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Poverty in Canada: Unidimensional and Multidimensional Measures

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Unidimensional and multidimensional measures.

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Introduction

Unidimensional measures of economic well-being (e.g., GDP) or poverty (e.g., income or consumption poverty) have been under fire for some time (Atkinson, 2003; Sen, 2006). Questions regarding, on the one hand, whether a single measure, such as GDP/capita, income, or expenditure, can adequately represent the experience of poverty and, on the other hand, whether aggregating multiple measures of attainments or deprivations into a single multidimensional measure of well-being or poverty (de la Vega & Urrutia, 2011) using subjective measures and weights, usually defined by the researcher, is an improvement (Anderson, 2008; Ravallion, 2011; Cavapozzi, Han, Miniaci, 2015) have been debated for more than a decade. While the debate continues, multidimensional measures of well-being, poverty, or deprivation are becoming main stay (Tsui, 2002; Bourguignon and Chakravarty 2003; Duclos, Sahn and Younger, 2006; Stiglitz, Sen and Fitoussi 2009; Alkire and Foster 2011). Multidimensional measures have been developed and used internationally. In particular, the Multidimensional Poverty Index (MPI) (Alkire & Santos, 2010; Alkire & Foster, 2011), and the Human Development Index (UNDP, 2010) have become popular measures for examining the well-being in developing countries and are recently beginning to gain traction in developed ones such as the European Union (Alkire et al., 2014; Whelan et al 2014), Germany (Merz and Rathjen, 2014; Suppa, 2016), the United States (Mitra & Brucker, 2014; Dhongde & Haveman, 2015) and other countries (see Notten & Guio, 2016 for an overview).

Many developing countries using multidimensional poverty index (MPI) as an evaluation tool have developed survey instruments that can track the joint measures across time, (see for

example the Global MDPI project at http://www.ophi.org.uk/). Other countries have high quality longitudinal survey data that have been used to develop instruments (for example, the EU-SILC data for the European Union (see Alkire et al. (2014) for an excellent discussion of the evolution of studies using EU-SILC data or Suppa (2016) for Germany's Socio-Economic Panel (SOEP)). US studies have parsed together information for indicators from multiple surveys (Mitra & Brucker, 2014; Dhongde & Haveman, 2015). While Canadian studies exist using multidimensional measures of well-being (Canadian Index of Wellbeing, 2016; UNDP, 2016), studies identifying and measuring multidimensional poverty (MDP) in the sense of Alkire & Foster (2011) have not been identified. This may be in part due to the absence of specific survey instruments. Like Mitra & Brucker (2014) and Dhongde & Haveman (2015), this study uses existing survey data to examine whether the Canadian surveys, the Canadian Community Health Survey (CCHS) and the Survey of Household Spending (SHS) in particular, can parse together enough information to offer MDP measurements and whether the MDP measurements lead to the same policy implications as more traditional poverty measures (GDP, income, and expenditure) across time and household types (e.g., those with children, lone mothers, and non-native born).

Section I will provide a literature review on the evolution of multidimensional poverty measures. Section 2 and 3 present data and methodology used herein, section 4 discusses the results, and section 5 provides a conclusion and policy discussion.

Literature Review

Historically, GDP measures have been used as measure of the economic well-being that can be compared across countries (UNDP, 2016). As any first year economics text book will discuss, GDP measures may be a viable indicator of aggregate economic growth but it is more limited as a description of the experience of wellbeing as it does not include household

production or the underground economy. Perhaps more importantly, it cannot measure important aspects of life such as health, leisure, environment, political freedom, or social justice. See for example figures 1- 3 that compare Canadian GDP with the other measures of well-being namely, the Economic Index of Wellbeing (Osberg and Sharpe, 2011), the Human Development Index (UNDP, 2016) and the Canadian Index of Wellbeing (Canadian Index of Wellbeing, 2016). GDP consistently over-estimates well-being relative to the other measures.

Net income has been the most commonly used instrument in micro-level poverty studies in Canada but consumption (expenditure) also has been used frequently to measure poverty (Brzozowski & Crossley, 2011; Wenchao et al., 2011; Stuart & Browne, 2010; Brzozowski et al., 2010; Crossley & Curtis, 2006; Crossley, & Pendakur, 2006; Xu, Kuan & Osberg, 2002; Osberg & Cyrus, 2000; Pendakur, 1998). These measures have been utilized to study different vulnerable groups (e.g., children (Meyer and Sullivan, 2011; Brzozowski & Crossley, 2011 Wenchao et al., 2011 Crossley & Curtis, 2006) and seniors (Milligan, 2008) and compare income and consumption poverty and inequality (Pendakur, 1998; Crossley & Curtis, 2006; Pendakur & Crossley, 2006; and Brzozowski et al., 2010). Typically income measures result in higher poverty and inequality measures but the trends are similar across time. Brzozowski & Crossley (2011) summarize multiple reasons for the movement from income to consumption as a poverty measure. Briefly, income is primarily desired because it allows for consumption from which individuals derive utility or well-being. Thus consumption may be a better direct measurement of material well-being than income. Moreover, households may attempt to smooth consumption, by saving (dis-saving) in good (bad) times, leaving consumption as a better measure of a household's longer-term material well-being. In addition, some measures of consumption (expenditure) may offer an indication of intra-household sharing or intra household allocations.

Multidimensional measures of well-being or poverty identify multiple attributes or deprivations experienced by an individuals in different dimensions. Although they typically include some measure of income or expenditure, they do not rely solely on the economic circumstances. MDP measures take the joint distribution of several attributes or deprivations into account, whether at the aggregate level (see for example figures 1 - 3 for Economic Index of Wellbeing, Canada's Human Development Index and Canadas Index of Well-being, respectively) or by tracking individuals or households across multiple dimensions and counting the number of deprivations simultaneously experienced by them (e.g., MPI al la Alkire & Foster, (2011)).

Alkire & Foster's (AF) (2011) methodology was adopted by the United Nations Development Program (UNDP) in 2010 to estimate a global multi-dimensional poverty index (UNDP-MPI) which is now published annually in the Human Development Report. While the UNDP-MPI is estimated largely for developing countries; as previously state, the measure has been adapted by researchers to assess poverty in many countries.

As presented Mitra & Brucker (2014) and Dhongde & Haveman (2015), the AF[1] method counts deprivations for a set of dimensions experienced by individuals or households. There are some language differences in the literature but basically, the identification of multidimensionally deprived individuals/households is a two-step process where cut-offs are used to identify whether an individual/household is deprived in a given indicator and then whether enough indicators are deprived to be considered multidimensionally deprived. More specifically, the MDP measure is constructed as follows:

[1] methodology also presented in the IARIW Multidimensional poverty workshop on MDP, August 2017, Dresden Germany.

Let i=1,2,…n be the number of individuals/households, l=1,2,…L, $L \geq 2$, be the number of dimensions and j=1,2,…d, $d \geq L$, be the indicators for the L dimensions. Assume that L and d are fixed and given but n can vary with the population size. Let y_{ij} denote the achievement of individual/household i in indicator j; y is an (nxd) achievement matrix. Let w_j, (w_j>0) denote the weight signifying the relative importance of indictor j, such that ($\Sigma w_j=d$); w is a $(1xd)$ weighting vector. Let z_j denote the poverty threshold for indicator j; z is a $(1xd)$ vector of poverty thresholds. Specifying a poverty threshold for each indicator denotes the first of the two-step identification process. If a household is deprived in an indicator j, i.e. $y_{ij} < z_j$ then the weighted deprivation score is $g^0_{ij}=w_j$; else $g^0_{ij}=0$. g^0 denotes the (nxd) deprivation matrix. Now, let c^0_i, ($0 \leq c^0_i \leq d$) denote the sum of weights for the indicators in which individual/household i is deprived i.e., c^0_i is the sum of the entries in the ith row of g^0; c^0 is a $(nx1)$ vector of deprivation counts. Assuming n = 4 and j = 5 and equal weights, $\Sigma w_j = 5$, the matrix of deprivation, g^0 and the count of deprivations $c^0 = \Sigma w_j\, g^0$ is the following:

$$\begin{array}{cccc} & \text{Indicators} & \text{weights} & c^0 \\ g^0 = & \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix} & \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \end{bmatrix} \Longrightarrow & \begin{bmatrix} 0 \\ 2 \\ 1 \\ 5 \end{bmatrix} \end{array}$$

An individual is identified as "multidimensional" poor if $c^0_i \geq k$ where k, ($0<k\leq d$) specifies the second cutoff. Using the second cutoff, the weighted deprivation matrix (g^0) and the weighted deprivation score vector (c^0) are censored; if a household/individual is not identified as multidimensional poor then the weighted deprivation score is replaced by zero. Thus a censored deprivation matrix $g^0(k)$ consists of $g^0_i(k)$ where $g^0_i(k)=w_j$ if $c^0_i \geq k$ else $g^0_i(k)=0$. Similarly

$c^0(k)$ is a censored vector of deprivation counts and consists of $c^0_i(k)$ where $c^0_i(k) = c^0_i$ if $c^0_i \geq k$ else $c^0_i(k)=0$. If k=2,

$$g^0(k) = \begin{matrix}\text{Indicators}\end{matrix} \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \end{bmatrix} \begin{matrix}\text{weights}\end{matrix} \Longrightarrow \begin{matrix}c^0\end{matrix} \begin{bmatrix} 0 \\ 2 \\ 0 \\ 5 \end{bmatrix}$$

Now, let q be the number of poor, so q=2 in the example. The headcount ratio, H = q/n = 2/4 or 0.5. The multidimensional poverty index, MPI (M^0 or the adjusted head count ratio) gives the weighted average deprivations experienced by the multidimensional poor. It is defined as the mean (μ) of the censored deprivation matrix. In the example, $M^0 = \mu\,(g^0(\mathrm{k})) = 7/20 = 0.35$.

The MPI can be estimated using categorical, ordinal and/or cardinal data. In reality however, it is often the case, as with this study, that most variables available in the surveys to use as proxies for indicators are binary. Dhongde et al., (2016) develop the conditions under which M^0 satisfies desirable axiomatic properties. Importantly, M^0 satisfies deprivation monotonicity: if a poor person becomes deprived in an additional indicator, the MPI will increase which is not true of the head count measure. M^0 is subgroup decomposability: the MPI can be expressed as the population-weighted sum of subgroup indices, say for different family types, making deprivation comparisons across groups possible, and it can be decomposed by indicators (i.e., to measure the contribution of a specific indicator in overall deprivation). The MPI, like other indicators, has some issues. It uses arbitrary weights and thresholds, and disregards price information while aggregating across dimensions (Ravallion, 2011) and it provides no

information on individuals who are not deprived as the researcher arbitrarily defines it (Thorbecke, 2011).

Many studies referenced herein focus discussion on the shortcomings of unidimensional measures of poverty and the necessity to move to multidimensional measurements. Some studies also compare, empirically, different unidimensional measures with multidimensional ones (Mitra & Brucker, 2014; Dhongde & Haveman, 2015; Suppa, 2016). Most multidimensional poverty measures include an indicator of standard of living which usually includes income poverty. As well, studies that examine the correlation between multiple indicators and/or dimensions find the correlations are surprisingly low (see for example, Alkire et al., 2014; Dhongde & Haveman, 2015). Thus, multidimensional poverty measures show higher poverty rates (head counts) than do income poverty measures (Mitra & Brucker, 2014; Dhongde & Haveman, 2015; Suppa, 2016). Generally, expenditure poverty rates are even lower than income poverty rates but time trends are similar (Crossley and Curtis, 2006). Osberg and Sharpe (2011), UNDP (2016), and Canadian Index of Wellbeing (2016) compare multidimensional measures of wellbeing with GDP measures in Canada and find that GDP measures tend to conclude much higher levels of wellbeing than do the multidimensional measures. The Canadian Index of Wellbeing finds a 9.9 percent improvement in Canadian living standards over the last decade while GDP growth points to a 35 percent increase (Canadian Index of Wellbeing, 2016). This study fills a gap in the literature by generating Canadian measures of income, expenditure and multidimensional poverty from microdata surveys and compares them to each other and to GDP/capita over time and across different subgroups of the population.

Data

Three sources of Statistics Canada publicly released data are used to estimate the poverty measures used in the study. Cansim tables 384-0038 and 051-0005 (http://www5.statcan.gc.ca/cansim) are used to calculate the growth in GDP/capita over time. The Survey of Household Spending (SHS) and the Canadian Community Health Survey (CCHS) are used to identify uni- and multiple dimensional poverty measurements. The 2003, 2005, 2007, and 2009 SHS and the 2003, 2005, 2007, 2009, and 2012 CCHS are used.

The *Survey of Household Spending* (Statistics Canada, 2016) is carried out annually across the ten provinces of Canada. It surveys private households. Individuals on Indian reserves and crown lands, official representatives of foreign countries living in Canada and their families, members of the Canadian Forces living in military camps, and institutionalized populations are not surveyed. The survey covers approximately 98% of the population in the provinces. The main purpose of the survey is to obtain detailed information about household spending. Information is also collected on income, dwelling characteristics, household equipment and demographics including age, sex and marital status. The survey uses a stratified, multi-stage sample selected from the Labour Force Survey (LFS) sampling frame. Survey weights that adjust for complex survey methodologies are provided and used. Over 21,000 households are surveyed and the response rates are typically between 70 and 75%.

The SHS contains income and expenditure information that is believed to be of good quality (Brzozowski & Crossley, 2011). The SHS and its predecessors, Statistics Canada's *Survey of Consumer Finance,* and the *Family Expenditure Survey* have been used extensively to study poverty and low income in Canada[2].

[2] Brzozowski & Crossley, 2011 present an excellent discussion on the data used to study poverty in Canada.

The CCHS is a cross-sectional design meant to provide reliable estimates for Health Regions and provinces in Canada (Statistics Canada, 2016). The CCHS uses three sampling frames to select the sample of households. The majority of the sample of households (83 percent) come from the Canadian Labour Force Survey sampling frame. The remaining 17 percent come from random digit dialing in select areas. Survey weights that adjust for the complex survey design are provided and used.

The CCHS is designed to collect information on health, social, and demographic information on the population living in the ten provinces and the three territories that is 12 years of age and over. Excluded from the survey's coverage are: persons living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Forces; the institutionalized population and persons living in some regions of Quebec and the Territories. Altogether, these exclusions represent less than three percent of the target population. The biennial survey has approximately 130,000 observations. An annual component was added in 2008 with a sample size of approximately half the biennial survey. The study uses data from biennial surveys of 2003, 2005, 2007, and the 2012 annual survey where variables were consistent across the years.

Methodology

The study aims to compare 'usual' measures of aggregate well-being, namely growth in GDP/capita with unidimensional and multidimensional measures of poverty. Unidimensional poverty measures include income and expenditure poverty. The multidimensional poverty (MDP) measure includes four dimensions (standard of living, health, education, and housing)

with two to three indicators per dimension. The dimensions and indicators are fairly standard in the MDP literature and available in these data.

The growth in real GDP/capita is a straightforward calculation of the percentage change in annual expenditure based GDP (expenditure based, chain-linked)/population calculated at the national and provincial levels. Income and expenditure poverty from the SHS are estimated per Crossley and Curtis (2006). Net income includes after-tax income from all sources. Expenditure measures include expenditure on all food (at home and in restaurants), shelter (estimated shelter costs for renters and owners, including water charges, heat, and hydro), household operations (communication, child care, laundry, cleaning, pet care, and household supplies), household furnishings and equipment (including services related to furnishings and equipment), transportation (operating expenses, rental vehicles, local commuter expenses, intercity transportation services), clothing, health care expenses, personal care supplies, equipment and services, recreational expenses (less recreational vehicles and outboard motors), home entertainment equipment and services, reading materials and other printed matter, and education (tuition, textbooks, supplies and services). A drawback of the expenditure measure is that it does not include 'lumpy' expenditures such as the purchase of durables.

Individuals live in households which have different needs due to demographic and household composition (a household with two parents and four children has different needs than a household with one parent and one child or a household with a single individual) and price differences (across time and region). The traditional way to adjust for these differences is with price indices and equivalence scales. The typical deflator used in poverty studies is the Consumer Price Index (CPI). Here, a Stone Price index is used. The Stone Price index is a mean-budget share weighted geometric average of all the price indices for goods in the total

expenditure bundle. Relative to the CPI, an arithmetic mean, the geometric mean price index allows for greater substitution. It also takes account of regional differences in base period prices and in inflation which the national CPI does not. The square root of household size, a standard, midrange, equivalence scale commonly used in the literature, is used to adjust for differences in need due to family size. Households are considered poor if they have income or expenditure that is less than or equal to half the median income or expenditure, respectively.

The CCHS income poverty measure is a derived variable provided by Statistics Canada which calculates the distribution of adjusted household income relative to the low income cut-off (LICO) in the data. The LICO adjusts for family size and geographic differences in costs. Households are considered poor if they are in the bottom quintile of the distribution in all years but 2003. In 2003, the variable measures quartiles, so the household is poor if it is in the bottom quartile.

The MDP dimensions, indicators, and thresholds are chosen to be as similar as possible to Dhongde & Haveman's (2015) US-Multidimensional Poverty Index (MPI) which also uses micro level data. The SHS and the CCHS indicators are reported by individuals living in households. The measures regard what is occurring in the household. Thus, the multidimensional poverty measure created herein is a measure of the household's experience. Therefore, the Statistics Canada weights are multiplied by household size to provide the proportion[3] of individuals experiencing the measures. The indicators are matched as closely as possible across the CCHS and the SHS (see table 1). The four standard dimensions used are: standard of living, health, education, and housing. The indicators for the dimensions are defined for each survey in table 1. Briefly, standard of living is captured by two indicators; income poverty and lack of

[3] Proportion and head count will be used interchangeably herein. The head count is equal to the proportion x 100.

employment which is proxied by the respondent reporting that the main source of household income is other than employment income. The health dimension contains two indicators; household health status (disability in household) and health system issues (household does not have a regular family physician (CCHS) and household health expenditures are twice median (SHS)). Education is measured by two indicators in the CCHS (no household adult has a high school certificate and no adult speaks an official language (English or French)) and one in the SHS (no household adult has a high school certificate). Finally, two indicators represent housing in the CCHS (the house is not owned by a household member and crowded ((less than one bedroom for parent(s) and each child) from 2003 to 2007 and food insecurity for 2009 and 2012)) and three indicators in the SHS (the house is not owned by a household, crowded ((less than one bedroom for parent(s) and each child), and house is inadequate (needs major repairs, and/or lacking hot/cold running water, inside toilet, or a bath/shower). The SHS had no information to estimate non-income and non-expenditure indicators before 2005. The data are not publicly available after 2009. The CCHS did not contain a measure of household size in 2001, the number of bedrooms is not available after 2007 but food insecurity variables are included from 2007 on thus, the change in the indicator for housing in 2009. However, food security questions were not asked to residents of PEI and NB in 2009, so the indicator and poverty measure was not available for the provinces in that year - sensitivity analysis is provided. CCHS variable definitions changed substantially in 2011 and again after 2012, thus 2011 is not used and surveys after 2012 did not have enough information to provide indicators similar to other years.

The differences in variable definitions and samples across time generates some concern, therefore sensitivity analysis is done on the constructed poverty measures and on samples

including and excluding NB and PEI. MDPS indicates multidimensional poverty measures from the SHS, MDPC from the CCHS. MDPS 1 includes High Health Expenditure, Disability, No high school, No employment income, low income, crowded, house inadequate, no home ownership. MDPS 2 includes all MDPS 1 indicators except housing ownership. MDPS 3 replaces crowded with high food expenditure in MDPS 1 and MPDS 4 is MDPS 3 without housing ownership. MDPS 5 includes MDPS 1 indicators in 2005 and 2007 and then MDPS 3 indicators in 2009 and removes housing inadequacy. MDPS 6 includes MDPS 5 indicators except for home ownership. MDPC 1 includes No MD, Disability, No high school, No official language speaker, No employment income, low income, crowded, and no home ownership from the CCHS. MDPS 2 includes all MDPC 1 indicators except housing ownership. MDPC 3 replaces MDPC 1 crowded indicator with food insecurity and MDPC 4 removes home ownership from MDPC 3. MDPC 5 includes MDPC 1 indicators from 2003 to 2007 and then MDPC 3 in 2009 and 2012 and removes no official language skills. MDPC 6 includes MDPC 5 indicators except for home ownership. MDPC 7 and 8 take MDPC 5 and 6 measures, respectively, and excludes NB and PEI from the sample to match CCHS 2009 data exclusions.

Each indicator is binary in nature, thus the household is deprived in the indicator if it is equal to one and not deprived otherwise. The household is deprived in the dimension if any of the indicators are equal to one. The household is considered multidimensionally poor if it is deprived in two or more indicators ($k \geq 2$). The union set of indicators ($k \geq 1$; deprived in one or more indicators) and the intersection set ($k = d$; deprived in all of the indicators), are frequently discussed in the literature as the extreme values of k and are reported here.

Finally, student and retired households are excluded (sample restricted to respondents aged 25 to 64 years of age who are not full-time students) as income and expenditures are likely to be substantially different than prime-aged households.

Results

Tables 2 and 3 present the proportion of individuals considered deprived in the indicators from the CCHS and the SHS, respectively. Given the two surveys are based on the LFS frame and have similarly worded questions for main source of household income, number of bedrooms, and home ownership variables, the proportion of individuals reporting deprivations in the indicators is surprisingly dissimilar. The higher proportion reporting disability deprivation in the SHS is understandable given the question is slightly different across the two surveys; individuals report a household member with a disability in the SHS and a household member who is limited in activities due to a disability in the CCHS. It is possible that more households experience disability than experience limitations in activities from the disabilities. The proportion of individuals in a household with low adult education is similar across the surveys in 2005 at just under 4 percent but the proportion almost triples subsequently in the CCHS while it remains fairly stable in the SHS. The question is similar across the surveys but is asked about highest level of adult education in household in CCHS and highest level of education for each adult (e.g., respondent, respondent's spouse, etc.) in SHS. The health and food insecurity indicators are relatively similar given the indicator definitions are different in the two surveys.

Because of the binary nature of the indicators, tetrachoric correlations are reported in tables 4 (CCHS) and 5 (SHS). Unsurprisingly, the correlations are highest between the low

income, no employment income, and other non-health human capital indicators. The correlations between health and other non-labour related indicators are lower. The pairwise correlations are all significant at 0.0001 except health and language. The low correlations between the individual indicators is consistent with what is seen in the literature (see, for example, Akire et al., 2014; Dhongde & Haveman, 2015).

Tables 6 (CCHS) and 7 (SHS) report Pearson correlations between the different MDP deprivation counts (C^0). The focus should be on comparing oddly numbered MDP counts to each other as they include home ownership and evenly numbered counts to each other as they exclude home ownership. The correlations including home ownership are bolded in table 6 for demonstration purposes. The correlations between the CCHS deprivation counts including the home ownership indicator are high at approximately 0.95 or higher, correlations are slightly lower for some of the counts that exclude the home ownership indicator (generally, 0.92 or higher). The correlations between deprivation counts in the SHS are similar. All pairwise correlations are significant at 0.000. Thus, it seems the poverty measures are very closely related. The tetrachoric correlations between MDP existence ($k \geq 2$) across the different measures are shown in tables 8 (CCHS) and 9 (SHS). The correlations are very high in magnitude and significance in both data sets.

Figure 4 (CCHS) and 5 (SHS) (appendix tables A1 and A2 include the data and standard errors) demonstrate the head counts or proportion of the population experiencing MDP for the different poverty measures. GDP, income, and multidimensional measures are available in the CCHS (figure 4, table A1). GDP, income, expenditure, and multidimensional measures can be compared in the SHS (figure 5, table A2). Figure 4 shows that the trends for all MDP measures are similar. Head counts increase from 2003 to 2007, fall slightly in 2009, and then increase

again in 2012. The proportion of the population considered income poor more than doubles from 2003 to 2005, then remains flat until 2012 when it falls by about a percentage point. GDP/capita shows increasing prosperity from 2003 to 2007, then it declines in 2009 and rises slightly in 2012. It seems that GDP and MDP measures offer opposite trends. As GDP indicates growing prosperity, MDP head count ratios are increasing. When GDP growth is negative, the head count ratio falls and when GDP returns to positive territory, MDP poverty increases again. The head count levels for income and multidimensional poverty measures without home ownership are in the mid teens, and head counts for multidimensional poverty measures with home ownership are in the high teens to low twenties. Figure 5 (table A2) show similar trends but lower income poverty head counts and higher MDP measure head counts in the SHS. The bolded counts in tables A2 and A3, are the measures that have the most information in the two surveys; the SHS head counts are slightly higher than the CCHS head counts. Comparing the measures that are structurally the closest between the two surveys, MDPC 5 and 6 with MDPS 5 and 6 (bolded italics in table A1 and A2), respectively, show very similar levels of poverty. Figure 6 (table A3) combines MDPC 1 (2003 to 2007) and 3 (2009 and 2012) as the main MDPC measure with home ownership (MDPC H) and MDPC 2 (2003 to 2007) and 4 (2009 and 2012) as the main MDPC measure without home ownership (MDPC NH) and compares the full sample to the sample dropping NB and PEI as a sensitivity analysis, MDPC H1 and MDPC NH2, respectively. The head counts are almost identical, likely due to the small samples in NB and PEI.

Figure 7 (table A4) presents the MPD deprivation counts for the poverty measures including housing and figure 8 (table A5) is without housing. Clearly, a large proportion of the population has no deprivations (half if home ownership is included as an indicator and more than 60 percent of population if housing is not included). Close to thirty percent of the population has

one deprivation and less around 1/10th of the population is deprived in two indicators. The proportion of the population deprived in three indicators is close to 0.05 (0.03) with home ownership (without home ownership). The proportion of the population experiencing more than three deprivations is substantially smaller than the proportion experiencing three deprivations both with (about 2/3) and without (about half) the home ownership indicator.

The last three measures presented in figures 7 & 8 (tables A4 & A5) are the union set of deprivation counts, the intersection set of the counts, the head count ($k \geq 2$) and M^0. Recall, $M^0 = \mu(g^0(k))$, the mean (μ) of the censored deprivation matrix or the weighted average deprivations experienced by the multidimensional poor). M^0 follows the same pattern as the other measures; growing from 2003 until 2007, falling slightly in 2009, and increasing again in 2012. M^0 ranges from 0.056 (0.032 without home ownership) in 2003 to 0.073 (0.044 without home ownership) in 2012. No respondent in either survey reports having all deprivations, so the intersection set is null.

Table 10 presents GDP/capita growth for the provinces, tables 11 and 12 show the proportion of the population that is income and expenditure poor, respectively, in each region (SHS data). The tables can be compared with tables 13 and 14 which provide MDP indicators from the CCHS. Overall, the measures indicate substantially different outcomes across the provinces. GDP/capita growth indicate that the Atlantic provinces, Quebec, and BC are doing relatively better than the other provinces (have higher growth rates). The income poverty (table 11) shows that in the beginning of the study, the Atlantic region has the highest proportion of their population living in poverty, BC and Quebec follow in second and third. Ontario and the prairies are best off. By 2012, the Atlantic region is still the worst off, but Quebec, Ontario, and BC are all equally poor and the Prairies have the lowest proportion of their population living in

poverty. The prairies fair much worse if examining expenditure poverty with Ontario having the lowest proportion living in poverty followed by BC, then the Prairies, Quebec, and the Atlantic region. The multidimensional measures have Quebec worst off, followed by the Atlantic region, BC, Prairies, then Ontario. Including housing leaves BC, Alberta, Ontario, and Quebec worse off than the Atlantic provinces.

The next four tables (15 through 18) provide the poverty measures decomposed by family type; GDP/capita growth can only be decomposed by geography. The overwhelming indication is that lone-parent households are substantially poorer than two-parent households and singles are poorer than couples. Unlike the provinces, the different measures show the same ranking across family type; couples are best off, followed closely by two-parent families, the poverty rates are substantially higher in single households and higher still in lone-parent households. Income poverty shows the largest difference between family types with singles and lone parents have head count ratios around five times that of couples and two-parent families. MDP measures are about three times higher form singles and lone parents as for couples and singles. Poverty has fallen over time, except for lone parents, if expenditure poverty is measured, while income poverty has fallen for all family types except two-parent families. Multidimensional poverty increased between 2003 and 2012 for all family types.

Tables 19 and 20 present the MDP measure decomposed by immigrant status (the public release SHS does not have an indicator of immigrant status). While new immigrants (those living in Canada for fewer than ten years) seem to fair slightly better through time, particularly when excluding home ownership, they have substantially higher poverty rates than do older immigrants or the native born. The head counts grow over time for both native born and older immigrants but their head counts are about 1/3 that of newer immigrants.

Conclusion/Discussion

In summary, this study used Statistics Canada's survey data to estimate and compare different poverty measures. Income, expenditure, and a multidimensional poverty were calculated from the SHS. Income and multidimensional measures were estimated using the CCHS. Indicators of deprivation are necessary to derive multidimensional poverty measures a la Alkire & Foster (2011). It was impossible to identically match indicators across surveys and time, thus multidimensional poverty measures developed with different indicators were calculated and compared to offer a sensitivity analysis of the different measures. The first objective of the study was met although with a little more subjectivity than may be desirable and with some difficulty in matching the indicators.

The second query of the paper, as to whether different measures of poverty/well-being provide similar statistics through time is definitely, it depends. Although the levels of poverty differ across the various multidimensional measures, the trends are very similar. Measures are substantially more similar if home ownership is not included as an indicator. While the national MDP trends are similar, there if far less consistency when comparing GDP, income, expenditure, and MDP measures nationally or across subgroups (provinces, household types, and immigrant status) and time. GDP and MDP measures indicate opposite conclusions; when GDP indicates increasing prosperity, MDP indicates growing poverty, and visa-versa. Other studies have found similar dissimilarity across different poverty measures (see for example, Anderson, 2008; Mitra & Brucker, 2014; Dhongde & Haveman, 2015).

The provinces rank quite differently depending on which poverty measure is used and whether or not home ownership is included. Family type and immigrant status rankings do not

change with poverty measure but the temporal trends do. The proportion living in poverty tends to stay fairly constant or fall slightly when examining income and expenditure measures but it grows when examining MDP measures, particularly if home ownership is included as an indicator. Policy makers may be content with the seeming stagnation or even small decrease in poverty when measured by income/expenditure but should be less so when examining multidimensional poverty. In general, Canadian and most provincial governments have not been pleased with the economic well-being as measured by negative or very small GDP growth in recent years.

This study developed different measures of poverty using methodologies commonly found in the literature and presented the results for comparison. The study cannot make a judgement on which measure of poverty is 'better' or 'best.' All poverty measures necessitate some subjectivity, even if only in the choice of cut-offs, as with income. Expenditure measures require decisions over which expenditures to include, and often exclude durables or 'lumpy' purchases. Income and expenditure measures use subjective, although widely accepted, adjustments for differing needs due to household types and prices faced. Multidimensional measures require subjective judgements on the indicators, cut-off points for indicators, weights, and the number of indicators (k) in which an individual or household must be deprived to be multidimensionally poor. Some studies have concluded that multidimensional poverty measures are 'better' because only multidimensional instruments can truly capture the experience of poverty (Merz & Rathjen, 2014; UNDP, 2016, Canadian Index of Well-being, 2016). Others argue that the use of arbitrary weights and thresholds, and the disregarding of price information while aggregating across dimensions (Ravallion, 2011) or the fact that the multidimensional

measures provide no information on individuals who are not deprived (as arbitrarily defined by researcher (Thorbecke, 2011) are substantial issues.

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Table 1

Multidimensional Poverty Dimensions and Indicators		
Dimensions	Indicators	
Health	No Regular MD	Household does not have a regular family physician (CCHS only)
	Disability	A household member is limited in activities by a disability
	High Health Expenditure	Health expenditures are twice the median (SHS only)
Education	No High School	Highest adult educational level in household is less than high school certificate
	No Eng/Fr Speaker	No one in household speaks an official language (CCHS only)
Standard of Living	No Employment	Major source of household income is not employment income
	Low Income	Household income (adjusted) is in the bottom quintile of the income distribution (CCHS). Household income (adjusted) is less than half median income (SHS).
Housing	Do Not Own Home	The house is not owned by a member of the household
	Crowded	There is not a bedroom for parent(s) and each child
	Food Insecure	Food Insecure Index (CCHS) Food expend > twice median (SHS)
	House Inadequate	Housing is inadequate according to standards (SHS only)

Table 2 Proportion of Individuals with stated Indicator in CCHS

	2003	2005	2007	2009	2012	
No MD	**0.1413** 0.0014	**0.1437** 0.0014	**0.1597** 0.0015	**0.1589** 0.0015	**0.1545** 0.0021	***Health***
Disability	**0.1068** 0.0012	**0.1116** 0.0013	**0.1064** 0.0012	**0.0901** 0.0012	**0.1121** 0.0019	
No High school	**0.0479** 0.0009	**0.0366** 0.0008	**0.0962** 0.0012	**0.0889** 0.0012	**0.0925** 0.0017	***Education***
No Language	**0.0148** 0.0005	**0.0110** 0.0004	**0.0148** 0.0005	**0.0142** 0.0005	**0.0083** 0.0005	
No Employ Income	**0.0453** 0.0008	**0.0433** 0.0008	**0.0479** 0.0009	**0.0484** 0.0009	**0.0518** 0.0013	***Standard of Living***
Low Income	**0.0638** 0.0010	**0.1468** 0.0014	**0.1480** 0.0014	**0.1500** 0.0015	**0.1402** 0.0020	
No Own Home	**0.2080** 0.0016	**0.1946** 0.0016	**0.2213** 0.0017	**0.2148** 0.0017	**0.2353** 0.0025	***Housing***
Crowded	**0.1283** 0.0013	**0.1024** 0.0012	**0.1013** 0.0012			
Food Insecure			**0.0813** 0.0014	**0.0663** 0.0010	**0.0806** 0.0016	

*Canadian respondents 25 to 64 years of age (2009 where PEI and NB are excluded – see text for explanation)

Table 3

	2005	2007	2009	
Health Expenditure	**0.1848** 0.0043	**0.1484** 0.0041	**0.1663** 0.0049	***Health***
Disability	**0.1116** 0.0013	**0.1553** 0.0042	**0.1669** 0.0049	
No High school	**0.0395** 0.0021	**0.0505** 0.0025	**0.0505** 0.0029	***Education***
No Employ Income	**0.0788** 0.0030	**0.0943** 0.0034	**0.0998** 0.0040	***Standard of Living***
Low Income	**0.0857** 0.0031	**0.0796** 0.0031	**0.0844** 0.0037	
No Own Home	**0.2113** 0.0045	**0.2355** 0.0049	**0.2644** 0.0058	***Housing***
Crowded	**0.0689** 0.0032	**0.0870** 0.0032	**0.0792** 0.0036	
Food Insecure	**0.0919** 0.0032	**0.0947** 0.0034	**0.1067** 0.0041	
Housing Inadequate	**0.0706** 0.0028	**0.1004** 0.0035	**0.0959** 0.0039	
*Canadian respondents 25 to 64 years of age				

Table 4

Tetrachoric Correlations between Indicators from CCHS 2007	No Regular MD	Disability	No High School	No Employ Income	Low Income	Not Own Home	Crowded	Food Insecure	No English Speaker
No Regular MD	1.0000								
Disability	-0.1510								
No High School	0.0485	0.3201	1.0000						
No Employment Income	0.0620	0.4360	0.4106	1.0000					
Low Income	0.1345	0.3419	0.3911	0.6926	1.0000				
Does Not Own Home	0.3008	0.1574	0.2310	0.4702	0.5933	1.0000			
Crowded (<1 rm/perso)	0.1562	-0.0069	0.1579	0.3071	0.4966	0.4783	1.0000		
Food Insecure	0.1076	0.3717	0.2949	0.5514	0.6394	0.5173	0.3963	1.0000	
No English Speaker	0.0651	0.0423	0.3188	0.2297	0.4209	0.2635	0.2695	0.2522	1.0000

Table 5

Tetrachoric Correlations between Indicators from SHS 2007	High Health Expenditures	Disability	No High School	No Employ Income	Low Income	Not Own Home	Crowded	Food Insecure	House Inadequate
High Health Expenditures	1.0000								
Disability	0.1570	1.0000							
No High School	0.0766	0.1158	1.0000						
No Employment Income	0.2301	0.3751	0.4077	1.0000					
Low Income	0.2216	0.1613	0.4554	0.6642	1.0000				
Does Not Own Home	0.0140	0.0651	0.4957	0.4115	0.6219	1.0000			
Crowded (<1 room/person)	-0.0836	0.1065	-0.0491	0.2522	0.2953	0.3942	1.0000		
Food Insecure	0.2507	0.0840	0.3628	0.4542	0.6953	0.3854	0.1669	1.0000	
House Inadequate	0.0755	0.1954	0.1531	0.1332	0.1597	0.1154	-0.0020	0.1972	1.0000

Table 6

Correlation Matrix Multidimensional Poverty Scores CCHS 2007	MDPC1 score	MDPC2 score	MDPC3 score	MDPC4 score	MDPC5 score	MDPC6 score	MDPC7 score	MDPC8 score
MDPC1 score	1.0000							
MDPC2 score	0.9460	1.0000						
MDPC3 score	0.9528	0.8937	1.0000					
MDPC4 score	0.8826	0.9296	0.9455	1.0000				
MDPC5 score	0.9945	0.9376	0.9470	0.8739	1.0000			
MDPC6 score	0.9388	0.9917	0.8859	0.9207	0.9439	1.0000		
MDPC7 score	0.9516	0.8832	0.9038	0.8196	0.9561	0.8879	1.0000	
MDPC8 score	0.8887	0.9269	0.8354	0.8558	0.8925	0.9333	0.9448	1.0000

Table 7

Tetrachoric Correlations Multidimensional Poverty Score ≥ 2 CCHS 2007	MDPS1 score ≥ 2	MDPS2 score ≥ 2	MDPS3 score ≥ 2	MDPS4 score ≥ 2	MDPS5 score ≥ 2	MDPS6 score ≥ 2	MDPS7 score ≥ 2	MDPS8 score ≥ 2
MDPS1 score ≥ 2	1.0000							
MDPS2 score ≥ 2	0.9791	1.0000						
MDPS3 score ≥ 2	0.9708	0.9436	1.0000					
MDPS4 score ≥ 2	0.9408	0.9632	0.9693	1.0000				
MDPS5 score ≥ 2	0.9949	0.968	0.9684	0.9312	1.0000			
MDPS6 score ≥ 2	0.9792	0.9946	0.9389	0.9518	0.978	1.0000		
MDPS7 score ≥ 2	0.9619	0.9289	0.935	0.8798	0.9682	0.9349	1.0000	
MDPS8 score ≥ 2	0.9361	0.9591	0.8943	0.9043	0.9364	0.9602	0.9619	1.0000

Table 8

Correlation Matrix Multidimensional Poverty Scores SHS 2007	MDPS1 score	MDPS2 score	MDPS3 score	MDPS4 score	MDPS5 score	MDPS6 score	MDPS7 score	MDPS8 score
MDPS1 score	1.0000							
MDPS2 score	0.9350	1.0000						
MDPS3 score	0.9497	0.8853	1.0000					
MDPS4 score	0.8687	0.9287	0.9387	1.0000				
MDPS5 score	0.9663	0.8841	0.9115	0.8136	1.0000			
MDPS6 score	0.9166	0.8354	0.9686	0.8920	0.9431	1.0000		
MDPS7 score	0.8965	0.9507	0.8409	0.8732	0.9267	0.8689	1.0000	
MDPS8 score	0.8290	0.8785	0.9032	0.9557	0.8504	0.9307	0.9161	1.0000

Table 9

Tetrachoric Correlations Multidimensional Poverty Score ≥ 2 SHS 2007	MDPS1 score ≥ 2	MDPS2 score ≥ 2	MDPS3 score ≥ 2	MDPS4 score ≥ 2	MDPS5 score ≥ 2	MDPS6 score ≥ 2	MDPS7 score ≥ 2	MDPS8 score ≥ 2
MDPS1 score ≥ 2	1.0000							
MDPS2 score ≥ 2	0.9690	1.0000						
MDPS3 score ≥ 2	0.9456	0.9301	1.0000					
MDPS4 score ≥ 2	0.9157	0.9586	0.9717	1.0000				
MDPS5 score ≥ 2	0.9773	0.9250	0.9273	0.8764	1.0000			
MDPS6 score ≥ 2	0.9334	0.8977	0.9812	0.9342	0.9558	1.0000		
MDPS7 score ≥ 2	0.9685	0.9776	0.9165	0.9255	0.9681	0.9248	1.0000	
MDPS8 score ≥ 2	0.9022	0.9278	0.9685	0.9788	0.9065	0.9696	0.9356	1.0000

Table 10

Growth GDP/capita by Canada and Province -					
	2003	2005	2007	2009	2012
CAN	0.019	0.022	0.028	-0.004	0.004
Nfld	0.027	0.022	0.072	0.034	0.010
PEI	0.026	0.050	0.018	0.009	-0.005
NS	0.018	0.023	0.034	0.004	0.013
NB	0.014	0.025	0.035	0.004	0.001
QUE	0.023	0.013	0.026	0.004	0.000
ONT	0.017	0.020	0.019	-0.005	0.000
MAN	0.017	0.019	0.037	-0.001	0.011
SASK	0.019	0.026	0.039	0.004	0.007
ALB	0.015	0.038	0.039	-0.022	0.008
BC	0.020	0.024	0.039	-0.010	0.010

Table 11

Income Poverty Head Count by Province - SHS				
	2003	2005	2007	2009
Atlantic	0.159	0.155	0.147	0.130
QUE	0.126	0.128	0.149	0.113
ONT	0.097	0.099	0.096	0.113
Prairies	0.087	0.082	0.081	0.079
BC	0.136	0.100	0.102	0.112

Table 12

Expenditure Poverty Head Count by Province - SHS				
	2003	2005	2007	2009
Atlantic	0.073	0.060	0.060	0.052
QUE	0.045	0.042	0.049	0.032
ONT	0.015	0.017	0.015	0.009
Prairies	0.026	0.016	0.028	0.018
BC	0.016	0.011	0.012	0.012

Table 13

Multidimensional Poverty by Province with home ownership - CCHS					
	2003	2005	2007	2009	2012
Nfld	0.177	0.188	0.235	0.178	0.162
PEI	0.126	0.159	0.203	-	0.174
NS	0.159	0.174	0.186	0.196	0.165
NB	0.170	0.173	0.174	-	0.177
QUE	0.239	0.236	0.274	0.243	0.270
ONT	0.158	0.168	0.196	0.167	0.189
MAN	0.141	0.204	0.237	0.164	0.170
SASK	0.119	0.157	0.173	0.163	0.187
ALB	0.147	0.147	0.164	0.194	0.242
BC	0.169	0.195	0.204	0.200	0.234

*Canadian households between 25 and 64 years of age except 2009 and MDPC 9 and 10 where PEI and NB are not included in sample
MDPC H = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded + no own
MDPC NH = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded

Table 14

Multidimensional Poverty by Province without home ownership - CCHS					
	2003	2005	2007	2009	2012
Nfld	0.148	0.168	0.194	0.139	0.146
PEI	0.093	0.104	0.159	-	0.124
NS	0.098	0.113	0.141	0.147	0.123
NB	0.135	0.134	0.141	-	0.141
QUE	0.142	0.160	0.187	0.163	0.181
ONT	0.089	0.119	0.140	0.115	0.118
MAN	0.103	0.161	0.187	0.117	0.121
SASK	0.082	0.112	0.126	0.108	0.110
ALB	0.091	0.098	0.116	0.127	0.133
BC	0.101	0.124	0.131	0.122	0.130

Table 15

Income Poverty SHS				
	2003	2005	2007	2009
Single	0.217	0.207	0.212	0.192
Couple	0.045	0.056	0.038	0.040
Two Parent	0.060	0.067	0.068	0.067
Lone Parent	0.283	0.271	0.272	0.249

Table 16

Expenditure Poverty SHS				
	2003	2005	2007	2009
Single	0.037	0.030	0.036	0.015
Couple	0.016	0.019	0.011	0.013
Two Parent	0.024	0.023	0.030	0.018
Lone Parent	0.065	0.062	64.720	0.071

Table 17

Multidimensional Poverty by Family Type with home ownership - CCHS					
	2003	2005	2007	2009	2012
Single	0.399	0.406	0.426	0.442	0.475
Couple	0.135	0.141	0.166	0.166	0.183
Two Parent	0.140	0.152	0.171	0.142	0.164
Lone Parent	0.405	0.436	0.451	0.431	0.434

Table 18

Multidimensional Poverty by Family Type without home ownership					
	2003	2005	2007	2009	2012
Single	0.217	0.236	0.259	0.268	0.257
Couple	0.070	0.081	0.098	0.099	0.107
Two Parent	0.088	0.113	0.130	0.100	0.107
Lone Parent	0.261	0.325	0.333	0.333	0.327

Table 20

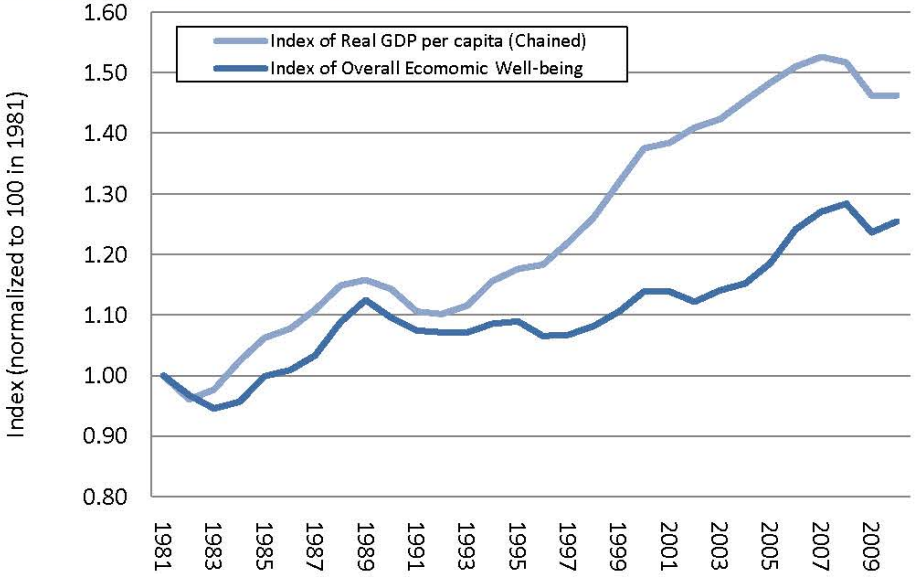
Multidimensional Poverty by Immigrant Status Type with home ownership					
	2003	2005	2007	2009	2012
Native Born	0.151	0.161	0.181	0.169	0.186
Immigrant < 10 yrs	0.479	0.475	0.500	0.459	0.472
Immigrant ≥ 10 yrs	0.188	0.201	0.240	0.193	0.253

Table 21

Multidimensional Poverty by Immigrant Status Type without home ownership					
	2003	2005	2007	2009	2012
Native Born	0.093	0.108	0.122	0.114	0.117
Immigrant < 10 yrs	0.306	0.337	0.356	0.279	0.250
Immigrant ≥ 10 yrs	0.098	0.151	0.191	0.139	0.176

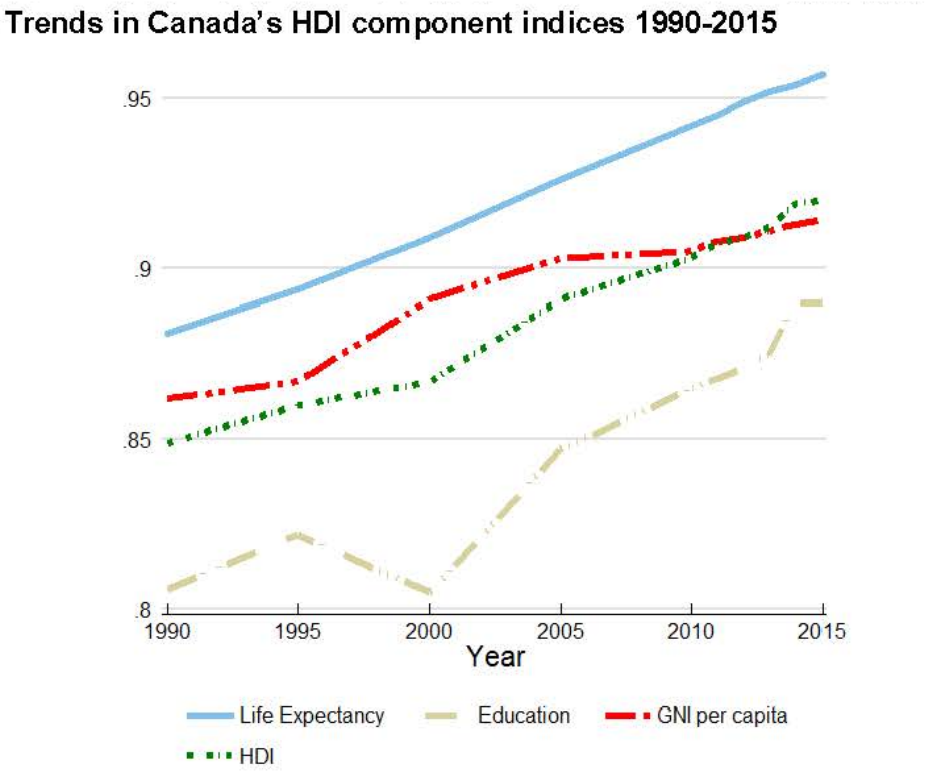
Figure 1

Chart 1: Trends in the Overall Index of Economic Well-being and GDP per Capita, Canada, 1981-2010, Indexed, 1981=100



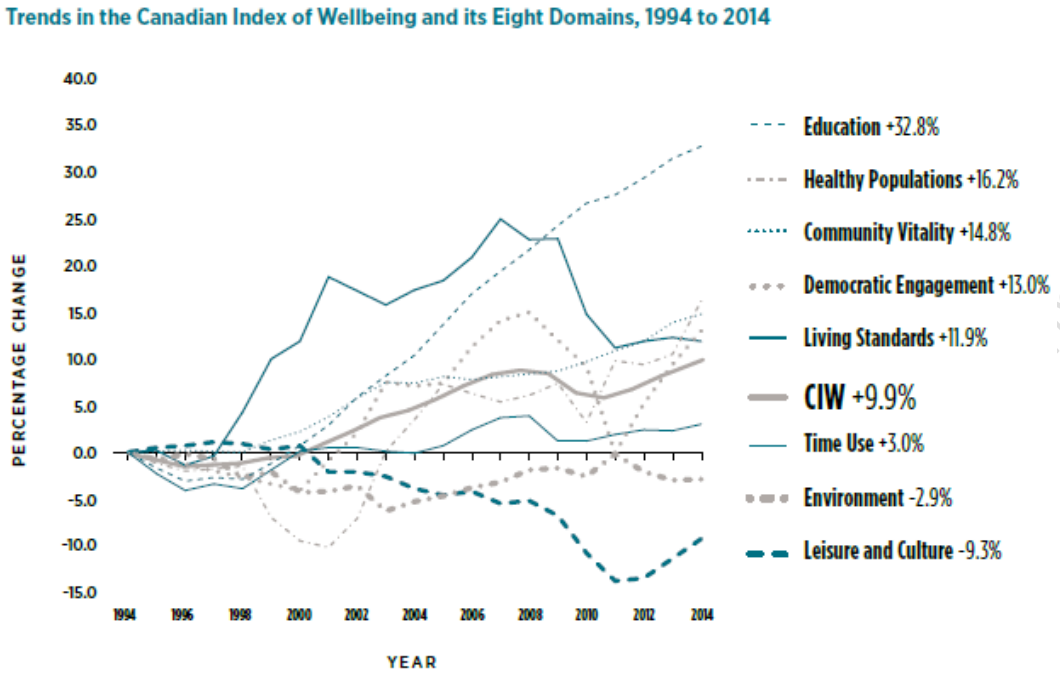
Source: Osberg and Andrew (2011) "Beyond GDP: Measuring Economic Wellbeing in Canada and the Provinces, 1981-2010. CSLS Research Report 2011-11, page 7

Figure 2



Source: United Nations (2016) "**Human Development for Everyone: Briefing note" (page 3) h**ttp://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/CAN.pdf

Figure 3



source: Canadian Index of Wellbeing (2016) "How are Canadians Really Doing? The 2016 CIW National Report." Waterloo, ON: Canadian Index of Wellbeing and University of Waterloo. page 5

Figure 4

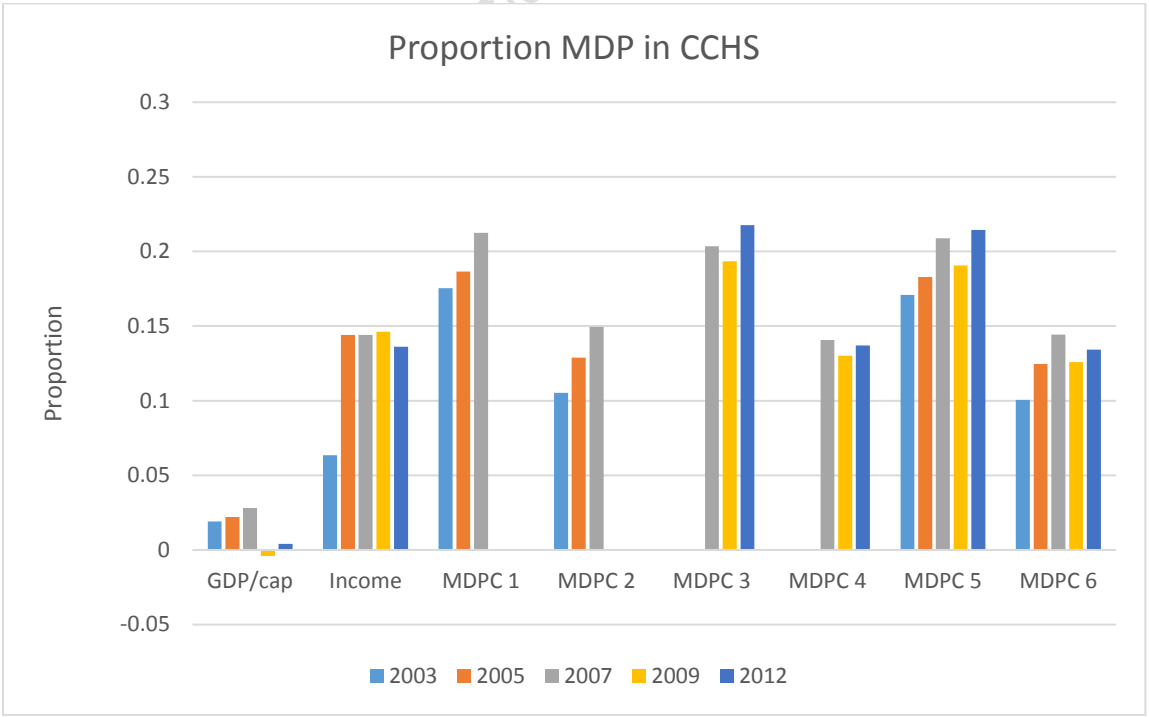


Figure 5

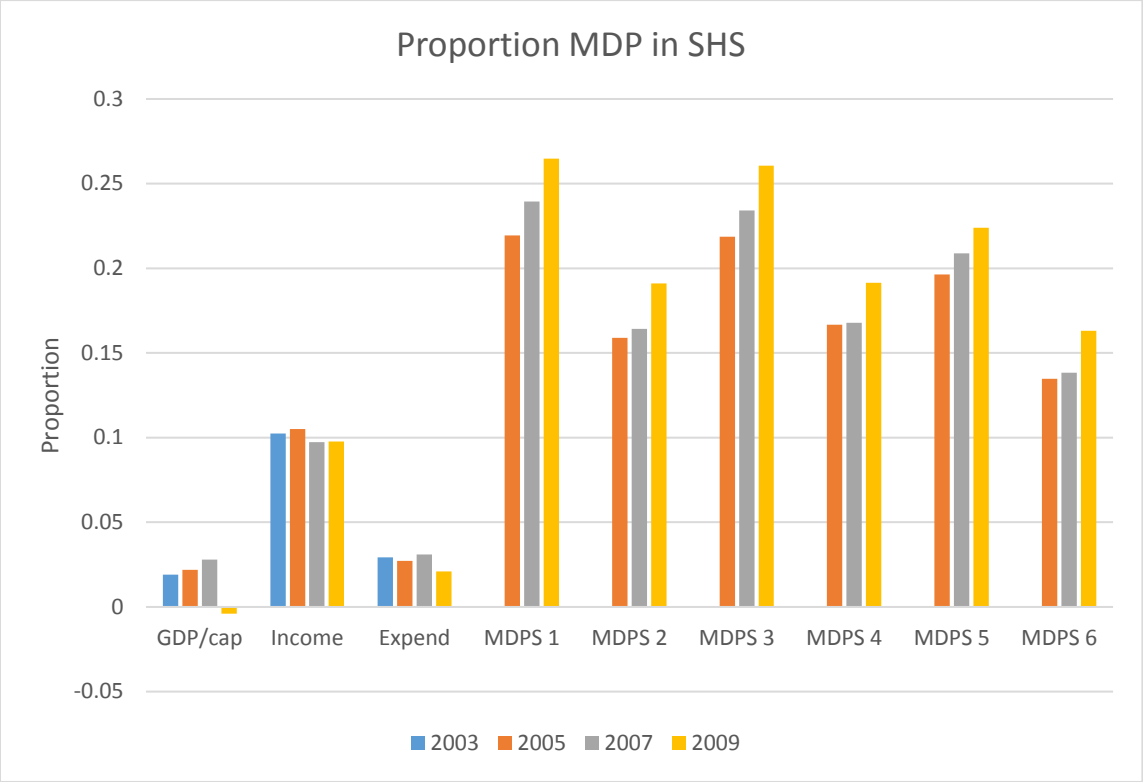


Figure 6

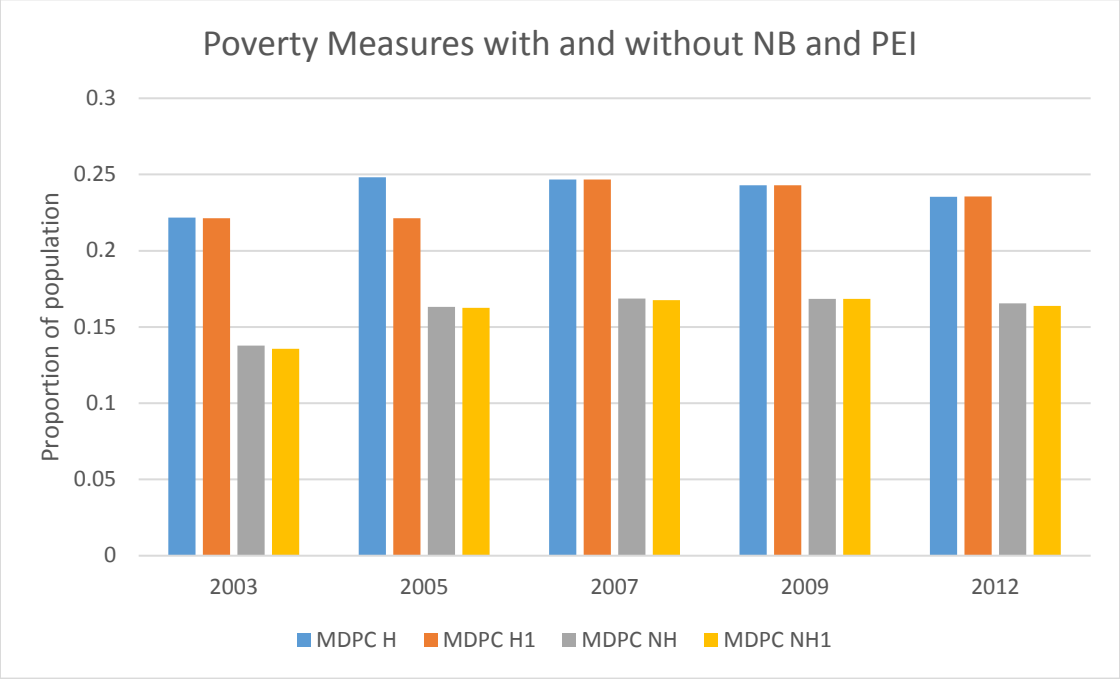


Figure 7

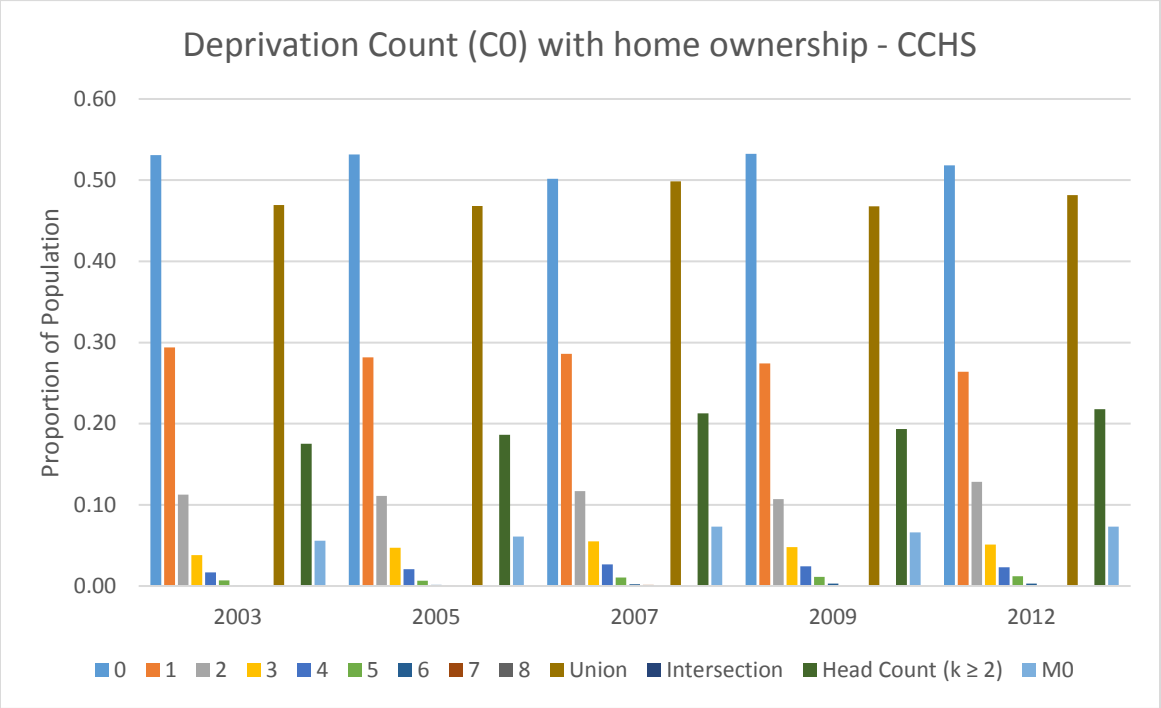
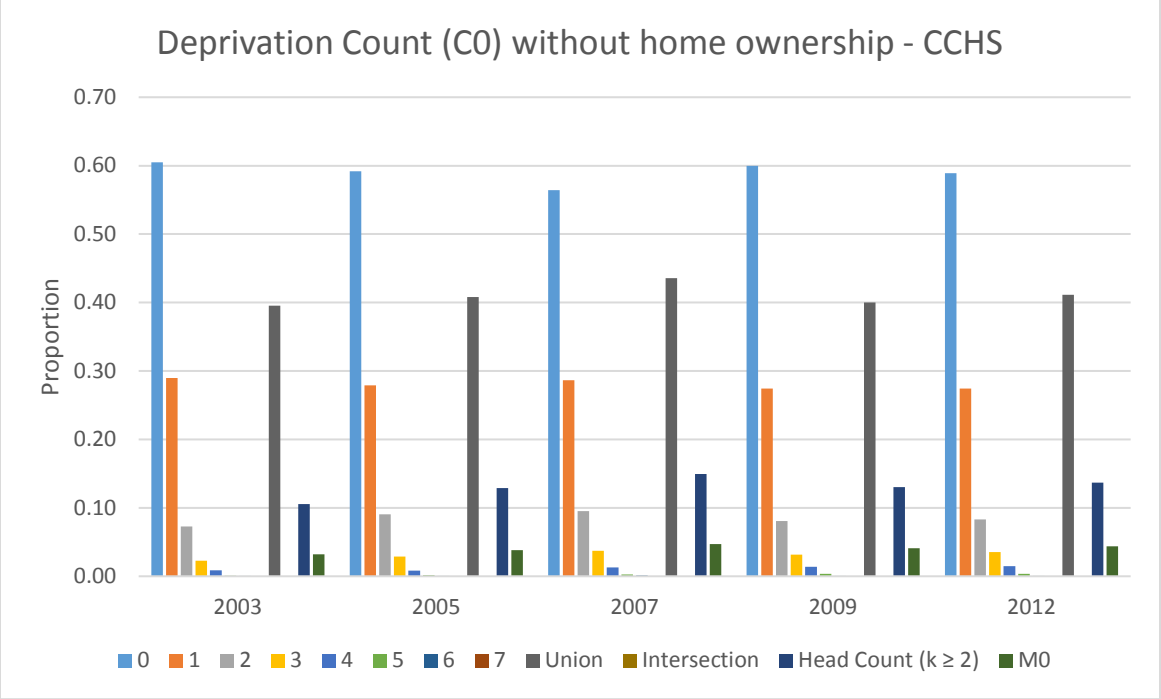


Figure 8



Appendices

Table A1

CCHS									
Year	GDP/cap	Income	Expend	MDPC 1	MDPC 2	MDPC 3	MDPC 4	MDPC 5	MDPC 6
2003	0.019	0.0634 0.0010		0.1754 0.0015	0.1053 0.0012			0.1710 0.0015	0.1006 0.0012
2005	0.022	0.1442 0.0014		**0.1865** **0.0016**	**0.1290** **0.0013**			***0.1830*** ***0.0015***	***0.1245*** ***0.0013***
2007	0.028	0.1441 0.0014		**0.2126** **0.0016**	**0.1495** **0.0014**	**0.2035** **0.0016**	**0.1406** **0.0014**	***0.2089*** ***0.0016***	***0.1443*** ***0.0014***
2009	-0.004	0.1463 0.0015				**0.1935** **0.0017**	**0.1302** **0.0015**	0.1907 0.0017	0.1259 0.0014
2012	0.004	0.1362 0.0020				0.2177 0.0024	0.1370 0.0020	0.2145 0.0024	0.1342 0.0020

*Canadian households between 25 and 64 years of age except 2009 where PEI and NB are not included in sample (see text for explanation)
MDPC 1 = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded + no own
MDPC 2 = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded
MDPC 3 = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + food insecure + no own
MDPC 4 = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + food insecure
MDPC 5 = No MD + Disability + No High school + No employ income+ low income + crowded to 2007/ food in 2009 + no own
MDPC 6 = No MD + Disability + No High school + No employ income+ low income + crowded to 2007/ food in 2009

Table A2

SHS									
Year	GDP/cap	Income	Expend	MDPS 1	MDPS 2	MDPS 3	MDPS 4	MDPS 5	MDPS 6
2003	0.019	0.1025 0.0044	0.0293 0.0024						
2005	0.022	0.1050 0.0054	0.0273 0.0031	**0.2194** **0.0045**	**0.1590** **0.0040**	0.2187 0.0045	0.1667 0.0041	***0.1964*** ***0.0044***	***0.1347*** ***0.0037***
2007	0.028	0.0974 0.0051	0.0309 0.0032	**0.2394** **0.0049**	**0.1643** **0.0043**	**0.2342** **0.0049**	**0.1678** **0.0043**	***0.2089*** ***0.0047***	***0.1384*** ***0.0040***
2009	-0.004	0.0977 0.0069	0.0211 0.0025	0.2647 0.0058	0.1911 0.0052	**0.2607** **0.0058**	**0.1914** **0.0052**	0.2239 0.0055	0.1631 0.0049

*Canadian households with head of household between 25 and 64 years of age
MDPS 1 = High Health Expenditure +Disability + No High school + No employ income+ low income + crowded + house inadequate + no own
MDPS 2 = High Health Expenditure +Disability + No High school + No employ income+ low income + crowded + house inadequate
MDPS 3 = High Health Expenditure +Disability + No High school + No employ income+ low income +high food exp + house inadequate + no own
MDPS 4 = High Health Expenditure +Disability + No High school + No employ income+ low income + high food exp + house inadequate
MDPS 5 = High Health Expenditure +Disability + No High school + No employ income+ low income + crowded to 2007/ food in 2009 + no own
MDPS 6 = High Health Expenditure +Disability + No High school + No employ income+ low income + crowded to 2007/ food in 2009

Table A3

CCHS							
Year	GDP/cap	Income	Expend	MDPC H	MDPC NH	MDPC 7	MDPC 8
2003	0.019	0.0634 0.0010		0.1754 0.0015	0.1053 0.0012	0.1764 0.0015	0.1024 0.0012
2005	0.022	0.1442 0.0014		**0.1865** **0.0016**	**0.1290** **0.0013**	0.1899 0.0015	0.1266 0.0013
2007	0.028	0.1441 0.0014		**0.2126** **0.0016**	**0.1495** **0.0014**	0.2191 0.0016	0.1472 0.0014
2009	-0.004	0.1463 0.0015		**0.1935** **0.0017**	**0.1302** **0.0015**	0.1935 0.0017	0.1302 0.0015
2012	0.004	0.1362 0.0020		0.2177 0.0024	0.1370 0.0020	0.2230 0.0024	0.1391 0.0020

*Canadian households between 25 and 64 years of age except 2009 and MDPC 9 and 10 where PEI and NB are not included in sample
MDPC H = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded + no own
MDPC NH = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded
MDPC 7 = MDPC H excluding PEI and NB
MDPC 8 = MDPC H excluding PEI and NB

Table A4

Deprivation Count (C^0) (with home ownership)					
Count	2003	2005	2007	2009	2012
0	0.531	0.532	0.502	0.532	0.518
	0.002	0.002	0.002	0.002	0.003
1	0.294	0.282	0.286	0.274	0.264
	0.002	0.002	0.002	0.002	0.003
2	0.113	0.111	0.117	0.107	0.128
	0.001	0.001	0.001	0.001	0.002
3	0.038	0.047	0.055	0.048	0.051
	0.001	0.001	0.001	0.001	0.001
4	0.017	0.021	0.027	0.024	0.023
	0.001	0.001	0.001	0.001	0.001
5	0.007	0.006	0.010	0.011	0.012
	0.000	0.000	0.000	0.000	0.001
6	0.001	0.001	0.002	0.003	0.003
	0.000	0.000	0.000	0.000	0.000
7	0.000	0.000	0.001	0.000	0.000
	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000
Observations	61,953	62,539	62,059	53,494	29,065
Union	0.469	0.468	0.498	0.468	0.482
	0.294	0.282	0.286	0.274	0.264
Intersection	0.002	0.002	0.002	0.002	0.003
Head Count ($k \geq 2$)	0.18	0.19	0.21	0.19	0.22
M^0	0.056	0.061	0.073	0.066	0.073

*Canadian households between 25 and 64 years of age except 2009 and MDPC 9 and 10 where PEI and NB are not included in sample
MDPC H = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded + no own

Table A5

Deprivation Count (C^0) (without home ownership)					
Count	2003	2005	2007	2009	2012
0	2003	2005	2007	2009	2012
	0.605	0.592	0.564	0.600	0.589
1	0.002	0.002	0.002	0.002	0.003
	0.290	0.279	0.286	0.274	0.274
2	0.002	0.002	0.002	0.270	0.003
	0.073	0.090	0.095	0.081	0.083
3	0.001	0.001	0.001	0.001	0.002
	0.023	0.029	0.037	0.032	0.035
4	0.001	0.001	0.001	0.001	0.001
	0.009	0.008	0.013	0.014	0.015
5	0.000	0.000	0.000	0.001	0.001
	0.001	0.002	0.003	0.004	0.003
6	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.001	0.000	0.000
7	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000
Observations	61,953	62,539	62,059	53,494	29,065
Union	0.395	0.408	0.436	0.400	0.411
	0.002	0.002	0.002	0.002	0.003
Intersection	0.000	0.000	0.000	0.000	0.000
Head Count ($k \geq 2$)	0.11	0.13	0.15	0.13	0.14
M^0	0.032	0.038	0.047	0.041	0.044

*Canadian households between 25 and 64 years of age except 2009 and MDPC 9 and 10 where PEI and NB are not included in sample
MDPC H = No MD + Disability + No High school + No Eng/Fr + No employ income+ low income + crowded