HOUSING RESEARCH REPORT

Defining the Affordability of Housing in Canada Final Report

Canada

CMHC SCHL

This study was conducted for Canada Mortgage and Housing Corporation (CMHC) and Natural Resources Canada (NRCan) under Part IX of the National Housing Act and the Program for Energy Research and Development (PERD). The analysis, interpretations and recommendations are those of the consultant and do not necessarily reflect the views of CMHC or NRCan.

Executive Summary

This report is undertaken to provide a better understanding of how housing affordability is defined in a national and international context. Given the breadth and diversity in measures of housing affordability, a better understanding of key differences can help drive towards improved identification of subsets of population facing affordability pressures.

The conventional measure of housing affordability is the shelter-cost-to-income ratio, which most commonly sets the affordability threshold at an arbitrary 30% of before-tax household income. The main criticism of this approach is that it applies the same percentage-of-income threshold irrespective of the composition of the household or its level of income. Consequentially, this approach is susceptible to misidentifying the types of households that are experiencing affordability challenges.

The principle alternative to shelter-cost-to-income ratios is the residual income, or "basic needs" methodology. This approach subtracts from a household's disposable (*i.e.*, after-tax) income the cost of non-shelter necessities, based on the size and composition of the household type. What is left after basin needs constitutes what is available, and therefore affordable, for shelter.

This study compares affordability thresholds using these two methodologies for four different household types and different types of housing for both renters and owners in 10 major CMAs. Both methodologies identify affordability pressures for single person and single parent households (with two children) across several CMAs. However, generally, the results of the analysis suggest affordability thresholds estimated using the basic needs methodology tend to be lower than the thresholds estimated when the conventional 30% norm is applied. This results in different pictures of affordability conditions using different definitions of affordability. The findings also suggest that the basic needs methodology may be more relevant for analyzing affordability pressures that arise in the bottom half of the income distribution, and for analyzing affordability among renters. The central reason being differences in household budgets and expenditure patterns between low and high-income households and between renter and owner households.

Applying the basic needs method may prove most useful in identifying the most vulnerable groups facing acute market housing affordability pressures and identify the source of those pressures.

Résumé

Le présent rapport a été rédigé dans le but de mieux comprendre la façon dont l'abordabilité du logement se définit dans un contexte national et international. Étant donné l'ampleur et la diversité des mesures qu'il existe en matière d'abordabilité du logement, le fait de mieux comprendre les principales différences peut nous conduire à améliorer la détermination des sous-ensembles de la population qui sont confrontés aux pressions sur l'abordabilité.

La mesure traditionnelle utilisée pour déterminer l'abordabilité du logement est le rapport des frais de logement au revenu, qui permet habituellement de fixer le seuil d'abordabilité à un taux arbitraire de 30 % du revenu avant impôt d'un ménage. Le principal reproche de cette approche réside dans le fait qu'elle consiste à appliquer le même seuil de pourcentage du revenu sans tenir compte de la composition du ménage ou de son niveau de revenu. Par conséquent, cette approche peut mener à une mauvaise détermination des types de ménages qui sont confrontés à des défis en matière d'abordabilité.

La principale solution de rechange à l'utilisation du rapport des frais de logement au revenu est le recours au revenu résiduel ou à la méthode des besoins essentiels. Cette approche consiste à soustraire du revenu disponible (c.-à-d. le revenu net d'impôt) d'un ménage les frais qui ne sont pas liés au logement, en fonction de la taille et de la composition du type de ménage. Le revenu qu'il reste après avoir soustrait les besoins essentiels représente le revenu disponible pouvant être consacré au logement.

Cette étude compare les seuils d'abordabilité déterminés à l'aide de ces deux méthodes pour quatre types de ménages différents et pour différents types de logements, à la fois pour des locataires et des propriétaires dans dix principales régions métropolitaines de recensement. Les deux méthodes relèvent les pressions sur l'abordabilité pour les ménages d'une personne et les ménages monoparentaux (avec deux enfants) dans plusieurs régions métropolitaines de recensement. Toutefois, de manière générale, les résultats de l'analyse suggèrent que les seuils d'abordabilité estimés à l'aide de la méthode des besoins essentiels ont tendance à être plus bas que les seuils estimés à l'aide de la norme traditionnelle de 30 %. Ces résultats dressent des portraits différents des conditions d'abordabilité fondées sur des définitions différentes de l'abordabilité. Aussi d'après les résultats, la méthode des besoins essentiels pourrait être plus pertinente pour analyser les pressions sur l'abordabilité qui surviennent dans la seconde moitié de la distribution du revenu, ainsi que pour analyser l'abordabilité au sein des locataires. La principale raison repose sur les différences de budgets des ménages et les habitudes de dépense entre les ménages à revenu bas et ceux à revenu élevé, et entre les ménages locataires et les ménages propriétaires.

L'utilisation de la méthode des besoins essentiels peut s'avérer plus utile pour déterminer les groupes les plus vulnérables qui sont confrontés à d'importantes pressions du marché sur l'abordabilité du logement et pour cerner la source de ces pressions.

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Introduction

The promotion of housing affordability is one of the stated purposes in sec. 3 of the *National Housing Act*. Notions of what constitutes affordability have changed over time. The most commonly used measure today is a shelter-cost-to-income ratio that is no greater than 30% of before-tax income. This benchmark is widely used by governments, housing authorities and statistical agencies, as well as housing policy researchers. The 30% benchmark figures prominently in CMHC's definition of 'core housing needs' (CMHC 2016). The 30% benchmark emerged in Canada in the 1980s after the U.S. Department of Housing and Urban Development (HUD) adopted this standard as an eligibility guideline for access to federally-supported rent-geared-to-income housing. In 1981, HUD increased the eligibility guideline from the 25% to 30% (Poterba 1994; Martens 2009; Stoloff n.d.). Prior to the 1980s, the Canadian benchmark was also 25% (Hulchanski 1995). A 1972 study had recommended a 20% benchmark for low-income households (Dennis and Fish 1972). Neither the current 30% benchmark, nor the earlier 25% benchmark, were based on studies of household budgets or actual housing costs in different regions.

The 30% benchmark has been criticized for under-estimating the magnitude of the shelter affordability pressures on low-income households. At the same time, the 30% benchmark may over-state the affordability challenges faced by more affluent households that can often support shelter costs exceeding 30% of their income. The most frequently used measure of housing affordability is a shelter-cost-to-income ratio. In most applications of this approach, affordability pressures are deemed to arise when the cost of shelter exceeds 30% of a household's before-tax income. Variations of this approach adjust nominal income to take account of differences in household composition or use an after-tax denominator and/or a lower percentage threshold.

Shelter-to-income ratios approach have been criticized on three grounds. First, the methodology applies the same percentage-of-income threshold (usually 30%) irrespective of the composition of the household or its level of income. Second, the 30% benchmark is arbitrary. It is not based on budget studies. And third, shelter-to-income ratios often misidentify the types of households that are experiencing affordability challenges.

The principal alternative to shelter-cost-to-income ratios is the residual income methodology. Applications of this methodology in Australia and the United States suggest that the residual income approach may provide a more accurate estimate of the incidence of affordability pressures. The residual income approach also may be more efficient in identifying the types of households that are subject to affordability pressures.

The residual income methodology subtracts from a household's disposable (*i.e*., after-tax) income the cost of non-shelter necessities, based on a market basket benchmark that is appropriate to the size and composition of the household type. The remaining income, which is termed the 'residual income', constitutes what is available, and therefore affordable, for shelter. This residual is then compared to the actual cost of shelter in various local markets to estimate the incidence of affordability challenges. The principal strength of the residual income methodology is that it is not dependent on an arbitrary cost-to-income ratio, such as the 30% benchmark. Rather an affordability challenge is deemed to arise when a household is obliged to cut back on necessities to cover the cost of shelter. The principal challenge in applying the residual income methodology is devising credible budget standards for necessities.

Chapter One of this report reviews current measures of housing affordability that are employed in Canada and in other jurisdictions. The review describes measures that are used by governments, public agencies, statistical authorities, industry organizations and advocacy groups in Canada, the United States, Australia, New Zealand and the European Union. Chapter One also compares the widely-used shelter-cost-to-income ratio with an alternative measure of affordability which is usually termed the 'residual income' approach. The residual income approach assumes that shelter is the first claim on a household's budget. To determine whether a household can afford shelter, this methodology estimates a household's residual income by subtracting from gross income the cost of non-shelter necessities and taxes. If this residual income is less than the actual cost of shelter, then the household can only pay for shelter by cutting back on non-shelter necessities or going into debt.

Chapter Two presents research findings on affordability thresholds. Affordability thresholds are the minimum incomes that different types of households would need to cover shelter costs in their area. These affordability thresholds are developed using two different approaches. The first approach calculates affordability thresholds by applying the 30% benchmark to estimates of actual shelter costs. The affordability threshold using this approach is the income that would be required for actual shelter costs to be no more than 30% of pre-tax income. Actual shelter costs are based on CHMC's *Rental Market Survey*, Statistics Canada's *Survey of Household Spending* and data on housing prices and mortgage rates. The second approach estimates affordability thresholds by calculating the income that would be required to cover actual shelter costs, taxes and basic needs. Basic needs are estimated using Statistics Canada's Market Basket Measure which was developed by Employment and Social Development Canada (ESDC). This approach to estimating affordability thresholds is essentially an application of the of the residual income methodology. Affordability thresholds are estimated using both methodologies for four household types in each of the 10 largest Census Metropolitan Areas (CMAs). Separate thresholds are estimated for renter and home-owner households. The results of this analysis support the view that the residual income approach offers a potentially more accurate profile of the affordability challenges faced by low-income households.

Chapter Three summarizes the report's findings and discusses their implications.

Chapter One: Housing Affordability Measures – Literature and Jurisdictional Review

Literature and Jurisdiction Review

Introduction

The most frequently used measure of housing affordability is some variant of the shelter-cost-to-income ratio. In most current applications of this approach in Canada and the United States, affordability pressures are deemed to arise when the cost of shelter exceeds 30% of a household's before-tax income. Some applications of this ratio approach adjust nominal income to take account of the impact of differences in household composition on shelter requirements. Other applications of the ratio method use an after-tax denominator and a lower percentage threshold.

The shelter-to-income ratio approach has been criticized on two grounds. First, in its usual application, the shelter-to-income ratio approach makes no distinctions based on household composition. It would apply the same 30% benchmark to a two-adult household with a before-tax income of $40,000 and to a one-adult household earning the same income, but with one or more pre-school children who require both child care and a separate bedroom. Some jurisdictions attempt to take into account the obvious differences in these households by adjusting the before-tax income before calculating the shelter-cost-to income ratio. However, there is no consensus on the appropriate adjustment formula. The second criticism of the ratio approach is that it often misidentifies which types of households are experiencing affordability challenges. Just as some households can experience serious affordability problems even when their shelter-cost–to income ratio is in line with the 30% benchmark, so also other households can support a ratio in excess of 30% and may freely choose to do so. (Jewkes and Delgado 2010; Stone 1993; Stone 2006; Stone *et al*. 2011; Belsky *et al*. 2005)

The principal alternative to the shelter-cost-to-income ratio is the residual income approach. The premise of the residual income approach is that, for most households, the cost of shelter is the first and largest claim on their income. Consequently, it is argued, affordability challenges are better revealed by evidence of households cutting back on non-housing necessities to meet the cost of shelter than by their spending more on shelter than the 30% benchmark. (Stone 1993; Stone 2006; Stone *et al*. 2011; Henman and Jones 2012). The residual income approach subtracts from disposable income the cost of non-shelter necessities, based on a market basket benchmark that is appropriate to the size and composition of the household type. The remaining residual income constitutes what is available, and therefore affordable, for housing.[1] While there have been only a few applications of the residual income approach, as will be shown, these have found a higher overall incidence of affordability problems than indicated by the shelter-cost-to-income ratio approach. The residual income approach

[1] An alternative and equivalent procedure is to subtract actual housing costs from disposable income. The resulting residual income can then be expressed as a ratio of the market basket cost of necessities. When the ratio is less than 1.0, unaffordable housing costs have forced the household to curtail the purchase of necessities.

may also be more efficient in identifying the types of households that face affordability challenges. This is an important consideration in designing policies to address affordability problems.

CMHC: Core Housing Need and Affordability Measure

CMHC defines 'acceptable housing' as housing that is "adequate in condition, suitable in size, and affordable" (CMHC 2016). A household whose shelter falls short of any of these three standards and for whom there is no available housing that would be acceptable is deemed to be in 'core housing need'. Based on the 2011 National Household Survey (NHS), 12.5% of households were in 'core housing need'. For almost three-quarters (73.3%) of these households, affordability was the sole determinant of 'core housing need'. For a further 16.4%, affordability was a factor in conjunction with either poor state of repair, overcrowding or both.[2] Affordability, therefore, accounted for the lion's share of unmet housing needs (CMHC 2014).

CMHC defines shelter as affordable when the cost of shelter is less than 30% of before-tax household income. The 30% shelter-to-income ratio (STIR) was established as the benchmark for affordability in the 1980s. For renters, in addition to rent, shelter cost also includes the cost of electricity, fuel, water and other municipal services if those services are not included in rent. For owners, shelter costs include mortgage payments (principal and interest), property taxes, condominium fees where applicable, and the cost of electricity, fuel, water and other municipal services. In 2011, somewhat fewer than two-thirds (63.7%) of households in 'core housing need' were renters (CMHC, Housing in Canada Online),

It should be stressed that the affordability test is not solely whether a household pays more than 30% of its before-tax income on shelter, but whether it is unable to pay the median rent for alternative local housing that also meets the adequacy and suitability standards without spending 30% or more of its before-tax income. Simply paying more than the 30% benchmark does not, in itself, establish an affordability burden.

Census and (NHS) Data indicate that the incidence of 'core housing need' decreased between 1996 (15.6%) and 2011 (12.5%). Data from the 2013 Canadian Income Survey indicate that core housing need has increased somewhat since 2011.[3] CMHC's measure of 'core housing need' is important both as an estimate of the number of households with unmet housing needs and as a measure of the trend in

[2] Calculated from Canadian Housing Observer (2014), p.1-3, Fig. 1-3:
affordability and adequacy (8.2%) + affordability and suitability (7.2%) + affordability, suitability and adequacy (1.0%) = 16.4%

[3] The National Household Survey (NHS) and the Canadian Income Survey (CIS) are not strictly comparable owing to different sampling techniques and sample sizes. The 2011 NHS data indicate a 12.5% incidence of 'core housing need' whereas the CIS for 2011indicates an incidence of 12.8% which increased to 13.5% in 2013. CMHC, "First Annual Estimate of Urban Households in Core Housing Need Based on Statistics Canada's New Canadian Income Survey" https://www.cmhc-schl.gc.ca/en/hoficlincl/observer/observer_026.cfm accessed September 6, 2016.

unmet housing needs over time.

Other Canadian Affordability Measures

Statistics Canada

Statistics Canada defines households that spend 30% or more of their before-tax household income on shelter expenses as having a "housing affordability" problem. Shelter expenses include electricity, oil, gas, coal, wood or other fuels, water and other municipal services, monthly mortgage payments, property taxes, condominium fees, and rent. Band housing on First Nations' reserve lands is not included in the calculation of housing affordability (Statistics Canada 2015). The estimates are based on Census-reported income and shelter expenses. Separate estimates of the incidence of shelter costs greater than 30% of before-tax income are published for renter and owner households.

The principal strength of the Statistics Canada measure is its simplicity. There are, however, four drawbacks. First, the 30% benchmark is based on convention rather an analysis of household budgets and spending. Second, the 30% benchmark is invariant with respect to household composition. Different types of households with the same before-tax income are likely to have different shelter requirements and different budgets for non-shelter necessities. Abstracting from these differences could lead to errors in estimating the overall level of affordability challenges, but more importantly in identifying the types of households that experience affordability challenges. Third, unlike CMHC's 'core housing needs' measure, the Statistics Canada affordability ratio is not adjusted to take account of households that have access to affordable housing, but choose to pay above the 30% threshold. And finally, the Statistics Canada measure uses household income *before* taxes and therefore *before* transfers that are delivered through the tax system. This could be a growing source of estimation error if there is an increase in the use of refundable tax credits to raise the living standards of low income households. For some types of low income households, refundable tax credits can increase after-tax income relative to before-tax income.

Bank of Canada: Housing Affordability Index

The Bank of Canada's Housing Affordability Index seeks to measure changes in the affordability of home ownership for a 'representative household'. The 'representative household' is one with a disposable income that is equal to the average disposable household income. This is derived by dividing disposable income from the system of national accounts by the number of households. The index estimates the proportion of disposable income that this household would pay to purchase a house at the six month moving average purchase cost reported by the Multiple Listing Services maintained by real estate boards (Bank of Canada 2016). The index indicates that affordability has deteriorated somewhat in the past few years, but has improved relative to 2006-2007. The Bank's Affordability Index is updated quarterly.

Monthly costs (the numerator) are composed of payments for principal and interest and an allowance

for utility costs. The assumed mortgage terms are a 5% down payment and 25-year amortization. The interest rate is a weighted average of discounted 1-, 3- and 5-year fixed-rate mortgages and the discounted variable-rate mortgage. The weights given to each interest rate are calculated from the Canadian Financial Monitor Survey published by Ipsos Reid. Utility costs are based on the Consumer Price Index for water, fuel and electricity. This data series is scaled to the average level of spending on utilities by homeowners for their principal accommodation from Statistics Canada's 2011 Survey of Household Spending. Property taxes are not included. Nor is the cost of mortgage insurance, which is required by most conventional lenders for down payments < 20%.

The average disposable income of a representative household (the denominator) is computed by dividing total quarterly household disposable income from the National Income and Expenditure Accounts, divided by the number of households in Canada. The estimate of the number of households is based on Census data and is calculated using an extrapolative headship-rate method. The 'headship rate method' is an internationally recognized procedure recommended by the United Nations (United Nations 1973).[4]

The Bank of Canada's Housing Affordability Index provides a broad national indicator of trends in the affordability of home ownership that is updated on a quarterly basis. There are, however, a number of drawbacks to the Index. First, the Index is national, whereas housing markets are regional. As a national indicator, the Bank's Housing Affordability Index underestimates – sometimes significantly – changes in regional affordability. For example, from the first quarter of 2009 to the first quarter of 2016, the Bank's Affordability Index increased by 8.8%, suggesting a moderate deterioration in affordability conditions. Over the same period, the average price of housing increased by 60.8% in the Vancouver area, based on the all housing types average selling price on the Multiple Listing Service (Real Estate Board of Greater Vancouver). A second drawback of the Bank's index is that it appears to conflate first-time buyers with households that are concurrently seller and buyer. Prior to recent changes in lending policies, the assumption of a 5% down payment may have been appropriate for a first-time buyer. However, a household that is concurrently selling and buying would likely be financing a much lower portion of the purchase cost, especially if the household is 'down-sizing'. A third drawback of the Bank of Canada's index is that it does not factor either property taxes or mortgage insurance into monthly carrying costs.

[4] The headship rate method assumes that the number of households is equivalent to the number of householders, i.e., persons who maintain a household. The following identity applies:

(# of households) = (# of householders) = (population) x (headship rate)

The headship rate method requires the classification of the population by sex, age and marital status. Projections are made for the number of persons and the ratio of the number of household or family heads to the number of persons. The main methodological challenge in the headship rate method of projections is estimating future levels of headship rates specific for sex, age, and marital status. The projections can be developed using (a) a constant rate method which replicates previous rates, (b) an extrapolative method which uses the annual average change of rates in the past, (c) a regression method which uses cross-sectional or subnational data on headship rates and economic and social indicators or (d) a normative approach which reflects policy guidelines. The Bank of Canada uses the extrapolative method.

RBC Housing Affordability Index

The RBC Housing Affordability Index is also a measure of home purchase affordability. The RBC Index is published quarterly. The Index is reported at the national level, the provincial level (regional for Atlantic Canada) and for 14 urban markets. The Index also tracks affordability trends separately for single-family detached homes and for condominium apartments. The Index, therefore, is a better indicator of trends in often distinct regional markets (RBC 2016).

The numerator of the RBC Index is the cost of carrying a mortgage (principal and interest) at prevailing interest rates plus a factor for the cost of utilities and property taxes. Housing prices are sourced from Brookfield RPS which filters the data to remove extreme values and other outliers. Mortgage servicing costs assume a 25% down payment, a 25-year amortization and a 5-year fixed mortgage rate. The cost of mortgage insurance is not included in the cost. The cost of utilities is based on values from Statistics Canada's Survey of Household Spending. These values are adjusted by the corresponding component of the Consumer Price Index to create a time series. Prior to mid-2015, property tax estimates were derived from Royal LePage's quarterly House Price Survey. These neighbourhood estimates were averaged to generate an estimate at the municipal level. Since 2015, the procedure has been to use a provincial estimate and to project this to the city level based on historical relationships to the provincial average (Hogue 2016).

The denominator of the index is an estimate of the median before-tax household income. This is based on weekly earnings from Statistics Canada's monthly Survey of Employment, Payrolls and Hours (SEPH). The advantage of using SEPH data is its monthly frequency. The SEPH estimate excludes workers who are self-employed or employed by small businesses which could not be classified. Although the SEPH estimate is marginally higher than the comparable estimate derived from the Labour Force Survey (LFS), the relationship between the two earnings estimates has been stable over the past decade. However, whether derived from SEPH or the LFS, estimates of earnings at the CMA level are subject to a potentially significant sampling error.

Affordability indices similar to the RBC index are supported by other financial institutions and by regional real estate boards. For example, home buyer affordability indices are published by the Desjardins Group (for Ontario and Quebec), the Toronto Real Estate Board (for the Greater Toronto Area) and the Urban Development Institute (for the Vancouver area).

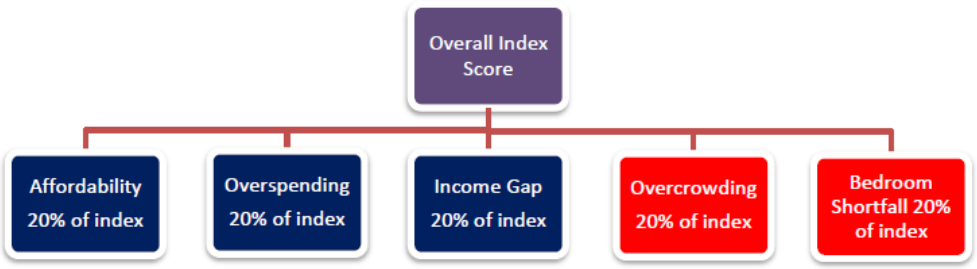
The principal strength of the RBC Housing Affordability Index, aside from its quarterly publication, is the regional perspective that the Index provides. For the first quarter of 2016, the national measure was 47.1%, but the measures for the Toronto and Vancouver areas were respectively 60.6% and 87.6%. This is well above the historic average for these centres. Since 1985, the average has been 47.8% for the Toronto area and 59.2% for the Vancouver area. The RBC Index for each region can also be compared to the qualifying debt servicing benchmark used by major financial institutions. This provides an approximate indicator of how current affordability conditions align with lending criteria. In general, financial institutions limit their mortgage loan exposure to 'gross debt servicing' (GDS) of 32-35% where

GDS is the monthly sum of mortgage servicing costs plus property taxes and heat. For markets, such as Toronto and Vancouver, the implication of the RBC Index is that the number of households that would qualify for conventional financing has declined. As with the Bank of Canada's Index, the assumption of a 5% down payment is more relevant to a first time buyer than to a household that is concurrently selling and buying a property. However, unlike the Bank of Canada Index, the RBC Index distinguishes between single-family detached houses and condominium apartments. In markets such as Toronto and Vancouver, this is an important distinction. In the first quarter of 2016, condominium prices were 48.3% of the price of single detached houses in the Toronto area and only 35.7% in the Vancouver area. For condominium purchases, the affordability measures in Toronto and Vancouver are somewhat less troubling: 36.5% in the Toronto area and 46.0% in the Vancouver area. The current divergence from historic norms is also lower.

Canadian Rental Housing Index

The Canadian Rental Housing Index was developed by a consortium led by the British Columbia Non-Profit Housing Association with various credit unions and credit union centrals across Canada. The Rental Housing Index uses somewhat different data sources than CMHC and different procedures to estimate both affordability and crowding. The Rental Housing Index also compares communities against regional and national averages using a composite measure comprising five equally-weighted factors: affordability, overspending, income gap, overcrowding and bedroom shortfall. Figure No. 1 illustrates the components of the index and their equal weighting.

Figure No. 1: Components of the Canadian Rental Housing Index



Source: Canadian Rental Housing Index, "Methodology" http://rentalhousingindex.ca/pdf/methodology.pdf

The five components are computed as follows:

- 'Affordability' is the ratio of average gross annual rent paid by households to average household annual income for these same households. This ratio is computed for each quartile. The resulting percentage at the quartile level is multiplied by 10 to generate a quartile score (e.g., 37% = 3.7). The four quartile scores are then summed to generate the overall affordability score.

- 'Overspending' is the percentage of renter households spending more than 50% of their before-tax income on rent plus utilities. The same procedure is followed as with the affordability measure. An overspending percentage is computed for each quartile. The resulting percentage at the quartile level is multiplied by 10 to generate a quartile score (e.g., 37% = 3.7). The four quartile scores are then summed to generate the overall affordability score.

- The 'Income gap' is computed by determining the difference between actual income at the quartile level and the income if the current average rent were 30% of that income. The income gap is then expressed as a percentage of actual income. The overall income gap score is computed using the same procedure as described above for the affordability and overspending components.

- 'Overcrowding' is the percentage of renter households living in dwellings that are not suitable for their household size and composition, based on CMHC's National Occupancy Standard. The overcrowding percentage at the quartile level is converted to an overall score using the procedure described above.

- The 'Bedroom Shortfall' is the number of additional bedrooms a community would need to house all renters suitably, based on CMHC's National Occupancy Standard. This shortfall is then expressed as a percentage of the total number of bedrooms in the community. The bedroom shortfall percentage at the quartile level is converted to an overall score using the procedure described above.

A composite index (known as the Rental Housing Index or RHI) is computed by converting the scores for each of the five factors to a value on a 1 to 10 scale. For example, for the overspending index, a value of 10 is assigned to the community with the highest percentage of households paying more than 50%. All other community scores are assigned a value between 0 and 10 based on how close their overspending percentage is to the community with the highest percentage of households paying more than 50%. A value of 0 would mean that no households in a community were spending more than 50% of their before-tax income on rent plus utilities. These standardized values on a 1 to 10 scale are computed for each of the five factors following the same procedure. The standardized values are then summed to generate the composite score. Lower values indicate superior performance relative to the provincial or national average.

The Rental Housing Index suggests a higher incidence of affordability challenges among renter households than CMHC's estimate of core housing need among renters. The principal strengths of the Rental Housing Index are its degree of regional detail and the greater breadth of its measure of rents. The Rental Housing Index uses estimates of rents from the 2011 National Household Survey. These estimates encompass both purpose-built rental housing and rental housing provided on the secondary market whereas CMHC's Rental Market Survey is confined to purpose-built rental housing. The

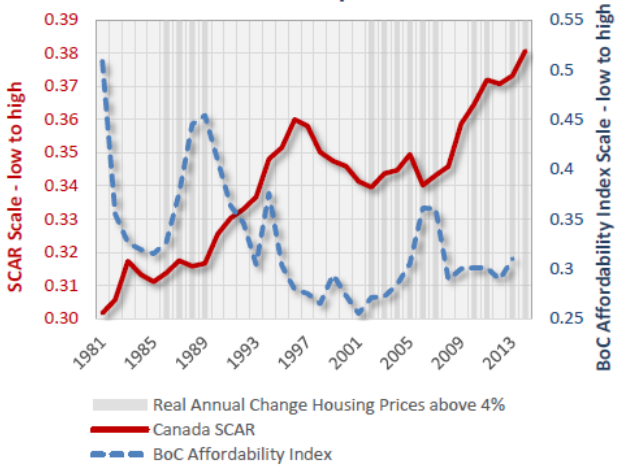
purpose-built rental housing stock consists of buildings with three or more rentable units. The secondary market comprises all other types of rental housing. These include: low-rise houses (of any type) that are rented, duplexes, investor-owned condominiums that are rented, and secondary suites in owner-occupied housing. CMHC's *Rental Market Report* indicates that rents for investor-owned condominiums tend to be higher than for comparable unit types in purpose built rental housing (CMHC 2015). However, the developers of the Rental Housing Index suggest that rents for secondary suites in owner-occupied housing are often lower. The overall relationship between rents in purpose-built rental housing and the secondary market are likely to vary by region and over time as supply and demand conditions evolve. The secondary market has played an increasingly important role in the overall supply of rental housing (Gunn et al., 2009). The use of a broader measure rents than the rents in purpose-built housing is therefore an important strength.

There are also drawbacks to the Rental Housing Index. The five components of the overall index may not be independent of one another. Thus, there may be implicit over-weighting of some of the index's components. The index does not exclude households that pay more than 30% of their before-tax income on housing or that are crowded even though there may be an available alternative that would enable the household to bring its rental costs into line with the 30% affordability guideline or with the National Occupancy Standard. And thirdly, the index's reliance on NHS data makes it difficult to update the estimates in a timely manner.

Shelter Consumption Affordability Ratio (SCAR)

The Shelter Consumption Affordability Ratio (SCAR) is being developed by the Canadian Centre for Economic Analysis. The initial results of this work were published in 2015 (Smetanin, 2015). The SCAR index generates a single measure to interpret the overall trend in the cost of shelter and shelter-related expenses in relation to disposable income and identifies the principal factors determining that trend. In sharp contrast with the Bank of Canada and RBC indices, the SCAR index reports a significant deterioration in affordability conditions since 2006-2007. Figure No. 2 shows the markedly different trajectories of the Bank of Canada's Housing Affordability Index and the SCAR index.

Figure No. 2:
Comparison of Bank of Canada Housing Affordability Index and CANCEA Shelter Consumption Affordability Ratio (SCAR), 1981-2015



Source: Smetanin, P. Moca, I. Yusuf, F. Kobak, P. "Understanding Shelter Affordability Issues – Research Report", The Canadian Centre for Economic Analysis, 2016 p. 7

The methodology that underpins the SCAR index draws from three distinct analytical approaches. The first of these is the 'residual income' methodology developed initially by Stone (1993, 2006, 2011). This procedure estimates the amount of household income available for shelter after other necessities have been purchased. The second analytical approach that informs the SCAR methodology is the user-cost model developed by Poterba (1984, 1992). The user-cost model revolves around the 'shelter service' that is provided to a household by a unit of housing and the cost of those services, regardless of whether the unit is rented or owned. For renters, the cost is the contract rent. For owners, the cost must take account of their imputed rental income (*i.e.*, owners are deemed to earn rent by renting to themselves) and the cost of the capital to acquire the housing asset. (Other user cost models also factor in an owner's actual or anticipated capital gains, maintenance costs, property taxes and the advantages that may be conferred by the tax system). Finally, the third analytical approach that the SCAR Index draws on is agent-based modelling (ABM) methodology. ABM simulates the behaviour of economic actors (firms, workers, households, financial intermediaries, *etc.*) in complex systems by assigning behavioural rules to these actors. Agent-based models contrast with traditional general equilibrium models which are premised on an inherent (and powerful) tendency in an economic system to find its equilibrium. In agent-based models, the tendency to find equilibrium is muted by institutional constraints, information shortages and behaviours.[5]

Among the strengths of ABM methodology that are especially relevant to an analysis of housing affordability are: (1) the incorporation of income effects on the demand for different types of housing, (2) the incorporation of substitution behaviour across housing types and across expenditure categories

[5] The *Economist* magazine published two extended articles on agent-based modelling which provide a non-technical overview of the methodology and how it contrasts with equilibrium-based models that rely on representative households and firms.

- *Economist.* July 22, 2010. "Agents of Change."
- *Economist*. January 17, 2013. "New Model Army."

in response to changes in prices, (3) replacing a notional 'representative household' with a range of households that more accurately reflects the heterogeneity of the demand for housing and (4) incorporating a demand for housing as an investment asset in addition to the demand for housing to provide shelter. A key implication of the SCAR analysis is that the demand for housing as an investment asset is the primary cause of the rapid price inflation that has been evident in some of the larger urban markets, notably in Vancouver and Toronto.

The SCAR analysis has three notable strengths. The first, as is evident from Figure No. 2, is that the SCAR model's findings are much closer to the commonly reported perceptions of affordability conditions for home buyers than are the findings from the Bank of Canada's Housing Affordability Index. The second strength of the SCAR model is that it draws on residual income methodology. The SCAR model, therefore, takes account of the impact of shelter costs (which may appear to be affordable based on a 30% standard) on the income available for purchasing other necessities. And thirdly, the SCAR model identifies the investment demand for housing as the principal culprit in the recent price inflation. These are significant strengths.

There are, however, three challenges in using the SCAR model. The first is that the model is currently focused on the affordability challenges of prospective home-buyers rather than renters. This is a significant limitation. The second challenge is that while the model's developers have made considerable progress, the SCAR model is still a work-in-progress. Finally, the third challenge is one that is inherent in the ABM methodology. This is best understood by comparing ABM methodology to dynamic stochastic general equilibrium (DSGE) modelling which has been the dominant approach to economic modelling in recent decades. At the centre of their models, the DSGE methodology put a powerful tendency of an economic system to find equilibrium. By contrast, in ABM methodology actors interact with one another and adapt to market forces based on prescribed rules that encompass bounded rationality and limited information. The system may or may not move towards equilibrium, depending on how actors respond to one another and adapt to market forces. The ABM methodology has been used to generate valuable insights into financial markets and their tendency to generate over-reactions (*e.g.*, 'bubbles'). However, there are fewer applications of ABM methodology to other types of economic problems. While ABM methodology holds considerable promise, it would be more appropriate to treat current ABM models as work-in-progress and therefore as challenges or supplements to conventional approaches, rather than a substitute for them. ABM models also require enormous amounts of data to support the simulation of the behaviour of various economic actors. Data may be more available for some applications of ABM methodology than for others.

Metro Vancouver: Housing and Transportation Cost Burden Study

The Metro Vancouver *Housing and Transportation Cost Burden Study* estimated the combined cost of housing and transportation in relation to before-tax household income by census tract for the Lower Mainland area. Housing costs and before tax income for renters and owners were derived from the

2011 NHS. Transportation distances and the number of trips were based on the 2011 Metro Vancouver Regional Trip Diary Survey commissioned by TransLink. Transportation costs were modelled based on transit fares and estimates for the fixed costs and operating costs of a private vehicle. Fixed costs (insurance, license and registration fees, sales taxes, and depreciation) were based on Canadian Automobile Association (CAA) estimates and Statistics Canada's Survey of Household Spending. Operating costs ($0.14/km) were derived from CAA estimates. The study estimated the housing-plus-transportation burden by income group and by area. The focus of the 2015 report was on working households which account for approximately 75% of all households in Metro Vancouver. The study found that for homeowners with mortgages, across nine sub-regions, housing-plus-transportation costs ranged from 38% to 45% of the median income. The study results show a moderately inverse relationship between housing costs and transportation costs, although there is considerable dispersion around the trends.

The Metro Vancouver *Housing and Transportation Cost Burden Study* appears to be the first Canadian study which rigorously links estimated transportation costs to the costs of shelter, based on location. The study therefore provides valuable insight into the potential significance of the trade-off between location and transportation costs. Since transportation costs are as unavoidable as housing costs, there is an intuitive advantage in interpreting affordability as 'shelter-plus-transportation' rather than confining affordability solely to the cost of shelter. As will be noted later in this review, two U.S. studies have also taken up this analytical approach.

The difficulty with applying a 'shelter-plus-transportation' approach is the availability of data on transportation costs and the reliability of modelling transportation costs. Not only does the 'shelter-plus-transportation' approach require detailed data on transportation costs, it requires those data at a neighbourhood level. Small changes in location can often have a significant effect on accessibility to public transit. The 'shelter-plus-transportation' approach also requires detailed information on commuting patterns to model actual transportation costs. At best, the necessary data to support 'shelter-plus-transportation' models will only be available on an intermittent basis. It would be difficult to produce reliable 'shelter-plus-transportation' cost estimates on an annual basis, let alone more frequently.

The Supply of Affordable Housing

Setting aside luxury housing, affordability (or unaffordability) is not a characteristic that is intrinsic to a housing unit. Rather, affordability arises from the relationship between the cost of housing and the income of representative household types. A housing unit that was affordable a decade ago, may no longer be affordable today. It is important to have measures of supply that are at least approximately reliable if we are to distinguish between an affordability problem that is rooted in income trends and one that is rooted in housing supply trends. A broad shortcoming of all of the measures of affordability that have been reviewed is that they provide limited guidance on whether to address the affordability

problem through income transfers or through supply-side initiatives. This review will return to this issue in its concluding section.

Table No. 1 summarizes the key features of the principal indicators.

Table No. 1: Synopsis of Canadian Affordability Measures

	CMHC Core Housing Needs	Statistics Canada 30% Affordability Benchmark	Bank of Canada Housing Affordability Index	RBC Housing Affordability Index	BCNPHA Canadian Rental Housing Index	CANCEA Shelter Consumption Affordability Ratio
Housing Costs (Numerator)	Renters: rent plus utilities. Rents are derived from CMHC Rental Market Survey which is restricted to purpose-built rental housing. Owners: mortgage (actual) plus property taxes, utilities and condo fees (if applicable).	Shelter costs are comparable to CMHC	Representative Household a) Notional cost of a mortgage based on: • 25 year amort. • 5% down • Weighted Avg. of 1,3, 5 & var. rate • 6-month moving avg. of MLS prices b) Utilities c) Property taxes not included	New Buyers a) Notional cost of a mortgage based on: • 25 year amort. • 25% down • 5-year fixed rate • Current price by region and housing type supplied by Brookfield RPS b) Utilities c) Property taxes included	Shelter costs are comparable to CMHC for renters except that rents are based on 2011 NHS which includes second-dary rental housing (*i.e.*, units not purpose built for rental).	Shelter costs are comparable to CMHC.
Income (Denominator)	Before-tax household income derived from Census and *NHS* (2011), and *Canadian Income Survey* (after 2011)	Before-tax household income derived from Census and *NHS* (2011)	Total Household Disposable Income per National Income and Expenditure Accounts divided by number of households. This is a proxy for the after-tax income of a representative household.	Before-tax income of a median household estimated from average weekly wages and earnings reported by the Survey of Employment, Payrolls and Hours.	Before-tax household income derived from NHS (2011).	Household income after taxes and necessities where necessities include transportation costs.
Frequency	Annual since 2011	Tied to Census. Every five years	Quarterly	Quarterly	Tied to Census. Every five years.	Annual estimates. First publication 2015
Geography	National, provincial and CMA	National, provincial and CMA	National	National, provincial and CMA	National, provincial and CMA	National and provincial published. CMA-level feasible.
Methodology	Ratio computed by income quintile. 30% Benchmark.	Ratio computed by income decile. 30% Benchmark	Ratio computed for notional representative household	Ratio computed for notional median household	Ratio computed by income quartile. 30% Benchmark.	• Agent-Based Modelling • Residual Income
Application	Estimate number of households in core housing need and trend.	Estimates shelter afford-ability incidence and trend.	Estimates affordability trend for new buyers.	Estimates affordability trend for new buyers.	Estimates number of renter households with affordability challenge and supply needs.	Estimates shelter affordability trend.

Affordability Measures in Other Jurisdictions

The concept of affordability is implicitly tied to the structure of the housing market, the share of social housing in the rented housing stock, and the role of housing benefits. Pomeroy observes that, as a result of the relatively large social housing sector in the UK with its highly regulated rents and the significant role played by housing benefits, "there is only a limited policy discourse on affordability in the literature – except in relation to homeownership" (Pomeroy, 2004). Pittini suggests that, in many EU jurisdictions, housing policy is framed in the context of a broader discussion of support for low-income families. As a result, policy discussions often do not focus on housing affordability, *per se* (Pittini, 2012).

In the short summaries that follow, affordability standards are sometimes explicit and, in other cases, implicit.

United States

Statutory Basis for the 30% Housing-Cost-to-Income Benchmark

In 1959, federal legislation gave local public housing authorities greater autonomy to set rents which had previously been held to 20% of tenants' before tax income. By 1969, rents in many public housing projects were significantly above the previous 20% benchmark. The *Brooke Amendment* to the 1968 *Housing and Urban Development Act* re-established the rent-geared-to-income principle such that rent in public housing was capped at 25% of a tenant's before-tax income. In 1981, this threshold was raised to 30% where it has remained (Poterba 1994; Martens 2009; Stoloff n.d.)

U.S. Census Bureau

The U.S. Census Bureau uses the 30% benchmark as the housing cost burden standard. Households that pay more than this benchmark are deemed to be cost burdened. The Bureau estimates housing-cost-to-income ratios for both renters and homeowners. For renters, housing costs are the contract rent plus the cost of utilities. For homeowners, housing costs are the sum of mortgage payments, insurance, property taxes, condo fees (if applicable) and the cost of utilities. Estimates are based on the American Community Survey (census). Income is before-tax income.

In the U.S., mortgage interest is a deductible expense for purposes of calculating taxable income. The use of before-tax income as the denominator is therefore a serious drawback when considering affordability in the context of homeowners. As with other generalized applications of the 30% benchmark, the Census Bureau's estimates of affordability do not give sufficient weight to the impact of differences in household composition or the willingness of some middle and upper-income households to support shelter costs above 30% without experiencing affordability pressure.

Dept. of Housing and Urban Development (HUD) – Housing Affordability

Housing Cost Burden: For renters, HUD uses the same definition of housing cost burden as the U.S. Census Bureau. For homeowners, however, HUD replaces reported mortgage costs (which can be zero if there is no mortgage) with a simulated cost that is based on standardized mortgage terms (10% down payment, a 30-year amortization, and a fixed-rate mortgage using the median rate from the American Housing Survey). The combined amount of taxes and insurance is set at 1.5% of the property's value.

Affordability Support for Renters: To support the administration of housing assistance programs, HUD surveys market rents to establish a Fair Market Rent (FMR) for each area. Since 1995, the FMR has been defined as "the 40th percentile of gross rents for typical, non-substandard rental units occupied by recent movers in a local housing market (US Department of Housing and Urban Development 2007)". A commonly used overall indicator of renter affordability is the ratio of the FMR to 30% of the Area Median Income (AMI). As a general principle, rent subsidies are equal to the difference between the FMR and 30% of the household's monthly income. Nominal monthly income is adjusted based on household composition. The adjustment factors are derived from household expenditure studies. However, these studies were conducted in the 1980s and may be dated (Vandebroucke 2011; Joice 2014; U.S. Department of Housing & Urban Development 2016c).

Affordability Support for First-Time, Low-Income Buyers: Public housing authorities have the option to establish home ownership programs whereby the subsidy that would otherwise support rent payments is provided to support mortgage payments. Eligibility standards include a requirement for full-time employment at or above the minimum wage. Assistance is available for up to 15 years. The local public housing authority can set limits on the price-to-income ratio for home purchases.

The procedure for determining an area's FMR is the lynchpin of the various housing assistance programs. While HUD endeavours to maintain rigorous standards for determining FMRs, the selection of neighbourhoods and eligible properties can have a significant impact on the estimate of the FMR in a particular area.

A notable strength of the HUD methodology is that it adjusts the nominal income of applicants for assistance based on the composition of their household. While the empirical basis for these adjustments may be dated, the adjustment principle is an important acknowledgement that household composition is an important determinant of shelter requirements and therefore shelter costs. HUD's approach to measuring the magnitude of affordability is also a strength. The magnitude of affordability is the difference between the survey-based Fair Market Rent and 30% of adjusted household income.

HUD / DOT: Location Affordability Index Model

The U.S. Department of Housing and Urban Development (HUD) and the Department of Transportation (DOT) launched the web-based Location Affordability Portal in 2013 (v 2.0 can be accessed at https://egis-hud.opendata.arcgis.com/datasets/c1c32742599a42c9a45c95be50ed2ab6_0). The model was developed by the Center for Neighbourhood Technology (CNT) which also distributes and applies

the model. (Earlier versions for the model were published and distributed by CNT prior to its adoption by HUD and DOT.)

The Location Affordability Portal provides standardized estimates for housing and transportation costs at the Census block level for the vast majority of the United States. Census blocks are the smallest measurement unit in the U.S. Census with populations ranging from 600 to 3,000 persons. The cost estimates are generated using the Location Affordability Index Model (LAIM) which is now in its second version. The LAIM requires 15 input variables. These are drawn primarily from the U.S. Census (American Community Survey), spatial files which contain information on modes of transportation (TIGER/Line files), and a longitudinal database which contains detailed information on the spatial distributions of workers' employment, their residential locations and the relation between the two at the Census Block level (Longitudinal Employment-Household Dynamics and Longitudinal Origin-Destination Employment Statistics – LEHD and LODES).[6] As affordability benchmarks the Location Affordability Portal uses 16% of before-tax income for transportation and 30% for shelter. Total affordability, therefore, is defined as 46% of before-tax (U.S. Department of Housing & Urban Development. 2016a; 2016b).

HUD reports that 69% of communities are affordable under the conventional definition whereby housing costs do not exceed 30% of the median household income. However, that proportion falls to 39% of communities using a housing-plus-transportation definition of affordability.

HUD's Location Affordability Index Model represents a significant advance in understanding the interplay between housing costs and transportation costs. There are undoubtedly many households that choose to locate in communities because housing costs are lower even though their commuting and other routine transportation costs will increase. HUD's Location Affordability Index Model brings these trade-offs in sharper focus. For urban planners and transit planner, this type of analysis may be especially valuable. There are, however, limitations to the model. In the first place, commuting patterns and related costs are simulated. The accuracy of these simulations needs to be tested and regularly updated. Second, the data required for the HUD model is tied to the Census cycle. It can become outdated if there is a significant change in housing prices, as occurred after 2007, or in transportation costs, as occurred after the fall in oil prices (Econsult 2013; National Association of Home Builders 2014).

[6] Additional data sources:

- National Transit Database
- Consumer Expenditure Survey
- **Illinois State odometer readings** collected to support smog abatement under the *Illinois Environmental Protection Act*

National Association of Realtors (NAR): Housing Affordability Index

The National Association of Realtors affordability index measures capacity of a median-income household to qualify for a mortgage loan on a median-priced existing single-family home. The index assumes a 20% down payment and uses current prevailing mortgage rates. To qualify for conventional financing on these terms, the servicing cost of a mortgage cannot exceed 25% of the before-tax median household income. The index is published monthly at both the national and four regional levels.

National Association of Home Builders (NAHB)/Wells Fargo: Housing Opportunity Index

The NAHB/Wells Fargo Housing Opportunity Index measures the number of houses sold in an area that were deemed affordable based on income and housing costs. The income benchmark is the median family income by metropolitan area as estimated by HUD. Mortgage servicing costs are based on a 10% down payment, a 30-year amortization, and the weighted average of fixed and adjustable mortgage rates. An allowance is also made for property taxes and insurance, but not for utilities. The home buyer affordability benchmark is 28% of family income (National Association of Home Builders 2014).

Both the NAHB and the NAR measures of affordability are focused on home buyers. Both indices provide an approximate indication of regional market conditions. Neither index is as complete in its treatment of shelter costs as the RBC Housing Affordability Index in Canada.

Stone, "Shelter Poverty Index" / Residual Income Approach

Michael Stone is generally credited with developing the residual income approach to measuring the incidence of shelter affordability pressures. In 1975, Stone introduced the concept of 'shelter poverty' to characterise households whose income after paying for shelter was insufficient to meet their non-shelter needs at the Bureau of Labor Statistics (BLS) lower budget standard (Stone 1975). Stone's review of U.S. Census data for 2001 found that approximately 34.5 million U.S. households faced shelter affordability challenges based on the 30% benchmark of shelter-cost-to-income. Stone's shelter poverty index found that the number of households facing affordability challenges was somewhat lower: 32.0 million using the shelter poverty index vs. 34.5 million using the 30% shelter-cost-to-income benchmark. However, Stone also found that the average size of households facing affordability challenges using his shelter poverty index was larger than if the 30% benchmark were applied: 2.5 persons per household versus 2.1 persons. Stone therefore found that there were more individuals living in shelter poverty, even though his index identified somewhat fewer households. Equally important, Stone also found that some households that were paying less than the 30% benchmark were nevertheless in shelter poverty (Stone 2006).

The principal strength of Stone's proposed residual income approach appears to be that it more efficiently identifies households that are experiencing shelter poverty. The principal difficulty in applying the residual income approach is the need to use a budget standard to estimate the cost of non-shelter necessities. Stone used the BLS lower budget standard. This standard was developed using expenditure pattern data from the 1960s. It was updated using Consumer Price Index data for the

standards various components. However, there have been no official updates to the standard since the 1980s when the BLS unit responsible for the standard was closed. A potential successor to the BLS lower budget standard is the U.S. Census Bureau's Supplemental Poverty Measure (SPM) (Renwick and Fox 2015). However, the SPM has had only limited application. It has also been criticized as inadequate by several researchers (Center for Community Economic Development 2013).

Australia

30/40 Standard

The *Report of the Select Committee on Housing Affordability* (2008) criticized the commonly used benchmark for affordability – housing costs not greater than 30% of before-tax income – on the grounds that higher income households could exceed this threshold without experiencing financial stress. The Report endorsed the 30/40 standard, *i.e.*, restricting the application of the 30% benchmark to households in the bottom two quintiles of the income distribution. The Report noted that the 30/40 standard is supported by the federal Department of Families, Housing, Community Services and Indigenous Affairs, the Reserve Bank of Australia, some state and local governments, prominent university researchers and other organizations.

The 30/40 standard broadly substitutes in Australia for the 'core housing needs' measure used by CMHC. While the Australian measure is restricted to the bottom quintile, this is of limited importance, since the preponderance of housing-related poverty occurs among households in the bottom quintile. Unlike the CMHC standard, the 30/40 standard does not apply a suitability test or a state-of-repair test. Overall, the CMHC standard is more comprehensive in its approach.

Australian Bureau of Statistics: '30/40 Standard – Renters Only'

The Australian Bureau of Statistics (ABS) publishes an affordability estimate for renters in the bottom two quintiles using a cost-to-income ratio. Shelter costs include rent plus general and water rates paid by the household less Commonwealth Rent Assistance (Australian Bureau of Statistics 2013). Nominal disposable income is adjusted using an equivalence scale ('OECD modified scale') (Australian Bureau of Statistics 2015).

Housing Industry Association: Housing Affordability Index

The *HIA Housing Affordability Index* is a purchase affordability metric. The index measures the ratio of actual average earnings (estimated by annualizing the average weekly earnings reported by the Australian Bureau of Statistics) to the 'qualifying income' required for a mortgage loan. The minimum 'qualifying income' is the income required to support a mortgage based on a 10% down payment, a 25-year amortization and the prevailing variable mortgage rate as reported by the Reserve Bank of Australia. The purchase price of a housing unit is the median price as reported by a private data service

(CoreLogic RP Data). Previously the median housing price was estimated based on data provided by the Commonwealth Bank of Australia. A qualifying income is one for which these mortgage servicing costs would not exceed 30%. The HIA states that the 30% threshold is used by lenders when assessing prospective borrowers (Housing Industry of Australia 2016).

The HIA index is similar to the RBC Housing Affordability Index although it relies more explicitly on lenders' definitions of qualifying income. The HIA index is somewhat less comprehensive than the RBC index in that it does not take account of property taxes or utilities.

Reserve Bank of Australia

The Reserve Bank of Australia, estimates the ratio of monthly interest payments on mortgage debt to the quarterly estimate of disposable income derived from the Australian national income and expenditure accounts. The ratio is one of ten indicators published by the Reserve Bank on the financial situation of Australian households. The ratio is neither presented nor interpreted as an affordability measure although changes in the trend may be indicative of greater or lesser financial stress on households.

The Reserve Bank's index is like the Bank of Canada's index except that the Reserve Bank explicitly treats its index as an indicator of financial stability rather than affordability.

Burke et al. - Application of the Residual Income Approach

To estimate the residual income available for housing, Burke *et al*. updated budget standards for different types of households. These standards were initially devised by the Social Policy Research Centre of the University of New South Wales (Burke *et al*. 2011). The budget standards broadly followed methodologies used by the U.S. Bureau of Labor Statistics and the U.K. Family Budget Unit of the University of York. By 'backing out' housing costs, Burke *et al*. were able to estimate the cost of non-housing necessities for each of these household types. For each type of household in the bottom two quintiles, the cost of non-housing necessities was then subtracted from the estimated income. Income estimates for each household type were derived from the Census. Income, net of the cost of non-housing necessities, constitutes the residual income which can be compared to the actual cost of shelter for these households. If the actual cost exceeds the residual income, there was a presumptive affordability problem.

Burke *et al*. compare the estimated magnitude of the affordability problem using both the conventional 30/40 standard described above and the estimates derived by applying the residual income approach. Using the conventional 30/40 standard, Burke *et al*. report that 23.3% of households in the bottom two quintiles paid more than 30% of their before-tax income for housing. This is the measure of affordability challenges using the 30/40 standard. However, using the residual income method indicated that 33.6% of households in the bottom two quintiles were subject to affordability pressures, *i.e*., they were compelled to cut back on non-housing necessities to cover the cost of shelter. Burke *et al*. also found

that the conventional 30/40 measure identified some households as experiencing an affordability problem where the residual income approach found that their higher expenditures for housing did not require cutting back on non-housing necessities.

The application of the residual income approach by Burke *et al*. is the most recent and rigorous application of the methodology. Their study confirms two of Stone's earlier findings with respect to U.S. data, namely that that the residual income approach identifies shelter poverty among households that are not identified by the 30% shelter-cost-to income benchmark and that conversely the 30% shelter-cost-to income benchmark attributes shelter poverty to households that are not so characterized by the residual income method. However, unlike Stone's earlier study of U.S. data, Burke *et al*. also found that the overall incidence of shelter poverty was markedly higher using the residual income approach. These are important findings that may also have implications for Canadian research on shelter-related poverty. As noted earlier, the foundation of the residual income approach is a budget study on which to base the estimated cost of non-housing necessities. In the absence of an official budget standard in Australia, Burke *et al*. were obliged to use standards developed by other researchers.

New Zealand

Statistics New Zealand reports housing cost affordability using both the ratio method and the residual income method described below (Statistics New Zealand 2016b).

Ratio Method: Housing costs are deemed affordable when they are less than 30% of a household's disposable (after-tax) income (Statistics New Zealand 2016c).[7] Statistics New Zealand's practice of using after-tax income contrasts with current Canadian practice.

Residual Income Method: Residual income is disposable income net of actual housing costs. To make residual incomes comparable across different types of households, Statistics New Zealand adjusts a household's nominal residual income by a factor that is determined by the size and composition of the household.

Eurostat

Eurostat is the statistical office of the European Union. Eurostat deems a household to be 'overburdened' when the total housing costs (net of housing allowances) represent more than 40 % of *disposable* income (net of housing allowances). Housing costs include mortgage payments for owners and rent payments for tenants, the cost of utilities (water, electricity, gas and heating) and any costs related to regular maintenance and structural insurance.

To provide context for the discussion of European examples, Table No. 2 summarizes Eurostat data on housing expenditures as a percentage of disposable income and the percentage of households for whom housing expenditures exceeds 40% of disposable income. In 2013, housing expenditures as a share of

[7] Elsewhere, Statistics New Zealand suggest a 25% benchmark (Statistics New Zealand, "Statistics" 2016).

disposable income in the EU averaged 22.3%. This ranged from a low of 13.8% in Luxembourg to a high of 39.9% in Greece. (An approximately comparable estimate for Canada would be around 26.0%).

Table No. 2: Indicators of Housing Affordability in the EU, 2014

	Percent of Households paying more than 40% of Disposable Income	Housing as a Percent of Disposable Income
EU-28	11.4%	22.6%
Euro area (EA-18)	11.4%	21.8%
Belgium	10.4%	20.8%
Bulgaria	12.9%	23.6%
Czech Republic	10.5%	24.2%
Denmark	15.6%	28.1%
Germany	15.9%	27.3%
Estonia	7.2%	18.3%
Ireland	4.9%	15.4%
Greece	40.7%	42.5%
Spain	10.9%	19.1%
France	5.1%	18.3%
Croatia	7.5%	20.0%
Italy	8.4%	17.1%
Cyprus	4.0%	13.5%
Latvia	9.6%	20.1%
Lithuania	7.1%	18.6%
Luxembourg	6.8%	14.0%
Hungary	11.4%	25.2%
Malta	1.6%	8.7%
Netherlands	15.4%	29.4%
Austria	6.6%	18.3%
Poland	9.6%	22.5%
Portugal	9.2%	19.3%
Romania	14.9%	25.1%
Slovenia	6.4%	17.1%
Slovakia	9.0%	20.3%
Finland	5.1%	18.0%
Sweden	7.8%	22.0%
United Kingdom	12.1%	25.2%
Iceland	8.8%	21.3%
Norway	8.2%	19.1%
Switzerland	10.6%	24.5%
FYR of Macedonia	17.6%	24.7%
Serbia	28.0%	36.7%

Source: Eurostat, http://ec.europa.eu/eurostat/en/web/products-datasets/-/ILC_MED01, http://ec.europa.eu/eurostat/statistics-explained/index.php/Housing_statistics (Table 1), Accessed September 3, 2016

United Kingdom (England)

Formerly, councils and housing associations constructed social housing using capital grants. Rents in these units were based on a formula that took account of local wages and rents. For most of England, social housing rents were around 50% of local market rents for approximately equivalent housing. For many tenants this system enabled households to rent housing without requiring a means-tested housing benefit. In 2014, social housing accounted for around 17% of the total housing stock and 47% of the rentable housing stock (Shelter 2016). More recently, the government has mandated the construction of social housing units for which the rents will be 80% of the local market rent. Social housing units are allocated by local housing authorities based on local definitions of need and priority. These criteria typically include: household income (after taxes and transfers), the age of household members, local rents, medical or disability conditions, *etc*. The Greater London Authority advises that households with gross incomes of less than £40,000, are generally not eligible for social housing if the lower quartile of private rent is equal to or less than 25% of the household's gross income. For households with a gross income over £40,000, the rent threshold is 30% of gross income. Rent costs are net of utilities.

While there is no official benchmark for housing affordability for home purchasers, the U.K. Dept. of Communities and Local Government maintains a public database showing, by area, the ratio of the lower quartile house prices to the lower quartile earnings and also the ratio of the median house price to median earnings (U.K. Government 2013).

Housing benefits in England are means-tested and are subordinate to a household (or individual's) entitlement to other tax credits or transfer benefits. Nevertheless, the housing benefit currently is one of the largest transfer payment benefits in England. In 2014-15, the average housing benefit was approximately £4,800 (U.K. Government 2015). This compared with a median disposable income in the UK of £25,600 (Office of National Statistics).

Scotland

The social housing system in Scotland and the operation of housing benefits is comparable to the system in England. However, the policy objective of the current Scottish government is to maintain rents in the social housing sector at a level that enables a low income household to pay rent without requiring a housing benefit. While there is no fixed definition of a low income household, a commonly used benchmark is the bottom quartile. Because of the current government's policy, rents in Scotland are generally lower than in England and the percentage of renter household income required to pay rent is also lower (Chartered Institute of Housing – Scotland 2013). In Scotland, renting households comprise around 38% of all households. Approximately 60% of these renting households reside in social housing (Joseph Rowntree Foundation 2014). In assessing rents and affordability, the Chartered Institute of Housing – Scotland uses a benchmark of 25% of income after taxes and transfers.

Ireland

The Irish Housing Agency states in its 2015 report that "as a general guide, for households on a moderate income, housing would be considered affordable where housing cost is below 35% of the household income (Housing Agency (Ireland) 2015)."

DKM Economic Consultants publish a widely cited affordability index for first-time home buyers (DKM 2016). The index assumes a 10% down payment, 25-year amortization, a variable rate mortgage and currently prevailing property prices. The index is updated annually.

Germany

German housing policy and tenure patterns are distinct in the OECD region. Most German households are renters. Affordability is maintained chiefly through rent controls, rather than social housing or housing benefits. Social housing accounts for only 5-6% of the housing stock, i.e., somewhat less than 10% of the rental stock. Only 1% of households receive a housing benefit separate from social assistance (Samol 2016).

The rent regulation system is based on a national database of rents. Landlords cannot establish rents more than 20% above the prevailing rents in the same locality. Rent increases are also restricted. In general, rent increases track inflation rates. A recent law restricted rent increases to 10% above the prevailing rents in certain cities where rent inflation was judged to be excessive (Eley 2015).

In 2012, the Senate Department for Urban Development and the Environment and the Senate Department of Finance have agreed to form the Alliance for Social Housing Policy and Affordable Rent with the six municipal housing societies of Berlin. The Alliance has set a target for new rental units such that rent will not exceed 30% of household income.

France

Approximately 44% of French households are renters. Social housing (mainly the HLM, habitation à loyer modéré) accommodates approximately 17% of all households or just under 38% of all renter households (Laferrère and Le Blanc 2006).

In addition to social housing, France has three types of housing benefits: the family housing allowance (ALF -l'allocation de logement familiale), the social housing allowance (ALS -l'allocation de logement sociale), and the individual housing allowance (APL -l'allocation personnalisée au logement). Benefit entitlement is determined by income after tax and transfers, prevailing rents, and household composition. Local authorities can establish priorities for particular classes of households in need. There is no straightforward relationship between income and benefit entitlement. Overall, approximately 20% of households receive one or more types of housing benefit (Bozio *et al*. 2015). The effectiveness of the housing benefit schemes has been questioned. Fack estimates that 78% of the

benefit value is captured by landlords in the form of higher rents. This reflects inelasticity in the supply of affordable housing that enables landlords to raise rents in response to the increased demand generated by the housing benefits.

The National Institute of Statistics and Economic Studies (INSEE) publishes estimates of the housing-cost-to-income ratio (both inclusive and exclusive of housing benefits), but does not indicate a benchmark for affordability.

The affordability test for home purchasers used by the research department of Crédit Agricole S.A. is one-third of gross income (2016).

Denmark

In Denmark social housing consists of **housing for rent that is built by not-for-profit housing associations.** Currently the not-for-profit housing makes up about 20% of the total housing stock. There are about 700 housing associations, which own 8,000 estates. Rents in the not-for-profit housing sector are set initially on construction and financing costs. Thereafter, increases in rent are determined by maintenance and operating costs. The national and municipal governments typically cover approximately 10-15% of construction costs. There are no income ceilings for residents. Subject to the terms of their agreements with municipal governments, the housing associations have the right to determine allocation priorities. However, municipalities have the right to assign tenants to at least 25% of vacant housing association units and, in some cases have a right to approve all new assignments (Housing Europe 2016)

In addition to its not-for-profit sector, Denmark also has two housing benefit programs. The larger of these – 'boligydelse' is only for recipients of old age pension and disability benefits. The smaller program – 'boligsikring' - is primarily aimed at tenants with children and tenants with high rent and low income. Depending on income and circumstances, this program pays a benefit up to 60% of rent, subject to a ceiling on both the eligible rent and the overall benefit payment.

The Netherlands

The Netherlands has the largest share of social housing in its total housing stock in the EU. Social housing accounts for approximately 32% of the total housing stock and three-quarters of the rental stock. In the Netherlands, social housing is provided primarily through not-for-profit housing associations. Until recently, access to social housing in the Netherlands was not restricted on the basis of income. However, a decision by the European Commission required that this universal approach be replaced by targeting the provision of newly available social housing units to persons with low incomes and/or disabilities. Since 2009, 90% of social housing in the Netherlands must be assigned to

households with an income below € 33,000 per year (Pellenbarg and Van Steen 2005; Elisinga and Wassenberg 2007; European Parliament 2013). For tenants, the share of housing costs (including utilities) is estimated at 35.3% of disposable income (AEDES 2013).

Sweden

Housing that is operated by municipally-owned housing corporations accounts for approximately 20% of the total housing stock and half of the rental housing stock (SABO 2016). There is no income test for social housing. The public housing sector was judged by the EU Commission to be in receipt of subsidies that were not targeted to those with the greatest need. The sector was judged to be dominating the rental market and unfairly disadvantaging private investors in rental housing. Rather than abandon the universality principle (as in the Netherlands), the Swedish housing corporations chose to forego subsidies. The public housing sector therefore consists of municipally-owned corporations that operate without overt subsidies but continue to provide units at cost-determined rents, rather than market rents (Elsinga and Lind 2012).

Finland

Social housing in Finland comprises approximately 16% of the total housing stock and around 47% of the rented housing stock. Approximately 60% of social housing is municipally owned. The remainder is owned by not-for-profit housing associations and co-operatives. Rents in social housing are cost-based. They do not reflect the market. As a result, rent in social housing estates is substantially less than the prevailing market rent for similar types of housing. Tenants are selected on the basis of financial need and other priorities, such as age and disability status. A general housing allowance is also provided to low-income households (Housing Europe 2016, Tähtinen 2003).

Strengths of the Shelter-Cost-to-Income Ratios as an Affordability Measure

As a measure of affordability, shelter-cost-to-income ratios have several strengths:

First, cost-to-income ratios are comparatively straightforward to calculate and easy to understand.

Second, cost-to-income ratios use current income and current expenditure data and,

therefore, do not require the use of price deflators to construct a time series. There is therefore no need to account for the discontinuities that are introduced by the periodic re-benchmarking of price deflators or the measurement errors that are intrinsic to price deflators and which tend to compound over time.[8]

Third, cost-to-income ratios are based on actual, observed behaviour. Unlike measures such as those published by the Royal Bank and the Bank of Canada, the STIR measure is not simulated. It does not require debatable assumptions about mortgage terms, down payments, *etc*.

Fourth, cost-to-income ratios are widely used by other jurisdictions and by other statistical authorities. These include, among others, the U.S. Department of Housing and Urban Development (HUD) and statistical authorities and housing agencies or departments in Australia, New Zealand, the United Kingdom, and the EU.

Fifth, data sources to compute the STIR ratio are available on a comparatively current basis. Though not strictly comparable, the STIR can be computed from the quinquennial Census/NHS or the annual Survey of Household Spending (SHS). Census/NHS data allow for analysis at the level of Census Metropolitan Area, Census Agglomerations and, depending on size, Census Tracts. Owing to sample size, SHS data can only be used at provincial and CMA levels.

These strengths explain why cost-to-income ratios are so widely used internationally and have become a key indicator, sometimes the primary or sole indicator, of affordability.

Criticisms and Possible Refinements of the STIR Measure

There are three criticisms of cost-to-income ratios which also apply, in some measure, to CMHC's affordability measure. Each of these criticisms implies a 'fix'. Some of the 'fixes' recommended by researchers warrant consideration while others may not justify the additional complexity or may raise other objections.

The 30% Benchmark does not take Account of

[8] In a study for the Bank of Canada, Rossiter concluded that the measurement bias in Canada's all-items Consumer Price Index ranges from .58% to .75% per year. Rossiter also suggested that bias has increased (Rossiter, 2005).

Differences in Household Income, Size and Composition

As noted earlier, the most commonly used affordability benchmark is that shelter costs should not exceed 30% of before-tax income. However, there is no reason to believe that the same benchmark percentage of income should apply regardless of household income, household composition or household size (Hulchanski 1995; O'Dell *et al.*, 2004). SHS data show that the share of shelter costs in total household expenditures is inverse to income. In 2014, shelter costs consumed 32.8% of total expenditures for the lowest quintile compared to 17% for the highest quintile (computed from CANSIM, Table 203-0022).

For households with the same income, the cost of non-housing necessities can vary greatly. For example:

- Employment-related expenses are approximately proportionate to the number of earners in a household. A household with $80,000 of income will have higher employment-related expenses if there are two or three earners generating that income compared to a household with the same income, but only one earner.
- Other things being equal, larger households will have higher costs for non-housing necessities than smaller households.
- The cost of non-housing necessities will likely be higher if a member of the household has a disability.
- Younger households may have to bear substantial child care expenses in addition to shelter costs and other necessities.

Although the 30% benchmark is now well-established in policy discourse, it does not appear to be grounded in any empirical studies of household budgets. In Canada, the 30% benchmark for STIR was established in the 1980s after the U.S. adopted a 30% standard. Previously, the Canadian benchmark had been set at 25% (Hulchanski 1995) as was also the case in the United States. For low-income households, a 1972 study recommended a 20% benchmark (Dennis and Fish 1972, 58).

Equivalence Scales

Equivalence scales are sometimes recommended as a procedure to address the shortcomings of the 30% benchmark. For example, Robinson *et al*. recommend that nominal household incomes be adjusted to make households of different sizes and composition comparable (Robinson *et al*. 2006). In principle, this is an attractive and seemingly simple procedure. However, there is no dominant practice in applying equivalence scales. As noted earlier, Statistics New Zealand utilizes an internally developed

'Jensen scale'.[9] Eurostat uses the 'modified OECD equivalence scale' as does the Australian Bureau of Statistics.[10] In its more recent reports, however, the OECD has replaced the 'modified OECD equivalence scale' with a 'square root scale' which divides household income by the square root of household size. An OECD paper notes that "the choice of a particular equivalence scale depends on a technical assumption about economies of scale in consumption as well as on value judgements about the priority assigned to the needs of different individuals such as children or the elderly" (OECD, no date).

Table No. 3 illustrates the impact of selecting different equivalence scales for different types of households earning the same nominal income.

Table No. 3: Illustration of Differences in Income Equivalence Factors based on Three Equivalence Scales*

Household Composition	Divisor Applied to Nominal Income		
	Oxford Scale ('Old OECD Scale')	Modified OECD Scale	Square Root Scale
1 Adult	1.0	1.0	1.0
2 Adults	1.7	1.5	1.4
2 Adults, 1 Child	2.2	1.8	1.7
2 Adults, 2 Children	2.7	2.1	2.0
2 Adults, 3 Children	3.2	2.4	2.2

Source: OECD, "What are Equivalence Scales" (OECD, n.d.)

*New Zealand's 'Jensen Scale' is not included because it requires information on the ages of children.

Applying an equivalence scale to nominal household incomes would address a significant weakness in the current formula for determining core housing need. Statistics New Zealand, for example, applies an equivalence scale (the 'Jensen Scale') in some analyses of housing affordability. It should noted, however, that broad-ranging budget studies of household spending patterns are needed to determine the design of an equivalence scale.[11]

[9] Jensen Equivalised Income = Household Income / {[a + (c * x) + (y * t)]z/2z}, where a = number of adults in household, c = number of children in household, t = sum of individual ages of children in household and x, y, z are constants (Statistics New Zealand 2016).

[10] The Eurostat procedure is as follows: the total (net) household income is divided by the number of 'equivalent adults'. The number of 'equivalent adults' is computed using the following weights (the 'modified OECD scale'):

- 1.0 for the first adult;
- 0.5 for the second and each subsequent person aged 14 and over;
- 0.3 for each child aged under 14.

Eurostat 2016, "Statistics Explained – Glossary"

[11] Several other equivalence scales that have been developed, but not adopted by statistical agencies are discussed in Perry (1995).

After-Tax Income may be More Appropriate than Before-Tax Income as a Ratio Denominator

The CMHC affordability standard estimates expenditures on shelter as a percentage of before-tax income. Belsky *et al*. believe that after-tax income is a better indicator of a household's purchasing power and therefore of its financial capacity to pay shelter costs. Statistics Canada also prefers after-tax income when applying its Market Basket Measure (MBM) (Statistics Canada 2013, 144).

The increased use of refundable tax credits to improve the living standards of low income households also supports a preference for after-tax income when estimating a shelter-to-income ratio. The Working Income Tax Benefit and the Canada Child Tax Benefit are both refundable tax credits. In some circumstances, the effect of these credits is to increase after-tax income relative to before-tax income. While the number of households whose after-tax income is greater than their before-tax income may be comparatively small, that picture could change if refundable tax credits take on a greater role in future poverty alleviation strategies.

As noted earlier, Eurostat estimates housing affordability in relation to after-tax income. The Shelter Consumption Affordability Ratio (SCAR) developed by the Canadian Centre for Economic Analysis also uses an after-tax estimate of income (Smetanin *et al.* 2016).

The National Household Survey (2011) provides self-reported information on both before-tax and after-tax income, as well as self-reported information on shelter expenditures. The self-reported nature of these responses may weaken their reliability. For the 2016 Census, Statistics Canada eliminated most self-reported questions on income opting instead to link long-form Census returns to individual income tax returns. This should increase the reliability of the after-tax data. It should be feasible, therefore to use NHS data and, more particularly 2016 Census and Income Tax data to estimate a shelter-to-income ratio that uses after-tax income as a denominator.

Changing the income denominator to reflect income tax and net transfers would be a valuable refinement to the current STIR measure. It would also be necessary to re-estimate the affordability benchmark as the 30% benchmark may be inappropriate when applied to an after-tax income.

Substitution Effects

Substitution effects refers to households' adjustments to spending patterns when relative prices change or incomes increase or decrease. There are three types of substitution effects that are especially germane to measures of affordability. These are: (1) reducing housing quality to preserve affordability, (2) accepting higher transportation costs to keep shelter affordable, and (3) cutting back on non-housing necessities to meet shelter costs.

Housing Quality:
To maintain affordability, some households may relocate to a less desirable location or to a housing unit with fewer square feet, even though the bedroom count remains the same. Conversely, a household may pay more than 30% of its income for housing that is in a more desirable location or that offers more space. Belsky *et al*. consider the failure to hold the quality of housing units constant to be a major shortcoming of cost-to-income ratios. Similar criticism are made by Jewkes and Delagadillo, the Urban Research Centre of the University of Western Sydney, Smetanin *et al*., and Goodman.

In a study of affordability among U.S. renters, Lerman and Reeder developed a methodology for approximating constant quality. When a constant quality measure was used, there were significant differences in both the overall proportion of households facing affordability challenges and, equally important, significant differences in identifying households with affordability challenges. Specifically, Lerman and Reeder found that, "[in the United States] 35% of rental households with an affordability problem by the conventional measure did not have an affordability problem by the quality-based measure, while 19 to 23% of rental households found to have an affordability problem by the quality-based measure were not so classified using the conventional measure" (Lerman and Reeder 1987, 1). Goodman finds material differences in the magnitude of rent increases using a constant quality benchmark depending on the type of price index that is used (*i.e*., Laspeyres, Paasche or Fisher). To address quality factors, such as location, Belsky *et al*. recommend the use of a hedonic index, *i.e*., a composite index that is based on a bundle of housing characteristics. The only example of such an index is Thalmann who developed a hedonic index as part of a study of renters in Switzerland (2003). Of direct relevance to current Canadian conditions is the apparent reduction in the size of condominium units (Carras 2012).

The technical challenges in constructing, or even approximating, a constant quality price index are formidable. Moreover, it is not self-evident that the investment in such an index would achieve greater accuracy in identifying housing need than CMHC's current standard which incorporates both state-of-repair and suitability qualifiers. There is, however, one area of household expenditure where substitution is both important and relevant to housing policy. In large urban centres, many households appear to be accepting longer commutes and, by implication, higher transportation costs to keep their housing affordable.

Housing + Transportation:
The RBC-Pembina Institute *2014 Home Location Preference Study* found that the desire for affordable housing forces a significant number of households to choose housing locations that impose higher commuting and routine travel costs. Commuting costs are not optional. There is some attraction, therefore, to an affordability metric that incorporates transportation costs. However, there are a number of considerations that need to be taken into account before investing in a comprehensive 'housing + transportation' affordability index:

First: while a 'housing + transportation' affordability index may provide useful guidance to urban planners, and perhaps to some home-buyers or renters, a residual income analysis of affordability also would generate insight into the shelter/transportation cost trade-off as well as providing greater insight into overall affordability patterns. If resources are limited, investing in a residual income analysis would be the preferred option.

Second: 'housing + transportation' affordability measures are only useful when they operate at a fairly granular geographic level. The U.S. HUD/DOT model operates at the Census block level which is essentially a neighbourhood. For large urban areas, CMAs would be too large to provide an accurate picture of the trade-off between housing costs and transportation costs and the impact of greater investment in transportation infrastructure. However, it is exceedingly costly to collect and update data on commuting patterns. There are also challenges in estimating the cost of vehicle operation and maintenance as there is likely to be a large variance around the average, given differences in vehicle type and the deferability of some maintenance costs.

Third: the demand for private transportation (car ownership and care usage) is strongly affected by income. Housing location is an important factor in the demand for private transportation, but income is also important, perhaps equally or more important. It is not clear how the housing location demand for private transportation can be reliably isolated with a low estimation error. Unlike shelter, there is no benchmark or standard for what constitutes transportation that is 'adequate, suitable and affordable'.

Fourth, it should also be noted that that the examples of 'housing + transportation' metrics discussed in this report are *not* primarily measures of affordability. Rather, these measures are intended to provide households (and planners) with a more accurate picture of locational efficiency. This is a valuable contribution, but it should not be confused with an analysis of shelter affordability.

Cutting Back on Non-Housing Necessities:

There can be little doubt that some households cut back on necessities because shelter is the first claim on the family budget. Food Banks Canada reports that its 4,000 affiliates serve over 850,000 persons each month. The organization states that "the households that request assistance are often forced to limit their spending on food because of the high and relatively inflexible cost of housing" (Food Banks Canada 2015, 1). The cost-to-income ratio measure of housing affordability has been criticized on the grounds that it does not take account of the likelihood that some households may have shelter costs that are at or below the 30% benchmark, but are covering those costs by curtailing spending on non-shelter necessities. As discussed earlier, the alternative that is recommended by some researchers is the residual income approach.

The Residual Income Approach

As discussed earlier in this chapter, the residual income approach asks 'is the net income available for housing adequate, after paying for other necessities?' There are strengths and weaknesses in the residual income approach.

Strengths:
The principal strength of the residual income approach is that it may offer a more accurate picture of the incidence of shelter poverty among renters in the bottom two quintiles. The work by Burke *et al*. showed that, in Australia, when compared to the shelter-cost-to-income measure, the residual income approach drew a significantly different picture of shelter poverty. There were marked differences in the overall proportion of lower income households that were experiencing affordability challenges. Equally important, there were important differences in identifying which households were in this situation. Stone reached the same conclusions earlier using U.S. data from 2001. The inference to be drawn from this work is that it may be useful to apply the residual income approach in Canada on an experimental basis. The objective would be twofold. The first is to determine the feasibility of applying the residual income methodology using Canadian data. The second is to determine how significantly different the findings are when compared to the current 30% benchmark and whether these differences would justify a more comprehensive application of the methodology.

Weaknesses and Challenges:
The principal challenge in applying the residual income approach is determining the basket of goods and services that comprise 'necessities'. Currently there is only one budget standard - the Market Basket Measure (MBM) developed in 1997 by Human Resources Development Canada, now Employment and Social Development Canada. The MBM measures the cost of a basket of goods and services that represent "a modest, basic standard of living (food, shelter, clothing, footwear, transportation and other common expenses such as personal care, household needs, furniture, basic telephone service, school supplies and modest levels of reading material, recreation and entertainment)" (Hatfield *et al*. 2010). The reference household is a four-person family comprising two adults aged 25-49 and two children (a girl aged 9 and a boy aged 13). Since its development in 1997, the MBM has undergone two revisions. Using the MBM, Census data and data from the Survey of Household Spending, it would be feasible to develop approximate budget standards for different types of households. These budget standards would only be provisional. However, they may be sufficient to test the overall value of the residual income methodology.

An important weakness in the residual income approach is that the definition of necessities is intrinsically normative. Sarlo, for example, has criticized the MBM as overestimating basic needs, (Sarlo 2013). Middle class households may have a different notion of necessities than lower-income households. It may be appropriate, therefore, at least initially to confine the application of the residual income methodology to the bottom two quintiles of the income distribution where necessities are likely to constitute a larger share of household expenditures.

A second weakness of the residual income approach is that it is not well suited to homeowners. The reason for this is that for homeowners the decision to purchase a house or condo is both a consumption decision to meet shelter needs and an investment decision. Households may willingly 'tighten their belts' for a few years to acquire a house or condo knowing that this property is also an investment asset that offers the realistic prospect of an untaxed capital gain. Separating the shelter demand from the investment demand is exceedingly difficult and is unlikely to be reliable within any useful degree of statistical confidence. It may therefore be appropriate to confine the application of the residual income approach to renters.

Finally, the results of the residual income methodology should also be compared with applying an equivalization procedure such that nominal household income is adjusted based on household composition. This procedure is far easier to apply and could generate comparable results.

The Supply Side

The supply of rental housing comprises: (1) purpose built rental housing units, (2) rental units supplied on the secondary market, and (3) non-market housing (i.e., social housing). Affordability is not an intrinsic characteristic of a housing unit. Affordability (or unaffordability) arises from the relationship between occupancy cost and household income. The apparent supply of affordable rental housing is therefore a moving target. This is true even for the supply of social or non-market housing. Although these units are offered at a below-market rent, for some households, social housing may still be unaffordable.

CMHC's Rental Market Survey provides reliable estimates of the number of purpose-built rental housing units and the average rents being charged. The surveys that support CMHC's Secondary Rental Market Survey are somewhat hampered by the difficulties in estimating the size of the universe. This is a moderate problem in regard to condo units that are on the rental market, but a more challenging problem for other types of housing units, especially secondary suites in owner-occupied housing.

There are also challenges measuring the supply of non-market housing. While most of the non-market housing stock was purpose-built as social housing, some local authorities contract with private suppliers to provide additional units. The changing volume of units supplied in this way introduces an element of fluidity into supply. It is also important to note that eligibility criteria for social housing are first and foremost a rationing mechanism (Hulchanski 1995). It is therefore important to compare eligibility criteria with estimates of prevailing shelter costs to determine the degree to which eligibility criteria are aligned with actual needs based on affordability.

Conclusion

The most frequently used indicator of shelter affordability is 30% (or less) of before-tax, household income. The 30% measure has the advantage of being straightforward to calculate. However, the 30% measure has significant drawbacks. It is counter-intuitive to apply the same shelter-to-income ratio to a household whose annual income is $30,000 and to a household whose annual income is $150,000. Similarly, it is unreasonable to apply the same ratio to a single-person household with an annual income of $30,000 and to a single parent with two children, but the same annual income. The residual income approach addresses these drawbacks by first estimating the cost of necessities, based on household composition. This approach potentially provides a more accurate profile of which types of households are experiencing affordability pressures and the severity of those pressures.

Chapter Two contributes to an assessment of the residual income approach by comparing the results of applying a shelter-to-income ratio and the residual income methodology to estimates of actual shelter costs for different types of renter and home-owner households. The findings are presented for the 10 largest Census Metropolitan Areas (CMAs) and for all income groups in the three CMAs for which there are decile data.

Chapter Two: Comparing Indicators of Housing Affordability

Introduction

This chapter looks at two different measures of housing affordability across 10 Census Metropolitan Areas (CMAs)[12]. It compares the cost of shelter for different types of households (*e.g.*, single adults, single parent families, *etc*.) in different types of owned and rented housing to the minimum household income required to meet these shelter costs (i.e. the *affordability threshold*). The conventional affordability measure is that monthly shelter expenses should not exceed 30% of before tax income. An alternative measure, the "basic needs" measure, calculates the combined minimum costs of the non-shelter necessities and the actual cost of shelter for each household type across each type of rented or owned housing unit. This method is essentially an application of the residual income approach for identifying the income levels below which affordability pressures become unsustainably severe. While there are only a few applications of the residual income approach, these all use after-tax income. To facilitate comparison with the 30% standard, which typically uses before-tax income, this chapter presents estimates of the affordability threshold based on basic needs plus actual shelter costs using both after-tax and before-tax income.

In general, the affordability thresholds estimated using the residual income methodology are lower than the thresholds estimated when the 30% norm is applied for single adult households and higher for couple renter households. This results in different pictures of affordability conditions, for households earning the median income, depending on the method and composition of the household considered. For renters, the conventional method suggests pervasive affordability problems for single-person households in all CMAs, but this is not confirmed by the basic needs method. Both methods identify affordability pressures for single parent households. Both methods suggest that, for households at the median income, affordability pressures are much less evident in households with two adults, regardless of whether there were also children in those households. Also, both measures are based on median (not higher market) rents suggesting greater affordability pressure for new renter households or those needing to relocate.

For new home buyers, the conventional method indicates significant affordability barriers for single person households and single-parent households. For couples, there are affordable ownership options for median income households in all CMAs, apart from Vancouver (and to a lesser extent Toronto) where most options are unaffordable to a median income household. The basic needs measure shows single-person households at the median income could only find home buying options in Calgary, Regina, Ottawa and Quebec City. Similar affordability constraints would apply to single-parent families. While the basic needs measure does not provide evidence of pervasive affordability barriers for couples in any CMA, it does find that the threshold is often higher compared to the conventional 30% measure for couples and couples with children. This is due to accounting for the added cost of child care and the higher tax burden of dual income households.

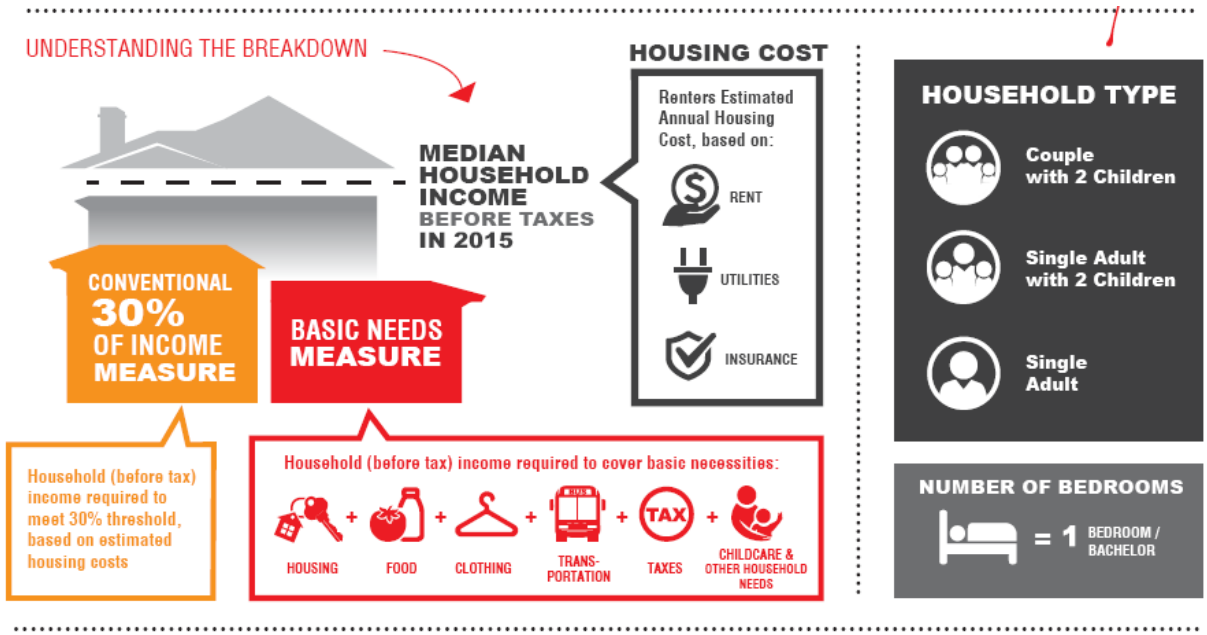
It is important to emphasize that the two measures provide different interpretations of affordability. The basic needs threshold represents an income floor under which a household would have little option

[12] The 10 CMAs are: St. John's, Halifax, Quebec City, Montreal, Ottawa, Toronto, Winnipeg, Regina, Calgary and Vancouver.

to reduce expenditures on food, clothing, health care or transit. It is more relevant to identifying and assessing the severity of affordability pressures in the bottom two quartiles of the income distribution. It is also more relevant to analyzing affordability among renters since it depends on an administratively-determined budget that does not reflect discrete spending options open to higher income household. It also may prove useful in identifying the most vulnerable groups facing acute market housing affordability pressures. Future work on applying the basic needs method should focus on the bottom half of the income distribution and in particular the higher expenses faced by particular types of household (for instance, households with members who are disabled).

The data tables referenced throughout this chapter can be found in Appendix A. Appendix A also includes applications of the traditional affordability thresholds and residual income methodology to decile groups in the Montreal, Toronto and Vancouver CMAs. Appendix B provides a detailed description of the estimation methodology, a summary of which follows in the next section. Appendix C provides supplementary data tables, including detailed housing costs by household and apartment type for each CMA. Finally, Appendix D contains infographics developed using the findings of this report, a sample of which appears below.

Illustrative Example of **Conventional 30%** Income and **Basic Needs** Affordability Measures



Precis of Methodology

Expenditure data, by household type and type of housing, across 10 CMAs, are derived from special tabulations for Statistics Canada's 2014 Survey Household Spending (SHS) adjusted to approximate household expenditures in 2015. Four household types are used: (1) single adult, (2) single adult with two children, (3) adult couple with no children, and (4) adult couple with two children. Estimates of the cost of non-shelter necessities are based on adaptions of Statistics Canada's Market Basket Measure (MBM). The MBM reference family comprises two adults, aged 25 to 49 and two children (of opposite sex), aged 9 and 13. The MBM is described by Statistics Canada as "a basket of goods and services representing a modest, basic standard of living" (Statistics Canada). Estimates for other household types were derived by adjusting the MBM based on the spending patterns for those household types indicated by the SHS. Non-shelter necessities also include estimated Canada Pension Plan (CPP)/Quebec Pension Plan (QPP) and Employment Insurance (EI) contributions by household type and CMA.

Estimates of the median before and after-tax income for each type of household in each CMA are based on the 2014 Labour Force Survey adjusted to approximate 2015 expected levels of income. In some cases, where these data were not available, estimates were made using 2011 NHS data adjusted to the expected 2015 level. Imputed income taxes are defined as the difference between before and after-tax income by household type and CMA.

For rental accommodation, costs were derived from the Fall 2015 release of the CMHC Rental Market Survey which surveys rents by the size of units (based on the number of bedrooms) in purpose-built rental buildings and in condo buildings. Household types were assigned to different sized units based on the National Occupancy Standard.[13] The cost of utilities and insurance for renters is based on the SHS.

For owned housing, costs are based the average selling price of four different types of owned housing: condos, townhouses, semi-detached houses and detached houses. (In Montreal and Quebec City, the housing types are condos, bungalows and two-storey houses.) While selling price data are available by type of unit, they are not available by size of unit. Mortgage costs are based on a 10% down payment, a 25-year term, and the average interest rate in 2015 for a five-year closed mortgage. This cost includes mortgage insurance which is typically required for a convention mortgage with a down payment of less than 20%. Costs for property taxes, maintenance (for freehold owners), insurance and utilities are based on SHS data. SHS data are available by household type, but not by housing type. Condo fees are based on average fees per square foot for Toronto-area condos.

[13]The National Occupancy Standard determines the number of bedrooms required by a family based on the age and sex of the dependent children.

	1 Adult	1 Adult / 2 Children*	Two Adults (Couple)	Couple / 2 Children*
Bachelor	✓			
1 Bedroom			✓	
2 Bedroom		✓		✓
3 Bedroom		✓		✓

*Bedroom requirements depend on ages of children

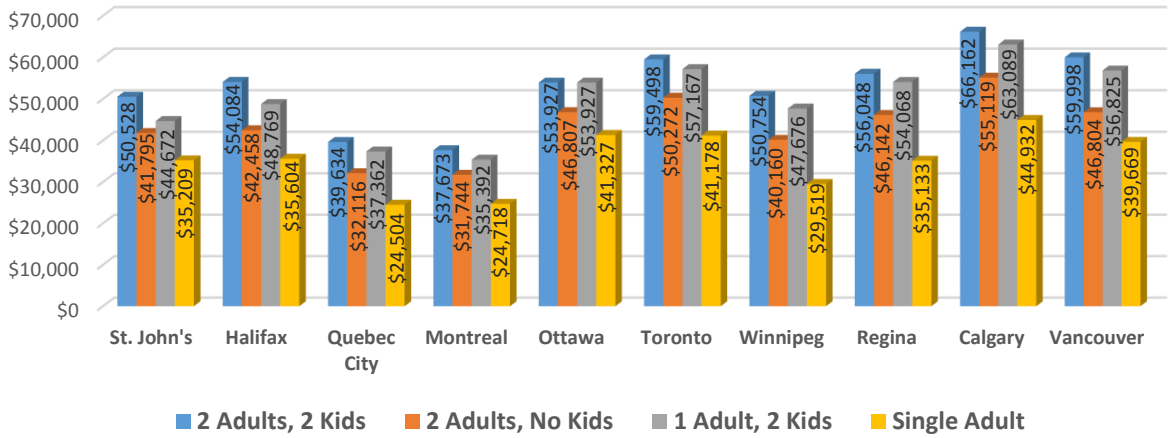
Renters

Applying the Traditional Affordability Threshold across Household Types

Table No. 4[14] summarizes the estimated monthly shelter cost across 10 CMAs by household type and by type of apartment. The estimates which are consistent with the National Occupancy Standard are in red while those that pertain to apartment sizes that either exceed or fall short of the National Occupancy Standard are in blue. For households with two children, the National Occupancy Standard can imply either a 2-bedroom or a 3-bedroom apartment, depending on the age and gender of the children. In the case of St. John's, where the marginal cost of moving from a two-bedroom apartment to one with three or more bedrooms is significantly lower than in other CMAs, the median rent for the former ($890) is nearly identical to that of the latter ($900).

The traditional affordability threshold, setting a shelter budget of 30% of before-tax household income, is estimated in Table No. 5. Households with before-tax income below the relevant threshold for the CMA, household type and size of apartment will experience affordability pressures whose severity will be approximately in proportion to the degree to which their income falls below the affordability threshold. Figure No. 3 illustrates the comparison of estimated income affordability thresholds (i.e. the household income below which affordability is challenged) for four household types across 10 CMAs.

Figure No. 3: Renters – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income, 2015



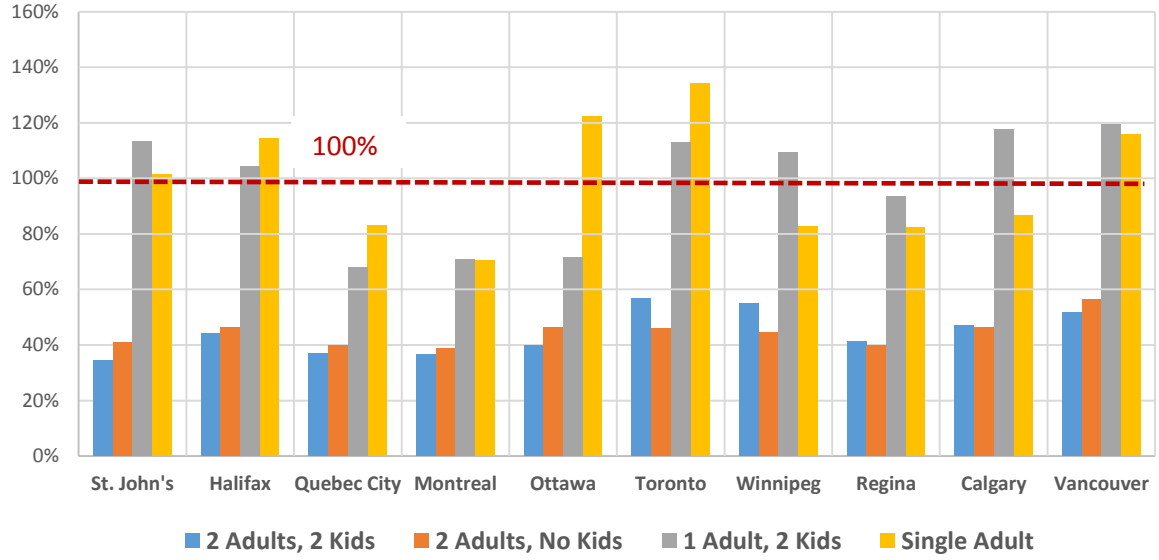
The figure above highlights affordability thresholds by household type and CMA based on the Conventional 30% measure, as summarized in Table No. 5. Thresholds are noticeably higher in Calgary, where households face larger costs for utilities than other CMAs. Toronto and Vancouver also have higher thresholds due to their high estimates for shelter costs.

Note: Thresholds in Figures 3 and 4 report the National Occupancy Standard, highlighted in red in Table No. 5. For households with children 2-bedroom apartments.

Figure No. 4 expresses the traditional affordability threshold as a percentage of the median before-tax income by household type in each CMA. A more detailed table of affordability thresholds across different housing types is set out in Table No. 6.

[14] All data tables referenced in this chapter can be found in Appendix A.

Figure No. 4: Renters – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income as a Percentage of the Median Before-Tax Income, 2015



The figure above presents affordability thresholds based on the conventional 30% measure as a percentage of median before-tax household income, seen in full in Table No. 6. Single adults and lone parents with two children face persistent affordability challenges; thresholds exceed income in four CMAs for the former and six for the latter. Both groups show affordability pressure in Toronto and Vancouver, where shelter costs are high, and Halifax, where household income is relatively low.

Figure No. 4 shows pronounced affordability pressures for single adults. However, these data may be misleading because an unknown percentage of single adults are likely to be elderly persons who supplement their income with borrowing or savings. Further research could provide a more precise estimate of the number of single adults experiencing an unmet housing need. More troubling is the profile of affordability challenges for single parents (the example is single adults with two children). *Table No. 6 shows that in 6 of the 10 CMAs, the traditional affordability threshold for both a two-bedroom and a three-bedroom apartment exceeds the median before-tax income of this type of household*. By contrast, Table No. 6 indicates that affordability is much less evident among two-adult couple households – both those with children and those with no children. In most CMAs, the affordability threshold is less than 65% of the median before-tax income for these types of households.

Affordability Thresholds based on Basic Needs Methodology

Table No. 7 summarizes the estimated "shelter + non-shelter necessities + imputed income taxes" cost across 10 CMAs by household type and by type of apartment. As in the previous tables, the estimates which are consistent with the National Occupancy Standard are in red while those that pertain to apartment sizes that either exceed or fall short of the National Occupancy Standard are in blue.

Large discrepancies in imputed income taxes between household types drive differences in incremental costs. To wit, single adult households in St. John's see their costs rise by about $10,000 with the addition of children while two adult households see an increase closer to $30,000. For the former, single adults

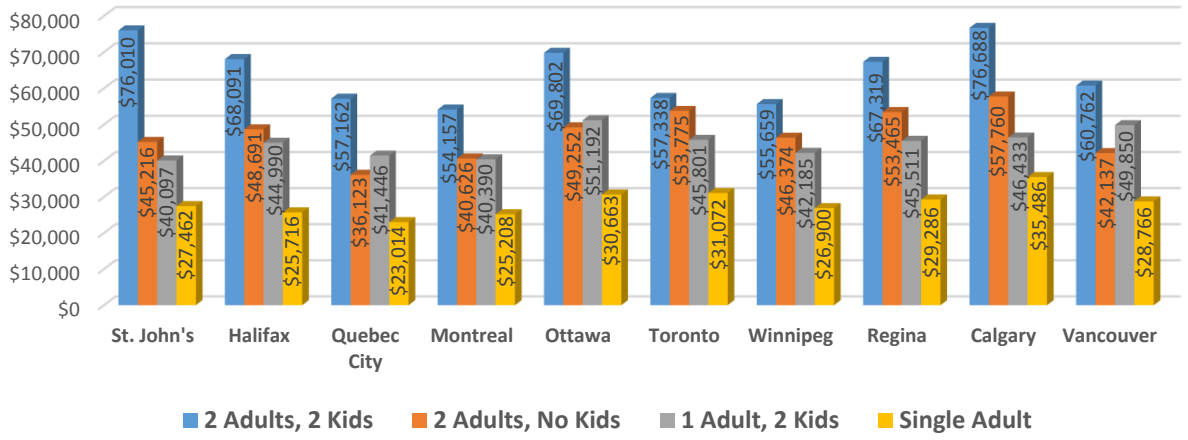
without children in St. John's actually have a higher imputed income tax payment than lone parents, likely due to transfer payments. The incremental cost, then, is a product of non-shelter necessities such as utilities. For the latter, the difference in imputed income taxes between childless couples and those with children is nearly $15,000. The following sample calculation shows the components of the affordability threshold for single adults living in a bachelor apartment in St. John's:

Affordability Threshold = Annual Shelter Costs + Non-Shelter Necessities + Imputed Income Taxes***
= $10,562 + $13,321 + $3,579
= $27,462

**sum of Market Basket Measure ($12,221) and CPP/QPP & EI contributions ($1,100)*
***difference of median household before-tax income ($34,696) and after-tax income ($31,117)*

Figure No. 5 illustrates the comparison of estimated income thresholds using the residual income methodology for four household types across 10 CMAs.

Figure No. 5: Renters – Affordability Thresholds based on Residual Income Methodology, 2015

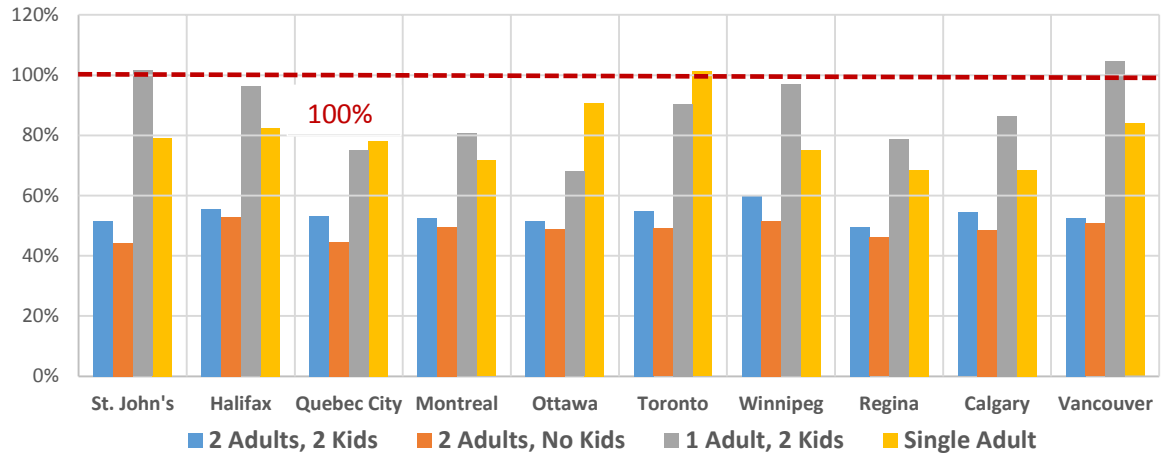


The figure above highlights some of the affordability thresholds by household type and CMA based on the basic needs measure, as summarized in Table No. 7. Affordability thresholds are consistently higher for couples, both with and without children, as a result of their disproportionately higher income tax burdens. Calgary has among the highest before-tax incomes for all household types, a fact reflected in its high affordability thresholds.

Note: Thresholds in Figures 5 and 6 are consistent with the National Occupancy Standard, highlighted in red in Table No. 7. For households with children 2-bedroom apartments are reported.

Figure No. 6 expresses the affordability threshold using the residual income methodology as a percentage of the median before-tax income by household type in each CMA. A more detailed table of affordability thresholds across different housing types is set out in Table No. 8.

Figure No. 6: Renters – Affordability Thresholds based on Residual Income Methodology as a Percentage of the Median Before-Tax Income, 2015



The figure above presents affordability thresholds based on the basic needs measure as a percentage of median before-tax household income, seen in full in Table No. 8. In general this measure indicates less affordability pressure than the 30% norm, though some two adult households fare better under the traditional measure. Single adults and lone parents with two children that have incomes below the median could face pressure in Toronto and Vancouver due to high shelter costs and child care fees.

This application of the residual income methodology suggests that, regardless of CMA, for all household types in rented housing that was consistent with the National Occupancy Standard, *the majority of households at the median before-tax income had sufficient resources to meet the market cost of shelter + minimum non-shelter necessities + imputed income taxes. In short, affordability pressures are not evident for most households at (or presumably above) the median before-tax income.* The analysis does indicate, however, that in some CMAs (notably Toronto, St. John's, and Vancouver) the cost of shelter + non-shelter necessities + taxes exceeds 100% of the before-tax income of households composed of a childless single adult or a single parent and two children (depending on their housing type). In particular, childless single adult households in Toronto face affordability pressure regardless of their accommodations. This suggests that a significant proportion of such households with before-tax income *below* the median would likely be experiencing affordability pressures. These findings are broadly consistent with the results from applying the conventional 30% norm (Table No. 3), except that the residual income analysis suggests less affordability pressure at the median income. That said, it is important to emphasize that the *non-shelter necessities* included in this analysis only provide for modest basic needs and as such could be interpreted as thresholds of income sustenance rather than income affordability.

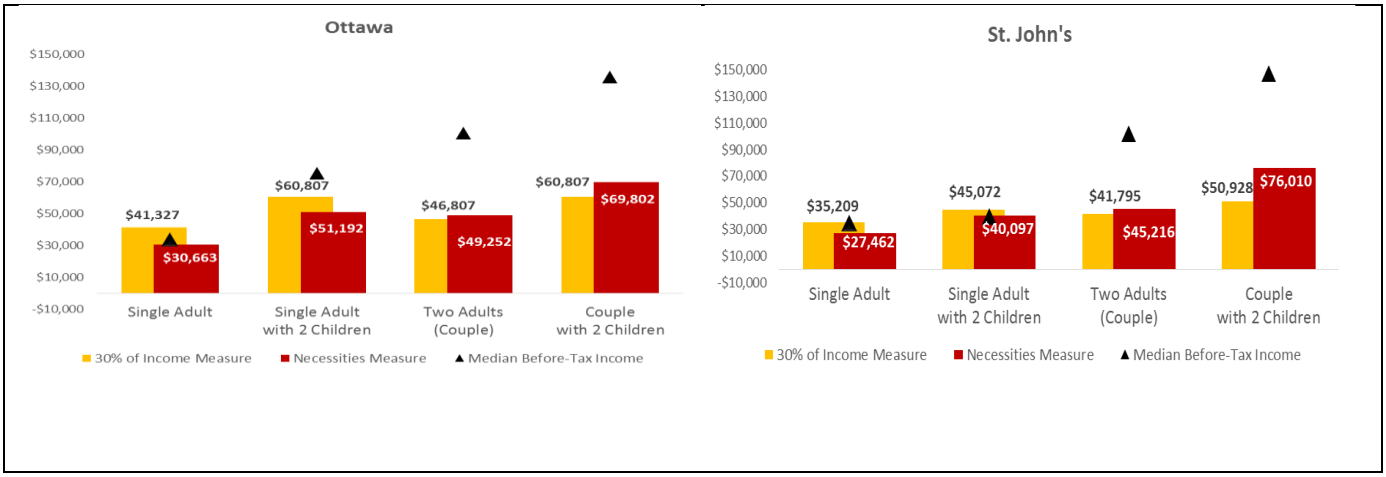
Comparing Conventional 30% of Income and Basic Needs Thresholds

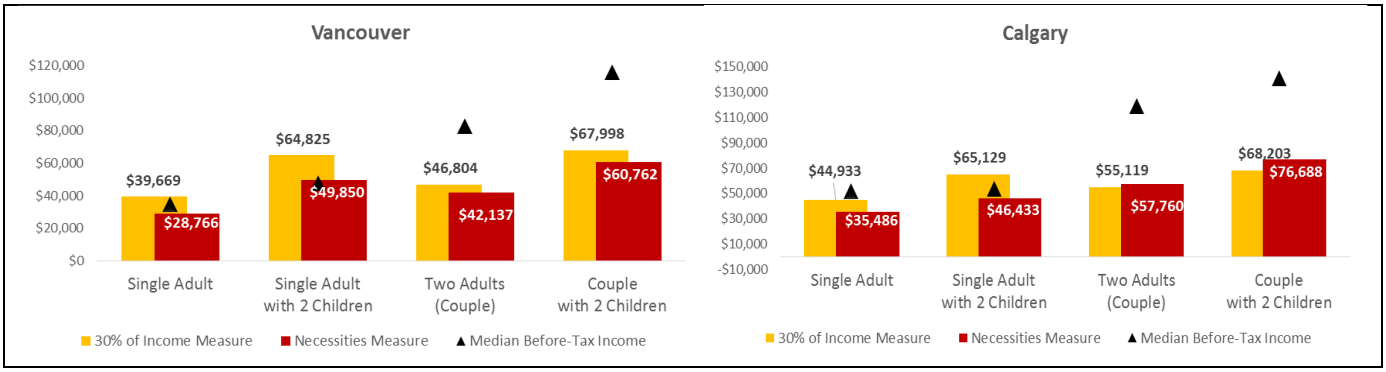
The figure below compares the conventional 30% of income and basic needs measures to median household income for various household types and CMAs (See appendices for additional CMAs).

Affordability thresholds estimated using the residual income (Basic Needs) methodology tend to be lower than the thresholds estimated when the conventional 30% income measure is applied for single adult households and higher for couple renter households. However, the two measures paint different pictures of affordability conditions depending on the method and composition of the household considered. Both methods suggest that, for households at the median income, affordability pressures are much less evident in households with two adults, regardless of whether there were also children in those households. Although a comparative analysis using median household income serves as a useful starting point to identify general differences in affordability between geographic regions and household types it conceals affordability pressures for incomes below the median. The basic needs approach may provide a better understanding of the nature of affordability pressures for households with incomes below the median, especially those at the margins.

For couples, and couples with children, the Basic Needs measure, or income level required to pay for housing and basic needs is above the conventional 30% income measure in most regions of the country. This is attributed to the relatively higher tax burden on high income dual income households. Households and the added cost of child care and other expenses paid by parents. This measure would be significantly higher for households with young children below school age.

Figure No. 7: - Renters – Comparison of Traditional (30% of Income) and Basic Needs (Necessities) Affordability Thresholds and Median Incomes, 2015





New Home Buyers

Affordability Thresholds based on Conventional Method

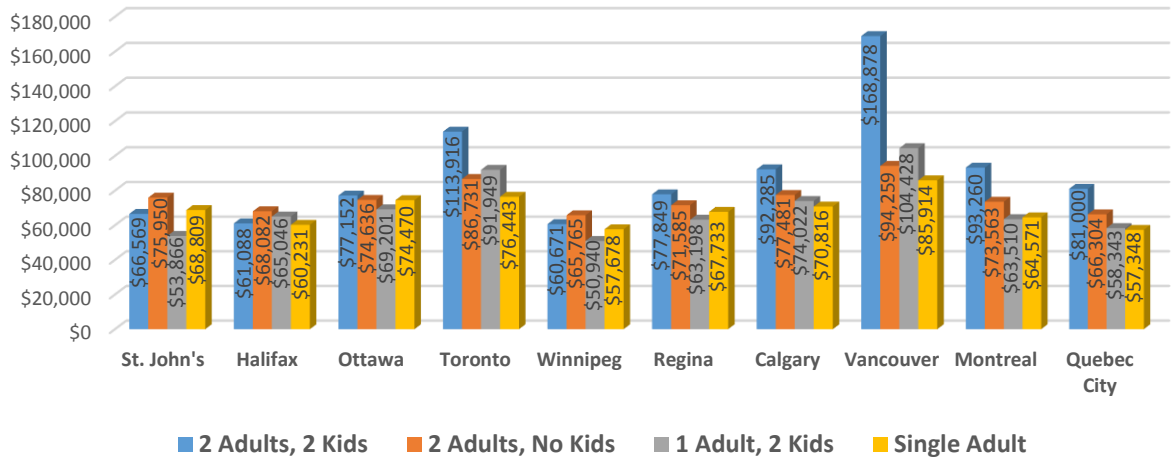
Table No. 9 summarizes the estimated shelter cost across 10 CMAs by household type and by type of housing unit for households that purchased their home in 2015. It should be noted that the costs for property taxes, utilities, insurance, and maintenance are derived from the Survey of Household Spending. These data are therefore tied to the type of household, not to the type of housing unit, which would be more realistic. Table No. 9 therefore may somewhat underestimate non-mortgage shelter costs of semi-detached and detached housing and over-estimate those costs for townhouses.

Monthly costs for home buyers that purchased a home in prior years would be higher or lower – although typically lower – depending on the purchase price and prevailing mortgage rate. Similarly, monthly costs for home buyers with more than a 10% down payment would also be lower. Conversely, monthly costs for home buyers that required second mortgage financing would be higher.

For Quebec City and Montreal, a different data source was used for average house prices. For freehold properties, these data are for bungalows and two-storey houses rather than the townhouses, semi-detached and detached houses which are the housing types used in the other CMAs.

The affordability thresholds using the conventional 30% norm are estimated in Table No. 10 and illustrated in Figure No. 8. Households with before-tax income below the threshold will experience affordability pressures.

Figure No. 8: New Home Buyers – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income, 2015

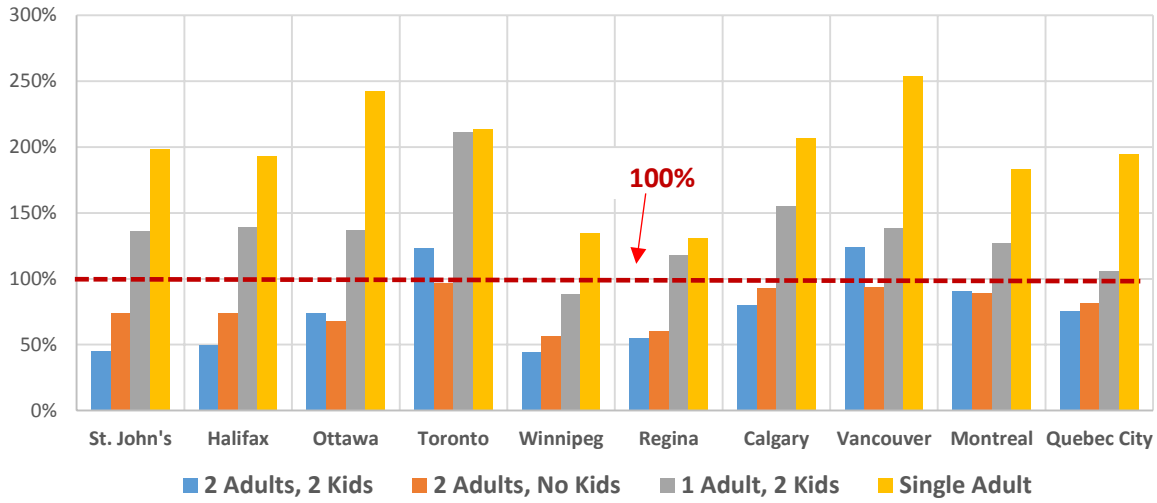


The figure above highlights some of the affordability thresholds by household type and CMA based on the conventional 30% measure, as summarized in Table No. 10. The threshold for couples with two children for Vancouver (and to a lesser extent Toronto) far exceed other household types because of the high cost of purchasing a semi-detached home. The shelter costs for a semi-detached home in Vancouver are more than double that of some CMAs such as Ottawa or Regina.

Note: Thresholds in Figures 8 and 9 are based on the lowest-cost appropriate housing type for each household, seen in red in Table No. 10.

Figure No. 9 expresses the affordability thresholds that are based on the 30% norm (Table No. 10) as a percentage of the median before-tax income by household type in each CMA. A more detailed table of affordability thresholds across different housing types and households is set out in Table No. 11.

Figure No. 9: New Home Buyers – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income as a Percentage of the Median Before-Tax Income, 2015



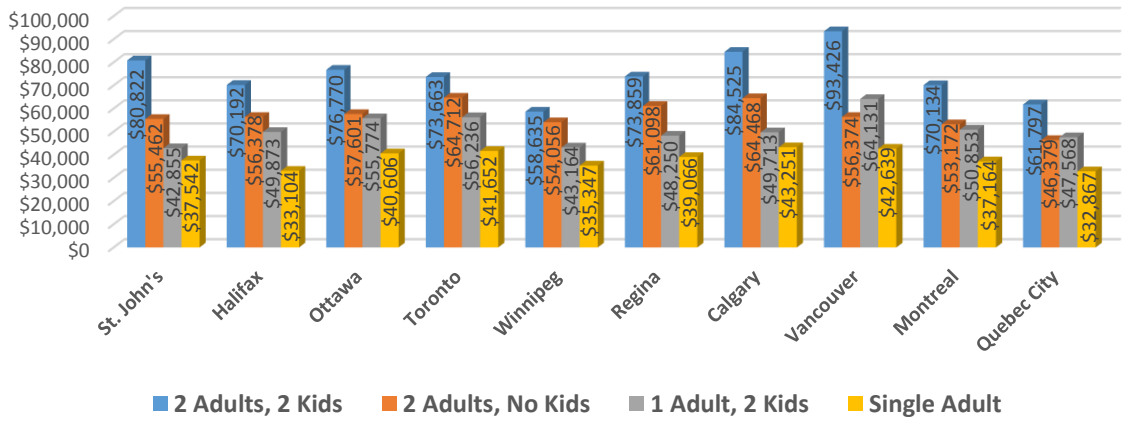
The figure above presents affordability thresholds based on the conventional 30% measure as a percentage of median before-tax household income, seen in full in Table No. 11. Affordability challenges are apparent across all CMAs for single adults and lone parents with two children. The high cost of housing in Vancouver means all household types face pressure in finding affordable accommodations.

The analysis shows that using the 30% of before tax income norm, *virtually no housing unit is affordable in any CMA to a single adult household or to a single parent household (with two children) with a median before-tax income.* For couples with a median before-tax income most types of housing are affordable in all CMAs, except Vancouver and Toronto. In these CMAs, affordability would be limited to condos and townhouses. (In Vancouver, the lower income of couples with no children means that all types of housing are unaffordable.)

Affordability Thresholds based on Basic Needs Income Method

Table No. 12 summarizes the estimated "shelter + non-shelter necessities + imputed income taxes" cost across 10 CMAs by household type and by type of housing unit. Figure No. 10 illustrates the affordability thresholds indicated in red.

Figure No. 10: New Home Buyers - Affordability Thresholds based on Residual Income Methodology, 2015

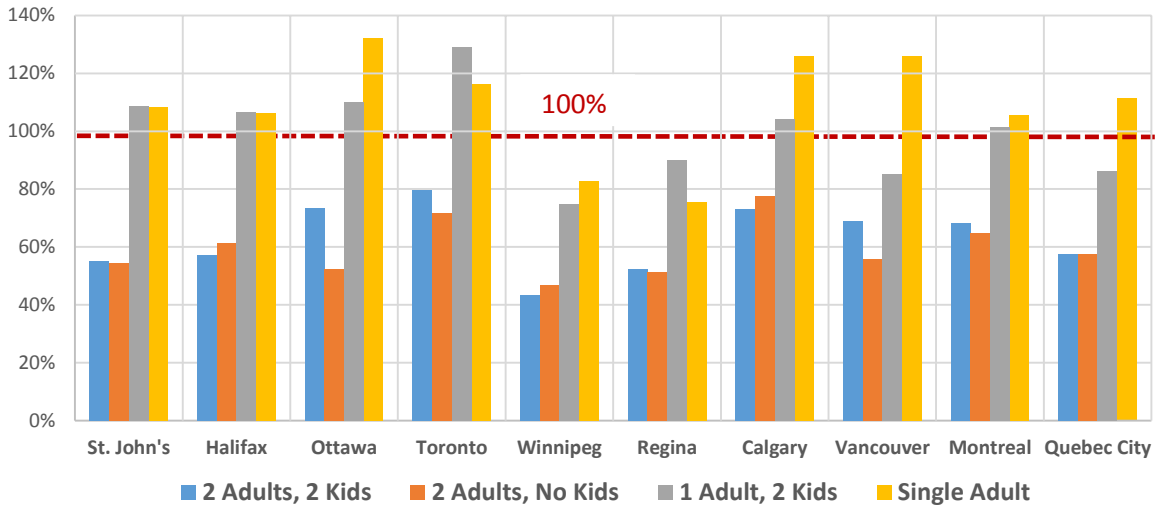


The figure above highlights some of the affordability thresholds by household type and CMA based on the basic needs measure, as summarized in Table No. 12. Households in Vancouver and Toronto have higher affordability thresholds due to the costs of home ownership. Couples with two children in Calgary and St. John's have high thresholds as a result of their large income tax burdens.

Note: Thresholds in Figures 10 and 11 are based on the lowest-cost appropriate housing type for each household, seen in red in Table No. 14.

Figure No. 11 expresses the affordability thresholds using the basic needs method as a percentage of the median before-tax income by household type in each CMA. A more detailed table of affordability thresholds across different housing types and households is set out in Table No. 13.

Figure No. 11: New Home Buyers – Affordability Thresholds based on Residual Income Methodology as a Percentage of the Median Before-Tax Income, 2015



The figure above presents affordability thresholds based on the basic needs measure as a percentage of median before-tax household income, seen in full in Table No. 13. As with renters, affordability pressures are less severe for home buyers when comparing the basic needs measure to the 30% norm. In cases where affordability challenges do persist, including Toronto and Ottawa, they are faced mostly by single adults without children. Their lower incomes can make it difficult to afford the same condos that couples without children can purchase with relative ease.

Table No. 13 shows that *the residual income methodology presents a different picture of affordability conditions*. For single adults with median before-tax incomes, home ownership is unattainable in Toronto, Vancouver and Ottawa. For single parents (with two children) with median before-tax incomes, there is an attainable option in all CMAs except Vancouver, Toronto and St. John's. For couples – both with and without children – there is potential affordability across all types of housing units in all CMAs, except Vancouver where detached housing would be unattainable. In general, therefore, *the residual income methodology suggests less pervasive affordability problems for new home buyers*, but assumes households are willing to live house poor.

Conclusions

This chapter has examined affordability from two perspectives. The first was the application of the conventional norm that shelter costs should not exceed 30% of a household's before-tax income. The second methodology was an application of the basic needs methodology. Affordability thresholds were estimated using both methodologies for four different household types and different types of housing. The affordability threshold is the household income below which affordability pressures become evident. The affordability thresholds were estimated based on data sources that provide a reasonable, approximate picture of actual shelter costs for both renters and owners in 10 major CMAs and the actual cost of non-shelter necessities.

In general, the affordability thresholds estimated using the basic needs methodology are lower than the thresholds estimated when the conventional 30% norm is applied. This results in different pictures of affordability conditions using different definitions of affordability. For renters, the conventional 30% norm suggests pervasive affordability problems for single-person households in all CMAs. This picture is not confirmed by the basic needs method for households at the median income. It is also difficult to draw categorical conclusions about single-person households because this category can include older persons who may be drawing down their savings. The two methodologies both identify affordability pressures for single person and single parent households (with two children) across several CMAs. The conventional 30% norm suggests that these affordability pressures would apply to both household types at the median income. The basic needs methodology suggests that the affordability pressures will be less evident at the median income level but will become more pronounced at lower incomes. Both methodologies suggest that, for households at the median income, affordability pressures are much less evident in households with two adults, regardless of whether there were also children in those households. Also, both measures are based on median rents, as opposed to going market rents which tend to be higher. This suggests that affordability pressures would be greater for new renter households or those needing to relocate.

For new home buyers, the conventional method indicates significant affordability barriers for single person households and single parent households. For couples without children, there are affordable ownership options for median income households in all CMAs, with the exception of Vancouver where most options are unaffordable to a median income household. In Vancouver and Toronto, owned housing costs exceed the median income for couples with children.

The basic needs measure shows single person households, at or above the median income, could find home buying options in Calgary, Regina and Winnipeg. Similar affordability constraints would apply to single parent families. While the basic needs measure does not provide evidence of pervasive affordability barriers for couples in any CMA, it does find that the threshold is often higher compared to the conventional 30% measure for couples with children due to the added cost of childcare and the higher tax burden of dual income households.

When interpreting the findings from applying the basic needs methodology, it is important to keep in mind that the MBM on which the cost estimates for non-shelter necessities is based, represents a

budget that has been pared down to necessities. A household whose income is insufficient to meet the affordability threshold defined by the basic needs methodology does not have the option to reduce expenditures on food, clothing, health care or transit. The household's options are to choose housing that is below the National Occupancy Standard, to move to a different CMA or seek out non-market housing, if it is available. The basic needs methodology is therefore more relevant for analyzing the affordability pressures that arise in the bottom two quartiles of the income distribution. The basic needs method is also more relevant for analyzing affordability among renters since the MBM budget bears almost no resemblance to the household expenditure patterns of home buyers. There are also other types of households, in addition to the four types examined in this report that should be considered. For example, households with a disabled or non-working adult will have a different income and expenditure profile. It would also be useful to remove students from the single-person households to have a more informative picture of the affordability pressures of single-person households.

The basic needs method may prove useful in identifying the most vulnerable groups facing acute market housing affordability pressures and identify the source of those pressures. Future work on applying the basic needs method should focus on the bottom two quartiles and should consider additional types of households. The basic needs method has less relevance for analyzing the affordability challenges of home buyers.

Chapter Three: Conclusions

This report reviewed alternative approaches to estimating housing affordability. The mostly widely used measure of affordability pressure is the proportion of households whose shelter costs exceed 30% of their before-tax income. The principal alternative to this measure is the residual income approach which compares appropriate shelter costs, given the composition of the household, to the household income that is available for shelter after paying taxes and covering non-shelter necessities. The report then applied these two approaches to measuring affordability to estimates of actual shelter costs for four types of households in the ten largest CMAs.

Three broad conclusions emerge from this report:

First: *the residual income approach potentially offers a more accurate profile of affordability conditions and may also provide better analytical support to policy-makers seeking to address affordability problems*. The principal strength of the residual income approach is that it takes account of differences in the cost of non-shelter necessities across different types of households. The residual income approach also takes account of differences in the shelter requirements (*i.e*., number of bedrooms) of different types of households. A further advantage of the residual income approach is that it provides greater insight into the contribution of non-shelter necessities, such as child care, to a household's affordability challenges. The residual income approach therefore highlights the potential impact of targeted income support.

Second: *applying the residual income approach will require a careful review of the estimated necessities budgets for different types of households*. Some elements of household costs are challenging to estimate. This is particularly the case with child care costs. Some households have access to subsidized child care or family-provided support, while others are dependent on the private market. As well, more information is needed on single adults. In particular, it is important to distinguish between those who are working full-time or who are disabled from those who are enrolled as students in a post-secondary program.

Third: *neither the shelter-cost-to-income ratio nor the residual income approach take sufficient account of the role debt and savings have in determining a household's affordability threshold*. Both approaches to measuring affordability pressure take income as the denominator. However, as the population ages, savings will play a more important role in financing shelter costs. Conversely, for younger households, the cost of servicing debt that was incurred while studying is also a factor that will need to be considered.

The shelter-cost-to-income ratio has long been a centrepiece in the analysis of shelter affordability in Canada and elsewhere. While this approach provides a useful, overall picture of the magnitude of affordability pressures, the shelter-cost-to-income ratio needs to be supplemented by measures derived from the residual income approach.

Appendices

Appendix A – Indicators of Housing Affordability
Data Tables & Decile Analysis

Data Tables

Table No. 4: Renters – Estimated Monthly Shelter Costs, 2015
Shelter Costs = Median rent + Insurance + Utilities

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$880.22	$960.22	$1,075.22	$1,085.22	$921.80	$1,001.80	$1,116.80	$1,126.80
Halifax	$890.10	$935.10	$1,105.10	$1,380.10	$1,004.22	$1,049.22	$1,219.22	$1,494.22
Quebec City	$612.59	$717.59	$837.59	$962.59	$709.06	$814.06	$934.06	$1,059.06
Montreal	$617.95	$707.95	$787.95	$937.95	$714.80	$804.80	$884.80	$1,034.80
Ottawa	$1,033.17	$1,170.17	$1,348.17	$1,520.17	$1,033.17	$1,170.17	$1,348.17	$1,520.17
Toronto	$1,029.46	$1,154.46	$1,324.46	$1,505.46	$1,134.18	$1,259.18	$1,429.18	$1,610.18
Winnipeg	$737.98	$928.98	$1,130.98	$1,347.98	$798.89	$989.89	$1,191.89	$1,408.89
Regina	$878.32	$1,069.32	$1,269.32	$1,583.32	$960.70	$1,151.70	$1,351.70	$1,665.70
Calgary	$1,123.31	$1,273.31	$1,472.31	$1,523.31	$1,228.23	$1,378.23	$1,577.23	$1,628.23
Vancouver	$991.72	$1,079.72	$1,319.72	$1,519.72	$1,092.63	$1,180.63	$1,420.63	$1,620.63

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$964.88	$1,044.88	$1,159.88	$1,169.88	$1,068.20	$1,148.20	$1,263.20	$1,273.20
Halifax	$1,016.45	$1,061.45	$1,231.45	$1,506.45	$1,137.11	$1,182.11	$1,352.11	$1,627.11
Quebec City	$697.91	$802.91	$922.91	$1,047.91	$765.85	$870.85	$990.85	$1,115.85
Montreal	$703.61	$793.61	$873.61	$1,023.61	$771.83	$861.83	$941.83	$1,091.83
Ottawa	$1,033.17	$1,170.17	$1,348.17	$1,520.17	$1,033.17	$1,170.17	$1,348.17	$1,520.17
Toronto	$1,131.81	$1,256.81	$1,426.81	$1,607.81	$1,192.46	$1,317.46	$1,487.46	$1,668.46
Winnipeg	$812.99	$1,003.99	$1,205.99	$1,422.99	$875.84	$1,066.84	$1,268.84	$1,485.84
Regina	$962.55	$1,153.55	$1,353.55	$1,667.55	$1,010.21	$1,201.21	$1,401.21	$1,715.21
Calgary	$1,227.98	$1,377.98	$1,576.98	$1,627.98	$1,305.06	$1,455.06	$1,654.06	$1,705.06
Vancouver	$1,082.09	$1,170.09	$1,410.09	$1,610.09	$1,171.95	$1,259.95	$1,499.95	$1,699.95

Table No. 5: Renters – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income, 2015

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$35,209	$38,409	$43,009	$43,409	$36,872	$40,072	$44,672	$45,072
Halifax	$35,604	$37,404	$44,204	$55,204	$40,169	$41,969	$48,769	$59,769
Quebec City	$24,504	$28,704	$33,504	$38,504	$28,362	$32,562	$37,362	$42,362
Montreal	$24,718	$28,318	$31,518	$37,518	$28,592	$32,192	$35,392	$41,392
Ottawa	$41,327	$46,807	$53,927	$60,807	$41,327	$46,807	$53,927	$60,807
Toronto	$41,178	$46,178	$52,978	$60,218	$45,367	$50,367	$57,167	$64,407
Winnipeg	$29,519	$37,159	$45,239	$53,919	$31,956	$39,596	$47,676	$56,356
Regina	$35,133	$42,773	$50,773	$63,333	$38,428	$46,068	$54,068	$66,628
Calgary	$44,932	$50,932	$58,892	$60,932	$49,129	$55,129	$63,089	$65,129
Vancouver	$39,669	$43,189	$52,789	$60,789	$43,705	$47,225	$56,825	$64,825

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$38,595	$41,795	$46,395	$46,795	$42,728	$45,928	$50,528	$50,928
Halifax	$40,658	$42,458	$49,258	$60,258	$45,484	$47,284	$54,084	$65,084
Quebec City	$27,916	$32,116	$36,916	$41,916	$30,634	$34,834	$39,634	$44,634
Montreal	$28,144	$31,744	$34,944	$40,944	$30,873	$34,473	$37,673	$43,673
Ottawa	$41,327	$46,807	$53,927	$60,807	$41,327	$46,807	$53,927	$60,807
Toronto	$45,272	$50,272	$57,072	$64,312	$47,698	$52,698	$59,498	$66,738
Winnipeg	$32,520	$40,160	$48,240	$56,920	$35,034	$42,674	$50,754	$59,434
Regina	$38,502	$46,142	$54,142	$66,702	$40,408	$48,048	$56,048	$68,608
Calgary	$49,119	$55,119	$63,079	$65,119	$52,202	$58,202	$66,162	$68,202
Vancouver	$43,284	$46,804	$56,404	$64,404	$46,878	$50,398	$59,998	$67,998

Table No. 6: Renters – Traditional Affordability Thresholds as a Percentage of the Median Before-Tax Income, 2015
(Green Font indicates Affordability Pressure)

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	101.5%	110.7%	124.0%	125.1%	93.4%	101.5%	113.1%	114.1%
Halifax	114.2%	120.0%	141.8%	177.1%	85.9%	89.7%	104.3%	127.8%
Quebec City	83.1%	97.3%	113.6%	130.6%	51.5%	59.1%	67.8%	76.9%
Montreal	70.3%	80.5%	89.6%	106.7%	57.1%	64.3%	70.7%	82.7%
Ottawa	122.2%	138.4%	159.5%	179.8%	54.9%	62.2%	71.6%	80.7%
Toronto	134.1%	150.4%	172.6%	196.1%	89.6%	99.5%	112.9%	127.2%
Winnipeg	82.5%	103.9%	126.5%	150.7%	73.3%	90.9%	109.4%	129.3%
Regina	82.2%	100.1%	118.8%	148.2%	66.5%	79.7%	93.6%	115.3%
Calgary	86.8%	98.3%	113.7%	117.6%	91.5%	102.7%	117.5%	121.3%
Vancouver	115.6%	125.9%	153.9%	177.2%	91.7%	99.1%	119.2%	136.0%

(Table No. 6 continued on next page.)

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	37.8%	40.9%	45.4%	45.8%	29.0%	31.2%	34.3%	34.6%
Halifax	44.3%	46.2%	53.6%	65.6%	37.0%	38.5%	44.0%	53.0%
Quebec City	34.5%	39.7%	45.6%	51.8%	28.6%	32.5%	37.0%	41.6%
Montreal	34.2%	38.6%	42.5%	49.8%	30.0%	33.5%	36.6%	42.4%
Ottawa	41.0%	46.4%	53.5%	60.3%	30.5%	34.5%	39.7%	44.8%
Toronto	41.3%	45.8%	52.0%	58.6%	45.5%	50.3%	56.8%	63.7%
Winnipeg	36.1%	44.6%	53.6%	63.3%	37.9%	46.1%	54.9%	64.2%
Regina	33.2%	39.8%	46.7%	57.5%	29.8%	35.4%	41.3%	50.6%
Calgary	41.3%	46.3%	53.0%	54.7%	37.0%	41.2%	46.9%	48.3%
Vancouver	52.1%	56.3%	67.9%	77.5%	40.5%	43.5%	51.8%	58.7%

Table No. 7: Renters – Affordability Thresholds based on Annual Shelter Costs + Non-Shelter Necessities + Imputed Income Taxes, 2015
(Necessities based on Statistics Canada Market Basket Measure)
Shelter Costs = Median rent + Insurance + Utilities
Imputed Income Taxes = Median Before-Tax Income – Median After-Tax Income

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$27,462	$28,422	$29,802	$29,922	$37,757	$38,717	$40,097	$40,217
Halifax	$25,716	$26,256	$28,296	$31,596	$42,410	$42,950	$44,990	$48,290
Quebec City	$23,014	$24,274	$25,714	$27,214	$38,746	$40,006	$41,446	$42,946
Montreal	$25,208	$26,288	$27,248	$29,048	$38,350	$39,430	$40,390	$42,190
Ottawa	$30,663	$32,307	$34,443	$36,507	$47,412	$49,056	$51,192	$53,256
Toronto	$31,072	$32,572	$34,612	$36,784	$42,261	$43,761	$45,801	$47,973
Winnipeg	$26,900	$29,192	$31,616	$34,220	$37,469	$39,761	$42,185	$44,789
Regina	$29,286	$31,578	$33,978	$37,746	$40,819	$43,111	$45,511	$49,279
Calgary	$35,486	$37,286	$39,674	$40,286	$42,245	$44,045	$46,433	$47,045
Vancouver	$28,766	$29,822	$32,702	$35,102	$45,914	$46,970	$49,850	$52,250

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	$44,256	$45,216	$46,596	$46,716	$73,670	$74,630	$76,010	$76,130
Halifax	$48,151	$48,691	$50,731	$54,031	$65,511	$66,051	$68,091	$71,391
Quebec City	$34,863	$36,123	$37,563	$39,063	$54,462	$55,722	$57,162	$58,662
Montreal	$39,546	$40,626	$41,586	$43,386	$52,117	$53,197	$54,157	$55,957
Ottawa	$47,608	$49,252	$51,388	$53,452	$66,022	$67,666	$69,802	$71,866
Toronto	$52,275	$53,775	$55,815	$57,987	$53,798	$55,298	$57,338	$59,510
Winnipeg	$44,082	$46,374	$48,798	$51,402	$50,943	$53,235	$55,659	$58,263
Regina	$51,173	$53,465	$55,865	$59,633	$62,627	$64,919	$67,319	$71,087
Calgary	$55,960	$57,760	$60,148	$60,760	$72,500	$74,300	$76,688	$77,300
Vancouver	$41,081	$42,137	$45,017	$47,417	$56,826	$57,882	$60,762	$63,162

Table No. 8: Renters – Affordability Thresholds based on Annual Shelter Costs + Non-Shelter Necessities + Imputed Income Taxes as a Percentage of the Median Before-Tax Income, 2015
(Green Font indicates Affordability Pressure)

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	79.2%	81.9%	85.9%	86.2%	95.6%	98.1%	101.5%	101.9%
Halifax	82.5%	84.2%	90.8%	101.4%	90.7%	91.8%	96.2%	103.2%
Quebec City	78.1%	82.3%	87.2%	92.3%	70.3%	72.6%	75.2%	78.0%
Montreal	71.7%	74.7%	77.5%	82.6%	76.6%	78.7%	80.7%	84.3%
Ottawa	90.7%	95.5%	101.9%	108.0%	63.0%	65.1%	68.0%	70.7%
Toronto	101.2%	106.1%	112.7%	119.8%	83.5%	86.4%	90.5%	94.8%
Winnipeg	75.2%	81.6%	88.4%	95.7%	86.0%	91.3%	96.8%	102.8%
Regina	68.5%	73.9%	79.5%	88.3%	70.6%	74.6%	78.8%	85.3%
Calgary	68.5%	72.0%	76.6%	77.8%	78.7%	82.1%	86.5%	87.6%
Vancouver	83.9%	86.9%	95.3%	102.3%	96.3%	98.6%	104.6%	109.6%

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Apartment	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA								
St. John's	43.3%	44.2%	45.6%	45.7%	50.0%	50.7%	51.6%	51.7%
Halifax	52.4%	53.0%	55.2%	58.8%	53.3%	53.8%	55.4%	58.1%
Quebec City	43.1%	44.7%	46.4%	48.3%	50.8%	52.0%	53.3%	54.7%
Montreal	48.1%	49.4%	50.6%	52.8%	50.6%	51.7%	52.6%	54.3%
Ottawa	47.2%	48.8%	51.0%	53.0%	48.7%	49.9%	51.5%	53.0%
Toronto	47.7%	49.0%	50.9%	52.9%	51.4%	52.8%	54.7%	56.8%
Winnipeg	49.0%	51.5%	54.2%	57.1%	55.1%	57.5%	60.2%	63.0%
Regina	44.1%	46.1%	48.2%	51.4%	46.2%	47.8%	49.6%	52.4%
Calgary	47.0%	48.6%	50.6%	51.1%	51.4%	52.7%	54.3%	54.8%
Vancouver	49.4%	50.7%	54.2%	57.1%	49.0%	50.0%	52.4%	54.5%

Table No. 9: New Home Buyers – Estimated Monthly Shelter Costs, 2015
Shelter Costs = Mortgage Carrying Cost + Property Taxes + Condo Fees or Maintenance + Insurance + Utilities

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$1,720.22	$1,221.74	$1,306.92	$1,676.28	$2,057.75	$1,346.64	$1,431.82	$1,801.18
Halifax	$1,505.77	$1,403.44	$1,025.04	$1,343.23	$1,903.00	$1,626.16	$1,247.75	$1,565.94
Ottawa	$1,861.74	$1,730.02	$1,928.81	$2,050.83	$2,084.76	$1,730.02	$1,928.81	$2,050.83
Toronto	$1,911.08	$2,026.79	$2,412.63	$2,975.81	$2,350.60	$2,298.73	$2,684.57	$3,247.75
Winnipeg	$1,441.94	$1,153.65	$1,200.96	$1,384.61	$1,750.47	$1,273.51	$1,320.82	$1,504.47
Regina	$1,693.33	$1,497.56	$1,719.45	$1,701.33	$1,978.13	$1,579.94	$1,801.83	$1,783.71
Calgary	$1,770.39	$1,684.90	$1,968.67	$2,316.20	$2,132.82	$1,850.54	$2,134.31	$2,481.84
Vancouver	$2,147.84	$2,334.79	$3,740.83	$4,909.53	$2,585.22	$2,610.71	$4,016.75	$5,185.45
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$1,614.27	$1,369.57	$1,930.03		$1,587.74	$1,587.74	$2,148.19	
Quebec City	$1,433.69	$1,241.29	$1,625.15		$1,458.58	$1,458.58	$1,842.44	

(Table No. 9 continued on next page.)

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$1,898.75	$1,427.95	$1,513.13	$1,882.50	$2,238.07	$1,579.04	$1,664.22	$2,033.58
Halifax	$1,702.05	$1,673.33	$1,294.93	$1,613.12	$2,140.25	$1,905.60	$1,527.20	$1,845.39
Ottawa	$1,865.91	$1,730.02	$1,928.81	$2,050.83	$2,084.76	$1,730.02	$1,928.81	$2,050.83
Toronto	$2,168.27	$2,326.81	$2,712.66	$3,275.83	$2,472.22	$2,462.07	$2,847.91	$3,411.09
Winnipeg	$1,644.12	$1,404.69	$1,452.00	$1,635.65	$1,917.23	$1,469.48	$1,516.78	$1,700.44
Regina	$1,789.62	$1,612.39	$1,834.27	$1,816.16	$2,110.15	$1,724.34	$1,946.22	$1,928.11
Calgary	$1,937.02	$1,876.01	$2,159.78	$2,507.31	$2,246.70	$2,023.35	$2,307.12	$2,654.65
Vancouver	$2,356.49	$2,616.52	$4,022.56	$5,191.27	$2,751.94	$2,815.90	$4,221.94	$5,390.64
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$1,839.08	$1,624.20	$2,184.66		$2,184.09	$1,771.03	$2,331.49	
Quebec City	$1,657.59	$1,494.90	$1,878.75		$2,002.12	$1,641.14	$2,024.99	

Table No. 10: New Home Buyers – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income, 2015

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$68,809	$48,869	$52,277	$67,051	$82,310	$53,866	$57,273	$72,047
Halifax	$60,231	$56,138	$41,001	$53,729	$76,120	$65,046	$49,910	$62,638
Ottawa	$74,470	$69,201	$77,152	$82,033	$83,390	$69,201	$77,152	$82,033
Toronto	$76,443	$81,071	$96,505	$119,032	$94,024	$91,949	$107,383	$129,910
Winnipeg	$57,678	$46,146	$48,038	$55,384	$70,019	$50,940	$52,833	$60,179
Regina	$67,733	$59,903	$68,778	$68,053	$79,125	$63,198	$72,073	$71,349
Calgary	$70,816	$67,396	$78,747	$92,648	$85,313	$74,022	$85,372	$99,274
Vancouver	$85,914	$93,391	$149,633	$196,381	$103,409	$104,428	$160,670	$207,418
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$64,571	$54,783	$77,201		$63,510	$63,510	$85,928	
Quebec City	$57,348	$49,652	$65,006		$58,343	$58,343	$73,697	

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$75,950	$57,118	$60,525	$75,300	$89,523	$63,162	$66,569	$81,343
Halifax	$68,082	$66,933	$51,797	$64,525	$85,610	$76,224	$61,088	$73,815
Ottawa	$74,636	$69,201	$77,152	$82,033	$83,390	$69,201	$77,152	$82,033
Toronto	$86,731	$93,073	$108,506	$131,033	$98,889	$98,483	$113,916	$136,443
		$56,188	Table	continued	below			
Winnipeg	$65,765		$58,080	$65,426	$76,689	$58,779	$60,671	$68,017
Regina	$71,585	$64,495	$73,371	$72,646	$84,406	$68,973	$77,849	$77,124
Calgary	$77,481	$75,041	$86,391	$100,292	$89,868	$80,934	$92,285	$106,186
Vancouver	$94,259	$104,661	$160,903	$207,651	$110,078	$112,636	$168,878	$215,626
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$73,563	$64,968	$87,386		$87,364	$70,841	$93,260	
Quebec City	$66,304	$59,796	$75,150		$80,085	$65,646	$81,000	

Table No. 11: - New Home Buyers – Affordability Thresholds based on Shelter Costs equal to 30% of Before-Tax Household Income as a Percentage of the Median Before-Tax Income, 2015
(Green Font indicates Affordability Pressure)

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	198.3%	140.9%	150.7%	193.3%	207.1%	135.5%	144.1%	181.3%
Halifax	193.2%	180.1%	131.5%	172.4%	162.7%	139.1%	106.7%	133.9%
Ottawa	220.2%	204.6%	228.2%	242.6%	110.7%	91.9%	102.5%	108.9%
Toronto	249.0%	264.1%	314.3%	387.7%	185.7%	181.6%	212.1%	256.6%
Winnipeg	161.3%	129.0%	134.3%	154.8%	160.7%	116.9%	121.3%	138.1%
Regina	158.5%	140.2%	160.9%	159.2%	136.9%	109.4%	124.7%	123.5%
Calgary	136.7%	130.1%	152.0%	178.9%	163.1%	141.5%	163.2%	189.8%
Vancouver	250.5%	272.3%	436.2%	572.5%	217.0%	219.1%	337.1%	435.2%
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	183.6%	155.7%	219.5%		126.8%	126.8%	171.6%	
Quebec City	194.5%	168.4%	220.5%		105.9%	105.9%	133.8%	

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	74.3%	55.9%	59.2%	73.7%	60.8%	42.9%	45.2%	55.3%
Halifax	74.1%	72.8%	56.4%	70.2%	69.7%	62.0%	49.7%	60.1%
Ottawa	74.0%	68.6%	76.5%	81.3%	61.5%	51.0%	56.9%	60.5%
Toronto	79.1%	84.9%	98.9%	119.5%	94.4%	94.0%	108.8%	130.3%
Winnipeg	73.1%	62.4%	64.5%	72.7%	82.9%	63.5%	65.6%	73.5%
Regina	61.8%	55.6%	63.3%	62.7%	62.2%	50.8%	57.4%	56.8%
Calgary	65.1%	63.1%	72.6%	84.3%	63.7%	57.4%	65.4%	75.2%
Vancouver	113.5%	126.0%	193.7%	249.9%	95.0%	97.2%	145.8%	186.1%
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	89.5%	79.0%	106.3%		84.8%	68.8%	90.6%	
Quebec City	82.0%	73.9%	92.9%		74.7%	61.2%	75.5%	

Table No. 12: New Home Buyers – Affordability Thresholds based on Annual Shelter Costs + Non-Shelter-Necessities + Imputed Income Taxes, 2015

(Necessities based on Statistics Canada Market Basket Measure)

Shelter Costs = Mortgage Carrying Cost + Property Taxes + Condo Fees or Maintenance + Insurance + Utilities

Imputed Income Taxes = Median Before-Tax Income – Median After-Tax Income

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$37,542	$31,560	$32,582	$37,015	$51,389	$42,855	$43,877	$48,310
Halifax	$33,104	$31,876	$27,336	$31,154	$53,195	$49,873	$45,332	$49,151
Ottawa	$40,606	$39,026	$41,411	$42,875	$60,031	$55,774	$58,160	$59,624
Toronto	$41,652	$43,040	$47,670	$54,428	$56,858	$56,236	$60,866	$67,624
Winnipeg	$35,347	$31,888	$32,455	$34,659	$48,888	$43,164	$43,732	$45,936
Regina	$39,066	$36,717	$39,379	$39,162	$53,028	$48,250	$50,913	$50,695
Calgary	$43,251	$42,225	$45,631	$49,801	$53,100	$49,713	$53,118	$57,288
Vancouver	$42,639	$44,883	$61,755	$75,780	$63,826	$64,131	$81,004	$95,028
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$37,164	$34,228	$40,953		$50,853	$50,853	$57,578	
Quebec City	$32,867	$30,558	$35,165		$47,568	$47,568	$52,174	

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	$55,462	$49,813	$50,835	$55,267	$87,708	$79,800	$80,822	$85,254
Halifax	$56,378	$56,034	$51,493	$55,311	$77,549	$74,733	$70,192	$74,010
Ottawa	$57,601	$55,971	$58,356	$59,820	$78,641	$74,384	$76,770	$78,234
Toronto	$64,712	$66,615	$71,245	$78,003	$69,155	$69,033	$73,663	$80,421
Winnipeg	$54,056	$51,183	$51,751	$53,954	$63,440	$58,067	$58,635	$60,839
Regina	$61,098	$58,971	$61,633	$61,416	$75,826	$71,196	$73,859	$73,641
Calgary	$64,468	$63,736	$67,142	$71,312	$83,800	$81,119	$84,525	$88,695
Vancouver	$56,374	$59,494	$76,367	$90,391	$75,786	$76,554	$93,426	$107,451
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	$53,172	$50,593	$57,319		$68,365	$63,409	$70,134	
Quebec City	$46,379	$44,427	$49,033		$61,522	$57,190	$61,797	

Table No. 13: New Home Buyers – Affordability Thresholds based on Annual Shelter Costs + Non-Shelter Necessities + Imputed Income Taxes as a Percentage of the Median Before-Tax Income, 2015
(Green Font indicates Affordability Pressure)
(Basic Needs Methodology)

	Household Type							
	Single Adult				Single Adult with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	108.2%	91.0%	93.9%	106.7%	129.3%	107.8%	110.4%	121.5%
Halifax	106.2%	102.3%	87.7%	99.9%	113.7%	106.6%	96.9%	105.1%
Ottawa	120.1%	115.4%	122.5%	126.8%	79.7%	74.1%	77.2%	79.2%
Toronto	135.7%	140.2%	155.3%	177.3%	112.3%	111.1%	120.2%	133.6%
Winnipeg	98.8%	89.1%	90.7%	96.9%	112.2%	99.1%	100.4%	105.4%
Regina	91.4%	85.9%	92.1%	91.6%	91.8%	83.5%	88.1%	87.7%
Calgary	83.5%	81.5%	88.1%	96.2%	98.9%	92.6%	99.0%	106.7%
Vancouver	124.3%	130.8%	180.0%	220.9%	133.9%	134.6%	170.0%	199.4%
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	105.7%	97.3%	116.4%		101.6%	101.6%	115.0%	
Quebec City	111.5%	103.6%	119.3%		86.3%	86.3%	94.7%	

	Household Type							
	Two Adult Couple (No Children)				Two Adult Couple with 2 Children			
Type of Housing Unit	Condo	Townhouse	Semi-Detached	Detached	Condo	Townhouse	Semi-Detached	Detached
CMA								
St. John's	54.3%	48.7%	49.7%	54.1%	59.6%	54.2%	54.9%	57.9%
Halifax	61.4%	61.0%	56.0%	60.2%	63.1%	60.8%	57.1%	60.2%
Ottawa	57.1%	55.5%	57.9%	59.3%	58.0%	54.8%	56.6%	57.7%
Toronto	59.0%	60.7%	65.0%	71.1%	66.0%	65.9%	70.3%	76.8%
Winnipeg	60.1%	56.9%	57.5%	60.0%	68.6%	62.8%	63.4%	65.8%
Regina	52.7%	50.9%	53.2%	53.0%	55.9%	52.5%	54.4%	54.3%
Calgary	54.2%	53.6%	56.4%	59.9%	59.4%	57.5%	59.9%	62.9%
Vancouver	67.9%	71.6%	91.9%	108.8%	65.4%	66.1%	80.6%	92.7%
	Condo	Bungalow	Two Storey		Condo	Bungalow	Two Storey	
Montreal	64.7%	61.5%	69.7%		66.4%	61.6%	68.1%	
Quebec City	57.3%	54.9%	60.6%		57.4%	53.3%	57.6%	

Applying Traditional Affordability Thresholds to Decile Groups

Table No. 14 compares the traditional 30-percent of before-tax income threshold to actual shelter expenditures (drawn from the SHS survey) for decile groups within the CMAs of Montreal, Toronto and Vancouver. These data do not differentiate between renters and owners. Nor do these data distinguish by type of household or type of housing unit.

The application of the 30% standard to decile groups in Montreal, Toronto and Vancouver indicates affordability pressures in the bottom two or three decile groups, depending on the CMA. In essence, *these data suggest that for the bottom three or four decile groups, expenditures on shelter exceed the traditional housing affordability threshold of 30% of before-tax income.* As noted earlier, the apparent affordability pressure on the bottom decile may reflect, to some degree, the presence of elderly persons in that income group whose income may be supplemented by loans or savings.

Table No. 14: All Households (Renters and Home Owners) - Shelter Costs as a Percentage of Traditional Affordability Threshold, 2015

CMA	Decile	Average Household Before-Tax Income	Implied Shelter Cost Based on Traditional 30% Rule	Actual Shelter Cost (SHS)	Actual Shelter Cost as Share of Implied Shelter Cost
Montreal	1	$9,956	$2,987	$7,586	254.0%
Montreal	2	$21,266	$6,380	$11,159	174.9%
Montreal	3	$31,243	$9,373	$10,223	109.1%
Montreal	4	$40,568	$12,170	$11,588	95.2%
Montreal	5	$52,388	$15,716	$12,461	79.3%
Montreal	6	$65,786	$19,736	$14,370	72.8%
Montreal	7	$80,430	$24,129	$16,590	68.8%
Montreal	8	$99,087	$29,726	$16,980	57.1%
Montreal	9	$132,182	$39,654	$20,702	52.2%
Montreal	10	$264,078	$79,224	$23,522	29.7%

(Table No. 14 continued on next page.)

CMA	Decile	Average Household Before-Tax Income	Implied Shelter Cost Based on Traditional 30% Rule	Actual Shelter Cost (SHS)	Actual Shelter Cost as Share of Implied Shelter Cost
Toronto	1	$12,222	$3,667	$12,989	354.3%
Toronto	2	$24,599	$7,380	$13,114	177.7%
Toronto	3	$36,853	$11,056	$16,447	148.8%
Toronto	4	$48,500	$14,550	$17,741	121.9%
Toronto	5	$62,549	$18,765	$18,821	100.3%
Toronto	6	$75,451	$22,635	$20,893	92.3%
Toronto	7	$95,378	$28,613	$24,872	86.9%
Toronto	8	$119,939	$35,982	$23,633	65.7%
Toronto	9	$167,438	$50,232	$31,140	62.0%
Toronto	10	$310,051	$93,015	$44,449	47.8%
Vancouver	1	$7,563	$2,269	$13,358	588.8%
Vancouver	2	$21,329	$6,399	$12,039	188.2%
Vancouver	3	$35,615	$10,684	$17,533	164.1%
Vancouver	4	$47,870	$14,361	$16,315	113.6%
Vancouver	5	$60,451	$18,135	$15,514	85.5%
Vancouver	6	$72,699	$21,810	$17,180	78.8%
Vancouver	7	$92,811	$27,843	$24,931	89.5%
Vancouver	8	$117,830	$35,349	$28,342	80.2%
Vancouver	9	$152,633	$45,790	$27,600	60.3%
Vancouver	10	$305,457	$91,637	$36,094	39.4%

Applying the Basic Needs Method to Decile Groups

Table No. 15 applies the residual income analysis to decile groups. These data do not differentiate between renters and owners. Nor do these data distinguish by type of household or type of housing unit. The procedure for estimating the cost of non-shelter necessities in Table No. 15 differs from the procedure applied in Tables 8 and 9. In Tables 8 and 9, the cost of non-shelter necessities was derived from an adaptation of Statistics Canada's Market Basket Measure to different types of households as well as CPP/QPP and EI contributions. In Table No. 15, the cost of non-shelter necessities is the sum of expenditures reported in the Survey of Household Spending (SHS) for clothing, food, transportation and some other types of expenses. The cost of shelter is similarly the cost of shelter reported in the SHS, as was the case in Table No. 14, rather than an estimate based on other sources. Decile data are only available for Montreal, Toronto and Vancouver.

The application of the residual income analysis to decile groups in Montreal, Toronto and Vancouver indicates affordability pressures in the bottom two or three decile groups, depending on the CMA. In essence, *these data suggest that for the bottom two or three decile groups, the income remaining after paying for non-shelter necessities is insufficient to cover the cost of shelter or conversely, to pay the costs of suitable shelter, these households are obliged to cut back on other necessities*. As noted earlier, the apparent affordability pressure on the bottom decile may reflect, to some degree, the presence of elderly persons in that income group whose income is supplemented by loans or savings.

Table No. 15: All Households (Renters and Home Owners) – Shelter Costs as a Percentage of Residual Income, 2015
Residual Income = After-Tax Income net of the Cost of Non-Shelter Necessities

CMA	Decile	Average Household Size	Average Household After-Tax Income	Cost of Necessities	Residual Income after Necessities	Cost of Shelter	Shelter as Percent of Residual Income
Montreal	1	1.2	$9,956	$10,494	-$537	$7,586	-1411.5%*
Montreal	2	1.5	$20,960	$14,237	$6,723	$11,159	166.0%
Montreal	3	1.7	$29,771	$16,179	$13,593	$10,223	75.2%
Montreal	4	2.0	$37,431	$24,739	$12,692	$11,588	91.3%
Montreal	5	2.6	$47,767	$26,975	$20,792	$12,461	59.9%
Montreal	6	2.7	$56,490	$26,680	$29,809	$14,370	48.2%
Montreal	7	2.8	$67,578	$31,707	$35,871	$16,590	46.3%
Montreal	8	2.7	$81,991	$40,113	$41,877	$16,980	40.5%
Montreal	9	3.5	$107,055	$42,278	$64,776	$20,702	32.0%
Montreal	10	3.5	$187,010	$51,495	$135,515	$23,522	17.4%

(Table No. 15 continued on next page.)

CMA	Decile	Average Household Size	Average Household After-Tax Income	Cost of Necessities	Residual Income after Necessities	Cost of Shelter	Shelter as Percent of Residual Income
Toronto	1	1.7	$12,222	$22,069	-$9,848	$12,989	-131.9%*
Toronto	2	1.6	$24,599	$18,110	$6,488	$13,114	202.1%
Toronto	3	2.5	$34,726	$17,348	$17,378	$16,447	94.6%
Toronto	4	2.3	$44,401	$24,777	$19,624	$17,741	90.4%
Toronto	5	2.7	$56,163	$31,391	$24,772	$18,821	76.0%
Toronto	6	3.0	$67,088	$34,667	$32,421	$20,893	64.4%
Toronto	7	3.5	$84,613	$40,636	$43,977	$24,872	56.6%
Toronto	8	3.2	$102,141	$43,025	$59,116	$23,633	40.0%
Toronto	9	3.7	$139,339	$47,751	$91,589	$31,140	34.0%
Toronto	10	3.7	$195,994	$72,797	$123,198	$44,449	36.1%
Vancouver	1	1.4	$7,563	$16,307	-$8,744	$13,358	-152.8%*
Vancouver	2	1.7	$20,580	$13,150	$7,430	$12,039	162.0%
Vancouver	3	2.1	$33,341	$25,004	$8,336	$17,533	210.3%
Vancouver	4	2.3	$43,101	$22,162	$20,939	$16,315	77.9%
Vancouver	5	2.2	$53,205	$25,589	$27,615	$15,514	56.2%
Vancouver	6	2.5	$63,746	$30,689	$33,056	$17,180	52.0%
Vancouver	7	3.0	$80,548	$34,165	$46,383	$24,931	53.8%
Vancouver	8	3.1	$98,745	$41,119	$57,626	$28,342	49.2%
Vancouver	9	3.4	$128,362	$45,436	$82,926	$27,600	33.3%
Vancouver	10	3.9	$230,243	$66,635	$163,608	$36,094	22.1%

*Many households in the lowest decile have lower after-tax incomes than the cost of necessities, indicating either that they live in extreme poverty, have sources of income not included in the SHS and/or are drawing down their household wealth (in the case of retirees for example). Mathematically, shelter as a percent of residual income is not a meaningful measure of the magnitude of the affordability shortfall since the number can grow very large when the numerator is exceeds the denominator. An alternative is to compare shelter costs to the absolute shortfall. In this case, first decile households in Montreal experience an absolute shortfall of $8,123, in Toronto a shortfall of $22,837 and in Vancouver a shortfall of $22,102.

Appendix B – Indicators of Housing Affordability
Methodology Description

MBM Components for 2014 are from CANSIM Table 206-0093 for each CMA and converted to 2015 dollars using either product-level (for clothing and food) or CMA-level inflation (for all other expenses) from Table CANSIM 326-0020. MBM components are developed by Human Resources and Skills Development Canada (HRSDC) and is meant to reflect the cost of a basket of goods and services representing a "modest, basic standard of living". It does so for a single demographic composition: a reference family of two adults aged 25 to 49 and two children aged 9 and 13. While HRSDC was responsible for defining the components of the basket, Statistics Canada collects the data on the cost of goods and services in the basket to calculate thresholds and produce low-income statistics. The latest revision of the MBM basket was completed by HRSDC in 2012 after substantial consultations.

Data on household spending comes from the Survey of Household Spending in 2014 which provides household-level expenditure data for the 10 CMAs for a variety of household compositions and income decile level data for 3 CMAs (Montreal, Toronto and Vancouver). The data in this survey does not match exactly with all MBM categories, as shown in the following table:

ID	Survey expenditure category	MBM Category
40094-45040	Clothing and accessories	Clothing
16100-16530	Transportation	Transportation
14000-14380	Shelter	Shelter
10140-13000	Food expenditures	Food
15500-15870	Household furnishings and equipment	Other expenses
15120-15440	Household operations	Other expenses
18020-18115	Personal care	Other Expenses
17060-17190	Direct costs to household	Income Deductions

To produce an estimate of disposable income for the MBM Statistics Canada removes some expenditures from after-tax income such as child care and spousal support payments, out-of-pocket spending on child care, and non-insured but medically prescribed health-related expenses such as dental and vision care, prescription drugs, and aids for persons with disabilities. Statistics Canada then adds the mortgage-free owner's advantage to the MBM for individuals living in homes for which they have no mortgage. For this exercise, the mortgage-free owner's advantage was not included because it is outside the interest of this analysis. Direct costs to households and child care are designated as necessary expenditures rather than being deducted from household incomes because median household income data can be drawn from sources for which no expenditure data is available, such as the Canadian Income Survey. Child care costs are included in household operations, owing only to the extent to which this data was suppressed in the Survey of Household Spending and only accessible through the data in this category.

Survey data was suppressed for some CMAs, deciles and household compositions in a number of data categories: household demographics, expenditure categories for household compositions and expenditure categories for some income deciles. Suppressed demographic data was estimated using weighted averages of comparable CMAs where data was available or from the 2011 National Household Survey. Suppressed expenditure data for household compositions was constructed from a weighted average of expenditures in other CMAs adjusted for income. Suppressed expenditure data was constructed from a weighted average of expenditures from deciles in other CMAs weighted for income. All expenditure data was converted to 2015 dollars using either product-level (for clothing and food) or CMA-level inflation (for all other expenses).

Survey expenditure categories are broader than the specific items in the MBM basket. For example, household operations include inessential expenditures on pets and gardening supplies. While in theory it might be possible to consider expenditures that match the precise basket outlined in the MBM, practically the costs of items in the exact basket for the MBM is not public and detailed expenditures in the survey are frequently suppressed for privacy reasons for most household compositions and income deciles. Even in categories where the MBM and survey categories are roughly analogous (notably shelter costs) there can be a significant divergence between what costs are dictated by MBM and what survey data indicates households actually spend given a similar household budget. For example, in Vancouver an average second decile household pays $12,039 in shelter costs and $4,959 in transportation costs but the equivalized MBM for the city puts shelter costs at $7,994 and transportation costs at $1,844, a difference of $7,161. Actual households spend much less on food and other expenditures than the MBM would indicate. As a result, in order to determine the pattern in changes of expenditure for a change in household composition a forecast was made based on the actual consumption decisions of households rather than a simple rules-based application of the MBM since this would bias necessary expenditures upwards due to an insufficient forecast for shelter costs. Using Statistics Canada adjusted MBMs yields similar results.

The theoretical MBM baskets for alternative household compositions were estimated with a simple OLS regression of the form:

$$X = \beta_0 Y_i + \beta_1 Y_i (A_i - 1) + \beta_2 Y_i \, K_i + \beta_3 A_i + \beta_4 K_i + \alpha$$

Where

- X is the array of log expenditure categories in the MBM for household *i*
- Y_i is the log per capita before tax household income of household *i*
- A_i is the number of adults in household *i*
- K_i is the number of children in household *i*

This structure is used because of the lack of available data from Statistics Canada. While household-level data is collected within Statistics Canada's surveys, this information is not publicly available but presented in aggregated profiles of specific demographic compositions. At the CMA level, especially for less populous CMAs, a high proportion of expenditures and specifics of household composition are

repressed. Moreover, decile income and expenditure data is available only for the three largest CMAs (Vancouver, Toronto and Montreal) and not for different household compositions. As a result, the data skews to median households and a single composition while the key households of interest have less-than-median incomes and have particular compositions (for example, single parent households).

The theoretical MBM is meant as a tentative measure for one which could be developed for target profiles directly from Statistics Canada's household survey. If the MBM measure for target demographics were constructed directly from non-supressed survey data at the household level the household composition variables for children and additional adults would be replaced by binomial variables, which would both improve the accuracy of estimates and the ease of interpreting coefficients produced by the model. More significantly, significant heterogeneous expenses (such as child care for single parents, or out-of-pocket health expenses for seniors) can be reliably quantified within the survey data. In the current dataset, this information is typically either suppressed or included in broad demographic sets of households which spend much less on these items. This results in a major factor in situational housing risk being understated in the analysis.

Before-tax household income is based on household expenditures for the MBM, which are assumed to take up the same share of before tax income as it does in a weighted average across CMAs. This structure is necessary because of the high correlation between income and household composition. The resulting coefficients were used to estimate the marginal impact on log expenditure for each essential category of necessities from a change in household composition and income. A dummy variable was introduced for CMA population (following Statistics Canada's approach with LICO estimation) but this was rejected because it had a poor goodness-of-fit. The marginal impacts were combined to produce an estimate of the change in overall expenditure expected for a set of household compositions different from the 2 adult 2 children composition of the MBM. The MBM has very specific demographic composition that could not be replicated within available data for constructing a theoretical MBM: both adults between the ages of 25 and 49 and the two children aged 9 and 13. Transportation expenditures were not derived theoretically but calculated from public transit costs for each household composition and CMA to accord within the MBM construction for urban areas.

Statistics Canada uses an alternative rules-based approach for household equivalence as follows:

- the oldest person in the family receives a factor of 1.0;
- the second oldest person in the family receives a factor of 0.4;
- all other family members aged 16 and over each receive a factor of 0.4;
- all other family members under age 16 receive a factor of 0.3.

Comparing overall expenditure on necessities between the two approaches finds them to be broadly similar:

	Expenditure on Necessities (excluding Shelter)							
	Estimated MBM				Equivalence Formula			
Household Type	Single Adult (No Children)	Single Parent	Couple (No Children)	Couple with Children	Single Adult (No Children)	Single Parent	Couple (No Children)	Couple with Children
CMA								
St. John's	12,221	25,804	15,875	28,027	14,013	22,421	19,619	28,027
Halifax	12,329	25,821	16,143	26,865	13,433	21,492	18,806	26,865
Quebec City	11,808	25,407	15,594	25,817	12,908	20,653	18,072	25,817
Montreal	11,925	25,464	15,667	26,101	13,050	20,881	18,271	26,101
Ottawa	13,056	25,459	17,236	26,525	13,263	21,220	18,568	26,525
Toronto	13,639	25,815	18,347	26,066	13,033	20,853	18,247	26,066
Winnipeg	12,249	25,589	16,115	25,997	12,998	20,797	18,198	25,997
Regina	12,195	25,368	15,775	25,570	12,785	20,456	17,899	25,570
Calgary	12,980	25,805	17,006	26,087	13,044	20,870	18,261	26,087
Vancouver	12,844	25,322	16,791	26,525	13,263	21,220	18,568	26,525

Within individual expenditure categories, however, the equivalence approach can exacerbate differences from the estimated approach in categories where the MBM varies significantly from actual expenditures, such as shelter. Since these are not included in the calculation of necessary expenditures for this exercise, however, the differences are muted.

Median income data for each household was drawn from multiple sources: CANSIM Table 206-0011 provides before and after-tax income for 2014 for each of the household compositions for seven of the ten CMAs (missing are Regina, Halifax, and St. John's). For those CMAs missing data, provincial data was used augmented by the difference between the CMA and provincial incomes found in the 2010 National Household Survey. CANSIM 111-0009 provides data on lone-parent families and individuals not in census families. All data was converted to 2015 dollars using the all-item CPI for the respective municipality.

Housing Cost Estimates

Monthly median home sale prices in 2015 were collected from the Canadian Real Estate Association (CREA) for CMAs outside Québec and averaged to achieve annual figures. Home prices from CREA were categorized by the following housing types: detached homes, semi-detached homes, townhouses, and condominium apartments. For CMAs within Quebec (i.e. Montreal, Quebec City), home sale price data were collected from Royal LePage's 2015 Quarterly House Price Survey. Royal LePage reports home prices categorized by the following housing types: bungalows, two-storeys, and condominiums. Home price data was available for Q1 2015, Q3 2015, and Q4 2015. For rentals, data on vacancy rate and market rent price by number of bedrooms for each CMA came from the Fall 2015 release of the CMHC Rental Market Survey. Data were collected via CMHC's Housing Market Information Portal.

Down payments were assumed to be 10% of the home sale price with a standard 2.40% CMHC mortgage insurance premium. Monthly mortgage payments were calculated based on a 25-year amortization

period and a mortgage rate of 2.45%. The mortgage rate was based on the average rates of 5 year closed mortgages obtained via RateHub from seven different lenders for each CMA.

Annual non-mortgage housing costs for owners (i.e. property taxes, utilities, maintenance, insurance) and renters (i.e. utilities, insurance) were collected from the 2014 Survey of Household Spending by family type for each CMA except Quebec City. Figures were converted to 2015 dollars using CMA-specific CPI values. In cases where data were suppressed or otherwise unavailable they were replaced by average values across all household types. Since Quebec City was not included in the SHS housing costs for Montreal were substituted. Utilities costs from the survey were used for both owners and renters on the assumption that such costs vary more due to family composition than by housing type.

For condominium owners, condo fees were collected from a 2015 Condos.ca study of condo fees in Toronto. This study found average condominium fees to be 0.59 per square foot. Condos were assumed to be 618 square feet for single adults or couples without children (one bedroom) or 996 square feet for couples with children or lone-parent households (two bedroom). Furthermore, utilities costs were reduced by 25% of their survey values for condominium owners since condo fees often replace some or all of a household's utilities costs. For the purposes of this analysis townhouses were assumed to be freehold such that condo fees were not applied to townhouse shelter costs.

Appendix C includes tables listing detailed housing costs by household and apartment type for each CMA. The non-mortgage housing costs (i.e. property taxes, utilities, maintenance, insurance) listed in these tables use data from the 2014 Survey of Household Spending for the average household rather than a specific family type. As a result, these costs do not vary between housing types within each CMA. The associated costs for renters (i.e. utilities, insurance) for each apartment type are matched to the appropriate household based on the National Occupancy Standard as follows: single adult with bachelor, two adult couple (no children) with one-bedroom, single adult with two children with two-bedroom, and two adult couple with two children with three or more bedrooms.

Appendix C – Indicators of Housing Affordability
Supplementary Data Tables

Table of Figures

Table 1 - St. John's Detailed Housing Costs by Housing Type, 2015

St. John's

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	254,000 - 280,000	204,000 - 225,000	223,000 - 247,000	309,000 - 341,000
	Property Taxes	144.23	144.23	144.23	144.23
	Utilities	212.32	283.10	283.10	283.10
	Maintenance	N/A	37.06	37.06	37.06
	Insurance	59.06	59.06	59.06	59.06
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,878.27	1,404.70	1,489.88	1,859.24
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	695.00	775.00	890.00	900.00
	Utilities	183.46	268.13	225.04	371.44
	Insurance	1.76	1.76	1.76	1.76
	Total Monthly Housing Cost	880.22	1,044.88	1,116.80	1,273.20

Table 2 – Halifax Detailed Housing Costs by Housing Type, 2015

Halifax

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	220,000 - 243,000	268,000 - 296,000	180,000 - 199,000	254,000 - 281,000
	Property Taxes	131.22	131.22	131.22	131.22
	Utilities	183.88	245.17	245.17	245.17
	Maintenance	N/A	39.63	39.63	39.63
	Insurance	47.17	47.17	47.17	47.17
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,677.08	1,622.30	1,243.90	1,562.09
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	750.00	795.00	965.00	1,240.00
	Utilities	134.07	261.26	249.03	381.92
	Insurance	6.03	5.20	5.20	5.20
	Total Monthly Housing Cost	890.10	1,061.45	1,219.22	1,627.11

Table 3 – Ottawa Detailed Housing Costs by Housing Type, 2015

Ottawa

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	245,000 - 271,000	271,000 - 300,000	317,000 - 351,000	346,000 - 382,000
	Property Taxes	220.42	220.42	220.42	220.42
	Utilities	161.85	215.80	215.80	215.80
	Maintenance	N/A	66.55	66.55	66.55
	Insurance	52.67	52.67	52.67	52.67
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,861.74	1,730.02	1,928.81	2,050.83
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	813.00	950.00	1,128.00	1,300.00
	Utilities	215.80	215.80	215.80	215.80
	Insurance	4.37	4.37	4.37	4.37
	Total Monthly Housing Cost	1,033.17	1,170.17	1,348.17	1,520.17

Table 4 – Toronto Detailed Housing Costs by Housing Type, 2015

Toronto

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	313,000 - 346,000	414,000 - 458,000	503,000 - 556,000	633,000 - 700,000
	Property Taxes	199.88	199.88	199.88	199.88
	Utilities	159.99	213.33	213.33	213.33
	Maintenance	N/A	48.47	48.47	48.47
	Insurance	53.29	53.29	53.29	53.29
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	2,133.99	2,307.27	2,693.12	3,256.29
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	925.00	1,050.00	1,220.00	1,401.00
	Utilities	100.07	202.41	204.78	263.06
	Insurance	4.40	4.40	4.40	4.40
	Total Monthly Housing Cost	1,029.46	1,256.81	1,429.18	1,668.46

Table 5 - Winnipeg Detailed Housing Costs by Housing Type, 2015

Winnipeg

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
	Market Price	199,000 - 220,000	206,000 - 228,000	217,000 - 240,000	260,000 - 287,000
	Property Taxes	153.90	153.90	153.90	153.90
	Utilities	144.31	192.42	192.42	192.42
	Maintenance	N/A	34.89	34.89	34.89
Own	Insurance	58.37	58.37	58.37	58.37
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,584.29	1,332.98	1,380.28	1,563.94
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
	Market Price	615.00	806.00	1,008.00	1,225.00
	Utilities	119.18	196.05	181.94	258.89
Rent	Insurance	3.80	1.94	1.94	1.94
	Total Monthly Housing Cost	737.98	1,003.99	1,191.89	1,485.84

Table 6 – Regina Detailed Housing Costs by Housing Type, 2015

Regina

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
	Market Price	229,000 - 253,000	250,000 - 277,000	302,000 - 333,000	297,000 - 329,000
	Property Taxes	165.77	165.77	165.77	165.77
	Utilities	185.73	247.64	247.64	247.64
	Maintenance	N/A	33.04	33.04	33.04
Own	Insurance	49.85	49.85	49.85	49.85
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,755.11	1,579.94	1,801.83	1,783.71
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
	Market Price	709.00	900.00	1,100.00	1,414.00
	Utilities	165.26	249.50	247.64	297.15
Rent	Insurance	4.06	4.06	4.06	4.06
	Total Monthly Housing Cost	878.32	1,153.55	1,351.70	1,715.21

Table 7 - Calgary Detailed Housing Costs by Housing Type, 2015

Calgary

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	256,000 - 283,000	298,000 - 329,000	364,000 - 402,000	444,000 - 491,000
	Property Taxes	161.34	161.34	161.34	161.34
	Utilities	206.08	274.77	274.77	274.77
	Maintenance	N/A	55.24	55.24	55.24
	Insurance	69.83	69.83	69.83	69.83
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	1,909.80	1,850.54	2,134.31	2,481.84
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	950.00	1,100.00	1,299.00	1,350.00
	Utilities	169.86	274.52	274.77	351.61
	Insurance	3.46	3.46	3.46	3.46
	Total Monthly Housing Cost	1,123.31	1,377.98	1,577.23	1,705.06

Table 8 – Vancouver Detailed Housing Costs by Housing Type, 2015

Vancouver

		Household Type			
	Housing Cost	**Condo**	**Townhouse**	**Semi-Detached**	**Detached**
Own	Market Price	380,000 - 420,000	500,000 - 552,000	825,000 - 912,000	1,095,000 - 1,210,000
	Property Taxes	166.66	166.66	166.66	166.66
	Utilities	125.38	167.17	167.17	167.17
	Maintenance	N/A	52.10	52.10	52.10
	Insurance	61.79	61.79	61.79	61.79
	Condo Fees	364.62	N/A	N/A	N/A
	Total Monthly Housing Cost	2,362.20	2,610.71	4,016.75	5,185.45
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	922.00	1,010.00	1,250.00	1,450.00
	Utilities	65.59	156.63	167.17	246.50
	Insurance	4.13	3.46	3.46	3.46
	Total Monthly Housing Cost	991.72	1,170.09	1,420.63	1,699.95

Table 9 – Montreal Detailed Housing Costs by Housing Type, 2015

Montreal

		Household Type			
	Housing Cost	**Condo**	**Bungalow**	**Two-Storey**	
Own	Market Price	256,000 - 283,000	271,000 - 300,000	401,000 - 443,000	
	Property Taxes	156.63	156.63	156.63	
	Utilities	116.65	155.53	155.53	
	Maintenance	N/A	36.16	36.16	
	Insurance	42.24	42.24	42.24	
	Condo Fees	364.62	N/A	N/A	
	Total Monthly Housing Cost	1,789.42	1,564.05	2,124.51	
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	530.00	620.00	700.00	850.00
	Utilities	78.23	165.08	175.98	233.00
	Insurance	9.72	8.53	8.82	8.82
	Total Monthly Housing Cost	617.95	793.61	884.80	1,091.83

Table 10 - Quebec City Detailed Housing Costs by Housing Type, 2015

Quebec City

		Household Type			
	Housing Cost	**Condo**	**Bungalow**	**Two-Storey**	
Own	Market Price	215,000 - 237,000	242,000 - 267,000	330,000 - 365,000	
	Property Taxes	156.00	156.00	156.00	
	Utilities	116.18	154.91	154.91	
	Maintenance	N/A	36.01	36.01	
	Insurance	42.07	42.07	42.07	
	Condo Fees	364.62	N/A	N/A	
	Total Monthly Housing Cost	1,608.14	1,434.99	1,818.84	
		Apartment Type			
	Housing Cost	**Bachelor**	**1 Bdrm**	**2 Bdrm**	**3+ Bdrm**
Rent	Market Price	525.00	630.00	750.00	875.00
	Utilities	77.92	164.42	175.27	232.07
	Insurance	9.68	8.50	8.79	8.79
	Total Monthly Housing Cost	612.59	802.91	934.06	1,115.85

Table 11- MBM Estimated from Actual Expenditures

CMA	Household Type			
	Single Adult	Single Adult with 2 Children	Two Adult Couple (No Children)	Two Adult Couple with 2 Children
St. John's	11,670	22,790	17,817	28,027
Halifax	11,829	22,819	18,136	26,865
Quebec City	11,799	22,533	18,081	25,817
Montreal	11,756	22,549	17,994	26,101
Ottawa	12,197	22,365	18,870	26,525
Toronto	12,726	22,706	19,927	26,066
Winnipeg	11,880	22,622	18,240	25,997
Regina	11,596	22,340	17,669	25,570
Calgary	12,044	22,690	18,562	26,087
Vancouver	11,964	22,222	18,404	26,525

Table 12- Equalization MBM

CMA	Household Type			
	Single Adult	Single Adult with 2 Children	Two Adult Couple (No Children)	Two Adult Couple with 2 Children
St. John's	14,013	22,421	19,619	28,027
Halifax	13,433	21,492	18,806	26,865
Montreal	13,050	20,881	18,271	26,101
Toronto	13,033	20,853	18,247	26,066
Winnipeg	12,998	20,797	18,198	25,997
Regina	12,785	20,456	17,899	25,570
Calgary	13,044	20,870	18,261	26,087
Vancouver	13,263	21,220	18,568	26,525
Ottawa	13,263	21,220	18,568	26,525
Quebec City	12,908	20,653	18,072	25,817

Table 13 - Ratio of Equivalent MBM + Actual Shelter Expenses as a share of Before-Tax Income

CMA	Single Adult	Single Adult With Children	Couple Without Children	Couple With Children
Calgary	0.5	0.7	0.3	0.3
Halifax	0.6	0.5	0.4	0.4
Montreal	0.7	0.4	0.4	0.4
Ottawa	0.6	0.8	0.3	0.2
Regina	0.4	0.8	0.3	0.3
St. John's	0.6	0.7	0.4	0.3
Toronto	0.5	0.6	0.4	0.4
Vancouver	0.6	0.5	0.4	0.4
Winnipeg	0.6	0.7	0.3	0.4
Quebec City	0.6	0.4	0.4	0.3

Table 14 - MBM Equivalent budgets compared to actual expenditures

MBM Equivalent budgets compared to actual expenditures							
	Clothing	Food	Shelter	Transportation	Other expenses	Total Expenditur	Household Size
Montréal MBM	1,958	11,524	8,935	2,679	9,940	35,036	4.0
MBM Equivalent (2nd Decile)	1,145	6,737	5,223	1,566	5,811	20,482	1.5
Actual 2nd Decile	1,484	4,757	11,159	4,526	3,470	25,396	1.5
Toronto MBM	1,629	10,691	14,456	4,665	9,081	40,522	4.0
MBM Equivalent (2nd Decile)	987	6,478	8,759	2,827	5,503	24,554	1.6
Actual 2nd Decile	2,932	5,206	13,114	6,175	3,798	31,224	1.6
Vancouver MBM	1,906	11,632	13,038	3,007	9,980	39,564	4.0
MBM Equivalent (2nd Decile)	1,169	7,132	7,994	1,844	6,119	24,257	1.7
Actual 2nd Decile	1,402	3,630	12,039	4,959	3,158	25,189	1.7

Table 15 - Actual shelter expenses compared to rental market data and MBM equivalent

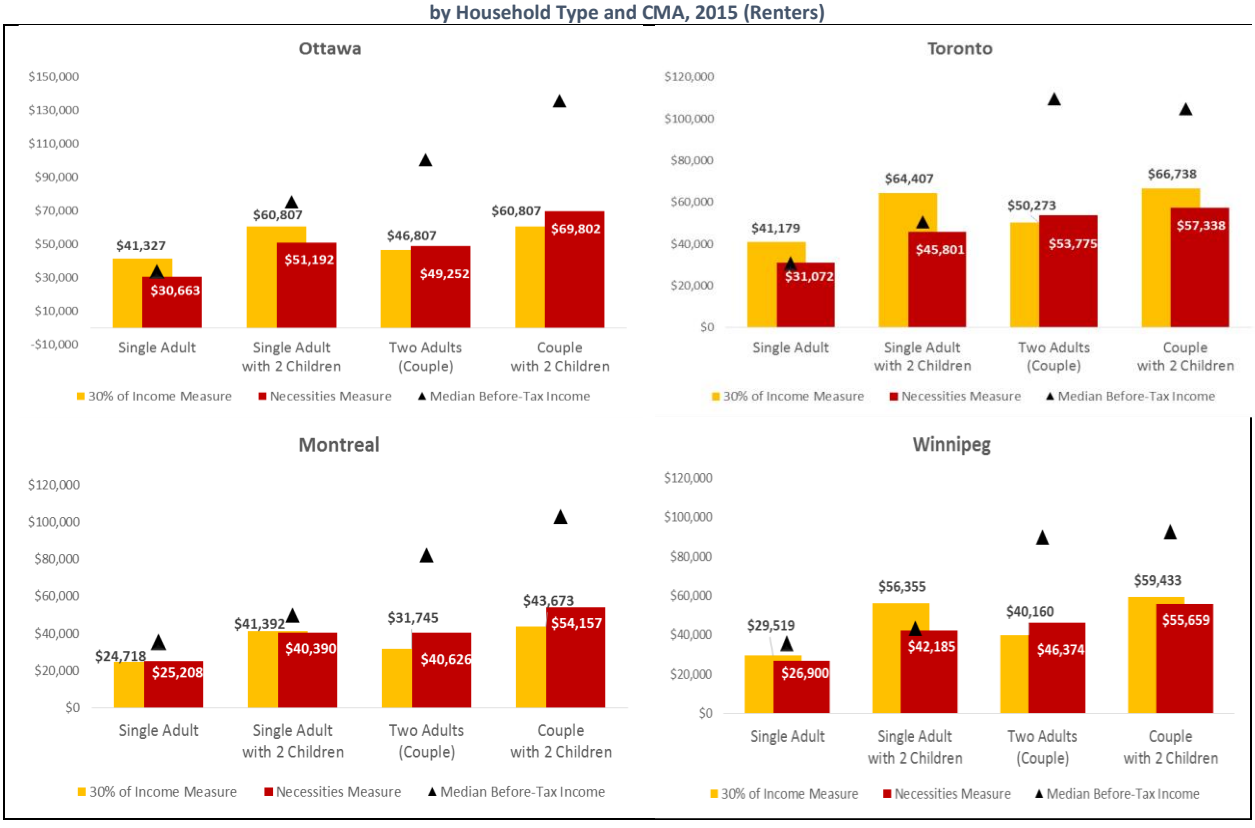
Actual shelter expenses compared to rental market data and MBM equivalent						
	Single Adult					
	Actual Shelter Expense	MBM Equivalent Shelter Expense	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA						
St. Johns	987	493	880	960	1,075	1,085
Halifax	999	499	890	935	1,105	1,380
Montreal	860	430	618	708	788	938
Toronto	1,281	641	1,030	1,155	1,325	1,506
Winnipeg	943	472	738	929	1,131	1,348
Regina	1,244	622	878	1,069	1,269	1,583
Calgary	1,365	682	1,123	1,273	1,472	1,523
Vancouver	1,066	533	992	1,080	1,320	1,520
Ottawa	1,126	563	1,035	1,172	1,350	1,522
Quebec City	767	383	613	718	838	963

	Single Adult With Children					
	Actual Shelter Expense	MBM Equivalent Shelter Expense	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA						
St. Johns	1,166	828	922	1,002	1,117	1,127
Halifax	1,132	806	1,004	1,049	1,219	1,494
Montreal	1,095	837	715	805	885	1,035
Toronto	1,413	1,079	1,134	1,259	1,429	1,610
Winnipeg	1,140	907	799	990	1,192	1,409
Regina	1,470	1,092	964	1,155	1,355	1,669
Calgary	1,657	1,231	1,232	1,382	1,581	1,632
Vancouver	2,261	1,680	1,095	1,183	1,423	1,623
Ottawa	1,459	1,093	1,035	1,172	1,350	1,522
Quebec City	1,068	774	709	814	934	1,059

	Couple Without Children					
	Actual Shelter Expense	MBM Equivalent Shelter Expense	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA						
St. Johns	1,375	963	965	1,045	1,160	1,170
Halifax	1,563	1,094	1,016	1,061	1,231	1,506
Montreal	1,241	869	704	794	874	1,024
Toronto	1,627	1,139	1,132	1,257	1,427	1,608
Winnipeg	1,305	914	813	1,004	1,206	1,423
Regina	1,606	1,124	963	1,154	1,354	1,668
Calgary	1,845	1,291	1,228	1,378	1,577	1,628
Vancouver	1,617	1,132	1,082	1,170	1,410	1,610
Ottawa	1,626	1,138	1,114	1,251	1,429	1,601
Quebec City	1,096	767	698	803	923	1,048

	Couple With Children					
	Actual Shelter Expense	MBM Equivalent Shelter Expense	Bachelor	1 Bdrm	2 Bdrm	3+Bdrm
CMA						
St. Johns	1,913	1,861	1,068	1,148	1,263	1,273
Halifax	1,988	1,952	1,137	1,182	1,352	1,627
Montreal	1,592	1,600	772	862	942	1,092
Toronto	2,342	2,304	1,193	1,318	1,488	1,669
Winnipeg	1,557	1,538	876	1,067	1,269	1,486
Regina	2,019	2,004	1,010	1,201	1,401	1,715
Calgary	2,137	2,165	1,305	1,455	1,654	1,705
Vancouver	2,311	2,248	1,172	1,260	1,500	1,700
Ottawa	2,042	2,019	1,114	1,251	1,429	1,601
Quebec City	1,821	1,764	766	871	991	1,116

Table 16 - Comparison of Conventional and Basic Needs Affordability Thresholds and Median Incomes by Household Type and CMA, 2015 (Renters)



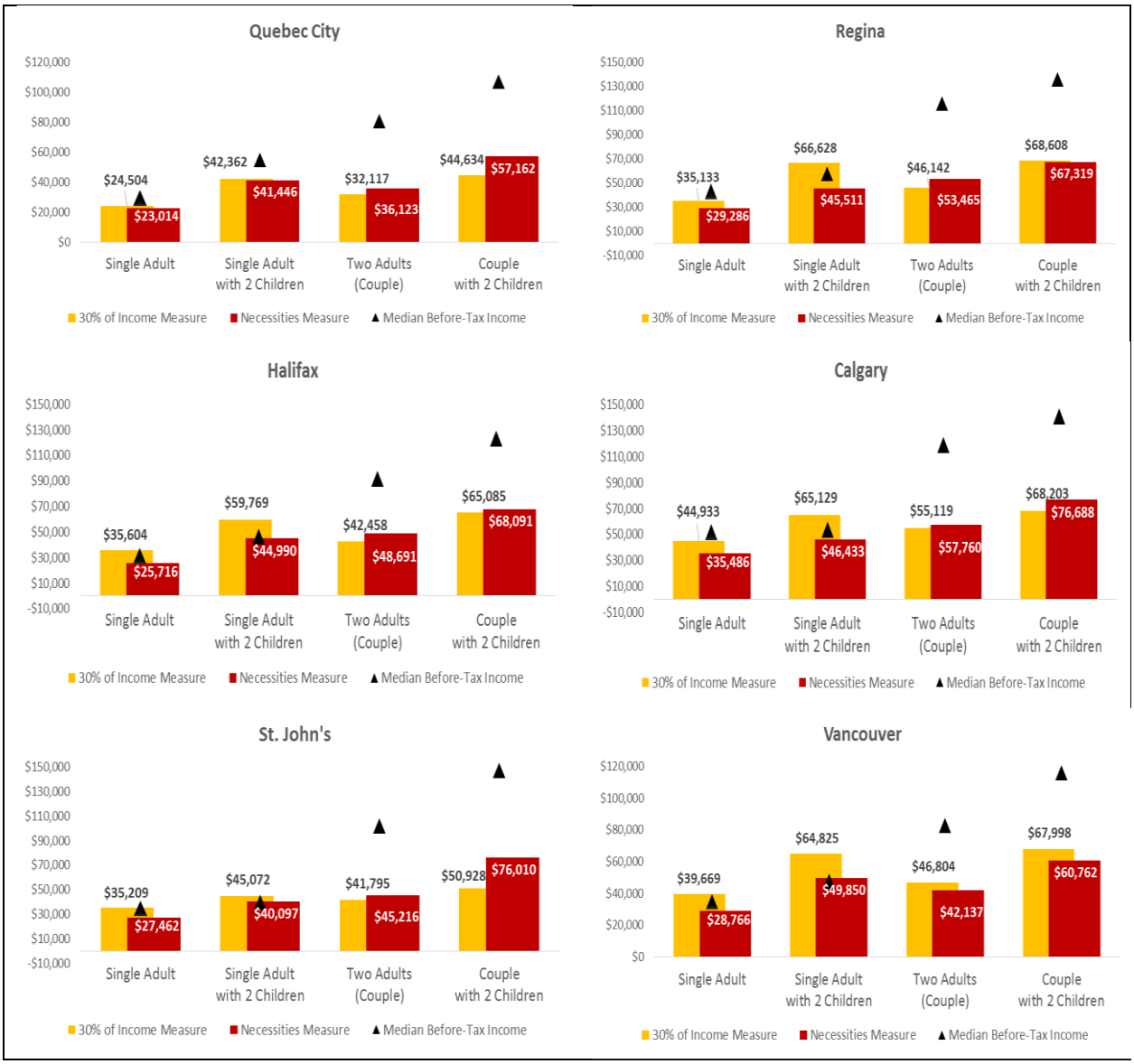
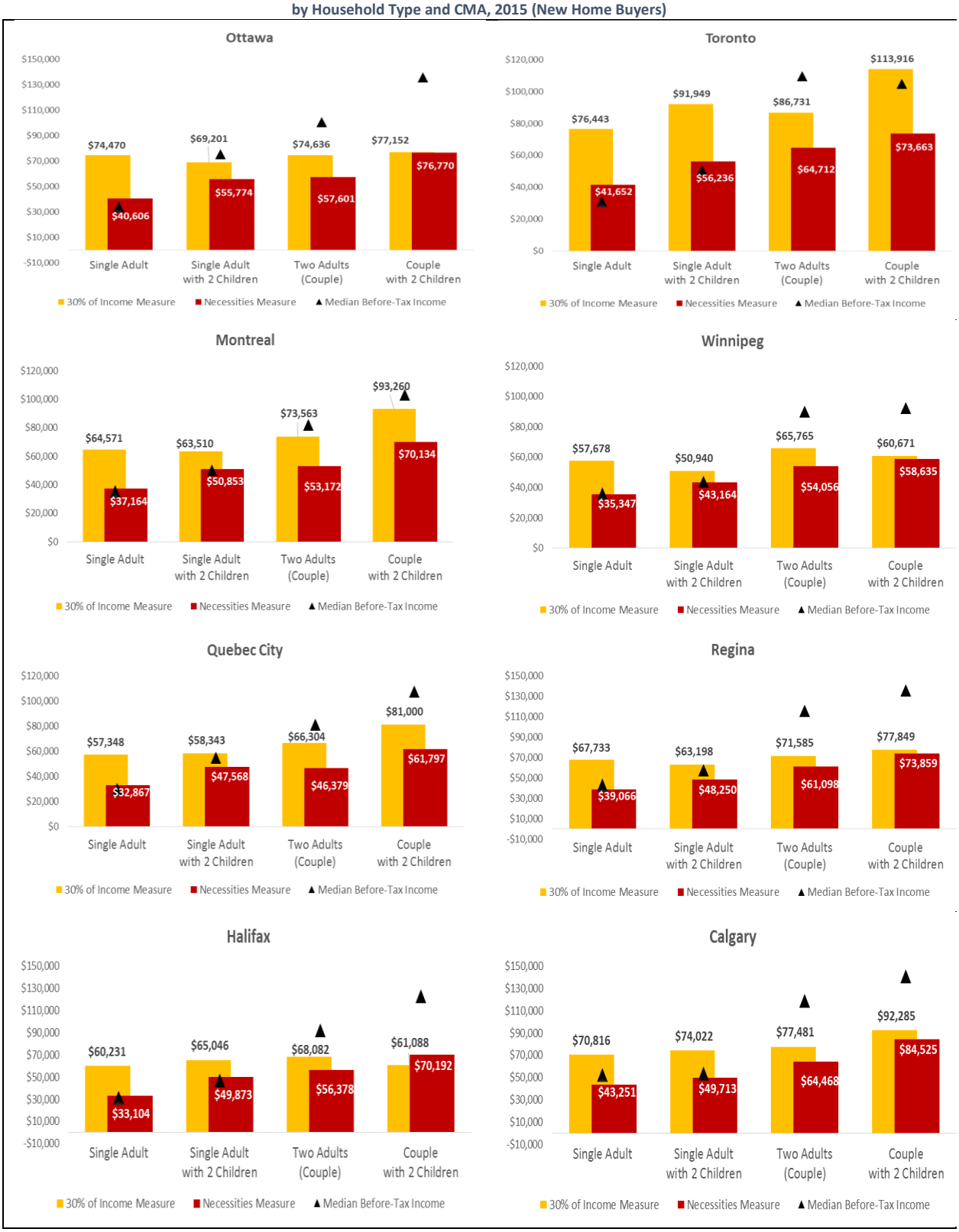
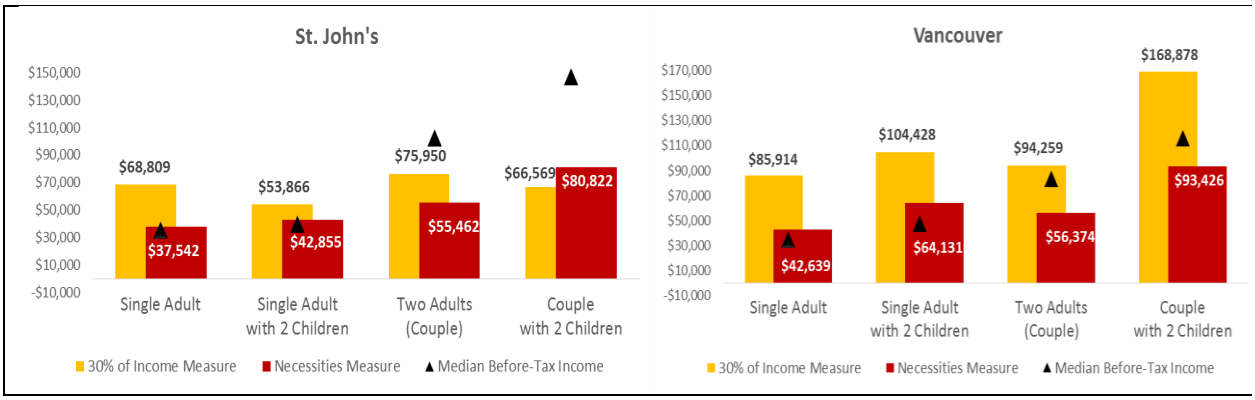
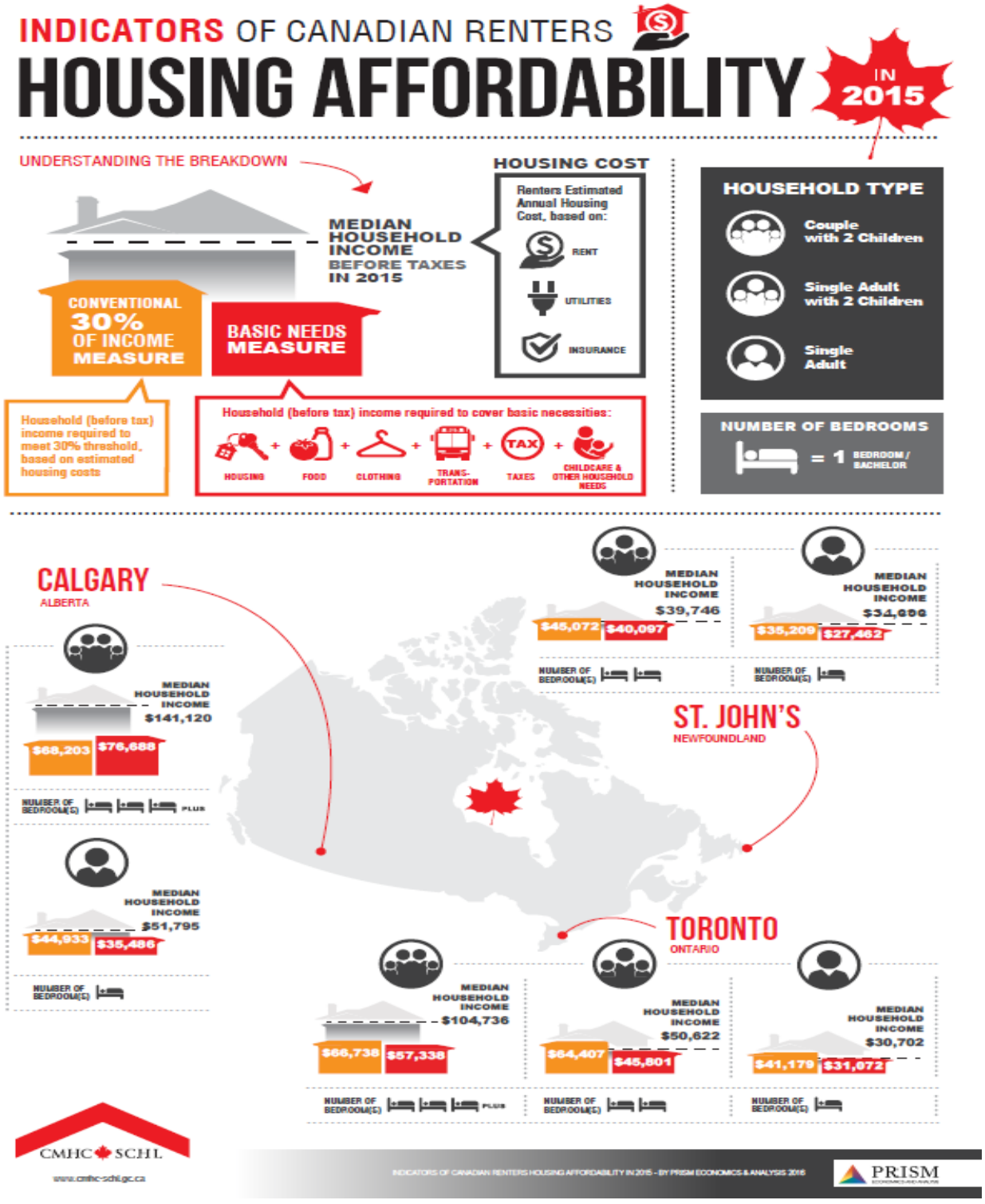

Quebec City
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0
$24,504
$23,014
$42,362
$41,446
$32,117
$36,123
$44,634
$57,162
Single Adult
Single Adult with 2 Children
Two Adults (Couple)
Couple with 2 Children
30% of Income Measure
Necessities Measure
Median Before-Tax Income
Regina
$150,000
$130,000
$110,000
$90,000
$70,000
$50,000
$30,000
$10,000
-$10,000
$35,133
$29,286
$66,628
$45,511
$46,142
$53,465
$68,608
$67,319
Halifax
$35,604
$25,716
$59,769
$44,990
$42,458
$48,691
$65,085
$68,091
Calgary
$44,933
$35,486
$65,129
$46,433
$55,119
$57,760
$68,203
$76,688
St. John's
$35,209
$27,462
$45,072
$40,097
$41,795
$45,216
$50,928
$76,010
Vancouver
$39,669
$28,766
$64,825
$49,850
$46,804
$42,137
$67,998
$60,762

Table 17 - Comparison of Conventional and Basic Needs Affordability Thresholds and Median Incomes by Household Type and CMA, 2015 (New Home Buyers)




St. John's
$150,000
$130,000
$110,000
$90,000
$70,000
$50,000
$30,000
$10,000
-$10,000
$68,809
$37,542
$53,866
$42,855
$75,950
$55,462
$66,569
$80,822
Single Adult
Single Adult with 2 Children
Two Adults (Couple)
Couple with 2 Children
30% of Income Measure
Necessities Measure
Median Before-Tax Income
Vancouver
$170,000
$150,000
$130,000
$110,000
$90,000
$70,000
$50,000
$30,000
$10,000
-$10,000
$85,914
$42,639
$104,428
$64,131
$94,259
$56,374
$168,878
$93,426
Single Adult
Single Adult with 2 Children
Two Adults (Couple)
Couple with 2 Children
30% of Income Measure
Necessities Measure
Median Before-Tax Income

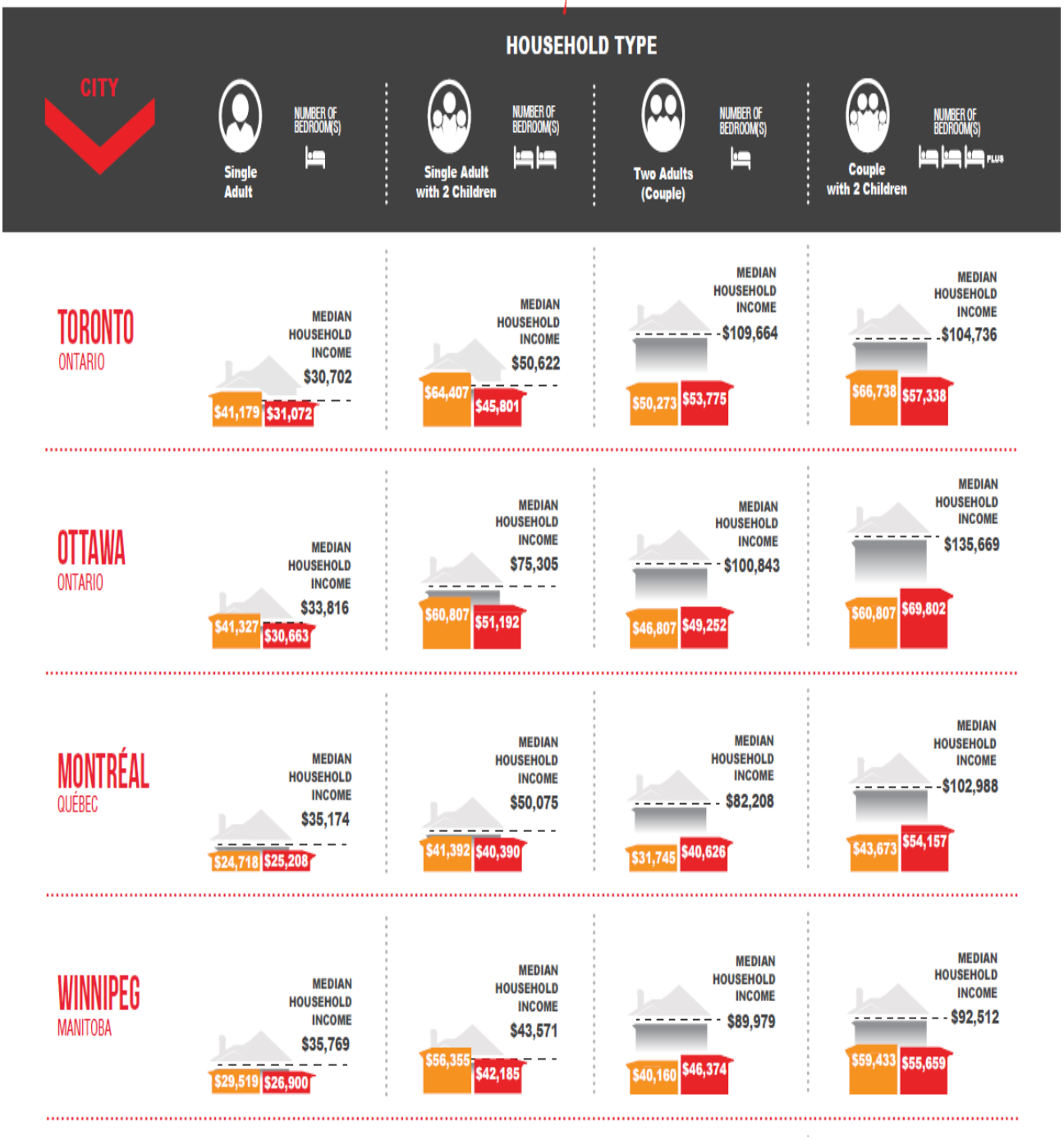
Infographics



INDICATORS OF CANADIAN RENTERS
HOUSING AFFORDABILITY IN 2015

CMHC SCHL

www.cmhc-schl.gc.ca




QUÉBEC CITY
QUÉBEC
MEDIAN HOUSEHOLD INCOME
$29,486
$24,504
$23,014
MEDIAN HOUSEHOLD INCOME
$55,089
$42,362
$41,446
MEDIAN HOUSEHOLD INCOME
$80,884
$32,117
$36,123
MEDIAN HOUSEHOLD INCOME
$107,239
$44,634
$57,162
REGINA
SASKATCHEWAN
MEDIAN HOUSEHOLD INCOME
$42,738
$35,133
$29,286
MEDIAN HOUSEHOLD INCOME
$57,779
$66,628
$45,511
MEDIAN HOUSEHOLD INCOME
$115,925
$46,142
$53,465
MEDIAN HOUSEHOLD INCOME
$135,700
$68,608
$67,319
HALIFAX
NOVA SCOTIA
MEDIAN HOUSEHOLD INCOME
$31,174
$35,604
$25,716
MEDIAN HOUSEHOLD INCOME
$46,776
$59,769
$44,990
MEDIAN HOUSEHOLD INCOME
$91,881
$42,458
$48,691
MEDIAN HOUSEHOLD INCOME
$122,868
$65,085
$68,091
CALGARY
ALBERTA
MEDIAN HOUSEHOLD INCOME
$51,795
$44,933
$35,486
MEDIAN HOUSEHOLD INCOME
$53,676
$65,129
$46,433
MEDIAN HOUSEHOLD INCOME
$118,966
$55,119
$57,760
MEDIAN HOUSEHOLD INCOME
$141,120
$68,203
$76,688
ST. JOHN'S
NEWFOUNDLAND
MEDIAN HOUSEHOLD INCOME
$34,696
$35,209
$27,462
MEDIAN HOUSEHOLD INCOME
$39,746
$45,072
$40,097
MEDIAN HOUSEHOLD INCOME
$102,183
$41,795
$45,216
MEDIAN HOUSEHOLD INCOME
$147,216
$50,928
$76,010
VANCOUVER
BRITISH COLUMBIA
MEDIAN HOUSEHOLD INCOME
$34,303
$39,669
$28,766
MEDIAN HOUSEHOLD INCOME
$47,660
$64,825
$49,850
MEDIAN HOUSEHOLD INCOME
$83,077
$46,804
$42,137
MEDIAN HOUSEHOLD INCOME
$115,862
$67,998
$60,762

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