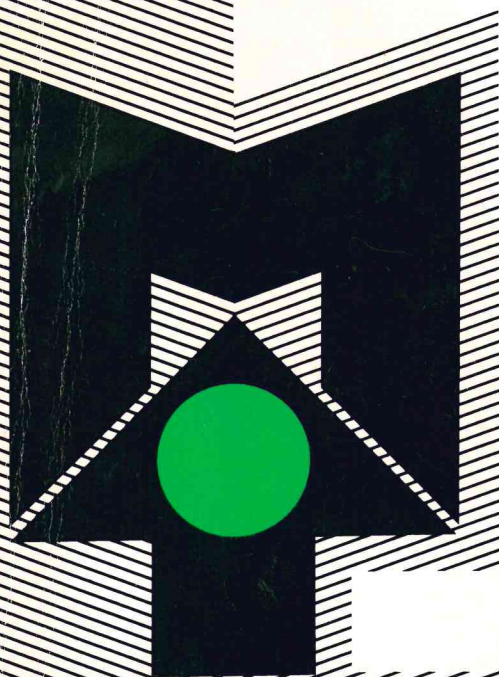
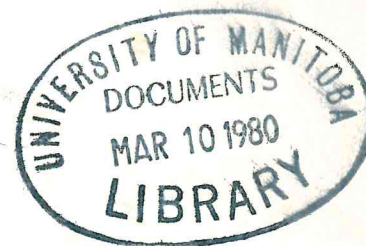


# <sup>2)</sup>Mincome Manitoba

## Manitoba Basic Annual Income Experiment

### The Accuracy of Income Reporting In Mincome Manitoba

Alexander Basilevsky  
Robert Sproule



<sup>3)</sup>Technical Report No. 10

1979

THE ACCURACY OF INCOME REPORTING  
IN MINCOME MANITOBA

by

Alexander Basilevsky  
Robert Sproule

MINCOME MANITOBA

Technical Report No. 10

## FOREWORD

The Manitoba Basic Annual Income Experiment is designed to evaluate the economic and social consequences of a guaranteed annual income program based on the concept of negative income tax. Of particular research interest is the labour supply response of individuals and families containing non-aged, able-bodied members. The Experiment is a jointly funded project of the governments of Canada and Manitoba and was collectively designed by researchers and officials of Mincome Manitoba, the Department of Health and Social Development, Manitoba, and the Policy Research and Long Range Planning Branch of the Department of National Health and Welfare, Ottawa. Mincome Manitoba is the agency established to administer the project and is solely responsible for all experimental operations. Seventy-five percent of the cost of the Experiment is funded by the Government of Canada; twenty-five percent is funded by the Province of Manitoba.

## ACKNOWLEDGMENT

The research described in this report reflects the cumulative contributions of a great many individuals. During the course of the study many helpful comments were offered by D. Hum, D. Komus and D. Sabourin. A very real contribution was made by the entire payments staff of Mincome Manitoba throughout the implementation and operational stages of the study. Finally, the present report has benefitted substantially from the suggestions and editorial guidance of A. Anderson, D. Hum and J. Kaufman.

The opinions expressed herein are those of the authors and should not be construed as representing the opinions or policies of the Province of Manitoba, Canada, or any agency of either government. The authors alone bear sole responsibility for any misleading interpretations and errors of fact. For a complete understanding of the payments system of Mincome Manitoba, the present report should be read in conjunction with D. Hum et al. "The Design of the Payments System of Mincome Manitoba", Technical Report No. 3, Mincome Manitoba, 1979 and D. Crest et al. "The Administration of the Payments System of Mincome Manitoba", Technical Report No. 4, Mincome Manitoba, 1979.

THE ACCURACY OF INCOME REPORTING  
IN MINCOME MANITOBA

- I. Introduction
  - II. Sample Description and Definition of Variables
    - 1. Definition of Income Components
    - 2. Description of the Sample
      - i. The Payments/Income Reporting System
      - ii. The Sample
  - III. Analysis of the Sample: Some Statistical Results
    - 1. Statistical Methodology
    - 2. Results of the Analysis
      - i. Revenue Canada/Mincome Manitoba Comparison
      - ii. Treatment/Control Comparison
      - iii. Treatment/Control Comparison for Reporting Units Not on Welfare
  - IV. Conclusions
- Appendix

THE ACCURACY OF INCOME REPORTING  
IN MINCOME MANITOBA

I. INTRODUCTION

Mincome Manitoba is a payments delivery system based upon the concept of a negative income tax (NIT). Certain families are designated as treatment reporting units and receive income-conditioned payments. These families receive a payment from Mincome Manitoba each month based upon a formula which takes into account, among other things, the total income received from all sources by the family the previous month. At the same time, the income entitlement for treatment reporting units is defined in terms of an annual amount. Because payments are based upon the income reported for the previous month, the amount paid out over the calendar year may not exactly equal the annual entitlement. Consequently, a year end reconciliation is necessary and treatment families are required to provide Mincome Manitoba with a copy of their Revenue Canada tax return for this purpose.

In any income maintenance program in which payments to recipients are largely determined by their total income, it is of prime importance that accurate information on current incomes be available to the administrative staff. This can be achieved by means of either direct reporting by the employer, or self-reporting by the participant, or a combination of the two, such as used by Revenue Canada. Self-reporting has evident advantages since it is more straightforward and less costly to use. In addition its coverage can be expected to be greater since many income items such as capital gains, gifts, etc., are virtually impossible to obtain from source. However, self-reporting raises questions

concerning the accuracy of the reported income since the possibility of intentional or unintentional misreporting by the participant exists. Under these circumstances income benefits delivered will not generally correspond to the intention of the program. Inaccurate reporting, if extensive or left unchecked, is very likely to result in the undermining of the financial and political integrity of the entire program. In particular a bias towards underreporting of income may significantly increase the cost of an income maintenance program so as to cancel out the cost and administrative advantages of the self-reporting procedure itself.<sup>1</sup>

The purpose of the present report is to provide a description and brief statistical analysis of the income reporting process of Mincome Manitoba. In brief, we investigate whether or not significant misreporting of income by Mincome Manitoba participants occurred during 1976, using Revenue Canada data as a check. For all intents and purposes we treat annual family income as reported to Revenue Canada as the "true" values against which reported income to Mincome Manitoba is compared.

It is, of course, arguable whether or not income reported to Revenue Canada should be considered as true values, and one may wish to view the following as simply a statistical comparison of two income series, albeit gathered from identical families and covering the same time period. However, two main factors militate against this interpretation. First, Mincome Manitoba is an experimental and short-life program. In contrast, the Revenue Canada requirements have been in place

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<sup>1</sup> On a research related issue, it is also the case that an inaccurate measure of income will seriously impede research and bias coefficient estimates because of "errors in variables". We will not be concerned with this issue here.

for a very long time. To the extent that familiarity, employer declaration of income, and threat of audit and sanctions deter intentional and unintentional misreporting, the income data gathered by Revenue Canada should be accurate. Secondly, every income maintenance program relying on self-reporting will be subject to the unavoidable limitation of basing its payments on reported income. The performance standards of Revenue Canada appeared to be satisfactory for our purposes and, therefore, Revenue Canada declared incomes are taken, by definition, as the true incomes.

The plan of the report is as follows. Section II briefly describes our sample and the variables which are used, while Section III contains the main body of the Statistical comparisons and tests. Finally, the conclusions of the study are summarized in Section IV.

## II. SAMPLE DESCRIPTION AND DEFINITION OF VARIABLES

Our data, in summary, consist of two sources, income data collected by the payments system of Mincome Manitoba and that available from Revenue Canada. Both data sources refer to the same time period, 1976, and to the same population group. However, the data differ in three major respects: (i) the definition of the reference period; (ii) the definition of the reporting unit; and (iii) the components of income. While Revenue Canada tax returns are based on a reference period of one year, Mincome Manitoba data collected from Income Reporting Forms (IRF) are monthly and must therefore be aggregated to annual totals. Also the reporting unit associated with the Revenue Canada annual tax returns is

the individual earner while Mincome Manitoba IRF data are largely based on what is commonly understood as the residential family. Finally, the two sources of data do not contain identical information concerning the component parts which go towards making up total income on either an individual or family basis.

The above data inconsistencies can be rendered comparable in a fairly straightforward manner. To render the more detailed Mincome Manitoba data comparable to those of Revenue Canada some redefinition of both data sets is required. Broadly speaking this was done for our study in the following way. Firstly, the monthly IRF data were summed (pooled) into annual totals for each individual, and the annual totals were then aggregated over all individual earners for a given family unit. The process was repeated for each income component (see Appendix for definitions), the final result being a set of income components defined for each family for the year 1976. This was the series constructed from Mincome Manitoba data.

The Revenue Canada individual earner income data were also aggregated in a fashion consistent with the definition of a reporting (family) unit as defined by the Mincome Manitoba Rules of Operation. The resulting aggregated components of family income could only be defined at a general level, since definitions had to be equally applicable to both data sets in order to render them comparable. For example, it was not possible to separate transfer receipts by individual programs since Mincome Manitoba reported transfer payments on a fairly aggregated basis. As it turns out, attempts to render income series comparable

were possible only for three income components. These were wage income, tax deductions, and what we term normal reduction rate income (see below).

Additionally, since we are considering components of annual family income any change in family composition will also affect these income components. Rather than get involved in the complexities of family composition changes, we decided to consider only those families (reporting units) which remained intact during 1976; that is, families whose composition was the same at year end as it was at the beginning of the year. This design decision still provided an adequate sample size for statistical analysis (see Table 1).

## II.1 Definition of Income Components

The following three income components were constructed from both Revenue Canada data and Mincome Manitoba data for purposes of comparison.

- (1) Wage Income: This income measure consists of two components: "earned income" which is reported on T4 slips to Revenue Canada and to Mincome Manitoba; and "other employment income" for which all statutory deductions are withheld at source by the employer.
- (2) Other NRR (normal reduction rate) Income: This income measure consists of the following components: "Other Employment Income" if no statutory deductions are withheld at source; disability CPP pension payments; superannuation receipts; taxable dividends received from (taxable) Canadian corporations; interest and investment income; alimony or separation allowance; supplementary employment benefits; scholarships (fellowships and bursaries);

rental income received from boarders or tenants; worker's compensation; blind persons' allowance; and lottery winnings.

- (3) Tax Deductions: This measure consists of the following items: CPP or QPP contributions which are paid at place of employment; UIC contributions; and the usual tax deducted as per information slips less income tax withheld from UIC benefits received.

The sum of the above three components is termed total income. Our purpose is, as mentioned above, to define income components which can be rendered comparable for data obtained from both Revenue Canada and Mincome Manitoba.<sup>1</sup> Accordingly, two additional income components, self-employed income and 100% reduction rate income, could not be employed for the present study. Also, it should be kept in mind that the above income components are not independent of each other since low (high) wages, for example, are by definition, associated with low (high) tax deductions. Such inter-dependence has implications for the testing procedures described below.

## II.2 Description of the Sample

In the present section we describe some relevant features of the payments system, the methods of data collection, and present some characteristics concerning the sample composition. We begin by describing the income reporting requirement in greater detail.

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<sup>1</sup> Other NRR income, as captured on Mincome Manitoba files, contained four additional components as compared to Revenue Canada data, and therefore had to be deleted; worker's compensation, war disability pensions, blind persons' allowance and lottery winnings.

(i) The Payments/Income Reporting System

Since Mincome Manitoba payments are largely conditional on earned income, all participants were required to report their monthly earnings on special Income Reporting Forms (IRF). These forms were mailed to all reporting units at the end of each month and requested information on family composition, wage/salary incomes, expenses, etc.<sup>1</sup> Family net worth was to be reported once at the beginning of each calendar year and whenever significant changes occurred.

The responsibility of preparing and certifying the accuracy of IRF data fell to one adult member of the reporting unit (the "filer") chosen by the reporting unit. The unit also had the power to alter the designation of "filer" at will. By agreement with Mincome Manitoba the filer was also required to provide supporting evidence concerning the unit's wage/salary and transfer incomes (as well as expenses incurred) in the form of employer pay stubs, cheque stubs from government payments, etc. This requirement of course did not operate if the filer neglected to report income or mail an IRF altogether, since in this case no Mincome Manitoba payments would be received for that month. If no income was earned the filer nevertheless had to file an IRF indicating that this was in fact the case. If an IRF was not received from a reporting unit for one month or more all payments to that unit would cease until the required missing information was reported retrospectively to the Mincome Manitoba payments office.

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<sup>1</sup> For more detailed information concerning the payments system see D. Crest et al. "The Administration of the Payments System of Mincome Manitoba", Technical Report No. 4, Mincome Manitoba, 1979.

The above measures constituted the principal incentive for the filing of IRF information in the case of the treatment family reporting units and ensured a fairly complete data file. This was not the case however for control units who were not eligible to receive Mincome Manitoba payments. Instead, control reporting units only received a fixed filing fee of \$10 per IRF, a practice which did not always result in a complete response rate. However, this did not appear to constitute a great impediment and sufficiently complete files were also obtained for the control group. Finally, all treatment reporting units were obliged to forward a copy of their Revenue Canada income tax returns. Control families were also requested to submit their tax forms and received a \$10 filing fee for doing so.

Once an IRF was received by the Mincome Manitoba payments office, strict quality control was employed in order to guarantee reasonable accuracy (low capture error) of the IRF data. When an IRF was received by Mincome Manitoba, a payments analyst would check the forms for completeness, supporting documentation such as pay stubs, and technical errors like an incorrect transcription by the filer of income data from pay stub(s) to the IRF. Each IRF would then be compared to those filed in the previous month(s) by the reporting unit. Any entry which seemed unreasonable with respect to the previous months' values would be verified by the analyst through direct telephone contact with the filer. Finally, in order to minimize processing error a second analyst would independently double-check the final results.<sup>1</sup>

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<sup>1</sup> The actual procedures are considerably more elaborate than those described above. For details see D. Crest *et al.* "The Administration of the Payments System of Mincome Manitoba", *op cit.*

(ii) The Sample

For purposes of comparing annual income misreporting, only those family reporting units which remained with Mincome Manitoba for the entire year (1976) and those which remained intact during this period were considered. The breakdown of the sample is given in Table 1, for both treatment (payment) and control units. The numbers in parentheses (rounded off to nearest integer values) represent the expected numbers of intact, non-intact and attrition families one would expect, had the attrition/family split process been random with respect to the payments/control criteria. From Table 1 we also observe that although the observed family splits are not too different from the expected values, the greatest source of non-randomness (lack of independence) is due to attrition. Also, it would appear that control families may have found little monetary incentive to remain on the program. It will be recalled that they receive only \$10 per tax return (per year) and \$10 for the IRF (per month).

TABLE 1

Composition of the 1976 Mincome Manitoba Payments/Control  
Sample in Terms of Sample Completeness Criterion

(The numbers in brackets denote numbers of reporting units we would expect if intactness of sample had been randomly distributed across payments/controls.)

<u>Sample Completeness</u>	<u>Reporting Units</u>		
	<u>Treatment</u>	<u>Control</u>	<u>Total</u>
Intact Reporting Units	868 (820)	154 (201)	1022
Non-Intact Reporting Units	191 (206)	66 ( 51)	257
Reporting Units with Less than 1 Year (1976) enroll- ment (Attrition)	<u>149 (181)</u>	<u>77 ( 45)</u>	<u>226</u>
Total	1208	297	1505

The non-random nature of attrition and family splits introduces the possibility that completeness of the sample may be correlated with other variables (such as total family income). If income misreporting is itself correlated with these variables, then the fundamental assumption of randomness upon which the statistical comparison of sample means is based is violated. This has an important implication for the statistical testing of mean differences considered in Section III. The effect of non-randomness with respect to incomes is considered below. For the time being we note that the sample value of  $\chi^2$  statistic for Table 1, by the usual theory of the (r x c) contingency tables is 47.7, which indicates a strong departure from independence (randomness).

Table 2 presents the sample cross classified by tax rate and support level. Tables 3 and 4 summarize dollar amounts per reporting unit of monthly payments and divergence between Revenue Canada and Mincome Manitoba reported incomes, respectively. Divergences between Revenue Canada and Mincome Manitoba reported total incomes are further broken down into income ranges in Table 5 and in Figure 1 in Section III.

TABLE 2

Distribution of the Sample by Treatment Plan  
(Tax Rate and Support Level Combination)

<u>Support Level</u>	<u>Tax Rate</u>			<u>Control Units</u>
	<u>.35</u>	<u>.50</u>	<u>.75</u>	
Low	64	140	-	-
Medium	70	116	87	-
High	-	68	59	-
Total	134	324	146	154

TABLE 3

Mincome Manitoba Payments Received  
by Program Participants  
(Dollar Amount per Reporting Unit)

<u>Support Level</u>	<u>Tax Rate</u>			<u>Control Units</u>
	<u>.35</u>	<u>.50</u>	<u>.75</u>	
Low	324	399	-	-
Medium	399	467	426	-
High	-	515	499	-
Total	363	461	455	-

TABLE 4

Dollar Amount Divergence Between Revenue Canada  
and Mincome Manitoba Reported Total Income  
(Dollar Amount Per Reporting Unit)

<u>Support Level</u>	<u>Tax Rate</u>			<u>Control Units</u>
	<u>.35</u>	<u>.50</u>	<u>.75</u>	
Low	195	78	-	-
Medium	417	295	507	-
High	-	458	305	-
Total	347	235	425	325

### III. ANALYSIS OF THE SAMPLE: SOME STATISTICAL RESULTS

In the present section we shall investigate three issues pertaining to the income reporting behaviour of the sample.

- (i) The accuracy of the IRF as an instrument of capturing self-reported income data is investigated first, by means of comparing income reported to Revenue Canada and Mincome Manitoba. Here, both controls and treatments are pooled into a single sample (Section III.1(i)). Also, in order to determine whether controls and treatments earned the same incomes<sup>1</sup> we test, for Revenue Canada data, mean income differences between controls and treatments (Section III.1(ii));
- (ii) Whether or not there is a systematic difference between the reporting accuracy of treatment (payments) and control families; and
- (iii) Whether or not there exist subgroups in the sample (defined below) which exhibit significant differences in income reporting results.

The second topic is of course of most interest since it is by comparing treatment families with the control group that we can shed some light concerning intentional misreporting of income. The treatment

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<sup>1</sup> As was noted above, the attrition rate was not the same for controls and treatments, which introduces the possibility that income was not distributed randomly across the treatment and control groups. If this is the case then the two groups will have significantly different (true) incomes and our statistical comparisons will not be valid. However, this is not the case since we find both groups to have insignificantly different Revenue Canada reported incomes.

group, by underreporting income, automatically becomes eligible for higher monetary payments (all else held constant), so there is a potential incentive for intentional misreporting by treatment units which is absent for control units. As previously mentioned, comparison of misreporting by treatments and controls was possible because Revenue Canada income tax forms were available for both groups. All members of a treatment reporting unit were required to submit their income tax returns to the Mincome Manitoba payments office. The income tax information was recorded, and the forms themselves were passed on to Revenue Canada.

Although the submission of income tax forms was a necessary condition for the receipt of Mincome Manitoba payments, participants were informed that payments would be computed from their own IRF reports rather than from tax returns. The tax returns were to be used at the end of the year for purposes of reconciliation. Although control reporting units were not required to submit their tax forms they were very actively encouraged to do so, and 75% of control units in fact did so during 1976. Each reporting unit therefore knew that its income reporting would be verified at the end of each year so it is probable that the tax returns acted as a constraint on purposeful misreporting. Our initial statistical analysis, which is presented below, confirms this hypothesis. Nonetheless, our results are perhaps best interpreted in terms of income reporting behaviour observed in the presence of officially instituted verification procedures, which are known to the respondents.

Our sample was defined as follows. Only intact reporting units which filed an IRF every month were selected (1022 units) and the amounts

by which IRF income data differed from reported income submitted on tax returns were computed (see below). A brief inspection of these differences (misreported incomes) revealed ten reporting units which misreported total income in excess of  $\pm \$5,000$ . These families were also omitted from the sample<sup>1</sup> (see Table 5). The final sample consists of 1012 treatment and control reporting units. In addition, a criterion was also employed requiring that a complete monthly record of IRF data for 1976 be available for each reporting unit on all three income components, irrespective of whether any income was actually earned during the whole year. Our sample, therefore, also contains reporting units which had no income in 1976, and as a result should probably not have been included in the sample. As stated at the outset, however, our intention in the present report is only to provide a rough view of misreporting behaviour.<sup>2</sup>

TABLE 5

Distribution of Reporting Units According to Whether  
Misreported Income is More/Less than  $\pm \$5,000$

	<u>Sample Size With Outliers</u>	<u>Number of Outliers</u>	<u>Sample Size Without Outliers</u>
Treatment	868	8	860
Control	<u>154</u>	<u>2</u>	<u>152</u>
Total	1022	10	1012

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<sup>1</sup> This was probably an unnecessary procedure since the small frequency of these outliers does not invalidate our statistical tests.

<sup>2</sup> It is perhaps necessary to point out that this research was carried out on the administrative data files of Mincome Manitoba; that is, the data files used for operational aspects of the payments delivery program and not analytic research files. The latter were not available at the time of this study.

### III.1 Statistical Methodology

The statistical methodology used in the present report is the well-known univariate comparison of (two) means. Strictly speaking a multivariate methodology of comparing mean values should also be employed since the three income components are certainly not uncorrelated. Multivariate statistics, however, are not computed since our primary interest lies in examining reporting of wage income rather than tax deductions or NRR income, which play secondary roles. A firm statement concerning total misreporting of income can therefore not be made unless multivariate tests are also considered. The three statistical tests which we use are defined as follows:

#### Test A:

When two variables are observed for each individual in the same sample (so that in effect we have only one sample of reporting units) the two sets of observations are generally not independent of each other. In this case the appropriate test is the pairwise comparison of means test defined as

$$t_A = \frac{\bar{d}}{S_d}$$

where,

$$d_i = X_i - Y_i \quad \text{and} \quad X_i \quad \text{and} \quad Y_i$$

are two observed values for unit  $i$  on two variables,

$$\bar{d} = \sum_{i=1}^n \frac{d_i}{n}, \text{ the sample mean of the } d_i,$$

$$S_d = \sqrt{\sum_{i=1}^n \frac{(d_i - \bar{d})^2}{n-1}}, \text{ the standard deviation of the differences, and}$$

$$S_{\bar{d}} = \frac{S_d}{\sqrt{n}}, \text{ the standard deviation of the mean difference } \bar{d}.$$

The test statistic  $t_A$  needs no assumption concerning the equality of population variances, and in a large sample approximate normality holds by the Central Limit Theorem, so that in practice the significance of  $t_A$  is checked against tables of the standardized normal distribution and  $t_A$  is replaced by  $Z_A$ .

### Test B

When two large random, independent samples are available (experimental and control) the appropriate test statistic is

$$t_B = \frac{(\bar{X}_e - \bar{X}_c)}{\sqrt{\frac{S_e^2}{n_e} + \frac{S_c^2}{n_c}}}$$

where  $\bar{X}_e, \bar{X}_c$  = means of the experimental and control samples, respectively;

$S_e^2, S_c^2$  = variances of the experimental and control samples, respectively;

$n_e, n_c$  = samples sizes of experimental and control samples, respectively.

In a large sample equality of variance for the two samples is not required but the formula is still valid in the special case when the variances are equal. However, the two samples must be independent (uncorrelated), as when both are drawn randomly.

Test C

When samples are small and population variances are equal<sup>1</sup> the two sample variances,  $S_e^2$  and  $S_c^2$ , are replaced by the pooled sample variance

$$S^2 = \frac{(n_e - 1) S_e^2 + (n_c - 1) S_c^2}{n_e + n_c - 2} .$$

The test statistic is then given by

$$Z_c = \frac{(\bar{X}_e - \bar{X}_c)}{\sqrt{\frac{S^2}{n_e} + \frac{S^2}{n_c}}}$$

which requires that the samples be independently drawn, and sample values must be taken from two normal distributions with equal variances.

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<sup>1</sup> When the population variances are not equal (in a small sample) the t distribution tables can still be used provided the degree of freedom  $n_e + n_c - 2$  is replaced by an approximate adjusted degree of freedom, smaller in magnitude.

### III.2 Results of the Analysis

We first compare the income amounts reported to Revenue Canada and Mincome Manitoba by both treatment and control units considered together. The rationale for this is to determine whether the Mincome Manitoba reporting forms tended, on the average, to yield biased income reporting. It is our conclusion that since the pooled treatment and control sample tended to underreport wage income (see Table 7), such underreporting depends more on the reporting process itself.<sup>1</sup> This conclusion is reinforced by further analysis (Section ii) where it is shown that such underreporting cannot be ascribed to treatment/control differentials.

#### (i) Revenue Canada/Mincome Manitoba Comparison

In Table 6 (and Figure 1) we present the distributions of misreported income  $I_D$ , when both the treatment (payments) and control groups are pooled into a single sample. Since our main interest centers on the misreporting of wages, in Figure 1 we exhibit the sample distribution of misreported wage income only. Although the class intervals are very wide (\$1000 intervals) it is evident that for both treatment and control reporting units the distribution of  $I_D$  is skewed. By examining the data we see, for instance, that a relatively higher number of respondents underreported income by \$1500 or less than overreported income by the same amounts. To verify whether underreporting is of global significance we carried out a statistical test of significance

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<sup>1</sup> The probability of omitting a component of wage income due to recall error is certainly higher than the probability of introducing a fictitious wage component (and thus to overreport), all else being equal.

TABLE 6

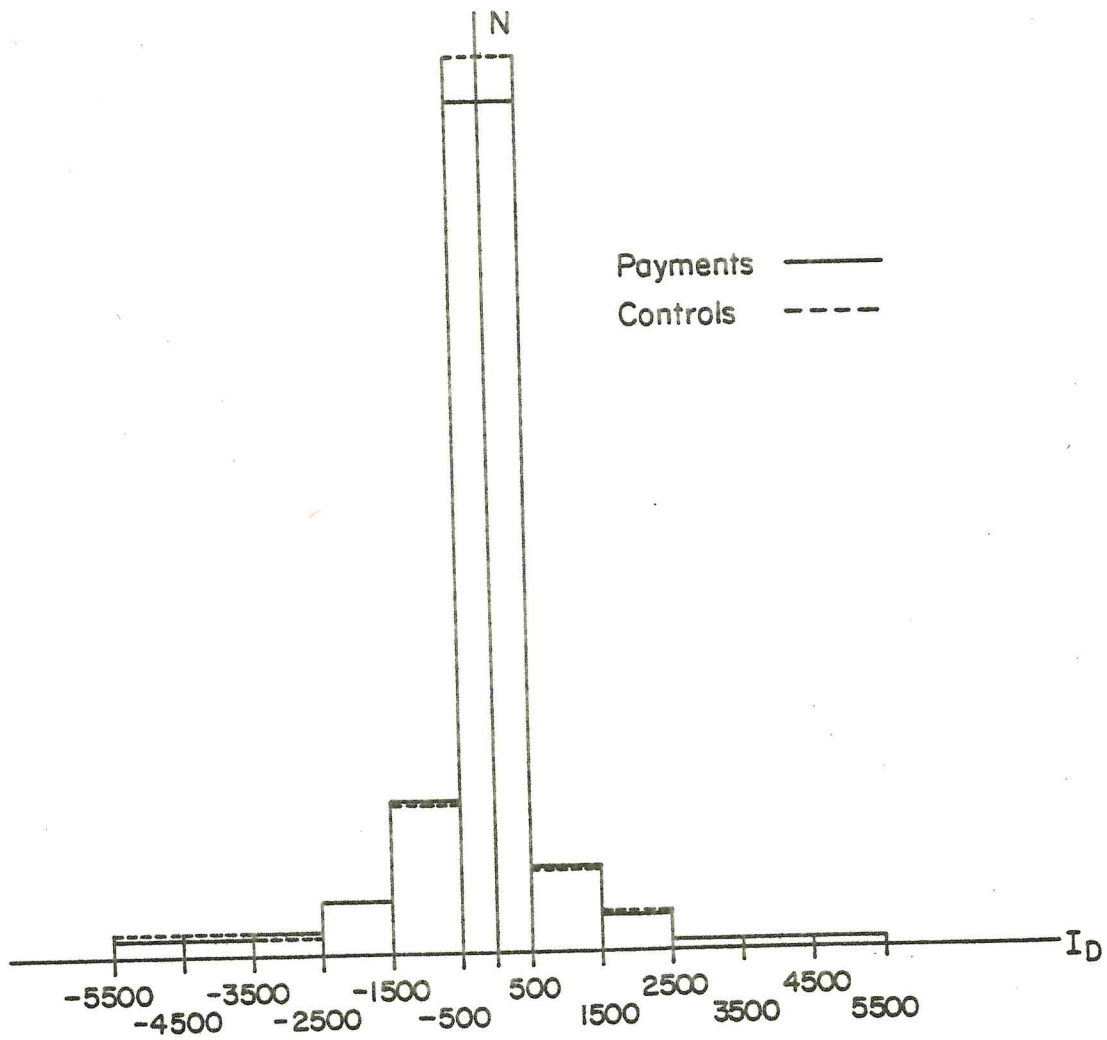
Distributions of Divergence  $I_D$  Between Revenue Canada  
and Mincome Manitoba Reported Income Components

Amount Range (\$)	Income Components					
	Wage Income		NRR Income		Tax Deductions	
	Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency
<u>Payments (Treatment)</u>						
Less than -5501	3	.004	0	0	0	0
-5500 to -4501	6	.007	1	.001	0	0
-4500 to -3501	5	.006	2	.002	0	0
-3500 to -2501	10	.012	5	.006	0	0
-2500 to -1501	33	.038	12	.014	4	.005
-1500 to - 501	106	.122	77	.089	18	.021
- 500 to + 499	627	.722	703	.810	843	.971
500 to 1499	55	.063	41	.047	4	.005
1500 to 2499	13	.015	15	.017	0	0
2500 to 3499	3	.004	5	.006	0	0
3500 to 4499	2	.002	4	.005	0	0
4500 to 5499	2	.002	3	.004	0	0
5500 and over	3	.004	0	0	0	0
Total	868	1.00	868	1.00	868	1.00
<u>Controls</u>						
Less than -5501	1	.007	1	.007	0	0
-5500 to -4501	1	.007	0	0	0	0
-4500 to -3501	1	.007	0	0	0	0
-3500 to -2501	1	.007	1	.007	0	0
-2500 to -1501	6	.039	1	.007	2	.013
-1500 to - 501	16	.104	8	.052	3	.020
- 500 to + 499	117	.756	134	.870	149	.968
500 to 1499	7	.046	5	.033	0	0
1500 to 2499	3	.020	4	.026	0	0
2500 to 3499	0	0	0	0	0	0
3500 to 4499	1	.007	0	0	0	0
4500 to 5499	0	0	0	0	0	0
5500 and over	0	0	0	0	0	0
Total	154	1.00	154	1.00	154	1.00

Divergence  $I_D = I_M - I_R$  between Revenue Canada ( $I_R$ ) and Mincome Manitoba ( $I_M$ ).

FIGURE 1

Number (N) of reporting units by divergence  $I_D$  between Revenue Canada and Mincome Manitoba reported income (Wages).



in the following way.

Let  $I_R^e, I_R^c$  = income reported to Revenue Canada by experimental and control reporting units, respectively; and

$I_M^e, I_M^c$  = income reported to Mincome Manitoba by experimental and control reporting units, respectively.

Then we compare the mean values of the pooled sample (vectors)

$$(3.1) \quad I_M = I_M^e + I_M^c$$

and

$$(3.2) \quad I_R = I_R^e + I_R^c ,$$

denoted as  $\bar{I}_M$  and  $\bar{I}_R$  , by testing the difference

$$(3.3) \quad \bar{I}_D = \bar{I}_M - \bar{I}_R .$$

The comparison is carried out by means of Test A (see above). A test of significance for the sample mean of (3.3) indicates whether mean misreporting  $\bar{I}_D$  is significantly different from zero; i.e., whether, on the average, the same amounts are reported to Revenue Canada as to Mincome Manitoba by the entire sample.

TABLE 7

Paired Comparison (Test A) for Mean Differences Between  
Mincome Manitoba and Revenue Canada Reported Income  
(Treatments and Controls)

Income Components	$\bar{I}_M$	$\bar{I}_R$	$\bar{I}_D$	Standard Deviation of $\bar{I}_D$	Correlation Between $I_M$ and $I_R$	$Z_A$
Wage	6826.19	6998.76	-172.80	28.10	.990	6.15
NRR	348.58	376.51	- 28.00	21.50	.680	1.30
Tax Deduc.	1149.72	1205.24	- 55.70	5.50	.992	10.13

The high values of  $Z_A$  in Table 7 indicate that both the treatment and control reporting units, taken as one sample, tend to underreport wage and tax deduction income to the Mincome Manitoba Payments Office. Although NRR income is also underreported, a mean difference of \$28.00 is not significant when compared to a standard deviation of \$21.50. It is interesting to note that although the mean reported income differences are significant, both Mincome Manitoba and Revenue Canada reported incomes are highly correlated, so that the IRF income data is a good predictor of true income. The high correlation can also be interpreted as an indicator that IRF income data has very little capture error.

(ii) Treatment/Control Comparison

The comparison carried out above is meaningful primarily when there is no significant difference in reporting income components between the treatment and control groups. In order to verify whether income misreporting is related to the level of Mincome Manitoba payments we compare mean

misreporting between treatment and control groups. As we said earlier, it can be argued that the control group has no inducement to purposely misreport income in order to obtain higher payments. Consequently, our test may also be interpreted as an indicator of the presence/absence of intentional misreporting.

We have already noted that sample attrition was not random with respect to treatment/control reporting units, thus introducing the possibility that attrition was the result (among others) of higher income control families (with little monetary inducement to file IRF information) leaving the program. To test whether or not the treatment/control distinction is related to family income we carry out a test for significant mean difference of Revenue Canada reported incomes, the results of which are given in Table 8. Although treatment reporting units exhibit a lower mean income than the controls, the  $Z_B$  values indicate that the differences are not significant at the 90% level with the exception of the NRR income component. Reporting units in the two subsamples can therefore be taken to have equal wage (and tax deductions) but not NRR income. Note however that due to lack of independence between the three income components our univariate test is strictly only valid for wages, the component of main interest.

There is also a marked difference in the standard deviation between the two mean Revenue Canada reported incomes  $\bar{I}_R$ , indicating that the sample mean  $\bar{I}_R$  for the control group is less stable (in the sampling sense) than  $\bar{I}_R$  for the treatment group. This is mainly due to the difference in the sample size. The standard deviations of sample incomes  $I_R$  between treatments and controls are more similar, although

control wage incomes still tend to vary more than the treatments wages, indicating perhaps a certain degree of non-randomness in the sample which can have its source either in the original allocation model<sup>1</sup>, attrition, or both.

TABLE 8

Comparison of Means Between Treatments and Controls  
Revenue Canada Reported Incomes

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Mean: $\bar{I}_R$	7105.50	6393.73	395.10	271.36	1224.41	1096.72
Standard Deviation of $\bar{I}_R$	212.29	544.52	30.12	56.23	44.93	104.70
Standard Deviation of $I_R$	6225.59	6713.23	883.41	693.28	1317.71	1290.84
Sample Size	860	152	860	152	860	152
Test Statistic $Z_B$	1.22		1.94		1.12	

<sup>1</sup> Experimental families were not assigned to their particular treatment plans with equal probabilities. For a complete discussion of the sample design see D. Hum et al. "The Sample Design and Assignment Model", Technical Report No. 2, Mincome Manitoba, 1979.

Table 9 deals with testing the principal hypothesis of interest, that is, whether treatment family units misreport more (or less) than do control units. Since treatments have a potential gain from misreporting income, notions of (neo-classical) economic "rationality" would lead us to expect significant mean underreporting on the part of treatments. The values of  $Z_B$  are computed as outlined in Section III.1, and a two-tailed test is used to test for significance of income misreporting between treatments and controls. In both cases the mean divergence  $\bar{I}_D = \bar{I}_M - \bar{I}_R$  is negative, which reinforces our initial conclusion of Section III.2(i) that both treatments and controls underreport income even though controls have no evident monetary incentive to do so.

In order to observe whether or not treatment reporting units misreported income intentionally we compare the mean values of  $\bar{I}_D$  for both groups in Table 9. It can be seen that the mean difference is not significant at the 95% level for wage income. NRR income and tax deductions, however, appear to be more significant but no firm conclusions can yet be made since, as mentioned at the outset, our tests are based on a sample which contains reporting units which did not earn any income during 1976. The inclusion of such units into the sample will usually reduce  $\bar{I}_D$  and increase its variance.

TABLE 9

Treatment/Control Differences (All Reporting  
Family Units) in Misreporting(The null hypothesis  $H_0 : \sigma_E^2 = \sigma_C^2$  is tested by the usual F ratio)

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Mean Income $\bar{I}$	6932.50	6223.40	362.19	271.75	1170.60	1030.63
Mean Deviation: $\bar{I}_D = \bar{I}_M - \bar{I}_R$	-173.20	-170.33	-32.91	-.21	-53.81	-66.09
Standard Devia- tion of $\bar{I}_D$	30.54	71.22	24.24	41.43	5.67	17.78
Standard Devia- tion of $I_D$	895.59	989.74	710.77	453.10	166.16	199.92
Sample Size	860	152	860	152	860	152
Test Statistic for $H_0 : \sigma_E^2 = \sigma_C^2$	1.040		1.937		1.739	
Test Statistic $Z_B$	-0.037		-.681		.659	

A secondary interpretation of our results in Table 9 is also possible. From equation (3.3) we have, for treatments and controls, the identities:

$$(3.4) \quad I_D^e = I_M^e - I_R^e$$

$$(3.5) \quad I_D^c = I_M^c - I_R^c$$

so that

$$(3.6) \quad I_D^e - I_D^c = (I_M^e - I_R^e) - (I_M^c - I_R^c) \quad .$$

When treatments and controls have the same mean incomes as reported by Revenue Canada; i.e.,

$$\bar{I}_R^e = \bar{I}_R^c$$

equation (3.6) becomes

$$(3.7) \quad \bar{I}_D^e - \bar{I}_D^c = \bar{I}_M^e - \bar{I}_M^c$$

where the left-hand side of equation (3.7) is the mean reporting differential between treatments and controls as tested in Table 9, and the right-hand side denotes the mean income differences between treatments and controls, as reported to Mincome Manitoba. Equation (3.7) then states that, algebraically, the average amount of misreported income  $\bar{I}_D^e - \bar{I}_D^c$  between treatments and controls is always equal to the average difference  $\bar{I}_M^e - \bar{I}_M^c$  (for the Mincome reported amount) between treatments and controls, when  $\bar{I}_R^e = \bar{I}_R^c$ . Since Table 8 has already established the equality  $\bar{I}_R^e = \bar{I}_R^c$  (in the population) we can also accept equation (3.7) to hold as well, so that Table 9 also tells us that mean incomes reported to Mincome Manitoba do not differ significantly between treatments and controls. Equation (3.7) however is of secondary interest.

The main thrust of Table 9 is to tell us that income reporting behaviour for both treatments and controls is not very different. In retrospect, our conclusion implies that any potential monetary incentive for underreporting true income which may have existed was probably removed by the requirement that all Mincome Manitoba participants make available their Revenue Canada tax forms to the Mincome Manitoba payments office.

(iii) Treatment/Control Comparison for Reporting Units  
Not On Welfare

The sample considered above consisted of all treatment reporting units, including those which decided to remain on welfare rather than accept Mincome Manitoba payments. The control group also contains reporting units which had welfare status. In both situations the welfare units received \$10 per month for filing the monthly IRF. Welfare reporting units which were assigned to the control group present no particular difficulty, although one might argue that welfare family units are sufficiently distinct in some manner to warrant separate analysis. The main problem concerning the analysis presented in the previous section lies in the fact that the definition of the treatment variable is not consistent. Although welfare reporting units were kept in the experimental frame, they were prevented by the Rules of Operation from receiving Mincome Manitoba payments so long as they remained on welfare (see Rules of Operation for further details). As such they cannot truly be considered as full fledged treatment families since they had no immediate

incentive to misreport income.<sup>1</sup>

In the present section we present a separate comparison of misreporting for units which were on welfare and those which were not on welfare. From Table 10 it can be seen that even when welfare families are deleted from the treatment group the difference in misreported wage income is not significant at the 95% level, for families without other adults. The difference becomes significant only for reporting units with other adults present (Table 11). The control group in this case however is very small (6 reporting units) and would therefore be more sensitive to misspecification error such as non-normality and non-random selection. Note that misreporting mean differences for welfare families (Table 12) is highly significant, even though welfare treatments had no immediate incentive to misreport.

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<sup>1</sup> Unlike the controls, however, welfare units which were included in the treatment frame had the option of converting to Mincome Manitoba payments if they so wished.

TABLE 10

Experimental/Control Differences for Families Not On  
Welfare and Without "Other Adults" in the Family

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Sample Size	770	83	770	83	770	83
Mean Divergence: $\bar{I}_D = \bar{I}_M - \bar{I}_R$	-129.00	-303.60	-41.30	51.10	-46.10	-83.20
Standard Devia- tion of $I_D$	837.95	989.74	675.99	453.10	151.05	199.92
Test Statistic for $H_0: \sigma_E^2 = \sigma_C^2$	1.395		2.226		1.752	
Test Statistic for $H_0: \mu_E = \mu_C$	1.548		-1.668		-1.641	

TABLE 11

Experimental/Control Differences for Families Not On  
Welfare and With "Other Adults" in the Family

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Sample Size	53	6	53	6	53	6
Mean Divergence: $\bar{I}_D = \bar{I}_M - \bar{I}_R$	-572.20	21.00	-118.30	-410.00	-150.00	-95.80
Standard Devia- tion of $I_D$	1268.57	727.75	770.18	560.21	301.31	100.76
Test Statistic for $H_0: \sigma_E^2 = \sigma_C^2$	3.038		1.890		8.943	
Test Statistic for $H_0: \mu_E = \mu_C$	-1.722		1.158		-.929	

TABLE 12

Experimental/Control Differences for Families On  
Welfare and Without "Other Adults" in the Family

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Sample Size	34	51	34	51	34	51
Mean Divergence: $\bar{I}_D = \bar{I}_M - \bar{I}_R$	-412.10	-85.00	287.30	34.70	-49.20	-8.80
Standard Devia- tion of $I_D$	1138.58	360.33	1202.88	251.80	119.02	30.24
Test Statistic for $H_0: \sigma_E^2 = \sigma_C^2$	9.984		22.81		15.50	
Test Statistic for $H_0: \mu_E = \mu_C$	-1.622		1.207		-1.938	

TABLE 13

Experimental/Control Differences for Families On  
Welfare and With "Other Adults" in the Family

	Income Components					
	Wage		NRR		Tax Deductions	
	Treatment	Control	Treatment	Control	Treatment	Control
Sample Size	2	11	2	11	2	11
Mean Divergence: $\bar{I}_D = \bar{I}_M - \bar{I}_R$	-1991.00	306.00	61.50	-243.30	-336.50	-189.30
Standard Devia- tion of $I_D$	1689.99	1493.05	86.97	1227.06	330.22	592.63
Test Statistic for $H_0: \sigma_E^2 = \sigma_C^2$	1.281		199.06		3.221	
Test Statistic for $H_0: \mu_E = \mu_C$	1.976		.813		-.402	

#### IV. CONCLUSIONS

At the outset we stated that one of the prime reasons for carrying out the payments/controls comparisons was to detect intentional underreporting of income by the treatment group which received Mincome Manitoba payments. However we caution that any significant difference(s) between the two groups cannot be interpreted only in terms of intentional misreporting since any differential effect which is correlated with receiving payments will also be responsible for treatment control differences. For example, there may have existed a differential knowledge or perception of the rules governing Mincome Manitoba payments between the two groups. It can be argued that the control group would not possess a strong enough incentive to acquaint itself with the Mincome Manitoba income reporting rules.<sup>1</sup> It is reasonable to suppose however that insignificant misreporting is largely an indication that no large scale, intentional, systematic underreporting of income existed with the intention of extracting larger Mincome Manitoba payments.

On the basis of our general examination of initial statistical results we can make the following conclusions:

- (i) Payments reporting units not on welfare exhibit no systematic underreporting of income when compared to the control group (Tables 10, 11)
- (ii) For those reporting units on welfare there does exist a mildly significant difference (at the 95% level) in the wage component (Table 13). Given the small sample sizes and the mild degree of skew observed in the histogram (Figure 1), however, it is very

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<sup>1</sup> Independent evidence about differential learning exists from American income maintenance experiments.

doubtful whether Table 13 indicates a significant difference.

Even if the difference had been highly significant it would not have relevant policy implications since both welfare treatment and control reporting units received no payments from Mincome Manitoba.

## APPENDIX

### Definition of Terms and Variables

1. Reporting Unit: A reporting unit is a residence-based concept of a family unit. It is composed of an adult member, and possibly other members who are related to the adult member through kinship or marriage, and who share the same dwelling.
2. Adult: An adult is an individual who is 18 years of age or over; 16 years of age or over if living with his/her spouse; or 16 years or over if living with one or more of his/her children.
3. Children: Children are non-adults of the reporting unit. These include persons under 18 years of age living without a spouse or children in the same dwelling as the adult member.
4. Payment Unit (Treatment Unit): Payment units are reporting (family) units which receive Mincome Manitoba income-conditioned payments. Payments units are contrasted with non-payment control units which do not receive payments. In statistical terms, a payment unit can be thought of as an "experimental" or a "treatment" unit.
5. Control Unit: A reporting unit which files the same information as a payment unit but only receives a fixed filing fee of \$10 per form.
6. NRR Rate: The rate at which wage income and other NRR income categories received by a payment unit are taxed by Mincome Manitoba.

7. Welfare Status: A variable indicating whether or not one (or more) member(s) of a reporting unit received municipal or provincial welfare payments during 1976.
8. Welfare Convert: A welfare convert is a reporting unit originally selected for enrollment as a payment (experimental) unit, but which chose to receive welfare maintenance rather than payments from Mincome Manitoba.