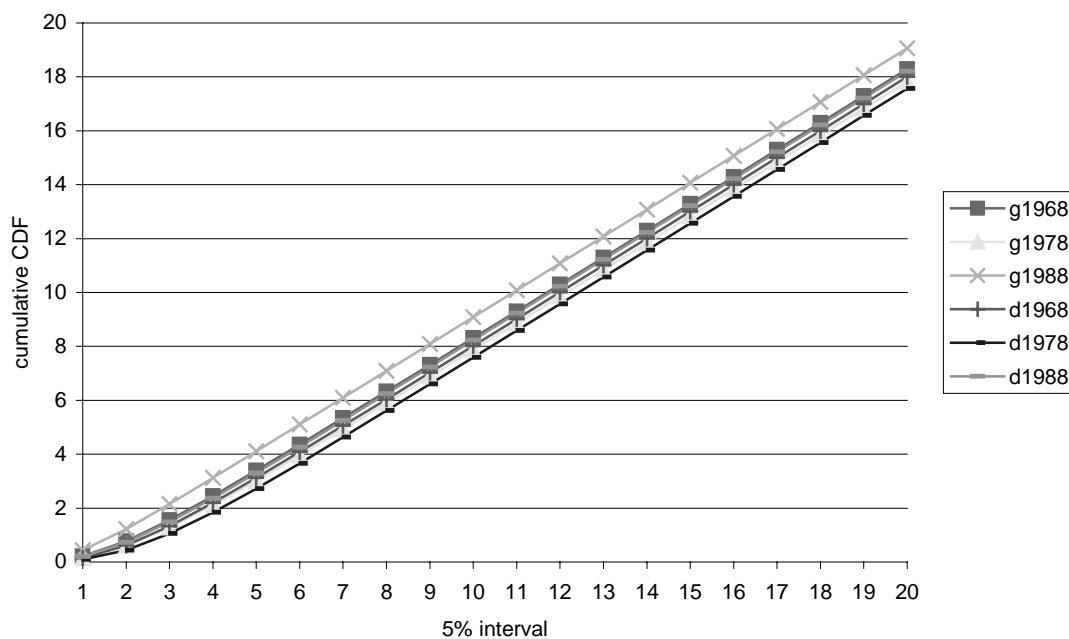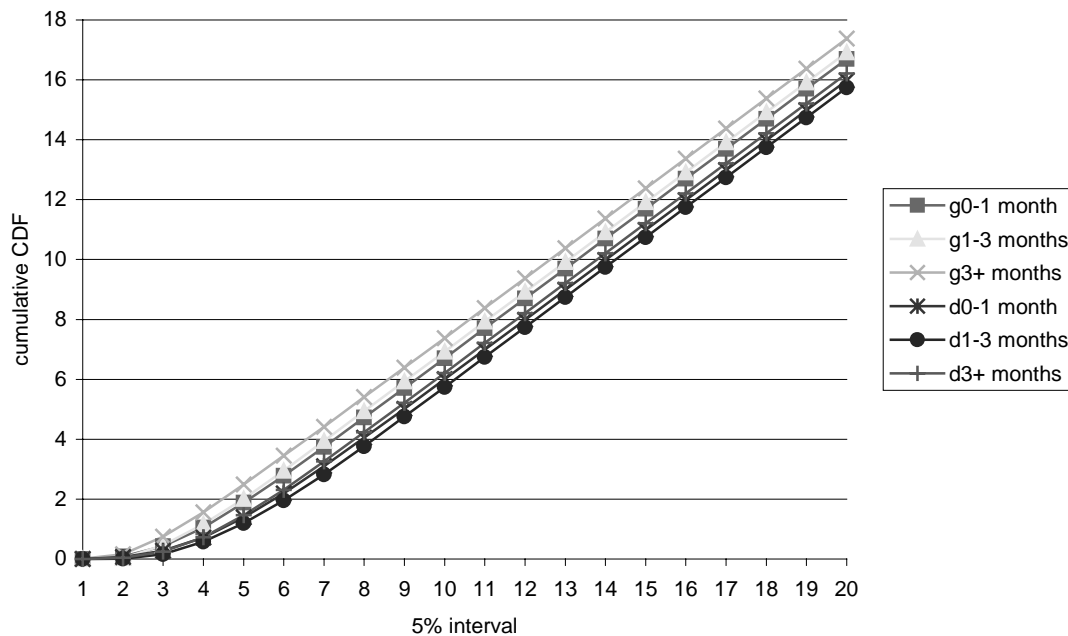
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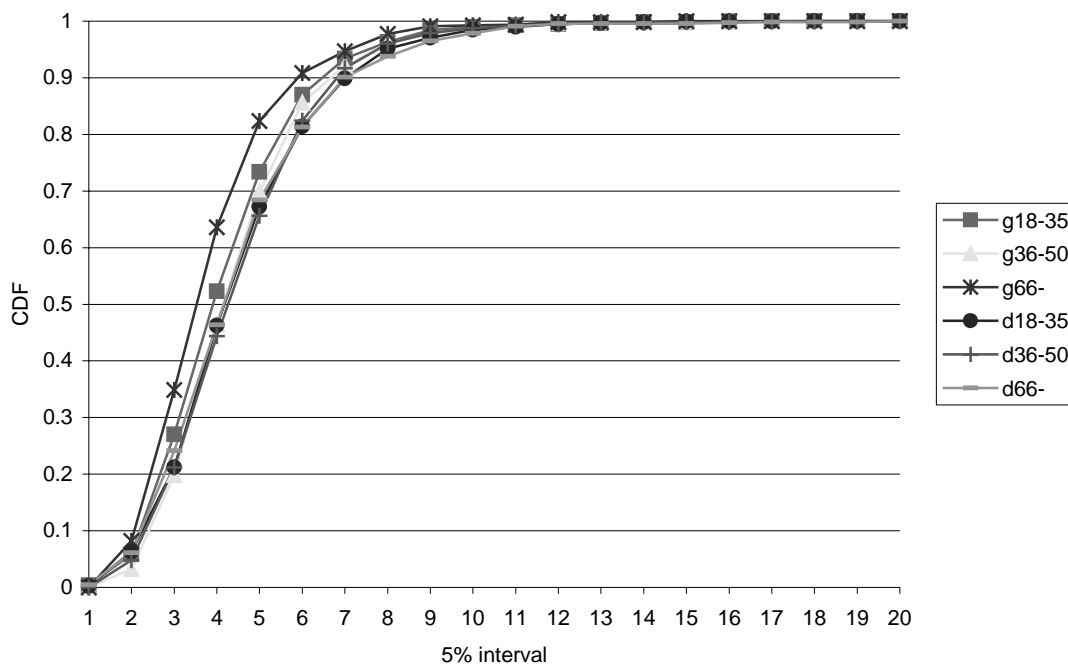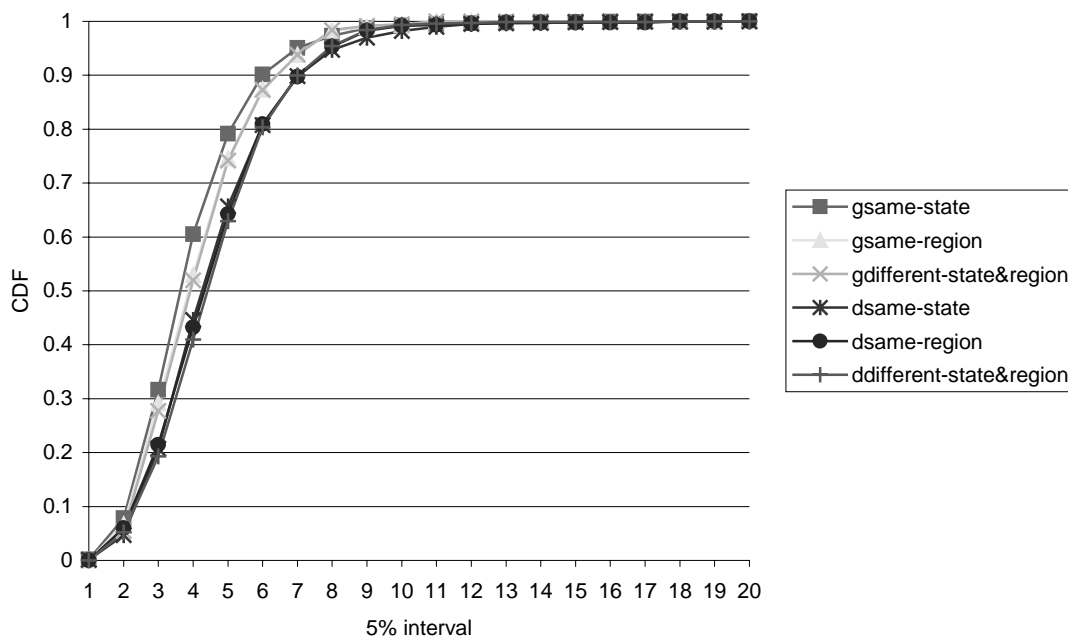

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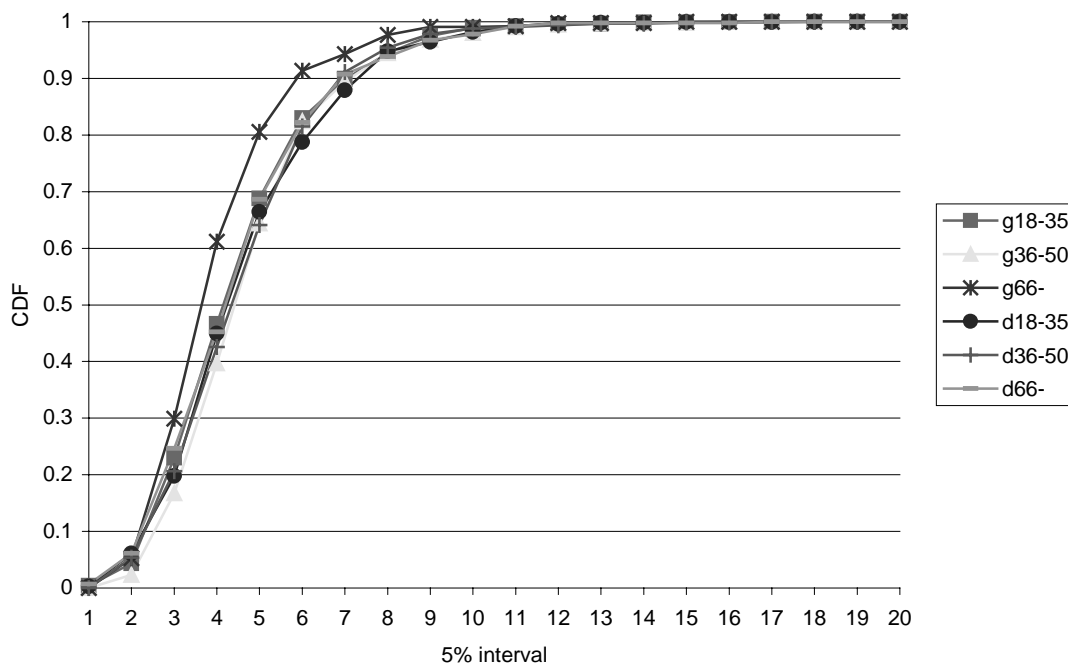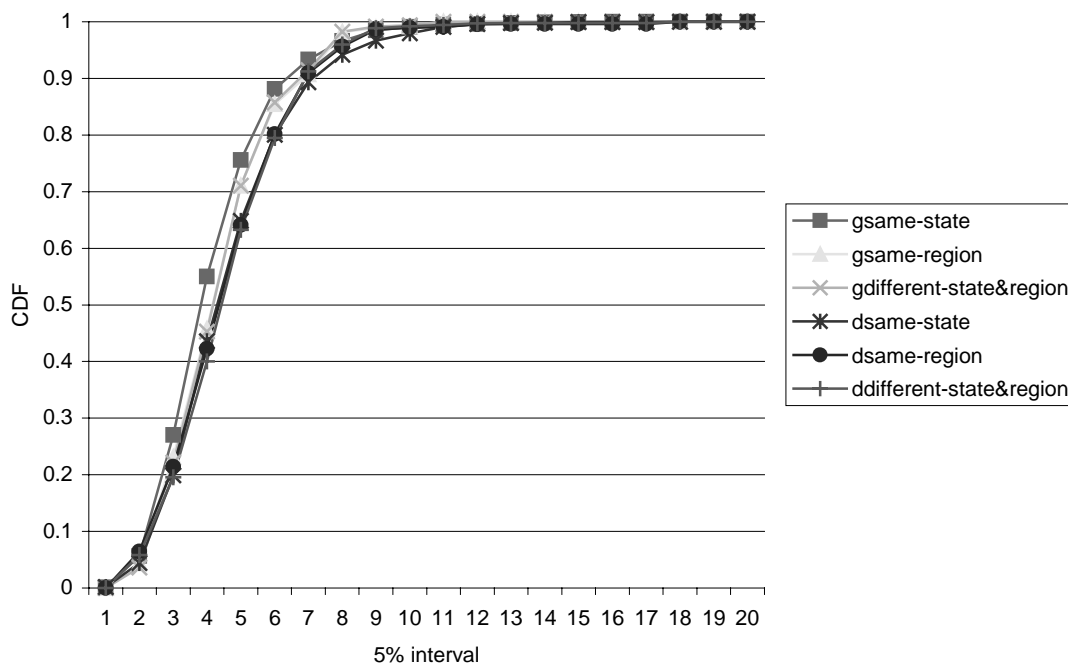
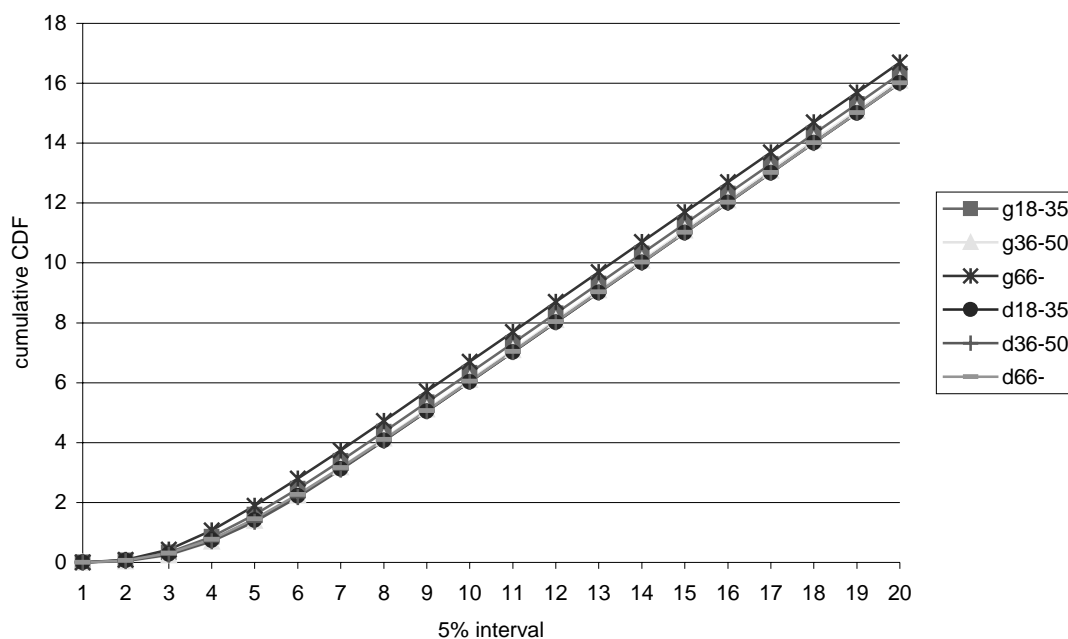Figure 11.C Un-weighted cumulative CDF of gross (g) and disposable (d) incomes by geographical mobility.

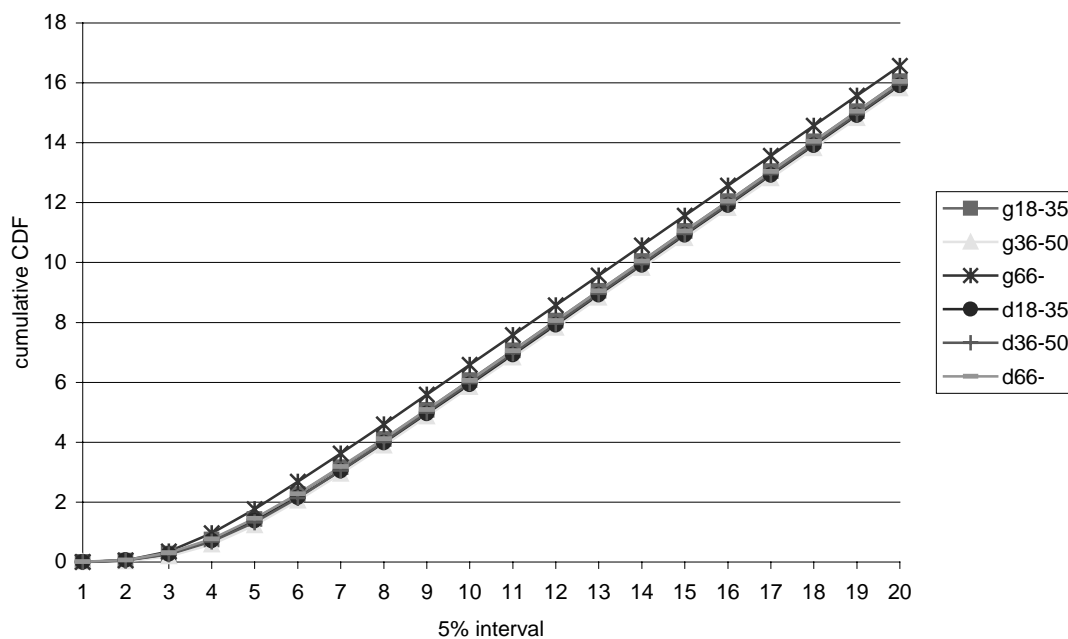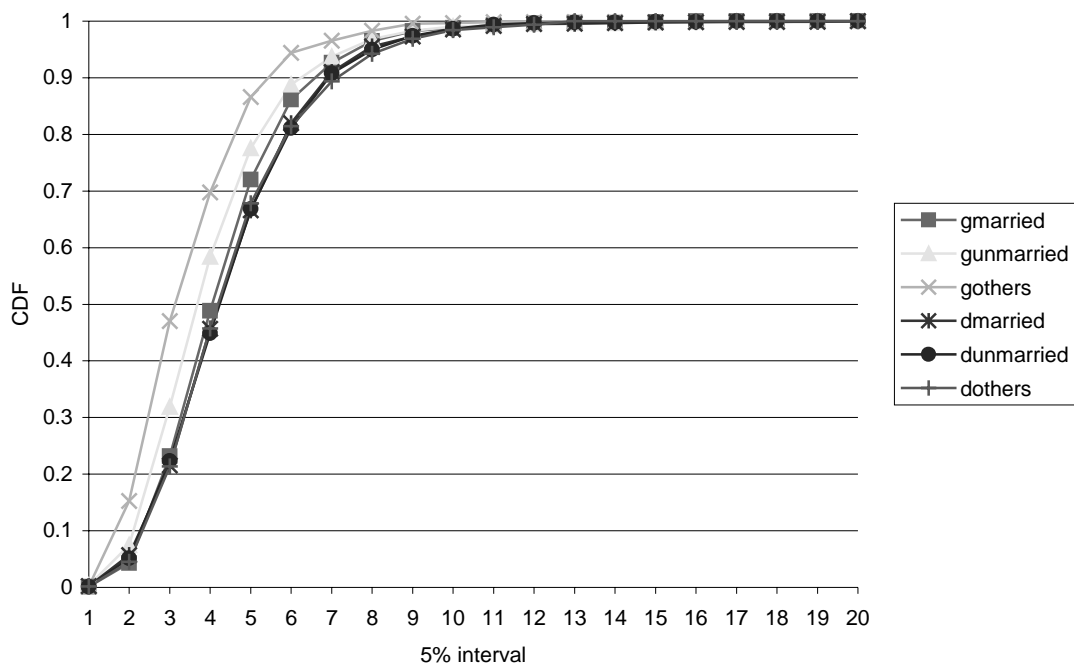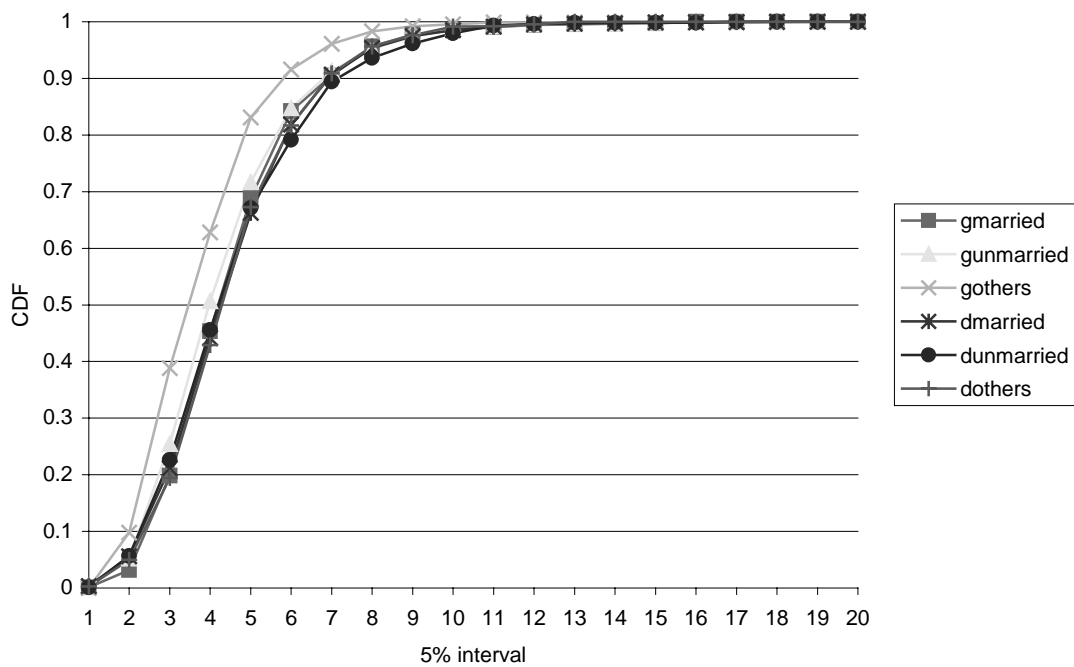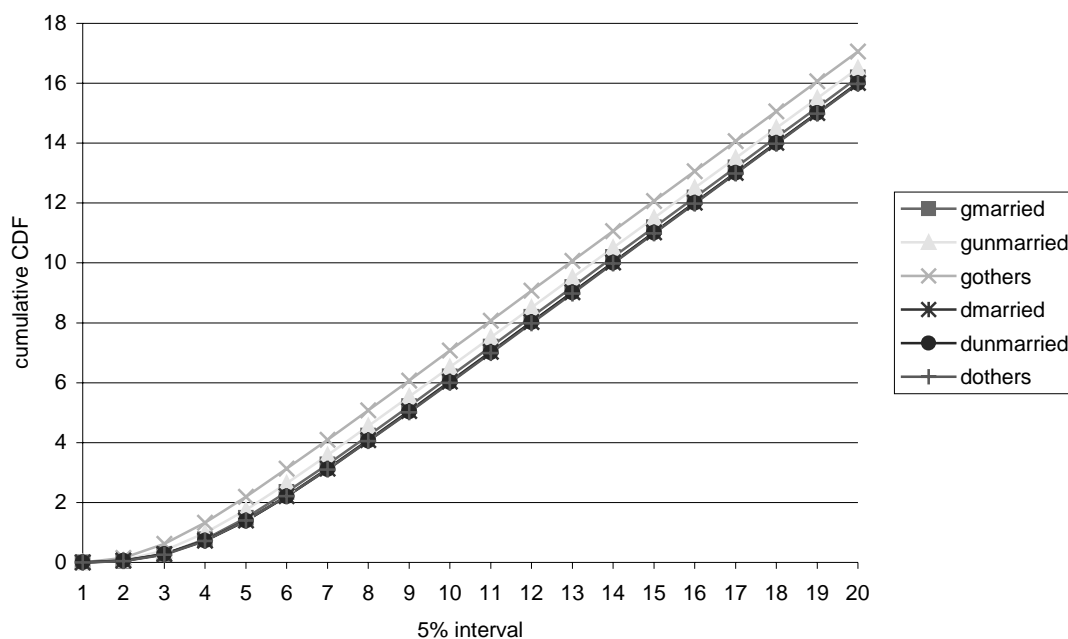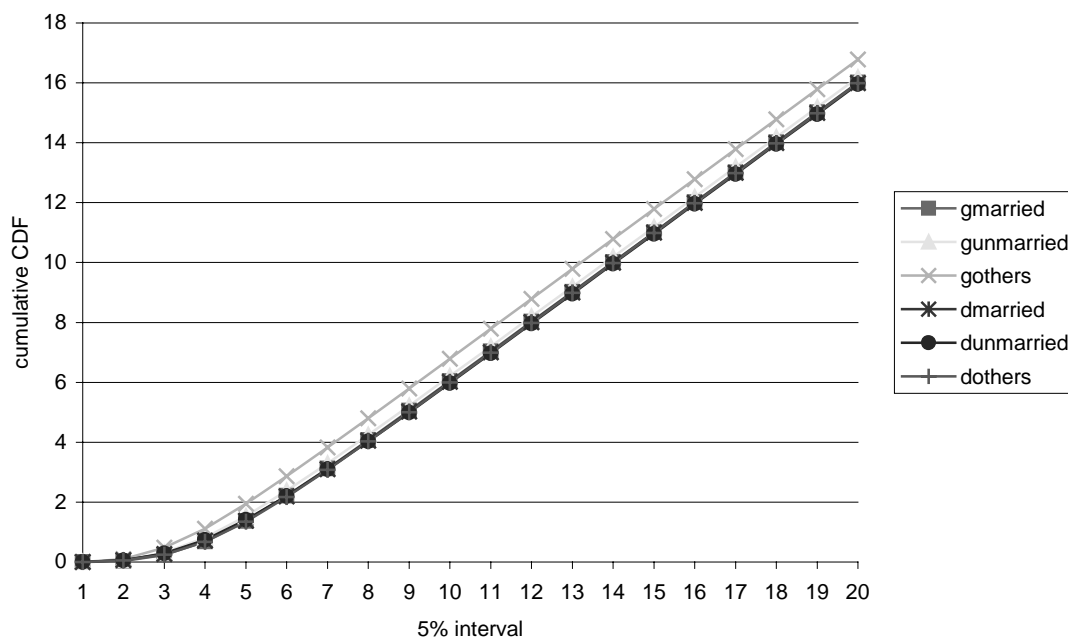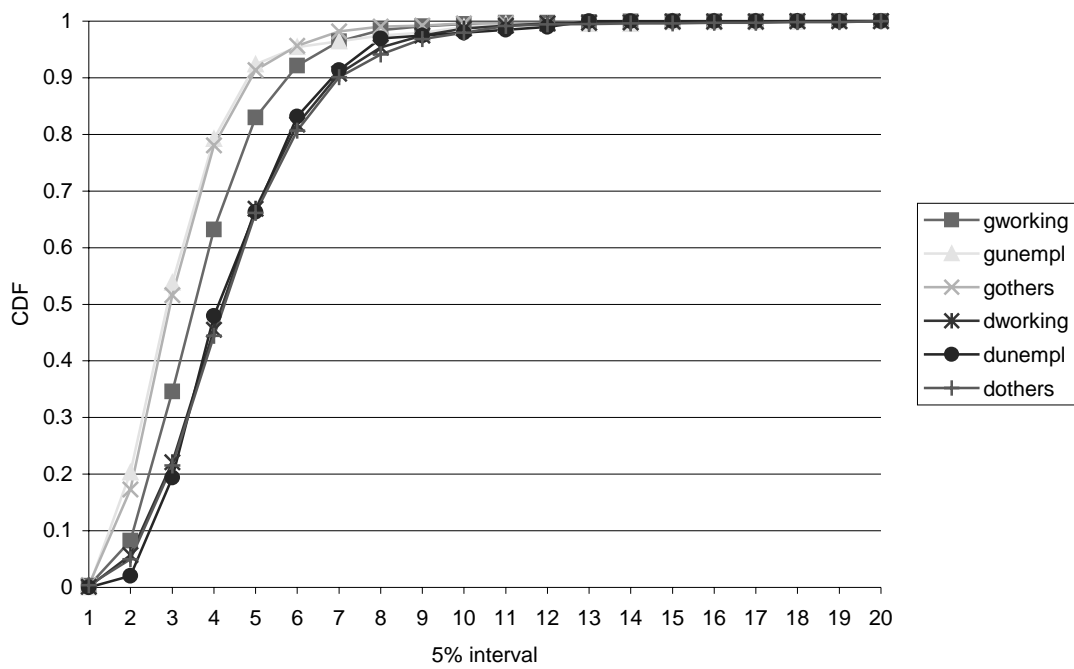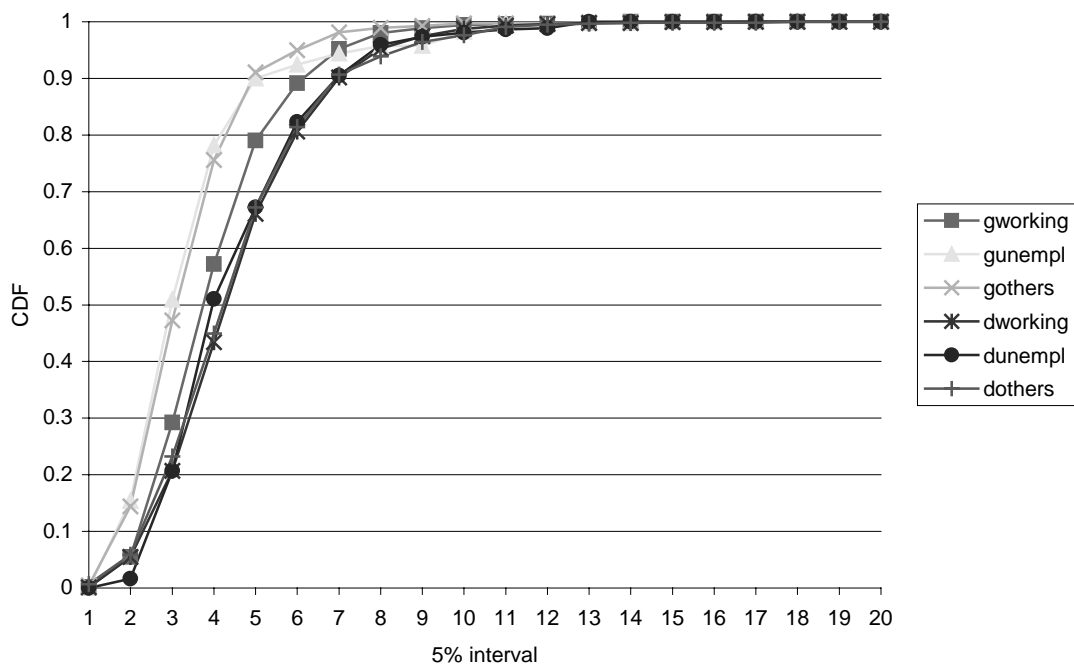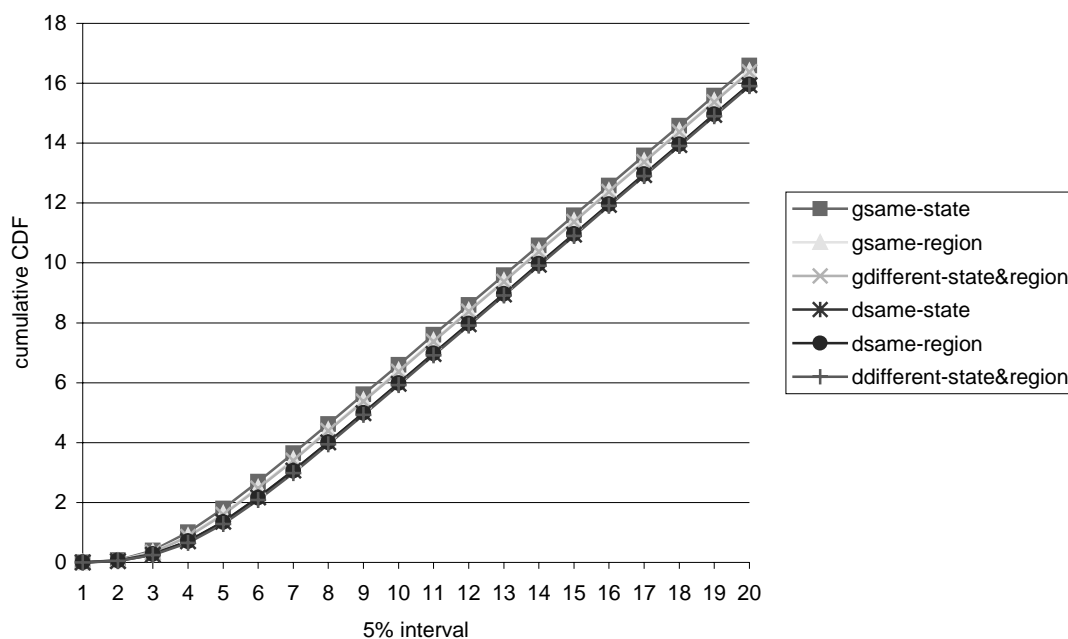Figure 11.D Weighted cumulative CDF of gross (g) and disposable (d) incomes by geographical mobility.
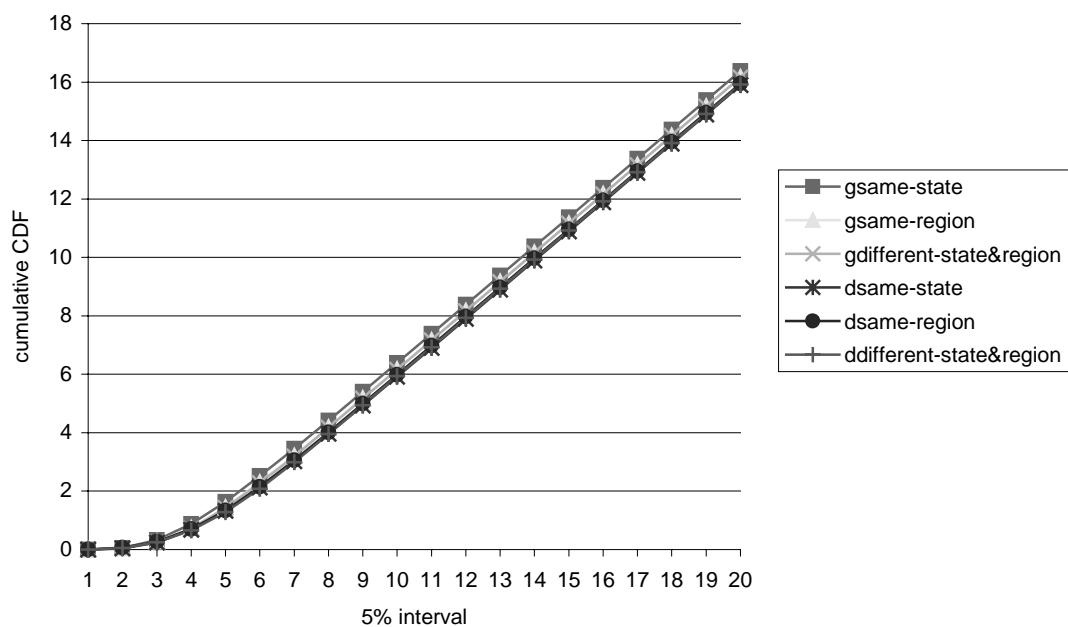
Table 1. Comparisons of gross and disposable incomes by YEAR of observation.

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                    un-weighted observations                      weighted observations
---------------------------------------------------------------------------------------------
             gross income      disposable income         gross income      disposable income
---------------------------------------------------------------------------------------------
variable      n     mean    std       n     mean    std       n     mean    std       n     mean    std
---------------------------------------------------------------------------------------------
1968       3897   12483  10818    3897   11252   8802   71348   14786  11674   71348   13208   9406
1978       3897   14819  12344    3897   12997   9292   63751   17883  13989   63751   15441  10244
1988       3897   17377  16700    3897   15408  12409   69608   20518  19820   69608   18027  14077
1993       3897   18704  17069       .       .      .   67454   21960  19207       .       .      .
1997       3897   19632  20904       .       .      .   59328   22231  22823       .       .      .
---------------------------------------------------------------------------------------------
variable    mean     std  prob    mean     std  prob    mean     std  prob    mean     std  prob
---------------------------------------------------------------------------------------------
1968(x) vs. 1978(y):
FSDxoy    0.1019  0.0111 0.000  0.1153  0.0115 0.000  0.1151  0.0027 0.000  0.1190  0.0027 0.000
FSDyox    0.0002  0.0008 0.381  0.0023  0.0020 0.103 -0.0002  0.0002 0.930  0.0001  0.0005 0.558
FOmax     0.0002  0.0008 0.381  0.0023  0.0020 0.103 -0.0002  0.0002 0.930  0.0001  0.0005 0.558
SSDxoy    0.3394  0.0399 0.000  0.3503  0.0368 0.000  0.4589  0.0106 0.000  0.4379  0.0102 0.000
SSDyox   -0.0653  0.0102 1.000 -0.0693  0.0090 1.000 -0.0539  0.0022 1.000 -0.0508  0.0018 1.000
SOmax    -0.0653  0.0102 1.000 -0.0693  0.0090 1.000 -0.0539  0.0022 1.000 -0.0508  0.0018 1.000
1968(x) vs. 1988(y):
FSDxoy    0.1828  0.0109 0.000  0.1702  0.0101 0.000  0.1753  0.0026 0.000  0.1873  0.0025 0.000
FSDyox   -0.0007  0.0008 0.821 -0.0009  0.0009 0.842 -0.0020  0.0002 1.000 -0.0023  0.0002 1.000
FOmax    -0.0007  0.0008 0.821 -0.0009  0.0009 0.842 -0.0020  0.0002 1.000 -0.0023  0.0002 1.000
SSDxoy    0.3353  0.0224 0.000  0.5374  0.0321 0.000  0.4049  0.0062 0.000  0.6082  0.0084 0.000
SSDyox   -0.1828  0.0109 1.000 -0.1484  0.0107 1.000 -0.1753  0.0026 1.000 -0.0943  0.0023 1.000
SOmax    -0.1828  0.0109 1.000 -0.1484  0.0107 1.000 -0.1753  0.0026 1.000 -0.0943  0.0023 1.000
---------------------------------------------------------------------------------------------
```

Table 1. Continuous.

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
1968(x) vs. 1993(y):												
FSDxoy	0.1989	0.0107	0.000	.	.	.	0.2001	0.0024	0.000	.	.	.
FSDyox	-0.0010	0.0005	0.987	.	.	.	-0.0019	0.0002	1.000	.	.	.
FOmax	-0.0010	0.0005	0.987	.	.	.	-0.0019	0.0002	1.000	.	.	.
SSDxoy	0.6717	0.0345	0.000	.	.	.	0.7536	0.0089	0.000	.	.	.
SSDyox	-0.1987	0.0109	1.000	.	.	.	-0.1415	0.0025	1.000	.	.	.
SOmax	-0.1987	0.0109	1.000	.	.	.	-0.1415	0.0025	1.000	.	.	.
1968(x) vs. 1997(y):												
FSDxoy	0.2165	0.0110	0.000	.	.	.	0.1895	0.0027	0.000	.	.	.
FSDyox	-0.0005	0.0004	0.961	.	.	.	-0.0006	0.0001	1.000	.	.	.
FOmax	-0.0005	0.0004	0.961	.	.	.	-0.0006	0.0001	1.000	.	.	.
SSDxoy	0.4945	0.0270	0.000	.	.	.	0.5295	0.0072	0.000	.	.	.
SSDyox	-0.2165	0.0110	1.000	.	.	.	-0.1895	0.0027	1.000	.	.	.
SOmax	-0.2165	0.0110	1.000	.	.	.	-0.1895	0.0027	1.000	.	.	.
1978(x) vs. 1988(y):												
FSDxoy	0.0782	0.0111	0.000	0.0862	0.0101	0.000	0.0675	0.0020	0.000	0.0855	0.0021	0.000
FSDyox	0.0001	0.0012	0.491	-0.0008	0.0009	0.814	0.0005	0.0004	0.097	-0.0017	0.0003	1.000
FOmax	0.0001	0.0012	0.491	-0.0008	0.0009	0.814	0.0005	0.0004	0.097	-0.0017	0.0003	1.000
SSDxoy	0.1835	0.0232	0.000	0.3135	0.0325	0.000	0.1926	0.0067	0.000	0.3283	0.0088	0.000
SSDyox	-0.0781	0.0113	1.000	-0.0471	0.0104	1.000	-0.0541	0.0028	1.000	-0.0102	0.0022	1.000
SOmax	-0.0781	0.0113	1.000	-0.0471	0.0104	1.000	-0.0541	0.0028	1.000	-0.0102	0.0022	1.000
1978(x) vs. 1993(y):												
FSDxoy	0.1070	0.0096	0.000	.	.	.	0.0971	0.0022	0.000	.	.	.
FSDyox	-0.0009	0.0006	0.934	.	.	.	-0.0019	0.0002	1.000	.	.	.
FOmax	-0.0009	0.0006	0.934	.	.	.	-0.0019	0.0002	1.000	.	.	.
SSDxoy	0.4276	0.0354	0.000	.	.	.	0.4328	0.0100	0.000	.	.	.
SSDyox	-0.0965	0.0108	1.000	.	.	.	-0.0537	0.0024	1.000	.	.	.
SOmax	-0.0965	0.0108	1.000	.	.	.	-0.0537	0.0024	1.000	.	.	.

Table 1. Continuous.

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
1978(x) vs. 1997(y):												
FSDxoy	0.1095	0.0113	0.000	.	.	.	0.0859	0.0023	0.000	.	.	.
FSDyox	-0.0005	0.0004	0.961	.	.	.	-0.0006	0.0001	1.000	.	.	.
FOmax	-0.0005	0.0004	0.961	.	.	.	-0.0006	0.0001	1.000	.	.	.
SSDxoy	0.3363	0.0278	0.000	.	.	.	0.3112	0.0077	0.000	.	.	.
SSDyox	-0.1094	0.0114	1.000	.	.	.	-0.0667	0.0028	1.000	.	.	.
SOmax	-0.1094	0.0114	1.000	.	.	.	-0.0667	0.0028	1.000	.	.	.
1988(x) vs. 1993(y):												
FSDxoy	0.0336	0.0096	0.000	.	.	.	0.0335	0.0024	0.000	.	.	.
FSDyox	0.0013	0.0007	0.002	.	.	.	0.0024	0.0002	0.000	.	.	.
FOmax	0.0013	0.0007	0.002	.	.	.	0.0024	0.0002	0.000	.	.	.
SSDxoy	0.1043	0.0254	0.000	.	.	.	0.1219	0.0069	0.000	.	.	.
SSDyox	-0.0304	0.0117	0.994	.	.	.	-0.0329	0.0027	1.000	.	.	.
SOmax	-0.0304	0.0117	0.994	.	.	.	-0.0329	0.0027	1.000	.	.	.
1988(x) vs. 1997(y):												
FSDxoy	0.0346	0.0090	0.000	.	.	.	0.0228	0.0015	0.000	.	.	.
FSDyox	0.0005	0.0007	0.222	.	.	.	0.0015	0.0002	0.000	.	.	.
FOmax	0.0005	0.0007	0.222	.	.	.	0.0015	0.0002	0.000	.	.	.
SSDxoy	0.1485	0.0299	0.000	.	.	.	0.1148	0.0083	0.000	.	.	.
SSDyox	-0.0312	0.0117	0.996	.	.	.	-0.0138	0.0028	1.000	.	.	.
SOmax	-0.0312	0.0117	0.996	.	.	.	-0.0138	0.0028	1.000	.	.	.
1993(x) vs. 1997(y):												
FSDxoy	0.0125	0.0060	0.000	.	.	.	0.0064	0.0007	0.000	.	.	.
FSDyox	0.0045	0.0062	0.336	.	.	.	0.0180	0.0028	0.000	.	.	.
FOmax	0.0030	0.0038	0.336	.	.	.	0.0064	0.0007	0.000	.	.	.
SSDxoy	0.0593	0.0307	0.030	.	.	.	0.0137	0.0082	0.048	.	.	.
SSDyox	0.0000	0.0143	0.523	.	.	.	0.0302	0.0049	0.000	.	.	.
SOmax	-0.0019	0.0121	0.553	.	.	.	0.0132	0.0075	0.048	.	.	.

Table 2. Comparisons of mean period (gross 1968-1993 and disposable 1968-88) incomes by AGE of households head in 1993.

	un-weighted observations						weighted observations					
	gross income			disposable income			gross income			disposable income		
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
18-35	1199	15471	6669	1199	13203	5937	17463	16430	6972	17463	13406	5957
36-50	1393	16394	6759	1393	13195	5501	22282	17338	7064	22282	13333	5550
51-65	647	16850	8475	647	13271	6061	13889	17933	8657	13889	13191	5990
65-	658	14380	6758	658	13248	6238	13820	14738	6261	13820	13132	5929
variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
18-35(x) vs. 36-50(y):												
FSDxoy	0.0740	0.0163	0.000	0.0282	0.0145	0.000	0.0693	0.0049	0.000	0.0254	0.0046	0.000
FSDyox	0.0046	0.0040	0.013	0.0214	0.0105	0.005	0.0015	0.0012	0.001	0.0327	0.0032	0.000
FOmax	0.0046	0.0040	0.013	0.0156	0.0072	0.005	0.0015	0.0012	0.001	0.0249	0.0040	0.000
SSDxoy	0.2413	0.0663	0.000	0.0647	0.0468	0.000	0.2291	0.0195	0.000	0.0495	0.0126	0.000
SSDyox	-0.0042	0.0019	0.996	0.0299	0.0449	0.453	-0.0040	0.0005	1.000	0.0375	0.0189	0.031
SOmax	-0.0042	0.0019	0.996	0.0088	0.0144	0.453	-0.0040	0.0005	1.000	0.0303	0.0122	0.031
18-35(x) vs. 51-65(y):												
FSDxoy	0.0764	0.0207	0.000	0.0238	0.0120	0.002	0.0880	0.0055	0.000	0.0175	0.0025	0.000
FSDyox	0.0045	0.0070	0.078	0.0259	0.0154	0.001	0.0000	0.0001	0.300	0.0425	0.0034	0.000
FOmax	0.0045	0.0069	0.078	0.0152	0.0078	0.003	0.0000	0.0001	0.300	0.0175	0.0025	0.000
SSDxoy	0.2865	0.0822	0.000	0.0464	0.0449	0.021	0.3047	0.0200	0.000	0.0172	0.0027	0.000
SSDyox	-0.0021	0.0081	0.786	0.0522	0.0603	0.229	-0.0059	0.0006	1.000	0.1467	0.0222	0.000
SOmax	-0.0022	0.0080	0.786	0.0110	0.0122	0.250	-0.0059	0.0006	1.000	0.0172	0.0027	0.000

Table 2. Continuous.

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
18-35(x) vs. 66-(y):												
FSDxoy	0.0064	0.0045	0.000	0.0209	0.0121	0.001	0.0041	0.0005	0.000	0.0098	0.0025	0.000
FSDyox	0.0923	0.0215	0.000	0.0339	0.0179	0.002	0.1279	0.0056	0.000	0.0481	0.0047	0.000
FOmax	0.0064	0.0045	0.000	0.0158	0.0085	0.003	0.0041	0.0005	0.000	0.0098	0.0025	0.000
SSDxoy	0.0047	0.0033	0.000	0.0390	0.0561	0.263	0.0040	0.0005	0.000	-0.0024	0.0020	0.852
SSDyox	0.2820	0.0786	0.000	0.0704	0.0610	0.041	0.4155	0.0191	0.000	0.1395	0.0194	0.000
SOmax	0.0047	0.0033	0.000	0.0100	0.0154	0.304	0.0040	0.0005	0.000	-0.0024	0.0020	0.852
36-50(x) vs. 51-65(y):												
FSDxoy	0.0417	0.0177	0.000	0.0202	0.0137	0.015	0.0430	0.0044	0.000	0.0083	0.0038	0.000
FSDyox	0.0293	0.0140	0.002	0.0311	0.0177	0.000	0.0174	0.0026	0.000	0.0476	0.0051	0.000
FOmax	0.0243	0.0115	0.002	0.0137	0.0084	0.015	0.0174	0.0026	0.000	0.0083	0.0038	0.000
SSDxoy	0.0917	0.0714	0.000	0.0266	0.0435	0.272	0.0981	0.0183	0.000	0.0071	0.0053	0.091
SSDyox	0.0444	0.0307	0.027	0.0736	0.0627	0.000	0.0173	0.0026	0.000	0.1037	0.0201	0.000
SOmax	0.0259	0.0201	0.027	0.0063	0.0108	0.272	0.0173	0.0026	0.000	0.0071	0.0053	0.091
36-50(x) vs. 66-(y):												
FSDxoy	0.0032	0.0034	0.000	0.0309	0.0126	0.000	0.0003	0.0004	0.000	0.0178	0.0031	0.000
FSDyox	0.1568	0.0219	0.000	0.0420	0.0189	0.000	0.1928	0.0055	0.000	0.0520	0.0054	0.000
FOmax	0.0032	0.0034	0.000	0.0251	0.0101	0.000	0.0003	0.0004	0.000	0.0178	0.0031	0.000
SSDxoy	0.0000	0.0000	0.000	0.0471	0.0662	0.359	0.0000	0.0000	0.000	-0.0041	0.0008	0.993
SSDyox	0.5306	0.0782	0.000	0.0992	0.0583	0.000	0.6629	0.0192	0.000	0.1235	0.0159	0.000
SOmax	0.0000	0.0000	0.000	0.0196	0.0266	0.359	0.0000	0.0000	0.000	-0.0041	0.0008	0.993
51-65(x) vs. 66-(y):												
FSDxoy	0.0015	0.0021	0.094	0.0256	0.0140	0.000	0.0000	0.0000	0.293	0.0204	0.0031	0.000
FSDyox	0.1633	0.0256	0.000	0.0325	0.0184	0.002	0.1836	0.0051	0.000	0.0402	0.0048	0.000
FOmax	0.0015	0.0021	0.094	0.0175	0.0094	0.002	0.0000	0.0000	0.293	0.0204	0.0031	0.000
SSDxoy	-0.0015	0.0015	0.641	0.0547	0.0697	0.269	-0.0029	0.0004	1.000	0.0398	0.0222	0.042
SSDyox	0.5496	0.0925	0.000	0.0769	0.0641	0.023	0.6937	0.0190	0.000	0.0574	0.0081	0.000
SOmax	-0.0015	0.0015	0.641	0.0151	0.0207	0.292	-0.0029	0.0004	1.000	0.0353	0.0165	0.042

Table 3. Comparisons of mean period incomes by MARITAL STATUS of households head in 1993.

```
-------------------------------------------------------------------------------------
                un-weighted observations                    weighted observations
-------------------------------------------------------------------------------------
            gross income     disposable income          gross income     disposable income
-------------------------------------------------------------------------------------
variable    n    mean    std      n    mean    std       n    mean    std      n    mean    std
-------------------------------------------------------------------------------------
married   2300  16318  6960   2300  13178  5756    38264  16923  7054   38264  13230  5622
unmarried  954  15084  6869    954  13263  5845    18420  16243  7249   18420  13351  6053
others     643  15285  7728    643  13301  6231    10770  16644  8345   10770  13343  6141
-------------------------------------------------------------------------------------
variable  mean    std  prob   mean    std  prob    mean    std  prob   mean    std  prob
-------------------------------------------------------------------------------------
married(x) vs. unmarried(y):
FSDxoy  0.0034 0.0032 0.034 0.0195 0.0118 0.002  0.0045 0.0017 0.000 0.0270 0.0036 0.000
FSDyox  0.0984 0.0175 0.000 0.0164 0.0115 0.000  0.0569 0.0037 0.000 0.0164 0.0038 0.000
FOmax   0.0034 0.0032 0.034 0.0095 0.0056 0.002  0.0045 0.0017 0.000 0.0163 0.0035 0.000
SSDxoy -0.0024 0.0019 0.906 0.0453 0.0469 0.037 -0.0011 0.0003 1.000 0.0396 0.0169 0.000
SSDyox  0.3204 0.0637 0.000 0.0313 0.0415 0.250  0.1744 0.0155 0.000 0.0370 0.0112 0.001
SOmax  -0.0024 0.0019 0.906 0.0057 0.0080 0.287 -0.0011 0.0003 1.000 0.0274 0.0085 0.001
Married(x) vs. others(y):
FSDxoy  0.0052 0.0049 0.011 0.0197 0.0100 0.003  0.0013 0.0007 0.000 0.0132 0.0042 0.000
FSDyox  0.1197 0.0218 0.000 0.0273 0.0161 0.000  0.0676 0.0052 0.000 0.0201 0.0052 0.000
FOmax   0.0052 0.0049 0.011 0.0139 0.0072 0.003  0.0013 0.0007 0.000 0.0123 0.0036 0.000
SSDxoy -0.0002 0.0017 0.507 0.0401 0.0453 0.051  0.0008 0.0002 0.000 0.0268 0.0096 0.001
SSDyox  0.2954 0.0645 0.000 0.0518 0.0537 0.168  0.1492 0.0177 0.000 0.0297 0.0191 0.075
SOmax  -0.0002 0.0017 0.507 0.0094 0.0110 0.219  0.0008 0.0002 0.000 0.0172 0.0092 0.076
Unmarried(x) vs. others(y):
FSDxoy  0.0292 0.0182 0.000 0.0207 0.0131 0.005  0.0394 0.0058 0.000 0.0303 0.0047 0.000
FSDyox  0.0311 0.0188 0.001 0.0308 0.0193 0.001  0.0076 0.0026 0.000 0.0269 0.0033 0.000
FOmax   0.0172 0.0098 0.001 0.0138 0.0086 0.006  0.0076 0.0026 0.000 0.0258 0.0029 0.000
SSDxoy  0.0429 0.0498 0.010 0.0410 0.0516 0.123  0.0567 0.0144 0.000 0.0602 0.0117 0.000
SSDyox  0.0484 0.0492 0.157 0.0646 0.0680 0.089 -0.0059 0.0035 0.955 0.0515 0.0232 0.000
SOmax   0.0099 0.0127 0.167 0.0088 0.0118 0.212 -0.0059 0.0032 0.955 0.0423 0.0142 0.000
-------------------------------------------------------------------------------------
```

Table 4. Comparisons of mean period incomes by WORKING STATUS of households head in 1993.

```
------------------------------------------------------------------------------------------
                    un-weighted observations                    weighted observations
------------------------------------------------------------------------------------------
          gross income      disposable income        gross income      disposable income
------------------------------------------------------------------------------------------
variable    n    mean   std     n    mean   std      n    mean   std     n    mean   std
------------------------------------------------------------------------------------------
working   2660  16617  7082   2660  13161  5744   45208  17681  7485   45208  13348  5783
unemployed 197  14145  7361    197  13414  6358    2453  15113  8071    2453  13091  5908
others    1040  14194  6722   1040  13331  6046   19793  14631  6362   19793  13153  5915
------------------------------------------------------------------------------------------
variable  mean    std   prob   mean    std   prob   mean    std   prob   mean    std   prob
------------------------------------------------------------------------------------------
working(x) vs. unemployed(y):
FSDxoy   0.0137  0.0089  0.000  0.0469  0.0175  0.000  0.0311  0.0040  0.000  0.0386  0.0028  0.000
FSDyox   0.1952  0.0350  0.000  0.0404  0.0247  0.000  0.2181  0.0092  0.000  0.0764  0.0101  0.000
FOmax    0.0137  0.0089  0.000  0.0292  0.0132  0.000  0.0311  0.0040  0.000  0.0386  0.0028  0.000
SSDxoy   0.0027  0.0010  0.000  0.1057  0.0741  0.000  0.0016  0.0002  0.000  0.0432  0.0063  0.000
SSDyox   0.6087  0.0996  0.000  0.0519  0.0737  0.449  0.6655  0.0276  0.000  0.0758  0.0334  0.003
SOmax    0.0027  0.0010  0.000  0.0208  0.0260  0.449  0.0016  0.0002  0.000  0.0393  0.0083  0.003
Working(x) vs. others(y):
FSDxoy   0.0025  0.0018  0.013  0.0183  0.0101  0.000  0.0001  0.0002  0.151  0.0107  0.0013  0.000
FSDyox   0.1717  0.0176  0.000  0.0136  0.0104  0.011  0.1841  0.0036  0.000  0.0318  0.0037  0.000
FOmax    0.0025  0.0018  0.013  0.0085  0.0053  0.011  0.0001  0.0002  0.151  0.0107  0.0013  0.000
SSDxoy  -0.0012  0.0022  0.709  0.0620  0.0606  0.136 -0.0030  0.0005  1.000 -0.0057  0.0006  0.999
SSDyox   0.5588  0.0550  0.000  0.0260  0.0335  0.043  0.6824  0.0131  0.000  0.1015  0.0145  0.000
SOmax   -0.0012  0.0022  0.709  0.0066  0.0089  0.179 -0.0030  0.0005  1.000 -0.0057  0.0006  0.999
Unemployed(x) vs. others(y):
FSDxoy   0.0596  0.0258  0.000  0.0485  0.0254  0.000  0.0587  0.0103  0.000  0.0637  0.0109  0.000
FSDyox   0.0267  0.0189  0.000  0.0447  0.0180  0.000  0.0334  0.0045  0.000  0.0453  0.0029  0.000
FOmax    0.0221  0.0122  0.000  0.0323  0.0118  0.000  0.0334  0.0044  0.000  0.0449  0.0031  0.000
SSDxoy   0.1416  0.0948  0.014  0.0851  0.1011  0.351  0.1101  0.0255  0.000  0.0315  0.0330  0.243
SSDyox   0.0402  0.0729  0.000  0.0954  0.0706  0.000  0.0563  0.0403  0.000  0.0752  0.0105  0.000
SOmax    0.0143  0.0234  0.014  0.0283  0.0306  0.351  0.0491  0.0305  0.000  0.0282  0.0272  0.243
------------------------------------------------------------------------------------------
```

Table 5. Comparisons of mean period incomes by RACE of households head in 1993.

	un-weighted observations						weighted observations					
	gross income			disposable income			gross income			disposable income		
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
white	2510	16612	7418	2510	13140	5912	57747	16934	7459	57747	13225	5833
black	1204	14544	6327	1204	13581	5887	7950	14853	6284	7950	13563	5953
others	183	13901	5495	183	11927	4574	1757	17102	6322	1757	13841	4953
variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
white(x) vs. black(y):												
FSDxoy	0.0011	0.0011	0.058	0.0377	0.0141	0.000	0.0008	0.0004	0.002	0.0240	0.0039	0.000
FSDyox	0.1166	0.0162	0.000	0.0055	0.0047	0.047	0.1090	0.0054	0.000	0.0090	0.0011	0.000
FOmax	0.0011	0.0011	0.058	0.0054	0.0043	0.047	0.0008	0.0004	0.002	0.0090	0.0011	0.000
SSDxoy	-0.0030	0.0023	0.917	0.1388	0.0626	0.000	-0.0057	0.0010	1.000	0.0977	0.0227	0.000
SSDyox	0.4631	0.0532	0.000	-0.0015	0.0068	0.939	0.4813	0.0175	0.000	-0.0022	0.0017	0.882
SOmax	-0.0030	0.0023	0.917	-0.0019	0.0042	0.939	-0.0057	0.0010	1.000	-0.0022	0.0017	0.882
White(x) vs. others(y):												
FSDxoy	0.0020	0.0011	0.000	0.0170	0.0133	0.000	0.0351	0.0090	0.000	0.1086	0.0120	0.000
FSDyox	0.2070	0.0377	0.000	0.0943	0.0290	0.000	0.0438	0.0008	0.000	0.0251	0.0017	0.000
FOmax	0.0020	0.0011	0.000	0.0168	0.0129	0.000	0.0341	0.0074	0.000	0.0251	0.0017	0.000
SSDxoy	0.0020	0.0010	0.000	0.0213	0.0193	0.000	0.1121	0.0348	0.000	0.3386	0.0398	0.000
SSDyox	0.6542	0.0989	0.000	0.3762	0.1258	0.007	0.0053	0.0147	0.694	-0.0033	0.0002	1.000
SOmax	0.0020	0.0010	0.000	0.0202	0.0168	0.007	0.0044	0.0120	0.694	-0.0033	0.0002	1.000
Black(x) vs. others(y):												
FSDxoy	0.0200	0.0154	0.000	0.0081	0.0095	0.000	0.1646	0.0128	0.000	0.1089	0.0127	0.000
FSDyox	0.0617	0.0296	0.000	0.1307	0.0316	0.000	0.0160	0.0013	0.000	0.0375	0.0028	0.000
FOmax	0.0172	0.0122	0.000	0.0081	0.0095	0.000	0.0160	0.0013	0.000	0.0375	0.0028	0.000
SSDxoy	0.0241	0.0309	0.000	0.0084	0.0110	0.000	0.6326	0.0439	0.000	0.2144	0.0398	0.000
SSDyox	0.1623	0.1084	0.062	0.5390	0.1335	0.000	-0.0009	0.0003	0.999	0.0003	0.0020	0.000
SOmax	0.0143	0.0143	0.062	0.0084	0.0110	0.000	-0.0009	0.0003	0.999	0.0003	0.0020	0.000

```
Table 6. Comparisons of mean period incomes by SEX of households head in 1993.
-----------------------------------------------------------------------------------------
                     un-weighted observations                    weighted observations
-----------------------------------------------------------------------------------------
               gross income      disposable income        gross income      disposable income
-----------------------------------------------------------------------------------------
variable    n    mean   std      n    mean   std        n    mean   std      n    mean   std
-----------------------------------------------------------------------------------------
male     2779  16329  7221    2779  13162  5858    47486  17062  7475    47486  13158  5797
female   1118  14643  6611    1118  13361  5855    19968  15814  6906    19968  13575  5890
-----------------------------------------------------------------------------------------
variable  mean    std   prob   mean    std   prob   mean    std   prob   mean    std   prob
-----------------------------------------------------------------------------------------
male(x) vs. female(y):
FSDxoy   0.0009  0.0012  0.146  0.0256  0.0110  0.000  0.0001  0.0002  0.188  0.0365  0.0041  0.000
FSDyox   0.1227  0.0172  0.000  0.0115  0.0097  0.002  0.0740  0.0038  0.000  0.0012  0.0009  0.000
FOmax    0.0009  0.0012  0.146  0.0091  0.0065  0.002  0.0001  0.0002  0.188  0.0012  0.0009  0.000
SSDxoy  -0.0049  0.0024  0.990  0.0781  0.0538  0.000 -0.0035  0.0005  1.000  0.1457  0.0162  0.000
SSDyox   0.3839  0.0534  0.000  0.0087  0.0241  0.672  0.2862  0.0133  0.000 -0.0040  0.0003  1.000
SOmax   -0.0049  0.0024  0.990  0.0023  0.0084  0.672 -0.0035  0.0005  1.000 -0.0040  0.0003  1.000
-----------------------------------------------------------------------------------------
```

Table 7. Comparisons of mean period incomes by OCCUPATION of households head in 1993.

	un-weighted observations						weighted observations					
	gross income			disposable income			gross income			disposable income		
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
profess.	954	19073	8245	954	13392	6118	19017	19971	8514	19017	13461	6041
not-in-lab.	1497	15407	5983	1497	13046	5522	23963	16173	6340	23963	13314	5691
others	1145	14103	6745	1145	13355	6101	20610	14587	6365	20610	13173	5879

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
professional(x) vs. others(y):												
FSDxoy	0.0000	0.0001	0.334	0.0098	0.0076	0.022	-0.0000	0.0000	0.312	0.0174	0.0021	0.000
FSDyox	0.2092	0.0194	0.000	0.0349	0.0167	0.000	0.2064	0.0047	0.000	0.0300	0.0049	0.000
FOmax	0.0000	0.0001	0.334	0.0085	0.0061	0.022	-0.0000	0.0000	0.312	0.0174	0.0021	0.000
SSDxoy	-0.0019	0.0011	0.950	0.0100	0.0202	0.367	-0.0014	0.0002	1.000	0.0093	0.0084	0.006
SSDyox	0.8061	0.0705	0.000	0.1075	0.0709	0.020	0.8356	0.0166	0.000	0.0427	0.0149	0.001
SOmax	-0.0019	0.0011	0.950	0.0044	0.0085	0.387	-0.0014	0.0002	1.000	0.0080	0.0052	0.007
Professional(x) vs. not in labor force(y):												
FSDxoy	0.0019	0.0016	0.056	0.0168	0.0093	0.000	0.0000	0.0001	0.297	0.0155	0.0022	0.000
FSDyox	0.3106	0.0189	0.000	0.0271	0.0156	0.002	0.3144	0.0047	0.000	0.0381	0.0050	0.000
FOmax	0.0019	0.0016	0.056	0.0123	0.0066	0.002	0.0000	0.0001	0.297	0.0155	0.0022	0.000
SSDxoy	-0.0026	0.0016	0.959	0.0338	0.0423	0.128	-0.0036	0.0004	1.000	0.0030	0.0024	0.104
SSDyox	1.1238	0.0714	0.000	0.0635	0.0598	0.059	1.2054	0.0163	0.000	0.1141	0.0165	0.000
SOmax	-0.0026	0.0016	0.959	0.0088	0.0107	0.187	-0.0036	0.0004	1.000	0.0030	0.0024	0.104
Others(x) vs. not in labor force(y):												
FSDxoy	0.0049	0.0026	0.000	0.0258	0.0126	0.000	0.0050	0.0007	0.000	0.0071	0.0014	0.000
FSDyox	0.1069	0.0172	0.000	0.0106	0.0097	0.063	0.1130	0.0046	0.000	0.0238	0.0036	0.000
FOmax	0.0049	0.0026	0.000	0.0081	0.0064	0.063	0.0050	0.0007	0.000	0.0071	0.0014	0.000
SSDxoy	0.0006	0.0013	0.319	0.0926	0.0656	0.029	0.0013	0.0002	0.000	0.0019	0.0022	0.216
SSDyox	0.3727	0.0595	0.000	0.0117	0.0248	0.303	0.4233	0.0154	0.000	0.0865	0.0159	0.000
SOmax	0.0006	0.0013	0.319	0.0040	0.0075	0.332	0.0013	0.0002	0.000	0.0019	0.0022	0.216

Table 8. Comparisons of mean period incomes by number of CHILDREN in 1993.

	un-weighted observations						weighted observations					
	gross income			disposable income			gross income			disposable income		
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
0	2124	16401	7630	2124	13171	6001	44374	17118	7727	44374	13194	5941
1	664	15775	6465	664	13412	5858	9173	16395	6437	9173	13612	5839
2	686	15416	6250	686	13307	5603	9284	16102	6345	9284	13492	5516
3 or more	423	13865	6043	423	13017	5526	4623	14392	6380	4623	13042	5255

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
0 child(x) vs. 1 child (y):												
FSDxoy	0.0201	0.0124	0.013	0.0453	0.0199	0.000	0.0037	0.0031	0.000	0.0582	0.0056	0.000
FSDyox	0.0471	0.0137	0.000	0.0176	0.0081	0.004	0.0417	0.0043	0.000	0.0146	0.0024	0.000
FOmax	0.0191	0.0111	0.013	0.0161	0.0073	0.004	0.0037	0.0031	0.000	0.0146	0.0024	0.000
SSDxoy	0.0259	0.0227	0.107	0.1185	0.0736	0.018	0.0021	0.0018	0.001	0.1598	0.0211	0.000
SSDyox	0.1366	0.0659	0.008	0.0129	0.0272	0.381	0.1483	0.0182	0.000	-0.0024	0.0005	1.000
SOmax	0.0217	0.0178	0.115	0.0054	0.0103	0.399	0.0021	0.0018	0.001	-0.0024	0.0005	1.000
0 child(x) vs. 2 children(y):												
FSDxoy	0.0056	0.0066	0.016	0.0398	0.0178	0.000	0.0027	0.0004	0.000	0.0551	0.0054	0.000
FSDyox	0.0646	0.0171	0.000	0.0172	0.0076	0.000	0.0567	0.0039	0.000	0.0137	0.0016	0.000
FOmax	0.0055	0.0065	0.016	0.0156	0.0063	0.000	0.0027	0.0004	0.000	0.0137	0.0016	0.000
SSDxoy	0.0060	0.0096	0.155	0.1108	0.0626	0.000	0.0028	0.0006	0.000	0.1534	0.0189	0.000
SSDyox	0.2272	0.0656	0.001	0.0135	0.0343	0.659	0.2196	0.0166	0.000	-0.0037	0.0003	1.000
SOmax	0.0059	0.0092	0.156	0.0051	0.0138	0.659	0.0028	0.0006	0.000	-0.0037	0.0003	1.000

Table 8. Continuous.

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
0 child(x) vs. 3 and more children(y):												
FSDxoy	0.0019	0.0020	0.071	0.0226	0.0156	0.000	0.0030	0.0003	0.000	0.0205	0.0039	0.000
FSDyox	0.1552	0.0232	0.000	0.0223	0.0146	0.001	0.1613	0.0066	0.000	0.0204	0.0022	0.000
FOmax	0.0019	0.0020	0.071	0.0119	0.0072	0.001	0.0030	0.0003	0.000	0.0186	0.0022	0.000
SSDxoy	0.0006	0.0026	0.404	0.0522	0.0562	0.000	0.0030	0.0003	0.000	0.0464	0.0178	0.000
SSDyox	0.5674	0.0743	0.000	0.0501	0.0637	0.280	0.5814	0.0228	0.000	0.0205	0.0221	0.289
SOmax	0.0006	0.0026	0.404	0.0076	0.0113	0.280	0.0030	0.0003	0.000	0.0142	0.0134	0.289
1 child(x) vs. 2 children(y):												
FSDxoy	0.0139	0.0103	0.004	0.0297	0.0172	0.000	0.0042	0.0023	0.000	0.0135	0.0046	0.000
FSDyox	0.0391	0.0190	0.000	0.0310	0.0188	0.000	0.0249	0.0057	0.000	0.0140	0.0036	0.000
FOmax	0.0118	0.0073	0.004	0.0177	0.0099	0.000	0.0042	0.0023	0.000	0.0110	0.0025	0.000
SSDxoy	0.0132	0.0289	0.136	0.0598	0.0556	0.000	0.0011	0.0007	0.007	0.0261	0.0202	0.000
SSDyox	0.1072	0.0717	0.019	0.0610	0.0731	0.222	0.0819	0.0258	0.000	0.0301	0.0249	0.068
SOmax	0.0054	0.0101	0.155	0.0121	0.0168	0.222	0.0011	0.0007	0.007	0.0101	0.0083	0.068
1 child(x) vs. 3 and more children(y):												
FSDxoy	0.0065	0.0044	0.000	0.0209	0.0139	0.000	0.0046	0.0010	0.000	0.0066	0.0027	0.000
FSDyox	0.1562	0.0274	0.000	0.0530	0.0251	0.000	0.1638	0.0086	0.000	0.0548	0.0076	0.000
FOmax	0.0065	0.0044	0.000	0.0177	0.0110	0.000	0.0046	0.0010	0.000	0.0066	0.0027	0.000
SSDxoy	0.0031	0.0022	0.000	0.0273	0.0401	0.000	0.0015	0.0004	0.000	0.0057	0.0034	0.000
SSDyox	0.5255	0.0961	0.000	0.1424	0.1022	0.063	0.5760	0.0293	0.000	0.2120	0.0354	0.000
SOmax	0.0031	0.0022	0.000	0.0126	0.0158	0.063	0.0015	0.0004	0.000	0.0057	0.0034	0.000
2 children(x) vs. 3 and more children(y):												
FSDxoy	0.0061	0.0048	0.000	0.0198	0.0136	0.000	0.0068	0.0018	0.000	0.0141	0.0031	0.000
FSDyox	0.1434	0.0287	0.000	0.0440	0.0238	0.000	0.1535	0.0084	0.000	0.0460	0.0081	0.000
FOmax	0.0061	0.0048	0.000	0.0151	0.0087	0.000	0.0068	0.0018	0.000	0.0141	0.0031	0.000
SSDxoy	0.0010	0.0027	0.000	0.0282	0.0510	0.000	0.0023	0.0018	0.000	0.0138	0.0033	0.000
SSDyox	0.5253	0.1195	0.000	0.1104	0.0835	0.000	0.5872	0.0353	0.000	0.1218	0.0302	0.000
SOmax	0.0010	0.0027	0.000	0.0077	0.0133	0.000	0.0023	0.0018	0.000	0.0138	0.0033	0.000

Table 9. Comparisons of mean period incomes by EDUCATION of households head in 1993.

	un-weighted observations						weighted observations					
	gross income			disposable income			gross income			disposable income		
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
0-11	1096	13692	5789	1096	13127	5770	15609	14133	5685	15609	13190	5613
12+	2504	16246	7075	2504	13235	5866	45167	16929	7282	45167	13269	5854
college	297	20412	8669	297	13421	6115	6678	21078	8608	6678	13580	6124
variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
0-11(x) vs. 12+(y):												
FSDxoy	0.1647	0.0174	0.000	0.0257	0.0139	0.000	0.1536	0.0046	0.000	0.0126	0.0039	0.000
FSDyox	0.0007	0.0009	0.080	0.0117	0.0092	0.010	0.0001	0.0001	0.190	0.0142	0.0044	0.000
FOmax	0.0007	0.0009	0.080	0.0084	0.0057	0.010	0.0001	0.0001	0.190	0.0103	0.0026	0.000
SSDxoy	0.5687	0.0520	0.000	0.0657	0.0527	0.098	0.6076	0.0132	0.000	0.0284	0.0142	0.000
SSDyox	-0.0007	0.0020	0.638	0.0173	0.0273	0.064	-0.0043	0.0006	1.000	0.0039	0.0060	0.002
SOmax	-0.0007	0.0020	0.638	0.0051	0.0070	0.162	-0.0043	0.0006	1.000	0.0029	0.0033	0.002
0-11(x) vs. college(y):												
FSDxoy	0.3977	0.0281	0.000	0.0541	0.0276	0.000	0.3841	0.0063	0.000	0.0525	0.0073	0.000
FSDyox	0.0000	0.0000	0.000	0.0211	0.0148	0.010	0.0000	0.0000	0.000	0.0054	0.0028	0.009
FOmax	0.0000	0.0000	0.000	0.0170	0.0106	0.010	0.0000	0.0000	0.000	0.0054	0.0028	0.009
SSDxoy	2.2489	0.1728	0.000	0.1410	0.1082	0.000	2.3413	0.0380	0.000	0.1476	0.0301	0.000
SSDyox	0.0000	0.0000	0.000	0.0296	0.0468	0.183	0.0000	0.0000	0.000	-0.0017	0.0014	0.911
SOmax	0.0000	0.0000	0.000	0.0115	0.0155	0.183	0.0000	0.0000	0.000	-0.0017	0.0014	0.911
12+(x) vs. college(y):												
FSDxoy	0.2247	0.0264	0.000	0.0432	0.0254	0.000	0.2224	0.0064	0.000	0.0465	0.0065	0.000
FSDyox	0.0013	0.0007	0.025	0.0235	0.0151	0.000	0.0004	0.0001	0.000	0.0085	0.0026	0.000
FOmax	0.0013	0.0007	0.025	0.0168	0.0099	0.000	0.0004	0.0001	0.000	0.0085	0.0026	0.000
SSDxoy	0.9515	0.1230	0.000	0.1042	0.0976	0.000	0.9646	0.0254	0.000	0.1247	0.0278	0.000
SSDyox	-0.0028	0.0010	1.000	0.0407	0.0532	0.197	-0.0016	0.0002	1.000	0.0039	0.0032	0.105
SOmax	-0.0028	0.0010	1.000	0.0118	0.0149	0.197	-0.0016	0.0002	1.000	0.0039	0.0032	0.105

Table 10. Comparisons of mean period incomes by UNEMPLOYMENT HOURS of households head in 1993.

		un-weighted observations						weighted observations				
		gross income			disposable income			gross income			disposable income	
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
01 month	3601	15980	7126	3601	13211	5859	63211	16842	7367	63211	13297	5872
2-3 months	109	15545	7067	109	13991	6931	1578	15781	6002	1578	13856	5744
3- months	187	13434	5940	187	12918	5089	2665	13684	6524	2665	12559	4648

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
0-1(x) vs. 2-3 months(y):												
FSDxoy	0.0283	0.0197	0.000	0.0762	0.0368	0.000	0.0509	0.0044	0.000	0.0631	0.0080	0.000
FSDyox	0.0702	0.0372	0.000	0.0237	0.0169	0.000	0.0911	0.0120	0.000	0.0188	0.0028	0.000
FOmax	0.0230	0.0151	0.000	0.0206	0.0120	0.000	0.0509	0.0044	0.000	0.0188	0.0028	0.000
SSDxoy	0.0478	0.0640	0.000	0.2340	0.1537	0.000	0.0531	0.0045	0.000	0.2885	0.0442	0.000
SSDyox	0.1622	0.1170	0.106	0.0174	0.0462	0.718	0.2231	0.0349	0.000	-0.0030	0.0002	1.000
SOmax	0.0209	0.0213	0.106	0.0056	0.0157	0.718	0.0531	0.0045	0.000	-0.0030	0.0002	1.000
0-1(x) vs. more than 3 months(y):												
FSDxoy	0.0037	0.0051	0.139	0.0268	0.0208	0.000	0.0089	0.0023	0.000	0.0157	0.0056	0.000
FSDyox	0.1842	0.0349	0.000	0.0494	0.0244	0.000	0.2438	0.0095	0.000	0.0765	0.0085	0.000
FOmax	0.0037	0.0051	0.139	0.0202	0.0140	0.000	0.0089	0.0023	0.000	0.0157	0.0056	0.000
SSDxoy	-0.0084	0.0079	0.861	0.0465	0.0494	0.000	-0.0060	0.0018	1.000	0.0287	0.0094	0.000
SSDyox	0.5595	0.1012	0.000	0.1395	0.1143	0.135	0.6835	0.0270	0.000	0.2668	0.0306	0.000
SOmax	-0.0084	0.0079	0.861	0.0204	0.0231	0.135	-0.0060	0.0018	1.000	0.0287	0.0094	0.000
2-3 months(x) vs. more than 3 months(y):												
FSDxoy	0.0160	0.0117	0.000	0.0281	0.0264	0.000	0.0147	0.0023	0.000	0.0072	0.0035	0.000
FSDyox	0.1700	0.0528	0.000	0.0976	0.0452	0.000	0.1817	0.0142	0.000	0.1153	0.0133	0.000
FOmax	0.0159	0.0112	0.000	0.0234	0.0190	0.000	0.0147	0.0023	0.000	0.0072	0.0035	0.000
SSDxoy	0.0035	0.0162	0.000	0.0236	0.0525	0.000	0.0000	0.0000	0.000	0.0000	0.0000	0.000
SSDyox	0.5919	0.2127	0.000	0.2943	0.1883	0.000	0.7484	0.0576	0.000	0.5001	0.0553	0.000
SOmax	0.0030	0.0084	0.000	0.0111	0.0205	0.000	0.0000	0.0000	0.000	0.0000	0.0000	0.000

Table 11. Comparisons of mean period incomes by GEOGRAPHICAL MOBILITY of households head in 1993.

| | un-weighted observations | | | | | | weighted observations | | | | | |
| | gross income | | | disposable income | | | gross income | | | disposable income | | |
variable	n	mean	std	n	mean	std	n	mean	std	n	mean	std
same state	2604	15589	6894	2604	13270	5878	43673	16412	7006	43673	13372	5796
same region	467	16308	6541	467	13124	5561	8668	17240	6600	8668	13178	5627
diff. S&R	747	16402	6401	747	13279	5365	14122	17224	6423	14122	13270	5353

variable	mean	std	prob	mean	std	prob	mean	std	prob	mean	std	prob
same state(x) vs. same region(y):												
FSDxoy	0.0773	0.0237	0.000	0.0264	0.0186	0.000	0.0921	0.0058	0.000	0.0140	0.0054	0.000
FSDyox	0.0112	0.0063	0.000	0.0243	0.0114	0.000	0.0159	0.0016	0.000	0.0216	0.0021	0.000
FOmax	0.0111	0.0061	0.000	0.0149	0.0083	0.000	0.0159	0.0016	0.000	0.0136	0.0048	0.000
SSDxoy	0.2066	0.0780	0.000	0.0459	0.0545	0.000	0.2419	0.0185	0.000	0.0032	0.0049	0.000
SSDyox	0.0012	0.0079	0.792	0.0603	0.0602	0.081	-0.0012	0.0002	1.000	0.0759	0.0215	0.000
SOmax	0.0010	0.0068	0.792	0.0102	0.0122	0.081	-0.0012	0.0002	1.000	0.0032	0.0045	0.000
same state(x) vs. different state and region(y):												
FSDxoy	0.0862	0.0209	0.000	0.0412	0.0193	0.000	0.0970	0.0047	0.000	0.0356	0.0047	0.000
FSDyox	0.0109	0.0048	0.000	0.0172	0.0062	0.000	0.0166	0.0014	0.000	0.0222	0.0013	0.000
FOmax	0.0109	0.0048	0.000	0.0155	0.0057	0.000	0.0166	0.0014	0.000	0.0221	0.0013	0.000
SSDxoy	0.2451	0.0657	0.000	0.0944	0.0613	0.000	0.2549	0.0146	0.000	0.0479	0.0140	0.000
SSDyox	-0.0015	0.0011	0.965	0.0209	0.0334	0.269	-0.0012	0.0002	1.000	0.0303	0.0151	0.000
SOmax	-0.0015	0.0011	0.965	0.0089	0.0120	0.269	-0.0012	0.0002	1.000	0.0252	0.0094	0.000
same region(x) vs. different state and region(y):												
FSDxoy	0.0341	0.0192	0.000	0.0383	0.0210	0.000	0.0118	0.0048	0.000	0.0230	0.0065	0.000
FSDyox	0.0222	0.0175	0.000	0.0176	0.0144	0.000	0.0090	0.0047	0.000	0.0036	0.0022	0.000
FOmax	0.0140	0.0098	0.000	0.0125	0.0089	0.000	0.0070	0.0029	0.000	0.0035	0.0021	0.000
SSDxoy	0.1378	0.1281	0.000	0.1216	0.0984	0.000	0.0426	0.0245	0.000	0.0767	0.0265	0.000
SSDyox	0.0545	0.0923	0.000	0.0288	0.0562	0.000	0.0137	0.0236	0.000	0.0002	0.0030	0.000
SOmax	0.0100	0.0169	0.000	0.0067	0.0117	0.000	0.0062	0.0092	0.000	0.0001	0.0011	0.000

Table 12. Summary of the number of observations by income definition and various sub-groups of household.

		1968		1978		1988		1993	1997	1968-1993	
Attributes	Sub-groups	Gross	Disposable	Gross	Disposable	Gross	Disposable	Gross	Gross	Gross&Disposable	
CHILDREN	0	1989	1989	2955	2955	3742	3742	5145	3349	2124	
	1	668	668	1223	1223	1299	1299	1788	1297	664	
	2	720	720	1064	1064	1246	1246	1821	1286	686	
	3 or more	1425	1425	912	912	827	827	1182	816	423	
SEX	Male	3455	3455	4399	4399	5010	5010	6863	4749	2779	
	Female	1347	1347	1755	1755	2104	2104	3073	1999	1118	
AGE	-35	1570	1570	2896	2896	3105	3105	3507	2205	1193	
	36-50	1643	1643	1386	1386	1913	1913	3364	2682	1393	
	51-65	1094	1094	1167	1167	1174	1174	1585	953	647	
	66-	495	495	705	705	922	922	1480	908	658	
RACE	White	3077	3077	3704	3704	4356	4356	6096	4130	2510	
	Black	1571	1571	2240	2240	2626	2626	2875	2036	1204	
	Others	154	154	210	210	132	132	965	582	183	
WSTATUS	Working	3492	3492	4398	4398	5068	5068	6652	-	2660	
	Unemployed	174	173	288	288	391	391	683	-	197	
	Others	1136	1136	1468	1468	1655	1655	2601	-	1040	
MARITAL	Married	3107	3107	3663	3663	4058	4058	5459	3641	2300	
	Single, Widow	956	956	1474	1474	1834	1834	2626	1846	954	
	Others	739	739	1017	1017	1222	1222	1851	1261	643	
EDUCATION	Low 0-11	2645	2645	2479	2479	2203	2203	3432	-	1096	
	Medium, 12+	1711	1711	2918	2918	3746	3746	5890	-	2504	
	High, College	446	446	757	757	1165	1165	614	-	297	
WEIGHT	Average	16.25	16.25	16.16	16.16	17.12	17.12	13.38	14.68		
Observations		4802	4802	6154	6154	7114	7114	9936	6748	3897	