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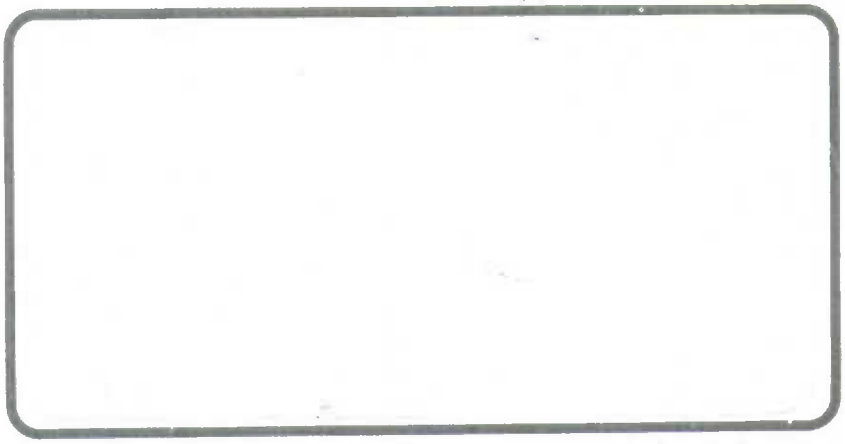

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A PROTOTYPE MICRO-MACRO LINK FOR THE CANADIAN HOUSEHOLD SECTOR, SESSION 3, MACRO/MICRO LINKAGES - HOUSEHOLDS

by

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ABSTRACT

A Prototype Micro-Macro Link for the Canadian Household Sector

This paper seeks to forge a link between Canadian macro and micro data relating to the household sector. The analysis is in three parts. The first part begins with National Accounts data on the personal sector. These data are adjusted to remove transactions relating to non-biological persons, so that the result is income and expenditure for the household sub-sector. The second part starts with the annual household survey used to collect income distribution data. These survey data are augmented in various ways to account for under-reporting and to add information from other micro data sets - particularly the periodic survey of household expenditure patterns and a sample of individual income tax returns. The result is a comprehensive, albeit partially synthetic, household micro data set. The final part of the paper then confronts these two largely independent data sets with each other, and discusses the general quality of the results.

Key Words: National Accounts, micro-foundations, household sectors, personal sectors.

Introduction

The development of an integrated system of National Accounts reached one of its high points with the creation of the 1968 UN Standard National Accounts (SNA). Also by the late 1960s, the confluence of economic events, new theoretical questions and a desire to make greater analytical use of computer technology led to some dissatisfaction with aggregate economic data and towards a desire for the development of micro data sets and their subsequent analytical exploitation. Most macro data or aggregates are, by and large, summations of their constituent micro or individual data. The difference in the analytical use of micro and macro data is therefore neither in the overall facts or events which they portray, nor in the universe they cover. Rather, the difference lies in the analytical results which are desired, and in the theoretical variables emphasized and the questions posed and answered. Thus, for instance, the SNA macro accounts provide the basis for analysis of the total income, expenditure and savings of the four broad sectors of the accounts (business, persons, governments, and non-residents) and the economic behaviour of these large groups vis à vis each other. Such questions as which socio-economic or income size group within the personal sector saves and spends how much cannot be addressed by macro economic data.

Over the past two decades, significant advances in the creation, simulation and analysis of mainly personal micro data sets have been achieved for example by Orcutt, et al (1977) Pechman and others, and the potential of computer manipulations of micro data sets generally have been explored by, among others, Fellegi, Goldberg, Aukrust and Norbotten. During the same time, the Ruggleses built some of the conceptual roads leading from SNA macro data in the personal sector towards the possibility of micro data

manipulations and also carried out significant spade work in the application of computer technology based analysis of the longitudinal establishment data files in the U.S. Department of Commerce. However, relatively little progress has so far been made in the integration of micro data analysis into an SNA framework.

There are several reasons for this seeming delay in the development and exploitation of micro data within an SNA framework. While computers and otherwise confidential micro data files have been available to government statisticians, the intellectual climate of economic analysis in the postwar years favored macro economics and the desire to quantify the large aggregates of Keynesian economics drove statistical development. However, interest in micro-analysis grew with the realization that there were limits as to what could be explained with macro data. Techniques were developed which permitted data on individuals and/or households and their economic, social and demographic characteristics contained in either statistical or administrative files to be made available on a sample basis to the research public. Some of the micro data work in the personal field mentioned above has been a direct result of these developments.

It has however not been possible to link this work directly with the National Accounts because the so-called personal sector in the National Accounts encompasses a much wider range of actors than natural or biological persons; it includes non-profit institutions, personal associations, and unincorporated business. Furthermore it contains a significant number of imputations for non-market transactions, such as rent on owner-occupied housing; and last but not least in contradistinction to most other sectors, not all constituent micro data of the personal sector are derived from individual, family, or household files or accounts. Many of the data in the personal sector come from the records of businesses or governments e.g. income from government transfer payments in the personal sector is not a statistical aggregation from individual or household receipts, but comes

from a record of the total out payments in the public accounts. A fair number of expenditures on consumer goods and services similarly are not the total of such expenditures as recorded by individuals, but the sales of such goods and services to individuals as reported in aggregate by business.

The purpose of this paper is to report on a prototype effort to construct, from existing data, a linked micro-macro account of the Canadian household sector. This effort encompasses two major processes. Essentially, we have started from the two existing and divergent types of data, and tried to meet somewhere in the middle. The next section of the paper reports on a series of adjustments that have been made to the personal sector in the SNA in order to extract a picture of the household sector from the conventional personal sector of which it is the major constituent. This involves trying to distinguish the economic activities of natural or biological persons from the activities of other institutions or groups (e.g. non-profit institutions) that have traditionally been put into the personal sector.

The following section then describes the construction of the Social Policy Simulation Database (SPSD). This is a microdata set that was originally constructed to serve as the basis for a policy oriented microsimulation model. However, in order for the model to generate reliable and comprehensive estimates, the underlying database has had to be augmented and adjusted to cover the household sector as completely as possible. Thus, the SPSD can also be viewed (serendipitously) as an effort to construct a more complete micro foundation for the household sector.

Once the national accounts adjustments and the contruction of the SPSD are described, we turn to an evaluation of their consistency. Starting from two largely independent sets of data, how close are we able to come? The reader will be the final judge, and the paper finishes with some concluding comments.

Households in the Personal Sector of the National Accounts

In order to avoid confusion, the term personal sector will henceforth be reserved to refer to the Personal and Unincorporated Business Sector of the Canadian SNA, while the term household sector will denote that aggregate which sums the transactions of natural persons and/or families and/or households. Aggregate data for the household sector will permit analysis of such macro economic concepts as income, expenditure, and saving from a truly natural person perspective. To elaborate on the latter term, what is really implied here is that one wants to create a sector which is the aggregate of decision making units composed of people. The smallest meaningful unit is the individual. (Of course, it is typically important to be able to group individuals into the families or households of which they are members.) Income will thus be truly income as received by households; expenditures will exclude the outlays of all manner of collectives. As a result, the household savings rate can, like in the work by the Ruggleses for the U.S., hopefully become more economically meaningful than the current so called personal savings rate. The paper will then demonstrate the "linkage" of the macro-data to the 1984 SPSD, an actually constructed micro-data set, with which it is possible to examine the economic behaviour of significant and critical population subgroups such as the elderly, married couples with children, married couples without children and so on - where these groups can also be broken down by age, income, geography, household size, etc.

The precise steps by which a household sector can be derived from the Canadian SNA personal sector depend generally on the statistical and analytical purposes for which such a household sector is to be used. A major statistical historical revision of the Canadian SNA has recently been completed, so that this paper does not propose a restructuring of the Canadian SNA.

Indeed, the sequence of adjustments outlined in this section are in the nature of supplementary and more detailed explanatory tables and can therefore be tailor-made. Thus it is not necessary to decide once and for all what the exact boundaries of the household sector will be. As a matter of fact it can be argued that restructuring of such a well-developed system as the Canadian SNA should not be proposed until any suggested alternatives have demonstrated their analytical and statistical robustness in actual use and over some time. The more precise nature of these choices will become evident as the different analytical uses of the household sector are discussed. Also while the maintenance of a uniquely defined SNA structure in printform will probably be always necessary, it can be argued that as both details and aggregate series become more and more computer accessible, analysts will find it progressively easier to satisfy their own needs by constructing alternate aggregates with officially supported micro-data sets, more detailed partial aggregations of macro-economic time series and computer programs.

There are fundamentally two reasons why the establishment of a household sector is analytically desirable. First, the behaviour of natural biological individuals is likely to be very different from the other types of agents included in the personal sector. Particular concern at the present time focuses on household saving. Second, in order to undertake economic analysis by the social, demographic and economic characteristics of households it is necessary to link to micro-data and this in turn requires a pure household sector. While the former reason may eventually lead to an "official", fully integrated SNA household sector, the latter analysis in the short term necessitates a household sector tailored to the particular definitions in specific micro-data sets - in the case of the present paper that of the Social Policy Simulation Database (SPSD) for 1984.

In this paper, the definitions adopted for the aggregate household sector are largely driven by the need to conform to the concepts embodied in the SPSD. However, the discussion also points out some alternative concepts which in the longer term might be preferable.

The first and most obvious step to go from the personal to the household sector is, of course, the removal of all (or at least most) data which do not pertain to natural persons, i.e. the income and expenditure - and hence also savings - of all the non-profit institutions and associations of individuals now included in the personal account. In the Canadian SNA the largest single component among the non-profit institutions are the institutions of higher learning. All religious organizations fall into this category and other large groups which may be mentioned would be such welfare and research organizations as the Red Cross, the Canadian Cancer Society, the Heart Fund and many others. Trade unions and political parties as well as recreational, educations and cultural organizations are others which are included in this category. Such a deconsolidation of the personal sector, however, also implies that fees and donations by household to these organizations, and transfers and gifts from these organizations to households must then be separately estimated and included in the household expenditure and income accounts respectively.

It should be noted that the deconsolidation of the personal account only shows different data in the household saving account where institutions have been removed which have savings (or dissavings) and/or which receive or transmit funds from or to other sectors of the economy. For instance, in the case of institutions of higher learning the major part of their operations are financed by government and their removal from the personal account will lower the income side of the household account by the amount of this transfer income while the expenditure side will be lowered by the grand total of their expenditure. Since part of their expenditure is financed by households, the expenditure side will be lowered more in the first round of adjustment, and the savings remaining in the household account will be raised by the excess of expenditure over income of the institutions. However, (assuming no net saving, endowment funds, or dissaving on the part of institutions) this will then be exactly offset in the next step when fees paid by households to these institutions, which were omitted as intrasectoral transfers in the personal account, are included in household expenditure. Both the income and expenditure accounts in the household

sector are then lower by the non-household financed expenses of these institutions. On the other hand, for example, the exclusion from the household account of a small soccer club which exactly matches its expenses for a coach, uniforms, and rent for the playing field by the fees it charges its members, will not result in a different aggregates between the personal and household accounts because the total expenses of the club removed from personal expenditure will be precisely matched by the fees charged by the club which will be added to household expenditure. This process is statistically speaking rather fortunate for it obviates the necessity of adjusting the personal sector for the numerous small, informal, ad hoc and quite frequently shortlived clubs and associations - more often than not even without employees, formal records, investment income or capital formation. To attempt such an undertaking would indeed be a statistical nightmare and costly beyond any bounds of reasonableness.

The concepts of household income, expenditure and savings and their treatment poses a number issues whose only long term solution might be to supply the data users with all the options and permit them to "roll their own". The main problems are treatment of private pension funds and to a lesser extent self financed annuity and whole life insurance purchases. The Canadian personal income and expenditure account does not contain on the expenditure side the private employer/employee contributions to pension funds and/or annuities nor individually purchased whole life insurance and annuity contracts. Since the means from which these funds are financed are either explicitly or implicitly included on the income side, the savings of such institutions are part of total personal savings. The assets of such funds are in the personal income and expenditure account deemed to be personal asset and outpayments from the funds are thus not part of personal income but a distribution of assets, and the investment income earned on these assets is included in personal income. This, it may be noted, is in contradistinction to public service and other publicly funded pensions, contributions to and outpayment from which are counted as transfers and hence excluded from personal savings. The savings and assets generated by these latter funds are part of the government sector. Private pension funds contain both employer and employee contributions and it is unlikely that

individuals are very knowledgable about their employer's contribution or their equity in the accumulated funds. (This is likely to change, however, as a result of major changes to the income tax rules whereby employees will be notified annually of the value of the employers' contribution to the pension plan on their behalf; see Department of Finance (1986).) Households have not exercised much control over these funds. (But again this also will probably change with recent pension reforms.) The Ruggleses have therefore proposed to remove employer contributions from the household account as well as remove the assets of or equities in such funds from household assets and to include pension benefits from these plans with household income.

For the present exercise, we have followed this treatment in order to bring household income, expenditure, savings and assets in consonance with that which one obtains from current questionnaires directed at the household, and hence with the SPSD. This makes the treatment parallel with that of public funds. On the other hand, it can be argued that the economic behaviour of households both at the micro and macro level is in no small way influenced by the fact that they have "forced" savings and future income security on account of the presence of such partially or wholly sponsored employer funds. An argument can therefore be made that the present treatment of these funds also has behavioural validity which cannot be ignored.[1]

Since there is no compromise between these two positions, and since this whole exercise is concerned with adding to the analytical value of the accounts rather than bringing forth a new generally consistent structure of the Canadian SNA, both versions of household income, expenditure and savings should be made publicly available. It may further be noted on ground of consistency that if one wants to include private funds with the household sector because the knowledge that future assured retirement income exists influences present spending (and saving) patterns, a similar treatment should be accorded to public funds.

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1. Richard Ruggles, in private conversation with one author, has, however, pointed out that national accountants ignore many other influences and facts which lead to different saving patterns, e.g. the rational considerations which do or should determine the saving pattern of a university professor with tenure are quite different from those of a prominent boxer or football player!

Somewhat analogous arguments to those made for pension funds can be adduced for individual purchases of whole life insurance and individual purchases of annuities. With respect to life insurance purchases, the Canadian treatment is that the administrative expenses of insurance companies are included in current expenditure on consumption goods and services and are deemed to represent the value of services rendered by life insurance companies. The accumulated funds of life insurance companies are deemed to be personal savings and the investment income on policy holders' funds is included with personal income. The Ruggleses make the case that whole life insurance has some similarity to savings accumulation in pension funds in that individuals have no exact knowledge of their equity, and have no control or access to their funds. Such investments nevertheless differ from equities in pension funds, at least to the extent that whole life insurance savings are accessible to individual policy holders by means of policy loans to the extent of the cash surrender value of the policy. Cash surrender values may be taken as reasonably equivalent to policy holders' equity and are probably not too difficult to obtain either via individual questionnaires or aggregatively from the record of insurance companies. Like in the treatment of pension funds previously discussed, the exact aggregate one derives for the household account would depend on the intended analysis, and both the present treatment and the complete separation of households and the insurance sector may prove useful in analysis. In order to achieve this, one would have to include the total premium payments on the expenditure side and the claim payments on the income side of the household accounts. To accord with the SPSD, all life insurance premiums and benefit payments have been added to the expenditure and income side respectively and investment income of life insurance companies has been removed from income.

Annuities present the third aspect of this particular problem. At the moment, purchases of annuities and return of their capital value are also considered intra-personal transfers, while the administration expenses and investment earnings are included with those of life insurance companies.

Again it can be argued that from a cash flow point of view, individuals consider payments into annuities as a purchase of (future) benefits and payments from annuities as an income. This latter version is the treatment in the SPSD, and is the way in which annuities have been treated in this study. However for the reasons outlined when discussing pensions, the present treatment - even in the pure household account - is also analytically valid and hence again both versions might eventually be published. In the case of annuities there is however another argument which could be proffered in opposition to changing present methodology. The question whether annuities are in essence different from the purchase of any other financial asset - be it some form of a Registered Retirement Savings Plan (a tax-deferred personal savings vehicle), a bond or stock - cannot be answered unambiguously and depends in no small way on each person's perception of his own saving mechanism. The two version account therefore is probably still valid, although it must be admitted that in this instance one comes pretty close to counting true capital transactions as current.

The above mentioned RRSPs, as well as the now discontinued Registered Home Ownership Savings Plans (RHOSP), may constitute another problem, since the current interest income from these plans is included in the personal sector. It may be difficult to defend the exclusion of such income from household income conceptually since the distinction between RRSPs and other individually held investments such as bonds and stocks - the income from which should not be excluded from household income and savings - becomes pretty esoteric. On the other hand the impact of both recently implemented and proposed tax changes relating to pension plans as well as pension reforms which will result in major flows of money from pension plans to RRSPs (as a consequence of early vesting and portability) may change both the nature and perception of these plans. The complete articulation of all such flows would permit alternate treatments and seems thus called for. Since purchase and redemption of RRSP's are not considered household expenditure or income in the SPSD, no adjustment for RRSP's were necessary

in this study. (Although at this time probably not as yet statistically significant, the conversion of RRSP's into annuities would make the inclusion of that type of annuity income in the total annuities income flow, described in the preceding paragraph, somewhat ambiguous).

On a more theoretical level, McCracken et. al. have pointed out that specific treatment of the above described investments revolve around such questions as the degree to which such investments can serves as collateral for loans, the fungibility of the assets, the rigidity of the contractual obligations incurred or the possibiity of discretionary changes. Whether decisions on these investments are motivated by personal or business reasons, are entirely voluntary or required by law or contract, are reached individually or collectively or result in funded or unfunded liabilities are other factors which may influence the specific treatment accorded to such investments.

The case for casualty insurance and other non-life insurance transactions is also perceptually more complicated at the individual level. Aggregatively only the net premiums (defined at the total premiums paid less claims received) or the administrative cost of this insurance is recorded, because claim receipts can simply be viewed as intra sector transfers (although they are of course routed via another sector). In the linkup with micro data, the total premiums should be recorded as outlays while on the other hand any claims received may in many instances be viewed as other income. Since this individual view of the insurance transaction is gross, the net saving will remain unaffected, although income and expenditure may differ between micro records and macro aggregates. The present data do not permit a precise reconciliation for this item.

The next set of adjustments are those which from the point of view of obtaining aggregate household savings need really not be made, but which are essential from the point of view of reconciling the aggregate household income and expenditure flows with the existing SPSD micro data and which also would contribute to the conceptual tidiness of the household saving concept. We refer, of course, to imputed items which are aggregate attributions made on the basis of macro-economic desiderata and are not currently found in micro data. They are always included on both the income and expenditure sides and do not affect savings. The main items which have been excluded here in addition to private employer pension fund contributions previously dealt with are the value of farm products consumed in farm households, the imputed interest for banking services, net imputed house rent for owner-occupied housing, and board and lodging furnished to employees in lieu of wages as well as clothing issued to members of the armed forces. Of course, the same arguments that lead to the inclusion of these imputations in the macro accounts also apply to the micro data. Hagenaars et. al. in a paper to this conference present an initial effort at just such imputations at the micro level.

Other supplementary labour income, such as employer contributions to private health or disability insurance schemes have also been eliminated since such data are not available in the SPSD.

Related to imputations is the matter of current versus capital expenditures by households. While the treatment of expenditure on owner-occupied housing as capital rather than current expenditure - and hence its inclusion in savings - in the personal account poses no problem in going from the personal to the household sector, since both the requirements of economic analysis and personal perception of housing as capital are likely to be coincident, the treatment of hard major durable consumer items such as cars, washing machines etc. as current expenditure has been subject to questioning in the personal sector and hence a fortiori in the household sector. The

data pertaining to the "capital" outlays are readily available. A few remarks about such a change of treatment may, however, be apropos. While it is quite true that from many points of view the acquisition of hard durables is a capital expenditure since consumption is spread out over several years, one may question what the point of such conceptual change would be. Particularly in the household sector, we surely would not want to add an imputation for the services rendered by such goods (which would be the logical although not essential consequence of such a treatment).[2] In this paper, the treatment of durable goods as part of consumer expenditure has been retained.

Charitable donations from corporations to the personal sector must also be removed from household income since all these donations are assumed to flow directly to non-profit institutions rather than to households. The problem of transfers composed of bad debt allowances from the business to the personal sector is somewhat different. From an aggregate household point of view these allowances should be left in the household sector since they constitute the amount by which goods reported as bought were not paid for and hence constitute an element of household savings and income. To reconcile with the micro data, however, these transfers have been removed from the aggregate since it is assumed that bad debts have not been reported as such by households, while the goods so acquired have been recorded as purchases.

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2. From another perspective one may also doubt whether these are truly capital goods of the same investment nature as housing. The consumer can, like houses, rent most of these types of goods from retail outlets which specialize in such services. However, there is one characteristic in which such goods differ significantly from housing as capital goods. Houses can be bought as an investment good, i.e. there exists a housing rental market for houses owned by individuals by means of which a houseowner can derive income from his investment. Such a market does not exist for the owner of hard durable goods i.e. while as stated above these goods can be rented from retail outlets, once they are owned by an individual, there exists no market on which the individual owner can rent out his possessions to others.

Since the SPSD does not contain information on population in the Yukon and Northwest Territories, the household sector has been adjusted accordingly for this study.

Since the aggregate household expenditure on goods and services are based on aggregate sales data which include goods and services bought by non-residents, a special adjustment to exclude such purchases as well as to include goods and services bought by Canadians abroad is made to the aggregate data. The SNA aggregate will therefore correspond to the aggregate expenditure of SPSD. However, at present the detailed expenditure data may show a discrepancy on account of external transactions, particularly in such categories which are closely related to tourism.

One almost intractable problem remains. It is an issue which is present in all three data sets under discussion: the personal sector, the household sector and in the micro data. The concern is the inclusion in all three data of the net income of non-farm unincorporated business and the net income received by farm operators from farm production. What one would like to have in all three data sets is, of course, the withdrawals of proprietors rather than their total income, because the latter fudges the boundary between business and households. Such withdrawals are, at the moment, not obtainable from the national accounts data sources and the information is also not available in the SPSD. It is probably not impossible that one could obtain these data eventually. However, two factors mitigate against the active pursuit of this course. The first one is simply that it is felt that it would be more difficult to obtain proprietors' withdrawals instead of net income, - and the latter is already probably one of the weakest components in both household accounts and surveys. This difficulty is also linked to the second aspect of the problem. The amounts withdrawn are often determined ex-post facto and revolve around lump sum or investment decisions on the part of a business person who may be motivated by both personal

and/or business considerations. Thus an unincorporated proprietor may decide to withdraw less than usual from the business when a good business investment opportunity presents itself or on the other he may increase his withdrawals to facilitate the purchase of a big ticket durable consumer item. Business and personal decisions and motivations can therefore be inextricably intermingled in this sector and a strict separation of business and personal portions may even from an analytical point of view not be particularly desirable. For the time being, it has therefore been decided not to try to "purify" the household account for this item.

The Social Policy Simulation Database (SPSD)

The SPSD is part of a larger project in Statistics Canada to provide to the public a package of data and modelling software that will allow users to analyse proposals for various kinds of reforms to Canada's system of income and sales taxes and transfer programs. This analytical capacity occupies about 10 megabytes and can be used with any IBM personal computer or compatible. The database and model are just now being selectively released to users as a prototype for testing and evaluation.

The database contains 1984 data that have been combined from a variety of sources. The starting point is the Survey of Consumer Finance (SCF). This is an annual survey of households whose principal objective is to provide a series on income distribution. In 1984, there were about 100,000 individuals in about 40,000 households in the SCF. The sample is geographically stratified, but unfortunately from the viewpoint of its basic objective, it is not stratified by any strong correlate of income.

The strong points of the SCF are its almost complete coverage of the population, its detail on the structure of the familial relationships within the household, and its reasonably good income data. From a social policy perspective, it provides a very good basis for all the most commonly desired breakdowns for assessing the prospective impacts of tax and transfer policy changes - geography, family type, and income.

However, the SCF suffers from a number of major deficiencies from the viewpoint of social policy modelling. Thus, it has been substantially adjusted and augmented in order to produce the SPSD. Fortuitously, many of these adjustments and augmentations also serve to make the SPSD a more accurate and comprehensive disaggregation, indeed micro foundation, for the household sector of the national accounts.

The creation of the SPSD from the SCF is a complex multi-step process. The first main step was to adjust the weights for each individual in the database. This process was primarily motivated by the need to force individuals and the households to which they belonged to have identical weights. At the same time, the weight adjustments were also used to force the population into accord with a variety of externally derived totals. These included the population by age, sex and province from census estimates, the number of high income tax filers according to administrative data from tax returns, the volume of welfare benefits from provincial government expenditure data, the number of unemployment insurance claimants from unemployement insurance administrative data, and distributions of families by size, labour market characteristics and province from data underlying the monthly Labour Force Survey sample frame. (The algorithm used is called raking or iterative proportional adjustment.)

Another adjustment is used to create data representing the institutionalized elderly, who are the most important group excluded from the coverage of the SCF. Essentially, duplicates were made of the records of all unattached non-institutionalized elderly individuals. These records were then flagged as representing the institutionalized elderly, and their weights were adjusted according to hospital and other administrative data to correspond with the known counts of this population by province, age range, and sex.

As part of the weight adjustment process, the weights of high income individuals are increased to offset their under-representation in the SCF. This is based on comparisons with data drawn from a sample of 400,000 income tax returns. This sample is stratified by income and contains about 25,000 records with incomes over $80,000, the cut-off point used for defining high income. Analysis of the SCF shows that there are too few high income individuals, and also those that do have below average high incomes. Thus, it is important to correct for this under-reporting of high incomes, and further to obtain richer detail on the joint distribution of various income components subject to preferential tax treatment (eg. dividends, capital gains) and deduction items (eg, carrying charges) relevant for tax policy analysis. To achieve this, the incomes of high income individuals in the SCF are completely replaced with synthetic microdata from the corresponding high income population from the income tax return sample.

This replacement process was done in two steps. First, the sample of 25,000 high income tax returns is clustered into 5,000 groups each containing exactly five individuals. The clustering process seeks to group individuals who are similar with respect to their income, its composition by source, and the pattern of tax deductions. Then each group of five individuals is averaged to create a sample of 5,000 synthetic tax returns. This clustering and averaging process is used so that the resulting synthetic set of individuals will not reveal any confidential information if it is made public, which is a basic objctive. The second main step is to match each of these 5,000 synthetic high income individuals with a high income SCF respondent. SCF records are cloned as often as needed to absorb all 5,000 tax return-derived synthetic records, with their weights correspondingly reduced. The two processes of first reweighting high income SCF records as part of the raking algorithm, and replacing high incomes as reported on the SCF with high incomes from tax return data results in an increase from $11.3 to $19.2 billion in income in the hands of the estimated 135,000 high income individuals.

Another major weakness of the SCF from the viewpoint of income tax policy analysis is the absence of data on tax deductions such as charitable donations and childcare expenses. These variables are imputed based on a complex hierarchical disaggregation of the full sample of 375,000 tax returns (i.e. excluding the high income returns already utilized), linked to a corresponding disaggregation of the SCF. The particular disaggregation varies with each of the 25 or so variables that are being imputed. The finest level of disaggregation is designed to leave clusters of about 100 tax returns. Then within each of these clusters, a non-parametric density function is estimated for the variable in question. The process of imputation to the SCF then uses a random number generator for each SCF record and each deduction item to draw from the appropriate density function. The main relevance of this process from the viewpoint of the household sector account is that it adds information to the SCF on employee pension plan and individual RRSP contributions.

The last major adjustment to the SCF in creating the SPSD of relevance to the household sector account is the imputation of data on expenditure patterns. These data are drawn from the Family Expenditure Survey or FAMEX. This is a geographically stratified sample of about 10,000 households from whom very detailed data on annual expenditure patterns, as well as income and family structure are obtained. The raw FAMEX micro records are matched in a structured but ultimately random way in a manner similar to that used for the synthetic high income tax returns. The FAMEX records are, however, synthetically matched at the household rather than at the individual level. Each FAMEX record has to be cloned on average about four times to bring the number of records up to the number of SCF households. Again a hierarchical disaggregation is first used to cluster both FAMEX and SCF records, then within each cluster corresponding sets of records are randomly matched.

In addition to the processes just described, the SPSD includes synthetically matched records derived from a one percent sample of administrative data on unemployment insurance claim histories (30,000 records) designed to support policy oriented modelling of the unemployment insurance system. It also incorporates a certain amount of controlled randomization designed to add sufficient noise to the data to prevent any respondents to the SCF from being identifiable, while at the same time preserving the analytical utility of the database. Thus, the full SPSD can be released as a public use microdata set.

This completes a sketch of the major steps in the construction of the SPSD. Unlike the previous section which described a series of adjustments to the personal sector aggregates designed to isolate the household sub-sector, the primary driving principle in the construction of the SPSD has been the pragmatic need to support microsimulation modelling of the tax and transfer systems. Of course, this implicitly means that the data should naturally come out closer to "true" household sector aggregates. However, the construction of the SPSD was not particularly influenced by any national accounting style concerns about correct concepts, for example whether or not to include private pensions in the household sector.

Indeed, from the viewpoint of microsimulation modelling, this latter question is ill-posed. First, in general, more data is always preferred to less data. According to this principle, then, data on private pension plans should certainly be included if it is available. Second, and perhaps more fundamentally, the data will be included or ignored on pragmatic grounds depending on the particular question under consideration. Since microdata are necessarily children of the computer age, they are never used except with a computer and with powerful database, retrieval, and modelling software. In this kind of environment, there is no need to agree on one correct definition. One can simply change an instruction in the software and roll up any aggregation or concept that one wants, given the available data.

Juxtaposition of the Household Sector and SPSD Aggregates

We turn now to a comparison of the results of these two largely independent data construction efforts. The basic results are shown in Table 1.

The first column of the table shows the aggregate amounts (in millions of dollars) that result from simply adding the corresponding item across all the individuals in the Social Policy Simulation Database (taking account of their respective sampling weights). These are the micro figures for this prototype link between a micro and macro view of Canada's household sector for 1984. The second column gives the corresponding macro aggregates derived from the National Accounts personal sector via the adjustments outlined earlier (the detailed data for the adjustments are outlined in Table 2). Finally, the third column shows the relative discrepancy between the two columns of figures.

Generally, the National Accounts-derived figures are higher. Still, for most items the differences are in the 5 to 15% range. Recall that these numbers almost always come from completely different sources. For example, wages and salaries in the National Accounts come from Revenue Canada, tabulation of wages and salaries submitted by employers while in the SPSD they come from interviews with individuals.

The income and expenditure items have been arranged in two groups, receipts which are income plus some other lump sum receipts, and disbursements which correspond to expenditures plus taxes plus saving. There remain several conceptual differences that are apparent in the table. First, on the receipts side, capital gains are a source of income in household surveys and for income tax purposes, but are not included in the national Accounts. Second, the Family Expenditure Survey (FAMEX), in order to have a complete picture of receipts and disbursements to aid in the verification of interview responses, also asks for "other money receipts" - sources of funds which can be used to finance expenditures or saving but which are not usually thought of as income. Again, there is no correpsonding concept in

the National Accounts for either of two reasons. First, some of these receipts are of a capital nature. Second, some reflect transactions entirely within the household sector. For example, these could be lump sum alimony settlements, bequests and inheritances. The corresponding disbursements by donors are shown under expenditures.

On the disbursements side of the account, the major conceptual difference relates to saving. For the National Accounts, saving is simply the difference between income and expenditure. In the FAMEX Survey, however, a series of questions are asked to determine saving directly. In part, this is done to provide redundancy in the questionnaire which can in turn be used for edit checks. This directly measured saving is referred to as the "Net Change in Assets and Liabilities". The residual error or discrepancy between income plus other money receipts on the one side and expenditures plus taxes plus saving on the other in the survey (household by household) is called the "Account Balancing Difference". In the FAMEX itself, this item serves to complete the identity between receipts and disbursements.

In Table 1, however, which has ben derived from the SPSD, this is not sufficient. The reasons is that not all variables have been added up from FAMEX data so that the underlying FAMEX identity need not hold. The market income variables (labour and investment income) have been taken mainly from the SCF, while payroll and income taxes and major transfers have been explicitly modelled. It should further be recalled that the SPSD also drew on income tax return data in order to adjust the incomes of high income individuals. As a result, a variable "Database Discrepancies" has been defined; it is simply the difference between receipts and disbursements as taken from the SPSD. It amounts to $9.3 billion, and thus constitutes a substantial portion of household saving. This additional saving corresponds quite closely to the additional income imputed to high income individuals in the SCF based on tax return data.

An estimate from the National Accounts is shown for the total amount of contributions to RRSPs. It is shown in parentheses because this does not contribute to the National Accounts estimate of household saving, since that figure is derived purely as a residual difference.

The $2.9 billion of expenditures not elsewhere classified (N.E.C. - row 12) in the SPSD column are expenditures that should really be allocated to one of the explicit expenditure categories (i.e. rows 2 to 10). They were grouped separately for the SPSD because of their tax exempt status under the sales tax. Similarly, the $1.3 billion of household expenditures abroad (row 13) in the National Accounts should also be allocated to specific areas of expenditure, but the necessary data do not exist.

Overall, we have been quite surprised at how well this juxtaposition of two almost entirely differently derived views of the household sector compare. The most serious discrepancy is the $13.8 billion difference in dividend and interest income. From the SPSD side, there are two possible reasons these numbers could be low. The first and most likely is simply under-reporting on the SCF. Recall that for high income individuals, incomes were taken from income tax returns, so that this under-reporting would apply only to the (large) group of individuals with incomes below $80,000. Most of these individuals have relatively small amounts of investment income (if any), and they were all eligible for an income tax exemption on the first $1,000 of investment income. The other less likely possibility is tax evasion on the part of high income individuals. On the National Accounts side, the investment income figures could be higher than they should be if the portfolio income of some non-biological entities in the personal sector was not removed in the derivation of the household sector; for example, no data were available to remove the investment income of estates and trusts.

Concluding Comments

In this paper, we have presented a prototype link between micro and macro data for the Canadian household sector. The link is not a direct one - the aggregate figures are not the sum of the micro figures, even though in

principle they could and perhaps should be. The reason is that many items in the personal sector of the National Accounts are not based on data from individuals; rather they are derived from the business and government institutions that transact with individuals.

As a result, the process described in this paper has been one of starting from both ends and working toward the middle. One starting point was the personal sector of the National Accounts. A series of adjustments was made to these macro data in order to isolate the incomes and expenditures ascribable to the household sector - the subset of agents conventionally grouped in the personal sector that are living, breathing individuals.

The other starting point was a variety of household surveys and individual administrative data sets. The independent micro data sets were pulled together into one sythetically matched and adjusted micro data set called the Social Policy Simulation Database (SPSD). The SPSD has as its primary motivation to serve as an input to the Social Policy Simulation Model (SPSM), a new analytical toold developed by Statistics Canada for general public use, designed to support analysis of prospective changes in the areas of income and sales tax and transfer program policy.

The key result in this paper is a juxtaposition and comparison of the view of the Canadian household sector derived from these two very different starting points. In our view, as a first effort, the comparison looks quite good.

Further work is clearly possible. In future years, more conscious effort could be devoted to keeping track of key items in the personal sector of the National Accounts to allow more reliable deconsolidation of the household sector. Further work is also required to verify the detailed conseptual differences that remain in the items juxtaposed in the main table of the paper. Finally, future versions of the SPSD could embody further adjustments and imputations to bring it more in line with the National Accounts derived aggregates.

TABLE 1-A: SPSD/NATIONAL ACCOUNTS RECONCILLIATION

(All Figures in Millions of Dollars)

	Receipts	SPSD	National Accounts	Percent Difference
1	Wages & Salaries (Incl. Military Pay)	202 248	214 396	6.0%
2	Self-Employment	16 082	17 992	11.9%
3	Farm	2 864	2 981	4.1%
4	Non-Farm	13 218	15 011	13.6%
5	Investment	23 435	37 177	58.6%
6	Dividends	4 742	7 610	60.5%
7	Interest	13 147	24 474	86.2%
8	Capital Gains	3 081		
9	Roomers & Boarders	125	118	-5.5%
10	Other (Net Rental, Life Insurance Cash Dividends, Other)	2 341	4 975	112.5%
11	Transfers	34 757	37 046	6.6%
12	Family Allowance	2 291	2 393	4.5%
13	Quebec Family Allowances	184	240	30.4%
14	Old Age Security Benefits (OAS/GIS/SPA)	10 731	10 999	2.5%
15	Canada/Quebec Pension Plan Benefits	4 869	5 599	15.0%
16	Social Assistance	5 538	5 888	6.3%
17	Unemployment Benefits	9 242	9 859	6.7%
19	Other (Workers Compensation, Etc.)	1 902	2 068	8.7%
21	Miscellaneous	10 930	13 195	20.7%
22	Pensions	7 751	8 810	13.7%
23	Other Money Income (Alimony, Royalties, Strike Pay)	3 179	4 385	37.9%
24	Other Money Receipts (Lottery, Lump Sum Settlements, Etc)	5 692		
25	TOTAL RECEIPTS	293 144	319 806	9.1%

TABLE 1-B: SPSD/NATIONAL ACCOUNTS RECONCILLIATION

(All Figures in Millions of Dollars)

	Disbursements	SPSD	National Accounts	Percent Difference
1	Expenditures	208 504	238 891	14.6%
2	Food, Beverages and Tobacco	40 395	44 183	9.4%
3	Clothing, Footwear and Accessories	13 193	15 473	17.3%
4	Gross Rent, Fuel and Power	40 609	43 826	7.9%
5	Furniture, Furnishings and Household Equipment and Operations	19 372	22 026	13.7%
6	Medical Care and Health Services	5 012	9 361	86.8%
7	Transportation and Communications	31 692	37 347	17.8%
8	Recreation, Entertainment, Education and Cultural Services	16 788	21 391	27.4%
9	Personal Goods and Services	28 441	41 071	44.4%
10	Retirement Pensions	3 769	2 950	-21.7%
11	Money and Other Gifts to Persons	6 370		
12	Other Expenditures N.E.C.	2 863		
13	Net Expenditures Abroad		1 263	
14	Taxes	52 490	55 352	5.5%
15	CPP/QPP Contributions	2 600	2 787	7.2%
16	Unemployment Insurance Contributions	3 426	3 164	-7.6%
17	Personal Income Taxes	46 465	49 401	6.3%
18	"Saving"			
19	Receipts minus Expenditures plus Taxes	32 150	25 563	-20.5%
20	Net Change in Assets and Liabilities	17 024		
21	Account Balancing Difference	853		
22	Database Discrepancies	9 331		
23	RRSP Contributions	4 941	(5 636)	14.1%
24	TOTAL DISBURSEMENTS	293 144	319 806	9.1%

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Receipts				
1.	Wages, Salaries & SLI	Q1.1	238 496	
	less			
	Food - other (imputed)	A62.2	498	
	Supplementary Labour Income (SLI)	Unpublished	22 595	
	Yukon, NWT, & foreign countries	A38.11 & 12	889	Net of estimated SLI assumed to be in the same proportion as national SLI in W,S & SLI
	Room & board - personal (imputed)	Unpublished	118	Part of A62.6
	Total		214 396	
3.	Accrued net income of farm operators	Q6.6	3 246	Excluding net accrued earnings of Canadian Wheat Board
	less			
	Farm product consumed on farm (imputed)	A62.1	197	Part of A62.6
	Farm fuel consumed on farm (imputed)	Unpublished	68	Special note on line A62.6:
	Total		2 981	The total amount of 517 m is divided as follows:
				Private room & board 118
4.	Net income of non-farm uninc. business, incl. rent	Q6.7	24 715	Fuel consumed on farm 68
				Institutional room & board 331
	less			
	Net rental	Q6.8	9 704	Cash & imputed, net of CCA
	Total		15 011	

* See end for explanation of source nonemclature

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - continued

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Receipts - cont'd				
6.	Dividends paid to Canadian residents by Canadian corp.	Q15.14	7 202	The total of interest, dividend & misc. investment income received by persons from non-residents is 1400 m divided as follows:
	Dividends received from abroad		408	
	Total		7 610	
7.	Interest dividend & miscellaneous investment income	Q6.9	49 931	Dividends 408 Interest 175 Miscellaneous 817
	less			
	Dividends		7 610	
	Imputation for financial services	A62.5	3 381	
	Investment income of:			
	Life insurance	Unpublished	5 456	
	Fraternal societies	Unpublished	144	
	Pension funds	Unpublished	6 972	
	Private non-profit organizations (PNPI), including Unions	Unpublished	651	
	Universities	Unpublished	159	
	Royalties	Unpublished	1 084	
	Total		24 474	
9.	Room & Board - personal (imputed)	Unpublished	118	

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - continued

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Receipts - cont'd				
10.	Net rental income	Unpublished	945	
	Life insurance cash benefits	Unpublished	4 030	Including fraternal society benefits. Original source is the Superintendent of Insurance Report. It shows death claims, annuity payments, surrender values and two other minor categories of benefits. This number is total, less dividends, and annuities.
	Total		4 975	
12.	Family & youth allowances	A55.1	2 393	
13.	Mothers & disabled allowances (provincial)	A55.26	240	
14.	Old age security payments	A55.10	10 999	
15.	Canada Pension Plan (CPP)	A55.38	4 045	
	Quebec Pension Plan (QPP)	A55.39	1 554	
	Total		5 599	
16.	Direct relief (provincial)	A55.24	4 470	
	Old age, & blind pensions (provincial)	A55.25	705	
	Direct relief (local)	A55.34	713	
	Total		5 888	
17.	Unemployment insurance benefits	A55.8	9 859	
19.	Workmens' compensation benefits	A55.27	2 068	
22.	Pensions to gov't employees	A55.9 & 28	2 594	
	Pensions from non-residents	Unpublished	428	
	Trusteed pension benefits	Unpublished	4 354	
	Life insurance annuity	Unpublished	1 434	
	Total		8 810	

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - continued

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Receipts -concluded				
23.	Royalties	Unpublished	1 084	
	Strike pay	Unpublished	28	
	Adult occupational training	A55.13	103	
	Assistance to immigrants	A55.14	28	
	Charitable disbursments to individuals	Unpublished	440	
	Veteran's pensions & allowances	A55.2 & 3	1 092	
	RRSP benefits	Unpublished	1 610	
	Total		4 385	
Disbursements				
2.	Food, beverage, & tobacco	A60.1	45 055	
	less			
	Food - other (imputed)		498	
	Farm product consumed on farm (imputed)		197	
	Territories	Unpublished	177	
	Total		44 183	
3.	Clothing, footwear, & accessories	A60.5	15 518	
	less			
	Territories	Unpublished	45	
	Total		15 473	
4.	Gross rent, fuel & powder	A60.9	57 159	
	less			
	Farm fuel consumed on farm (imputed)		68	
	Net imputed rent & CCA	A62.3	13 073	
	Territories	Unpublished	192	
	Total		43 826	

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - continued

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Disbursements - cont'd				
5.	Furniture, etc.	A60.16	22 083	
	less			
	Territories	Unpublished	57	
	Total		22 026	
6.	Medical care & health services	A60.24	9 372	Small revisions required for purposes of this comparison
	less			
	Territories	Unpublished	11	
	Total		9 361	
7.	Transportation & communications	A60.29	37 461	
	less			
	Territories	Unpublished	114	
	Total		37 347	
8.	Recreation, entertainment, education & cultural services	A60.36	26 248	Small revisions required for purposes of this comparison
	Fees paid to universities	Unpublished	641	
	less			
	Expenditures of universities	Unpublished	5 436	
	Territories	Unpublished	62	
	Total		21 391	

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - continued

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Disbursements - cont'd				
9.	Personal goods & services	A60.41	37 194	
	Premiums paid			
	- life insurance	Unpublished	8 846	
	- fraternal societies	Unpublished	273	
	Charitable contributions applicable to religion & Welfare PNPI	Unpublished	2 322	Based on preliminary data
	Charitable dues	Unpublished	69	
	Union dues	Unpublished	536	
	Sub total		49 240	
	less			
	Expenses of religions & welfare PNPI	Unpublished	3 765	Based on preliminary data
	Trade unions	Unpublished	834	Contributions to political parties not available at this time.
	Political parties	Unpublished	103	
	Financial sector imputations	Unpublished	3 381	
	Territories	Unpublished	86	80% of actual number of $108m to allow for deductions.
	Total		41 071	

TABLE 2. THE ADJUSTMENT OF NIEA PERSONAL ACCOUNTS TRANSACTIONS TO SPSD CONCEPTS - concluded

Table 1 Category Number	NIEA Category/Item	Source *	1984 Data Millions of $	Notes
Disbursements - concluded				
10.	Employee contributions to pension plans	Unpublished	2 950	
13.	Net Expenditures abroad	A60.48	1 263	Not allocable by good or service category.
15.	CPP	Q14.1	2 114	Lines Q14.1 and 14.2 are all employer and employee contributions. Adjustments have been made to retain all employee, and employer portion of self-employed contributions
	QPP	Q14.2	673	
			2 787	
16.	Employee contributions to unemployment insurance	Unpublished	3 164	
17.	Income taxes	Q6.18	49 555	
	less Territories	G4.1&6	154	
	Total		49 401	
23.	RRSP contributions		5 636	

Source nonemclature:
- Q - National Income & Expenditure Accounts, Catalogue 13-001 Quarterly, table & line number.
- A - National Income & Expenditure Accounts, Catalogue 13-201 Annual, table & line number.
- G - System of National Accounts, Provincial Economic Accounts, Catalogue 13-213, Annual

Unpublished - Unpublished Statistics Canada data

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