A Better Inflation Indicator: A CPI with a Net Purchases Approach to Owned Accommodation, 2005-2010

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Abstract:
The official CPI was created to serve as an escalator of incomes and has always been constructed primarily to serve that purpose. However, it has also been used as an inflation indicator, and for two decades now the Bank of Canada has built its inflation targeting policy around it. However the official CPI is poorly suited to its new role as an inflation indicator, and its continued use only increases the risk that Canada will fall victim to the same kind of housing bubble that only recently plunged the United States into its worst recession in the postwar era.

This paper constructs a CPI based on a net purchases approach for the 2005 CPI basket. This index is similar to the CPIs now published by Australia, New Zealand and Finland, with the exception that real transaction prices for houses are used and there is no effort made to exclude the land price from the house price. This practice seems to come from extending SNA concepts relevant to measuring GDP to household accounts where they are inappropriate.

The official CPI excluding mortgage interest, which can be considered a special case of this more restrictive form of the net purchase approach, gives empirically different results, even at the national level, and would be less sensitive to a bubble in house prices.

Like the Finnish CPI, but unlike its Antipodean counterparts or the official Canadian series, property taxes and special charges are also excluded, as a tax on wealth that has no place in an inflation indicator.

Keywords: owner-occupied housing, net acquisitions, housing bubble

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The Great American Housing Bubble

The bursting of the American housing bubble was one of the most disastrous economic events of the last half century. From 2000 forward American home prices rose swiftly and steadily, more than doubling by the time that they peaked in 2006. This surge in home prices was accompanied by a big boost in residential construction activity. Moreover there was a securitization of American mortgages, with the mortgage-backed securities being sold all over the world. When the housing bubble burst, house prices started falling dramatically, causing a wave of defaults. Since most American mortgages are no-recourse loans, many homeowners were better off by simply walking away from their homes. The banks that held the mortgages would then put up the homes for sale at whatever price they could get for them, which would further depress prices, which would cause more Americans to walk away from their homes, a vicious circle that may still not have run its course. At the time of writing, about five years after the housing bubble burst, it is still not clear that American housing prices have turned the corner and are on their way back up.

When the housing price bubble burst in 2006 it set in motion a financial collapse in America that lead to a North American and arguably a world recession in 2008. The world-wide distribution of securities backed by American mortgages guaranteed that if there was a collapse of the domestic housing market it would cause a real jolt to world financial markets. For the United States and the world it was the deepest and most synchronized recession since the 1930s.

For Canada, however, despite being the United States’ neighbor, the recession was not so severe and there was no financial collapse. This has lead to some quite un-Canadian chest-thumping about our superiority to Americans in having a better monitored financial system, sounder mortgage legislation and so forth. However, few people have noticed one critical failing that lead to the US housing bubble where Canada is hardly any better off than the United States. The US Federal Reserve Board’s favored inflation indicator, the personal expenditure price index (PEPI) excluding food and energy, was quite insensitive to surging housing prices, and gave them no warning of what was to come. The Bank of Canada’s inflation target, the CPI All-items, is only marginally better, and must be replaced if Canadians are serious about being hit by the same kind of bubble sometime in the future.

The Bureau of Economic Analysis (BEA) series uses a rental equivalence measure for owned accommodation (OA), as required by the System of National Accounts. However, this measure proved entirely inadequate either to monitor the steep rise in house prices during the ascent, nor the sharp fall when the bubble burst. This is obvious from Chart 1 attached, which compares the PEPI series for imputed rents with the Case-Shiller 20-city composite price index for resale homes. While the Case-Shiller index faithfully monitors the rise and fall, the PEPI series plods steadily and innocuously upward without giving any hint of what was happening in the market.

The slide also shows the Federal Housing Financing Agency (FHFA) house price index purchase only series, formerly known as the OFHEO HPI, for the Office of Federal...
Housing Enterprise Oversight. While it peaks a year later than the Case-Shiller index in 2007, and does not rise so steeply otherwise its pattern is very similar.

Professor Steve Hanke (2010) notes that:

The Fed's inflation metric signalled "no problems." But abrupt shifts in major relative prices were underfoot. Housing prices measured by the Case-Shiller index were surging, increasing by 44.8% from the first quarter in 2003 until their peak in the first quarter of 2006.

However, Professor Hanke, in an article that is highly critical of FRB policies and blames the Fed for the US housing bubble, doesn’t attach any particular importance to this observation. As the reference to “relative prices” suggests, he does not seem to think that the Fed’s inflation indicator was faulty per se, and he makes no recommendation that it be replaced by one that is properly sensitive to housing prices.

Professor Thomas Sowell (2009) blames the housing boom and bust mostly on US housing policies. But he does note that in 2005, Federal Reserve Chairman Allan Greenspan stated in 2005, the year before the US housing bubble burst, that: “Although a bubbling in home prices for the Nation as a whole does not appear likely, there do appear to be at a minimum signs of froth in some local markets where home prices seem to have risen to unsustainable levels”.  

Professor John Taylor (2009) in his book _Getting Off Track_, criticizes the FRB for not following Taylor’s rule from 2002 to 2005, but maintaining a lower rate of interest. (Taylor’s rule states that the short term interest rate should be one-and-a-half times the inflation rate plus one-and-a-half times the GDP gap plus one.) Had the US inflation rate been measured using a CPI with a homeownership component based on the NP approach, the departure of the interest rate from Taylor’s rule would have been considerably larger than shown in Professor Taylor’s book.

However, there are some studies that do link the US housing boom and bust to deficiencies in the FRB’s chosen inflation indicator. Professors Laidler and Banerjee (2008), in a commentary written for the C.D. Howe Institute, would have us believe that the US FRB erred in using the PEPI excluding food and energy prices because unlike the CPI series used by the Bank of Canada, the American index is subject to revision and does not take account of food and energy price increases, which were substantial in the

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2 See Sowell (2009), p. 43. Dion and Sabourin (2009, p. 23) write that “a moderate rise in the relative price of housing may be of no particular concern to monetary authorities, especially if it is concentrated in specific locations where fundamentals drive the housing price higher.” The American housing boom was highly concentrated in a few regions, including coastal California, Nevada, Arizona and Florida. Large urban centres like Detroit, Houston and Dallas were almost entirely unaffected by the boom or bust. It was easy to claim at the time that these regional increases in house prices in the affected regions responded to fundamentals: demographic increase, shortage of residential lots, etc. and it was partially true. The American experience does not give one any confidence that a central bank is capable of distinguishing between regional house price increases with local effects, and broader surges capable of bringing down an economy.
years leading up to the 2006 housing bubble. They don’t mention that the core CPI used by the Bank of Canada as an operational guide also excludes most energy prices; electricity is the only important component of energy included in the core. While these are valid points, the US financial collapse was triggered by a housing bubble, and it would seem to be more pertinent that the Fed’s chosen inflation indicator was virtually insensitive to rising home prices than that it was also insensitive to food and energy prices.

Professors Laidler and Banerjee (2008, p.8-9) note that:

The United Kingdom is now seeing its housing bubble collapse, but, unlike the Fed, the Bank of England is a formal CPI inflation targeter… However, although it bears the same label as Canada’s broadly based CPI, the UK’s index is not equivalent and covers a narrower range of goods. It is, in fact, the European harmonized index of consumer prices as applied to local data,…and it takes no account at all of the costs associated with the owner occupancy of housing. [This is not quite true, as the UK CPI, consistent with HICP guidelines, includes minor homeowner repairs and maintenance; it does exclude other homeownership costs.] This extraordinary omission makes it a dubious tool for measuring inflation in an economy such as that of the United Kingdom, with an owner-occupancy rate of about 70 percent, and in which house prices and, therefore, that component of the cost of living associated with the provision of shelter have until recently been rising at double-digit rates in many areas.

Not surprisingly, the UK retail price index (RPI), which does account for owner-occupancy costs and is roughly equivalent to the Canadian CPI, has risen significantly faster in recent years…Had the Bank of England been targeting this index or even the variant that it targeted before 2003, which ignores mortgage interest while accounting for other owner-occupancy costs it is hard to believe that UK monetary policy would not have tightened sooner, with salutary effects not just on inflation, but on the local housing market, too. [All italics added.]

There are several points worth making about the preceding passage. First, the authors should be commended for favoring an inflation indicator that includes house prices over one that does not, and they are almost certainly right in believing that the exclusion of house prices from their inflation indicator after 2003 contributed greatly to the British boom and bust.

However, they are wrong in believing that if housing prices are rising at double-digit rates the consumer price series for owner-occupied housing will necessarily be rising at the same rate. In fact, the RPI for owner-occupied housing never hit double digit rates of increase based on 12-month rates of change at any time in the last decade, although, like its Canadian equivalent, it includes house prices. A series for OA based on rental equivalence, by definition, excludes house prices and would likely be weakly correlated with house price movements.
And they are wrong if they believe that the RPIX, excluding mortgage interest costs, would have been an inferior indicator in terms of coming to grips with the surge of housing prices than the RPI, which included them. The mortgage interest index carries all the baggage of interest rate changes and years past movements in house prices with it. The RPIX series gives a larger impact to current house price movements. This can be seen in their own Figure 8: of the three series: CPI, RPI and RPIX, the RPI series is much the choppiest, as one would expect in a series that is sensitive to current mortgage interest rates.

Professors Diewert and Nakamura and Mr. Leonard Nakamura (2009, p.156-7) give a much better analysis of how the inflation indicator used by the US FRB helped to put America into recession:

Over the course of the recent house price bubble in the United States, the price of homes rose rapidly from 1999 Q4 to 2005Q4 (11.3% annually as measured by the Case-Shiller index, and 8.4% annually as measured by the Federal Housing Financing Agency) but slowly as measured by owner equivalent rents (3.4%). One consequence was that measured core inflation remained relatively docile during this period since only rents are used to measure inflation for housing services in the United States.

While Erwin Diewert and the Nakamuras are excellent diagnosticians, I am skeptical of the remedy that they propose, a hybrid of the equivalent rent and opportunity cost approaches which does not respect two of the core requirements one would expect of an inflation indicator: reliance on market prices and exclusion of interest rate series.

The Official Approach to Measuring Owned Accommodation

The official CPI for OA has been described in the CPI’s own reference document as a user cost index. Perhaps because of this, its rationale is not well understood and it has often been unfairly criticized.

It would be more accurate to describe it as an index of lessor’s deductible costs. One imagines that a lessor (or landlord) is renting a home to himself, but can still claim the normal cost deductions from income as if he were renting to a third party.

Besides an other expenditures category, there are five categories identified in the official index:

1. Mortgage interest costs,
2. Replacement cost of depreciation,
3. Property taxes and special charges,
4. Cost of homeowner’s insurance,
5. Cost of maintenance and repairs paid by homeowners.
In the most recent reference paper for the CPI it is clearly stated that:

The primary concern for the Canadian CPI is to provide an adequate indicator of price-induced changes in the purchasing power of the consumer dollar. The treatment of owned accommodation in the CPI is designed to serve this purpose.

It was never designed to serve as an inflation indicator, and is poorly suited to that purpose. Nevertheless it was conscripted to serve in that role in February 1991 when the Bank of Canada adopted a monetary policy based on inflation targeting and more than two decades later it is still being used in this way.

It’s as if the Olympic Games had only one track race, the 1500 metres, and Canada were sending Kevin Sullivan to Atlanta in 1996 because he was our best miler. Then the games added a 100-metre race, and our Olympic committee opted to have Kevin run in that race too, ignoring Donovan Bailey, because we were used to having only our best miler run for us.

Nor is there any official indication that this will change. The background information released by the Bank of Canada in November 2006 on the renewal of the inflation target proposed a research program that proposed looking at changes in the target rate of inflation or a move to price level targeting but completely ignored investigation of a change in the inflation target. Given the manifest unsuitability of the existing indicator this is really putting the cart before the horse. Any important change in the inflation indicator may require a change in the target rate as well. The Bank of England brought its inflation target down to 2% from 2½% when it changed its inflation indicator from the RPIX to the CPI in 2003.

There have been no published studies by the Bank of Canada re-examining the inflation indicator with regard to its OA component and only one unpublished study, by Richard Dion and Patrick Sabourin (2009). Unfortunately that study was compromised by my own poor advice at the time that they calculate a net purchase series inclusive of a property tax component. Nor, since they were not advised to do so, did they make an attempt to extend the NP approach to owned vacation homes or to exclude other tax-like components from the CPI. Hopefully their study will be redone and updated to reflect a superior NP indicator, similar to the one outlined in this paper.

Nevertheless, their rejection of the NP approach seemed to be partly determined by the authors’ implicit rejection of the concept of having two consumer price series, one for escalation and one for inflation targeting. They noted with disapproval that the NP measure “is not fully compatible with cost-of-living index.” (See Dion and Sabourin (2009; p. 25.) This is true but hardly relevant to their own quest for a superior inflation indicator. What was Donovan Bailey’s VO$_2$ max in 1996? Who knows or cares? While an important datum in gauging the performance of a distance runner it has no relevance in evaluating a sprinter.
Two years ago at the annual CEA meeting in Toronto, giving the Doug Purvis Memorial Lecture, former Bank of Canada governor David Dodge (2009, p.34) also defended maintaining the status quo as far as the Bank’s inflation indicator was concerned: “In setting the policy rate central banks should continue to focus on consumer prices over the medium term, not directly target asset prices.” Of course, this really sets up a false distinction between consumer prices and asset prices, when the real question is whether pricing of housing should be carried out on a special user cost basis, or using the same net purchase approach that Dodge has never questioned as applied to consumer durables.

And he notes in a footnote that “Of course house prices are included in the Canadian CPI, and hence the Bank of Canada does respond to rapid increases in the price of owner-occupied housing.” As evidence of this Dodge cites several of the Bank’s Monetary Policy Reports, most notably the report of October 2006, p. 33. However if one goes to p.33 one finds a technical box that discusses the substantial increase in resale house prices from 2000 to 2006 as measured by Royal LePage. Pace David Dodge, the CPI for owned accommodation has never used Royal LePage data to measure housing prices. However, if one looks at the rate of increase in the new housing price index (NHPI) for house and land, the actual housing price indicator used in the CPI, as opposed to the increase in the owned accommodation component of the CPI, one finds that the former index increases at about 2.9% per year on average, or at only about 55% of the 5.3% per year increase registered by the NHPI. So Mr. Dodge’s own chosen example does not in any way support his thesis that the official CPI is appropriately sensitive to house prices.

Unfortunately, Canadian monetary economists in general and not just those in or previously associated with the Bank of Canada seem to share a predilection for the status quo. For example, Angelo Melino (2011) in a Monetary Policy Commentary for the C. D. Howe Institute writes: “After considering existing alternatives, or minor tweaks to them, [Gregor] Smith, correctly in my opinion, concludes that there is no compelling alternative to the CPI.” (This is not an entirely accurate take on Professor Smith’s views, as we will see below.)

Let us now proceed to discuss the components of the CPI for OA in more detail.

Mortgage interest costs would be a deductible expense for a landlord, as opposed to an owner-occupier, and so are treated as cost element; the equity portion of mortgage payments is not deductible and is excluded.

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3 There are other authors who do the same thing. For example, Freedman and Goodlet (2007, p. 20) highly approve the Bank of International Settlements because it does not want to “identify and try to prick asset price bubbles”. But surely this is what any inflation-targeting central bank would be doing with respect to real estate bubbles if it adopted an NP approach to OA in its inflation indicator and a sufficiently rigorous upper bound on the inflation rate. The alternative that they prefer, to wait until the bubble bursts, and let the central bank clean up the wreckage afterwards, would be inefficient, if not inhumane. The authors rightly favour the development of leading indicators of financial stress, such as when the demand for a particular asset (e.g. new houses) much exceeds what would seem to be reasonable. However, surely the existence of good housing price data is a prerequisite for such a leading indicator of financial stress, and these data are much more likely to be available with an inflation indicator that gives a prominent role to housing prices.
The replacement cost of depreciation is not an actual paid expense, and is proxied in the CPI by an index of new dwelling prices based on contractors’ estimates of what they could sell their homes for if the dwelling were sold without the lot. It is the only elemental index related to an imputed expenditure rather than a paid expenditure in the Canadian CPI, but it is justified on the basis that for a landlord depreciation cost is a deductible expense, and no landlord could stay in business on a continuing basis unless he was replacing his stock of dwellings as they aged.

Property taxes are not really a consumption expenditure. They constitute a special kind of wealth tax. Nevertheless they are a cost to the landlord and would be reflected in the rent that the landlord charged the tenant.

Costs of insurance and costs of maintenance and repairs would be paid partly by the landlord and partly by the tenant for a rented dwelling. In the official approach all costs of insurance and of maintenance and repairs are included in the index.

Gregor Smith (2009, p.8), in a widely read and frequently praised monograph for the C. D. Howe Institute on the Canadian CPI finds two things wrong with the OA component:

First, it includes only the mortgage interest cost as a user cost component and not the opportunity cost of the equity tied up in a house. This omission tends to make their weight on housing too small. Second, a true user cost that tries to mimic market rents would include an estimate of the anticipated capital gain on holding the house (recall that depreciation raises the user cost of an asset, so appreciation lowers it), but Statistics Canada does not deduct this anticipated capital gain from its measure of the user cost. Omitting this factor – admittedly quite challenging to measure – tends to make its estimate of the user cost too high and the weight on housing too large.

Unfortunately, Professor Smith seems to assume that it was the intent of the index makers to calculate a user cost index based on opportunity cost and they fell short of their goal. This was not the case. The opportunity cost of equity tied up in the home would normally be excluded as an imputed rather than a paid cost. Unlike depreciation expense, its inclusion could not be justified as being a deductible cost for a landlord.

As for capital gains on holding a house, this is not a cost at all, but an income stream, and an anticipated income stream at that, and so would have no place in an index based on a landlord’s costs.

And Professor Smith goes on to show his bias in favour of a user cost approach when he continues:

A constructive step might be for Statistics Canada to report several possible series (or components thereof) for owner-occupied housing. Researchers then could work with these series and perhaps reach a consensus on the empirical
importance of the user-cost components. [Italics added.]

This follows closely on a brief outline of four different treatments of owned accommodation: exclusion, net purchase (“use the acquisition price”), rental equivalence and user cost, but he assumes that some variant of the user cost approach should be adopted.

In fact, Statistics Canada did just what Professor Smith recommends in a study by Erdur and Prud’homme (2007), calculating two variants of a full user cost index for the years 2000-2006. The results were hardly encouraging for advocates of a full user cost approach. In this period of strong housing demand, the OA components based on user cost declined by 2.1% and 1.3% per annum as opposed to increases of 2.2% and 3.3% in indexes based on the official concept and on the net purchase (NP) concept.

In 1997, the United Kingdom’s Office of National Statistics paid the Canadian approach the ultimate compliment of adopting it. Previously the ONS had used a limited payments approach to OA in its Retail Price Index. From 1997 forward it also incorporated a component for the replacement cost of depreciation. The international experience of the full user cost approach has been much less happy. The ILO CPI Manual notes with approval that Iceland has adopted a simplified version of the full user cost approach (see section 23.86). Sweden also has adopted a simplified version of the full user cost approach, including a component for opportunity cost of owner’s equity but not one for anticipated capital gains. In both cases, the survival of these series is somewhat in doubt given that Sweden will likely be compelled to calculate CPIs with OA components based on the NP approach as a member of the European Union, and so will Iceland as a candidate country for membership.

Although the lessor’s deductible costs approach would seem to be similar to the rental equivalence approach, it could potentially be applied over a far greater variety of commodities. Rental markets for most commodities are notoriously thin. Even the U.S. Bureau of Labor Statistics only applies the rental equivalence approach to owner-occupied housing and to a portion of appliance purchases reflecting dwellings that are rented with appliances.

By contrast, the lessor’s deductible costs approach could be applied in principle to any durable good. For example, whether or not there was a rental market for yachts, one could calculate the replacement cost of depreciation on yachts, interest expense related to yachts purchased on credit and so forth, and generate a lessor’s cost CPI for yachts. The most obvious durable good to which the lessor’s cost approach could be extended is motor vehicles. Here the situation is very similar to the housing market with active resale markets and with a large share of purchases being made on credit with the vehicle serving as collateral for the vehicle loan just as the house serves as collateral for the mortgage.

The other expenditures component of the index contains two categories of expenditure:
1. transaction costs related to owned principal residences,
2. Expenditures on non-principal residences (cottages and owned vacation homes).

The transaction costs included in the index are:

1. Real estate commissions,
2. Transfer taxes and land registration fees,
3. Legal fees related to real estate transactions,
4. Transfer taxes and land registration fees,
5. Appraisals, surveying costs and mortgage penalties.

None of these are actually priced items, all are proxy series. Overwhelmingly, real estate commissions are paid on transactions involving existing homes, but the indicator for real estate commissions is based on new housing price series, and there is no attempt to monitor real estate commission rates themselves.

Transfer taxes and land registration fees, on the other hand, are mostly paid on purchases of new homes and not existing homes. From 2005 to 2009 the average value of transfer taxes paid over all households declined by 15.7%, but this was due partly to the recession and partly to the inevitable bouncing of the data given the small samples involved. Transfer taxes per household reporting were up by 19.3% from 2005 to 2009. A lot of the increase was due to the City of Toronto introducing a land transfer tax (LTT) of around 1.1% in February 2008. But partly it is also due to the strong increase in house prices over that period, which has tended to raise the average LTT rate on new home purchases without any legislated changes in rates. For example, since May 1997 the LTT rate for the Province of Ontario is:

- 0.5% for houses worth less than $55,000,
- 1.0% for houses worth at least $55,000 but less than $250,000,
- 1.5% for houses worth at least $250,000 but less than $400,000
- 2.0% for houses worth $400,000 or more.

As house prices rise, the average Ontario LTT rose between 2005 and 2009 even though there had been no change in the legislated rates.

Although an expenditure weight is assigned to LT Ts in the Canadian CPI, there has never been any collection of LTT rates; even the proxy index used for the series depends only partly on new housing prices. Therefore, the official index is not properly sensitive to house price surges in two ways, firstly by not proxying the index entirely on new house price changes, and secondly, by not reflecting in any way the increase in effective LTT rates due to house prices rising above thresholds that trigger a rate increase. (Note that the changes in effective LTT rates due to rising prices would be part of the core CPI measure if LTT rates were priced in the CPI, since they do not represent one-time tax hikes, but are the result of the natural evolution of housing prices.)
For a long time expenditures on non-principal OA (or owned vacation homes) were distinguished from expenditures on principal OA in the CPI. This sensible practice came to an end with the January 1995 update of the CPI, as part of a massive reduction in elemental indexes that accompanied the introduction of the 1992 basket. For the 2005 basket, the following components are distinguished for non-principal owned accommodation:

1. Repairs and maintenance,
2. Property taxes and sewage charges,
3. Insurance premiums,
4. Other expenses

Other expenses would include condominium charges, survey costs, legal fees and premiums for mortgage charges. Expenses nowhere included are mortgage interest costs and the replacement cost of depreciation, so in terms of its weighting the index for owned vacation homes is a limited payments index rather than a landlord’s deductible costs index.

Both mortgage interest and depreciation were excluded for practical rather than conceptual reasons. The annual Survey of Household Spending (SHS), which is the source of most of the CPI’s expenditure weights, only asks for mortgage payments, not mortgage interest. The replacement cost expenditure calculation for principal residences depends on an estimated value of the home received from SHS respondents and no such question is asked about non-principal residences. This will change with the 2009 basket update, when expenditure weights will be assigned to both mortgage interest and replacement cost.

It is notable that property taxes and special charges was the most important single cost item associated with non-principal owned accommodation, although, as was said, it really represents a special kind of wealth tax and not the cost of any good or service.

Self-built homes are not as important in Canada as they are in other countries. Generally only several such homes are reported each year to the SHS every year. Currently, all expenditures on self-built homes are treated as a part of improvements and alterations in the SHS, and therefore they are out of scope for the CPI. I have not attempted to add such expenditures to the home purchase weight, but this should be done if a home purchase series is to be calculated and published on a regular basis.

The most important of its components is the mortgage interest cost component. Since it is designed for a CPI to be used as an escalator of incomes it tries to reflect the changes in mortgage interest paid by the Canadian population for all mortgages contracted in the survey year. For this purpose a 25-year (or 300-month) moving average of house prices is calculated to properly reflect the impact of changing house prices on mortgage interest cost. This housing price component is multiplied by an interest rate series to get the mortgage interest cost index. Since the maximum amortization period of Canadian mortgages is 35 years, and until the end of 2009 it was 40 years, one could argue that for
escalation purposes this is not long enough and a 35-year (or 420-month) moving average of house prices would be more appropriate. In any case, it should be obvious that such a series is out of place in any inflation indicator worthy of the name. Were the prices of all consumer goods and services to stabilize today and remain as they are for the next three decades, the official CPI would still take a quarter of a century before it showed no change from month to month, based solely on the changes in house prices in its mortgage interest component.

As Tiff Macklem (2009, p.9), now the deputy governor of the Bank of Canada, has noted, there is also a problem with the interest portion of the mortgage interest cost index (MICI):

…the Bank’s policy instrument—the target overnight rate of interest—has a very direct effect on mortgage rates at shorter maturities, and this gives a misleading signal of the future trend in inflation. For example, a rise in the target for the overnight rate will tend to boost mortgage-interest costs, resulting in a rise in inflation in the very short run. But looking beyond this horizon, the higher interest rates will dampen spending and thus reduce inflationary pressures.

The interest portion of the current MICI is based on conventional mortgage rates for one-year, three-year and five-year fixed terms. As with the housing portion of the MICI, a moving average of past and previous values over several years is calculated. The MICI has never incorporated variable rate mortgages, although doing so would provide a more precise escalator-type measure of mortgage interest costs. The 2009 SHS indicated that variable rate mortgages accounted for 27.9% of household mortgages. The rates on variable rate mortgages will move in lock-step with the Bank of Canada’s target overnight rate of interest more than any fixed rate series. If they are still excluded from the MICI it is at least partly because lacking an independent monthly inflation indicator, considerations related to the use of the official CPI as such an indicator have made Statistics Canada reluctant to incorporate variable rate mortgages, even though this would improve the CPI in its role as an escalator series. (The Canada Mortgage and Housing Corporation (CMHC) does not currently publish a variable rate mortgage series, either for open or closed mortgages.)

Gregor Smith (2009; p.8-9) has this to say about mortgage interest in the missing links:

Some commentators argue that the inflation target should exclude components, such as mortgage interest, that are closely related to the central bank’s policy tools. [This is probably a reference to Tiff Macklem’s paper, although my own paper with Emad Mansour, which Dr. Smith also cites, makes the same point.] According to this argument, if the Bank of Canada were to raise its target for the overnight interest rate, with a view to lowering the future inflation rate, mortgage rates would rise as well, because these interest rates tend to move roughly in tandem with money-market rates. If mortgage interest were to be included in the CPI through the user cost of housing, then the CPI also
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would rise, which would yield an incorrect signal of the longer-term impact of the policy change.

Is this a case where the best cost-of-living index is not the best target for monetary policy? I think not. There are a variety of ways in which an increase in the general level of interest rates might be passed through by firms into higher prices. And the Bank of Canada is an old hand at explaining that reacting to inflation expectations by raising nominal interest rates in the short run will lead to lower nominal interest rates (through the Fisher effect) in the long run. Similarly, the Bank does not argue that changes in its policy rate primarily cause changes in today’s inflation rate.

Actually, it really is a case where the best cost-of-living index is not the best target for monetary policy, just like the best miler is never the best sprinter.

Regarding Professor Smith’s first point, no-one denies that sometimes higher interest rates may be passed on by firms into higher prices. If these are consumer prices then such pass-through effects will be properly captured in a well-designed inflation indicator. To reflect them again by directly incorporating interest rates in the CPI is double counting. His second point seems to imply that the CPI is intended to be an indicator of long-term price change and any short-term distortions caused by incorporating interest rates into it can be shrugged off. But the CPI is intended to be an indicator of short-term and long-term price change. Such distortions are a serious matter.

In any case, it seems he has missed the fundamental point. In a properly designed inflation indicator, all goods and services, including houses that are usually purchased on credit, have to be given their full purchase weight, as if they were paid for in cash. To do otherwise would bring in lagged house prices or imputations for the flow of housing services, and make the index something other than an index of current transaction prices. But once one rules out all credit transactions, there is simply no place in the index for mortgage rates, or any other kind of interest rates.

When the Bank of Canada introduced inflation targeting in February 1991, the Reserve Bank of New Zealand was the only precedent it was aware of. As the Reserve Bank of New Zealand targeted its overall CPI without excluding mortgage interest, the Bank of Canada chose to do the same. However, less than six years later, in December 1997, the Reserve Bank of New Zealand removed mortgage interest from its target series; later, with its September 1998 quarterly update Statistics New Zealand also removed the mortgage interest component from its CPI. On October 28, 1999 the Reserve Bank of New Zealand switched back to the CPI as its inflation target, but only after that CPI had been purged of its interest rate components.

The Bank of England became the third central bank to adopt an inflation targeting regime in August 1992, and from the very beginning it targeted RPIX (the Retail Price Index excluding mortgage interest) rather than the overall RPI.
So of the three initial central banks that adopted pure inflation targeting regimes (the Central Bank of Chile retained exchange rate targets when it adopted inflation targeting in 1990) only the Bank of Canada did not exclude mortgage interest costs from its target series within the first few years of adoption. It remains one of the very few central banks with an inflation target including mortgage interest today. Possibly the only other one is Sweden, and if the Swedish Central Bank adopts the HICP as its inflation indicator they will have eliminated mortgage interest from their inflation target too.

**The Ideal and the Practicable NP Approach to Measuring Owned Accommodation**

The first NP series for OA for Canada was calculated by Baldwin and DeVries (1985), and its modest objective was simply to give a comparable series of inflation rates for Canada for the period during which the United States went from a NP approach to a rental equivalence approach for OA. The Bureau of Labor Statistics switched from their net equivalence approach with the January 1983 update of their CPI. The BLS seems never to have given any thought to continuing their old index on a more defensible basis, either as the official CPI or as an alternative consumer price series.

It is unfortunate that they did not do so. The American index was marred by an unnecessary and indefensible mortgage interest component. The home purchase index was unreliable because of its source. It relied uniquely on a price database from the US Federal Housing Administration (FHA). The FHA mortgage ceilings meant that the index stood for a diminishing share of American homes when prices were rising, and gave rise to well-founded criticisms that the index was downward biased. The BLS never tried to calculate a reformed NP series when they calculated a set of experimental measures prior to opting for the rental equivalence approach. (These experimental measures were the inspiration for StatsCan’s own analytical indexes for owned accommodation.)

Had the BLS chosen to continue their NP series, stripped of its mortgage interest and property tax components, and with a reformed home purchase series, such a consumer price series would have been a far better inflation indicator than the personal expenditure price index used by the US Federal Reserve Board to monitor inflation. If such a series had existed and the FRB had based their policy on it, it is possible that the US housing boom and bust of the last decade might never have happened.4

The first official consumer price series for OA based on a sound NP approach was calculated by myself in 1985, as part of the initial analytical series for OA for Canada.5 (The American approach was fundamentally unsound, because of its mortgage interest component; New Zealand also had calculated a CPI with an NP approach to OA that was also marred by a redundant mortgage interest component.) Unfortunately, it was far from an ideal NP series.

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4 Remarkably, the US homeownership index included not only repairs and maintenance but improvements expenditures as part of its basket, or at least the index based on a 1960-61 basket did. See Jaffe (1964). While this undoubtedly made it an inferior index for escalation, it had great potential as an inflation indicator.

5 See Baldwin (1985). Also see the Appendix for more background on the analytical owned accommodation index program.
John Maynard Keynes wrote somewhere about how one of the chief impediments to developing something new is that it is difficult to escape old patterns of thought. When the first analytical NP series was created it was obvious that the replacement cost index was out, the MICI was out and a home purchase index had to go in. Once that was done, I thought the job was pretty much done. At that time, there was a sharp distinction between owned principal homes and owned vacation homes and the latter was considered outside the mandate for the analytical series program.

Property taxes and special charges were defensible in terms of the CPI as an escalator series since the owner must pay them if he wishes to retain control of their house. It wasn’t a lagged series and it wasn’t an imputed series so I didn’t think of excluding it, and I don’t remember anyone else proposing it. However it would have been better if it had been excluded as an inflation indicator really shouldn’t include a series that simply represents a special kind of wealth tax. That first analytical series didn’t make the exclusion and unfortunately it set the pattern for all subsequent updates.

Both Australia and New Zealand have adopted CPIs with OA components based on the NP approach. Neither has excluded property taxes from their CPIs. Here the problem seems to be that while there is a general recognition that this would be appropriate for an inflation indicator, the official indexes are still widely used as escalators and their exclusion would be ill-received by those who continue to use the CPI as an escalator.

R. W. Edwards of the Australian Bureau of Statistics notes that: “in some cases, government taxes and charges may not be directly related to the level of consumption of a good or service but may still be included as they are an inescapable cost of other consumption decisions (e.g. local government rates and charges are an inescapable cost of home ownership).” However, this would seem to be an argument for including property taxes in an escalator-type series, and in no way justifies including it in an inflation indicator.

By contrast, Eurostat (2010) plans to exclude property taxes from their Harmonized Index of Consumer Prices (HICP) if they incorporate an OA component based on a NP approach. Although they already exclude other tax-related items like drivers’ registration fees from the HICP, part of the reason it is easy for them to decide this way is that the HICP is designed solely to serve as an inflation indicator, particularly for the European Central Bank. Member countries that wish to have a distinct official CPI designed for escalation can have them, so there is no pressure on the HICP to be all things to all people.

This is something Canadians should keep in mind in constructing their own inflation indicators. It should not be an index to supplant the CPI, which should retain its primary

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role as an escalator series. Instead it should be an index to supplement the CPI, to be used by the Bank of Canada and others as the preferred measure of inflation.\footnote{Eurostat (2010, p.5) is uncertain whether an owner-occupied housing component should be added to their HICP under the same name, or to call it something else, Household Expenditure Price Index (HEPI) being the name proposed. The first choice would seem to be the best one. An HICP excluding all owner-occupied housing costs except for minor repairs would have only limited interest as a stand-alone index and the initialism HEPI is already widely associated with Higher Education Price Index. Perhaps HICP would be a good designation of the Canadian inflation indicator as well, as long as it was understood that it was not meant to follow the Eurostat methodology in all particulars. Perhaps the NAFTA countries should look into calculating HICPs on the European model that would provide inflation indicators for their three countries according to a common methodology.}

With its January 2006 update, Statistics Finland moved to a NP approach for OA in its CPI, making Finland the first country to do so in the eurozone area or in the EU. While generally consistent with Eurostat’s planned approach for calculating OA, the Finnish CPI includes an interest component for home loans. The Finnish CPI also includes a component for interest on consumer credit. The latter index is excluded from the Finnish HICP, and presumably when Eurostat is ready to include OA in the HICP based on an NP approach, Statistics Finland will exclude only the interest component for home loans from the HICP, where it now excludes most of its OA component.

Historically the Canadian CPI has depended primarily on household budget surveys for its expenditure weights. However, there are two aspects of Eurostat’s HICP, which are difficult to reconcile with this:

1. The HICP basket relates to the expenditures of a country’s residents at home, and of foreign residents within the country (business-related expenses of foreign residents are excluded); this is quite different from the CPI basket, which relates to the expenditures of Canadian residents at home and abroad.
2. The HICP mandates a net premiums-gross expenditures approach to homeowners’ insurance, tenants’ insurance and similar types of insurance; the CPI uses a gross-premiums-net expenditures approach. (Australia and New Zealand also have adopted a net premiums approach to insurance.)

In the first case, the limitations of weighting based on household budget surveys are obvious. They cover only the expenditures of Canadian residents and miss entirely the expenditures of non-residents within the country. Moreover they almost never provide any information on the breakdown of expenditures by Canadian residents between domestic expenditures and expenditures abroad.

This is an issue for the OA index, especially for owned vacation homes, since many Canadians have vacation homes in the United States or elsewhere, while many foreigners have vacation properties in Canada. However, it is not a critical problem for the construction of an inflation indicator, either for this component, or for other components (traveller accommodation, intercity transportation) where domestic expenditures and national expenditures differ substantially.
For years, StatsCan has essentially calculated expenditure weights on a national basis, but priced on a domestic basis. It hasn’t collected airfares from overseas carriers or rail fares from Amtrak, even though expenditures contribute to the CPI basket shares. So it would not be a disaster if it priced vacation homes only in Canada, even though a lot of the SHS expenditures relate to Florida and other foreign sunspots.

This being said, if an alternative source of weights could be exploited there would be advantages in using it. In adverse conditions, the net purchases for owned vacation homes might go negative in Canada, if Canadian residents were selling their vacation homes here or abroad to non-residents. By contrast, net purchases of owned vacation homes within Canada by Canadian or foreign residents could only go negative if there were almost no building activity and a transfer of owned vacation homes to the business sector, which would likely never happen.

In terms of a cost-of-living-index (COLI) framework, the gross premiums approach makes most sense. The consumer is considered to be paying for peace of mind. If there is increased risk of their house being damaged or destroyed by flooding due to climate change and this is reflected in higher premiums this is a price increase like any other price increase. On the other hand, for an inflation indicator, it would probably be inappropriate to treat such an increase in premiums as a price index. Wringing inflation from the economy shouldn’t mean reacting to premium increases by insurance companies who are only trying to ensure their viability.

The HICP has favoured pricing insurance based on gross premiums with weighting based on net premiums. Although this may not be theoretically ideal, it does allow them to base pricing on actual market values, while reducing the impact that gross premium pricing entails.

For Canada, it would impose more of a response burden to obtain a breakdown of all repair expenditures between those made independently and those reflecting insurance claims. (In some cases, as George Beelen (2004) points out, the respondent may be unaware of the amount of the claim, which is known only to the company.) Estimates based on industry data or some mix of information coming from households and the industry would seem to be required for good net premium-gross expenditure estimates.

In any case, there was no attempt for these estimates to change the existing insurance estimates for homeowners’ insurance. Although not unimportant, a net premiums property insurance index would not make a big difference to the overall measure. Just the same for the estimation period covered it would likely have reduced the average rate of inflation of the OA component and made house prices stand out even more distinctly as the big contributors to price change.

The New Zealand CPI omits improvements and alterations to owned homes from their OA components, while Eurostat plans to include them in the HICP. Again, the difference in treatment is probably due in large part to the Antipodeans’ index doing double duty as an inflation indicator and escalator. In terms of a COLI, it makes no sense to include
improvements in a home in the basket, since the raison d’être of the index is to measure the change in cost of the household maintaining the same standard of living.\(^8\)

On the other hand, it is useful to include improvements in an inflation indicator. The broader the base of the household spending the better. A central bank should be no less concerned about the economy overheating in the renovations sector than in any other part of the economy.

However, there is not currently a consumer price index for improvements in Canada or the makings of one. Although there are labour and materials series created for the homeowner repairs CPI which could and probably will go into the constructing of some future improvements series these are hardly sufficient to calculate a proper index for improvements. Major additions like the installation of a swimming pool where all the work is handled by a single contractor should be priced in a CPI for improvements. It would be an onerous undertaking requiring a considerable response burden from contractors.

While the inclusion of improvements in an inflation indicator would be highly desirable at some time in the future the expenditure base is broad enough for a reliable series without it, and it need only be added when resources are available to do so.

**Omission of Land Costs from the NP Series**

Not all home purchases by households involve a dwelling and lot together. Owners of mobile homes may rent their lots. Owners of self-built homes may have purchased their lots some years in advance of building on it, so in the survey year all of their expenses relate to the dwelling. A properly calculated NP index should reflect only dwelling costs for such transactions in its expenditure weight. However, the home purchase index itself will probably reflect only house prices for dwelling and lot together, because dwelling-only transactions make up such a small part of home purchases.

Also, many new homes will be built on existing lots after the demolition of the old home. If both the sale of the old home and the purchase of the new home occur in the survey year the value of the lot would virtually cancel and only the net dwelling cost would affect the expenditure weight.

However, Australia and New Zealand, and now Eurostat, have gone way beyond this. They have decided to calculate their NP series for OA excluding lot costs from both the expenditure weights and the house prices, i.e. the expenditure weights and price indexes would represent dwellings only.

In the case of the HICP, since most OA is still excluded from the official series and the home purchase component for OA will not be incorporated for some time, there is still some doubt about how all this will play out in practice. The Eurostat (2010; p. 43)

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8 The Australian CPI treats improvements as in scope. However they are not priced, they are proxied by “new house building costs”. See Edwards (2003), section 8.73.
manual itself mentions the possibility that the same “net weight, gross price” approach used for insurance premiums in the HICP might be used for net purchases. The home purchase weight would be calculated netting out land costs while the price index used would represent the gross house price, i.e. the price of dwelling and lot together.

The manual seems to reject this compromise, surprisingly given that on principle the HICP rejects fictive prices in favour of transaction prices, and dwelling prices extracted from total house prices, however sophisticated the method used, are still fictive prices.

However, last December Eurostat (2010) published a set of Housing Price Indexes compiled for 23 members of the EU, plus Norway and Iceland. These HPIs include the land component, without any direct explanation why. Later in the paper it is stated that “mirroring the practice of the Harmonized Indices of Consumer Prices (HICPs), the house price indices should, as closely as possible, reflect actual transaction prices.” (See p. 3)

The United Kingdom’s Consumer Prices Advisory Committee (CPAC) in its 2010 annual report, notes with a hint of anxiety that:

In Australia and New Zealand, the two longest users of the net acquisitions [NP] approach, the majority of new dwellings use standard designs to be constructed on land that households already own (project homes). Thus the exclusion of land is not problematic. While project homes are common and representative in some EU countries (e.g. Germany), they are not common or representative in the UK. The share of other forms of self build in the UK is also relatively small. Therefore the approach used by the Australian Bureau of Statistics, and by Statistics New Zealand, is not extendable to the UK housing market. (ONS (2010), Annex A1-10)

Nevertheless, the CPAC seems to take it for granted that land prices must be excluded from a home purchase index. In its list of pros and cons of the NP approach, these are the first two cons cited:

- It is not currently possible to separate the cost of land from the cost of dwellings, nor the respective proportion of costs associated with the land, meaning that changes in the cost of land (which is considered an asset) and the costs relating to purchasing and maintaining it will be included in the index.
- It is not certain that it will be possible to separate the cost of land in the future in such a way that would be suitable for use within a CPI. (ONS (2010), Annex A-6)

The first point indicates that for now at least the UK intends to adopt the “net weight, gross price” approach to calculating a NP index. However it is remarkable that CPAC doesn’t even consider the possibility that exclusion of land from the index basket is neither necessary nor helpful.

In the European Union, and still more in the broader Europe that includes candidate countries, self-built homes are probably more important than they are in North America.
The Eurostat manual certainly pays a lot of attention to them. This may have something to do with their decision to exclude land from the HICP, which might be less difficult there than it would be in North America.

Eurostat (2010; p.28) gives as its reason for excluding land that the dwelling part of a home purchase is treated as the consumption part while the land part of the purchase is treated as the investment part. This is an artificial distinction in the extreme, as anyone who has ever owned a home knows the property on which it sits is a source of pleasure to the homeowner and their family. Thomas Sowell (2009; p.13-14) notes that even building or buying a home on an acre-lot may be motivated by the desire to keep a distance from less affluent people, keeping the riff-raff out, especially in minimum acre-lot communities. Thus the decision to buy a large lot would be a life-style (or consumption) decision rather than an investment decision. (However, Sowell also notes that if an owner owns a house on an acre-lot and then helps to institute minimum acre-lot restrictions on the area, his own property will benefit from the increase in values.)

The exclusion seems to reflect some kind of unstated preference for leaving out of the HICP what is left out of GDP, as opposed to its personal expenditure component. However, Eurostat has no problem with including transaction costs (real estate commissions, legal fees, etc.) associated with home purchases in the HICP, and it would also include improvements to owned houses. Both are excluded from personal expenditures as investment expenditures, but are part of residential construction expenditures within GDP. On the other hand, land, with the exception of land improvements, is excluded from GDP altogether, since in general it is neither created nor destroyed.

But again, this exclusion of land as a non-produced good is inconsistent with the HICP’s general approach. If land is not produced, neither are used cars produced, but net purchases of used vehicles by the target population from the non-target population are part of the HICP.

No-one denies that the land component of home prices is more volatile and more subject to speculative ups and downs than the dwelling component. As Sowell (see p.9-10) has noted, the housing boom and bust in the United States was remarkably concentrated in those regions of the country, like coastal California, where for one reason or another, land was much more expensive relative to dwellings than it was elsewhere in the country. Maybe the easiest way to attack such an exclusion of land values, rather than attack the notion that land and only land is purchased with an investment motive, is to adopt it without reservation. Suppose that housing bubbles were set off uniquely by investment-driven speculation on the lots, with dwelling prices themselves being completely unaffected. Would one then want an inflation indicator that was appropriately sensitive to such housing bubbles and could in a worst case scenario choke them off by pushing the inflation rate to the central bank’s upper bound? Or would one want an inflation indicator that was completely insensitive to such housing bubbles, which could, in a worst case scenario, lead to a collapse of the nation’s finances and output? The answer is obviously
that it would be better to include land costs than exclude them, even if land purchases by households are purely investment-motivated.

James Whitworth (2011), Head of International Co-operation for Eurostat has made clear that one of the principal reasons for Eurostat planning to add an OA component to the HICP is precisely to keep track of housing bubbles, so it does seem strange that Eurostat nonetheless plans to exclude lot prices from their index. This is a decision that the agency should urgently reconsider while the homeownership component of their index is still in its planning stage.

**Price Index Series Used**

The data shown relate to unlinked 2005=100 consumer price series at the Canada level of aggregation. The indexes calculated are direct Laspeyres price indexes, that is, each index has the formula:

\[
\frac{\sum_j p_{i05}^j q_{i05}^j}{\sum_j p_{i05}^j q_{i05}^j} = \sum_j \left( \frac{p_{i05}^j}{p_{i05}^j} \right)^{05} = \sum_j \frac{p_{i05}^j}{p_{i05}^j} = \sum_j W_j p_{i05}^j; t = \text{Jan} 2005, ..., \text{May} 2010
\]

The monthly movement of these series for the official concept will match the official CPI series from May 2007 forward as April 2007 was the link month for the introduction of the 2005 basket. For the earlier part of the estimation period, from January 2005 to April 2007, the CPI was based on a 2001 basket.

The use of unlinked Laspeyres series has the great advantage that in analyzing differences between different methods one can concentrate on the approaches themselves, ignoring the inevitable distortions and complications created by chain linking.

However, the official CPI is a chain fixed-basket index, which will generally use three different baskets over a period as short as a decade. Concentrating on a single basket does have the disadvantage that a pattern perceptible for that basket may be peculiar to it, and cannot be generalized to the CPI as a whole. As far as possible, the paper has tried to pinpoint any special features of the 2005 basket that may be pertinent to the choice of an inflation indicator.

All data series relate to elemental indexes in the primary classification of the CPI, even where it would have been desirable to deal with micro-indexes that aggregate to these elemental series. For example in the case of other owned accommodation expenses, although the expenditure weight of this series was reduced in the NP index to exclude property taxes and special charges for owned vacation homes, no adjustment was made to the index itself. Of course, if the NP series were being calculated in a production environment, a more careful computation would be called for.
Calculation of Expenditure Weights and Proxies for Additional Elemental Indexes

For these estimates, the NP series for OA was created from the official series for OA as follows:

1. The MICI was removed,
2. The replacement cost index was removed and replaced by a NP index of owned homes,
3. A NP index for owned vacation homes was added, proxied by the NP index for owned homes,
4. A new elemental for land transfer taxes and registration fees was created, proxied by the NP index for owned homes,
5. The series for property taxes was removed,
6. The expenditure weight of other owned accommodation expenses was reduced by the exclusion of land transfer taxes and also of property taxes and special charges on owned vacation homes.

Note that every one of these six adjustments has the effect of increasing the impact of current changes in new housing prices on the OA component.

The replacement cost series for OA is simply the official series with the MICI excluded. When one aggregates to the CPI All-items level it is identical in definition to the CPI excluding mortgage interest series, which has long been published as a special aggregate by StatsCan. This is virtually the same in scope as the RPIX series, which, as previously mentioned, was long used by the Bank of England for inflation targeting.

Because such a replacement cost series has an established history both in Canada and in the United Kingdom, this was the series calculated. No attempt was made to further adjust it, e.g. by the exclusion of property taxes, although if the reader takes a look at items 3 to 6 above it should be obvious that all of these adjustments or a variant of them could be applied in the context of a replacement cost approach.

Nothing was done in this regard because there does not seem any good reason for an inflation indicator to be developed in terms of replacement costs rather than net purchases. That being said, the adjustments would be easy to perform, they would bring the replacement cost indicator closer in movement to the preferred NP indicator, and such a replacement cost series would be substantially better as an inflation indicator than either the CPI All-items now used by the Bank of Canada or the CPI All-items excluding mortgage interest.

Although no NP series was calculated including improvements, a weighting diagram was constructed for such an index. (See Table 1.) As can be seen, the inclusion of improvements on owned homes and owned vacation homes would make a big difference to the OA component. Combined, they account for a greater expenditure than mortgage interest cost, much the most important component in the official OA index. This has to be qualified somewhat as the expenditures on homeowners’ repairs and maintenance are
understated by perhaps two thirds due to repairs and maintenance expenditures being misclassified as improvements.\footnote{The problem is essentially that from 2004 on the SHS has treated replacement expenditures such as the replacement of eavestroughing as improvements. It was not clear at the time this paper was completed how this would be handled in the 2009 basket update. It is certain that the problem will not be resolved in the SHS questionnaire itself until at least the 2012 questionnaire. See Baldwin (2011a) for details.} Also, as previously mentioned, there are small expenditures assigned to improvements that constitute expenditures on self-built homes that would be better classified with net purchases.

That being said, improvements would still make a big difference to an NP index. Even deducting misallocated repairs expenditures, improvements would be about 49% the size of net purchases for owned homes, and 45% for owned vacation homes.

As can be seen in Table 2, while the NP series calculated has about 82% of the expenditure weight of the official OA series, an NP series including improvements would have 117% of the weight. The replacement cost series is small compared to the official series, with only about two thirds of the weight, since it excludes the official series’ most important component, mortgage interest cost.

Table 3 shows the basket shares of components of OA for the different concepts. The most striking thing to note in this is just how little impact current house prices have on the official index, as compared any of the alternatives shown. The replacement cost component is the only elemental index that relates exclusively to current house prices, and it has less than one fifth of the basket. Even in this case, the index relates to fictive house prices, contractors’ estimates of what they might have sold their dwellings for, rather than actual transaction prices.

The real estate commissions are moved on new housing prices including lot prices, but while real estate commissions are better than a quarter of other owned accommodation expenses, they only account for 2.8% of total OA expenditures. New housing prices are also imputed to other owned accommodation expenses, but the imputation process is complicated and for no other component of other owned accommodation expenses is a proxy based exclusively on housing prices, not even land transfer taxes.

Housing prices are of course part of the MICI, but MICI uses a 25-year moving average of new housing prices. Current month changes have only a very small impact on the index, and often as not even these will be moving in the opposite direction from mortgage rates, the other half of the MICI.

The difference when one compares the official concept basket with the published NP basket is stark. Items reflecting current house price movements account for 74.9% of the OA basket, or about three times their share using the official approach. Even if an NP index was calculated including improvements in owned homes and owned vacation homes, items reflecting current house price movements would still account for 52.4% of the basket share, more than double their share using the official concept. Even using the
replacement cost approach, items reflecting current house price movements have 33.4% of the basket, considerably more than they do for the official index.

This comparison of weights indicates just how misplaced is David Dodge’s confidence in the official CPI because it does after all include housing prices. Current housing prices per se, have less than a third of the basket share in the OA component for the official series that they would have in an official index based on NP, exclusive of improvements, and less than half if NP were inclusive of improvements.

A number of caveats are required concerning these weights.

First, replacement cost expenditures for the 2005 basket were not calculated using the same methodology as used for the 2001 basket, which assumed an average 1.5% depreciation rate for owner-occupied dwellings. Instead the existing 2001 expenditure weights were price updated using the new housing price indexes (NHPIs) for house only. The effect of this at the Canada level was the same as if the 2001 methodology were used to calculate the expenditure weight with a 1.2% depreciation rate. For the 2009 basket update, the replacement cost weights will once again be calculated using the old methodology, but with a 1.4% depreciation rate.

Second, as mentioned, the 2005 expenditure weight for homeowner’s repairs and maintenance is undervalued by as much as two thirds, so the relative importance of other components in all approaches is somewhat overstated. This is not the case for the NP weights including improvements, since any undervaluation of repairs implies a matching overvaluation of improvements and everything balances out.

Third, ideally the home purchase expenditure weight, as well as expenditure weights for other infrequently reported, cyclical items, would be based on several years rather than a single year. For most items probably no more than three years expenditures would be required. For home purchases five years of expenditures would seem advisable. However, expenditure weights based on average values for the years 2001 to 2005 would be lower than those based on 2005 only, since 2001 and 2002 were weak years for residential completions, especially 2001.

(Incidentally, the ILO CPI Manual makes the groundless objection to the NP approach that in a boom year it will give housing a basket share that is much too high, and in bust years it will give housing a basket share that is much too low. This would never happen, as in every case where it has been calculated by official agencies, multi-year expenditure weights have been used. Even in countries that do not have annual household budget surveys, as Canada does, there will always be data on dwelling sales or completions from which acceptable estimates can be cobbled together.)

Fourth, for owned vacation homes only, expenditures for the years 2001 through 2005 were calculated by province at 2005 prices. As can be seen from Table 4, recorded expenditures for 2005 were considerably larger than for other years; the use of multi-year
expenditures would certainly have reduced its basket share of owned accommodation. Note also that for Nova Scotia, British Columbia, the Yukon and Northwest Territories the net purchases are negative, not just for any particular year, but even for 2001-2005 on average. This is the more remarkable as the SHS estimates used to calculate net purchases for owned vacation homes are inherently upward biased: we cannot deduct sales from purchases, and are forced to deduct the cash received from the sale of a home, which may be considerably smaller if there is a large mortgage payout and an interest rate penalty.

For the two territories these negative values may be due to small samples; even pooled over five years the number of purchases and sales are not large. For Nova Scotia and British Columbia it seems more likely the cause is:

1. Self-built cottages or any other secondary residences will not be part of the purchase estimates, but would be included, as for principal residences, in the improvements estimates.
2. Households that inherit cottages or other dwellings that they use as secondary residences will not show up in the purchase estimates, but they will show up in the cash received estimates if they later decide to sell these dwellings.
3. Households that upgrade their accommodation may keep their old homes as second homes; houses that were purchased as principal residences may get sold as secondary residences.

More investigation would be required to see which of these explanations, which are not, of course, mutually exclusive, is the more important. Because of the first factor, it would be better to extract self-built dwellings from the improvements estimates for owned vacation homes as well as owned principal residences and add them to the purchase estimates. Although their numbers may not be large, it would make it less likely that one would get negative net purchase estimates.

In a production context, the land transfer tax and owned vacation home NP series, if they were still proxied, would at least be proxied at the CPI strata level and thus would differ from the NP series at the Canada level. However, for this exercise, both series were proxied at the Canada level. The only special series that was calculated at a regional level of detail was the critical home purchase series.

The regional breakdown of the home purchase weights is also quite different from the replacement cost weights in ways that have implications for the series sensitivity to emerging housing bubbles. Table 5 shows the breakdown for the home purchase series, the replacement cost series and the dwelling purchase series. The latter would be the series, not calculated, one might obtain if only the dwelling portion of net purchases were included in the index. (To calculate this, the dwelling-to-total ratio of the NHPI for 2005 for a region was multiplied by its 2005 home purchase weight.) For the replacement cost expenditures the old variant indicates what the regional basket shares would have looked like if the same methodology were used to calculate the replacement cost weights for the
2005 basket as for the 2001 basket, rather than simply price updating the 2001 expenditure weights.

One would expect the home purchase weight to be considerably larger than the replacement cost weight in regions that have been slow growing, like Northern Ontario and higher in those that have been rapidly growing, like Alberta and British Columbia. Generally, this is the case. Note that the home purchase price index has almost a five percentage point higher basket share than the replacement cost index for Toronto. This is of some import, since Toronto had the biggest housing bubble of any major Canadian urban centre in recent decades, a bubble that burst in 1989.\(^{10}\) Toronto would also be one of the top candidates to have a housing bubble in the future.

**Calculation of NP Index for Homes**

As we speak, many countries in the EU are busily calculating house price indexes that did not exist before, with the goal of incorporating them in their HICP series. Unlike them, Canada has had a reliable price index for new homes, which goes back to 1976, and for some population centers even further. This is the new housing price index or NHPI. Separate NHPIs are calculated for the house only and for house and land together, both of which have long been used in the CPI for owned accommodation. The CPI for a given month is published in the following month, while the NHPI is published the month after that. Therefore given month NHPI data is unavailable when the CPI is being processed, and because of this the NHPI is used with a one-month lag: January estimates being incorporated with the February CPI update, February estimates with the March update, and so on. In order to increase comparability with the official CPI estimates, and to duplicate as much as possible how an NP index would be calculated if it were published on a monthly basis in tandem with the official series, this same one-month lag has been incorporated in these estimates.

At the same time, a CPI calculated as an inflation indicator could and probably should allow for a one-month revision policy, at least for its home purchase index, given the critical importance of avoiding housing bubbles. It would be a matter for negotiation with the Bank of Canada and other interested parties whether such a one-month revision policy would apply strictly to housing-related series, or to all components of the CPI.

This net acquisition series, unlike previous ones, is based not on the published NHPIs but on analytical NHPI series adjusted for value added tax. These would include the Goods and Services Tax (GST), the Quebec Sales Tax (QST) and the Harmonized Sales Tax (HST), where applicable. This was, of course, not an issue for the first analytical series calculated by Baldwin and DeVries (1985) and Baldwin (1985), which predated the introduction of the GST and QST in 1991.

The NP series on a 2005 base is calculated as follows:

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\(^{10}\) See MacDonald (2010), Appendix A.
1) Each analytical NHPI series on a 1986 time base was rebased to a 2005 time base.

\[ P_{t/05}^{na,r} = f \times P_{t-1/86}^{nhpi,r} ; t = Jan2005,....., Dec2010 \]

Where \( f = \frac{1200}{\sum_{t=Dec2004}^{Nov2005} P_{Dec2004}^{nhpi,r}} \)

(Although the official NHPI is now on a 2007 time base, the analytical series used by Consumer Prices Division retain an older 1986 time base.)

2) A weighted average of the regional indexes was calculated using the NHPI weights for the year 2005, price updated to 2005. These weights were published at 1997 prices and are based on dwelling completions for the years 2002 to 2004. Therefore, it would be appropriate to think of the NP index as being a Lowe price index with the following formula:

\[ P_{t/05}^{np} = \left( \frac{\sum_{r} \left( P_{05}^{r} q_{02-04}^{r} \right)}{\sum_{r} \left( P_{05}^{r} g_{02-04}^{r} \right)} \right) P_{t/05}^{na,r} ; t = Jan2005,....., Dec2010 \]

The New Housing Price Survey covers every province of Canada but excludes the territories. Since the CPI target population includes the territorial population centers of Whitehorse, Yellowknife and Iqaluit, implicitly these centers were proxied by the average home purchase index for all provinces. In a production context, something different would have been done. The analytical NHPIs would have been aggregated to the CPI strata level using the 2005 NHPI weights just described. (This would only have been necessary for Southwestern Ontario and possibly Southern Quebec.) Then these series would have been aggregated to the Canada level using NP weights for 2001 to 2005 or 2003 to 2005. The proxies for the territorial centers would have been reconsidered; resale price indexes for the centers themselves would have been examined before resorting to any kind of proxies based on NHPIs for southern Canada.

The analytical NHPI series were only created with the introduction of the GST and the QST in 1991. The effective tax rates varied due to housing tax rebates which disappeared at higher prices, so these rates were price sensitive. Ideally, the tax adjustment would have occurred at the quote level, but this has never been done. This has become a bigger issue with the introduction of the Harmonized Sales Tax (HST) in Ontario and Quebec, where the housing rebates are much more generous than anything previously offered and the rebates are capped but never eliminated, so the effective tax rate approaches the maximum asymptotically without ever reaching it. Bear in mind that, conceptually speaking, such price-induced changes in effective tax rates would be part of the core CPI, and of the CPI excluding changes in indirect taxes, since these are not one-time increases but occur naturally from month to month due to the evolution of house prices.
This really dictates the need for a new production system for the NHPI which would permit the analytical series to be calculated with tax adjustment at the quote level. However, these changes in effective tax rates are not so important that such a reform need be made a high priority; it could wait until such a time as the NHPI production system must be overhauled for other reasons.

**Analysis of OA Series for the Different Concepts**

Table 6 shows a comparison between the OA series based on the different concepts. Although the estimation period is not long, it is a period of great interest since it includes the first recession faced by Canada in more than 15 years and the recovery that followed. The recession, which now seems to have stretched from 2008-Q4 to 2009-Q2, saw a normal slump in housing demand and prices. However, it was followed by a most unusual vigorous recovery in housing prices, with the NHPI expanding steadily from July 2009 forward. Often housing prices are sluggish for many months following the trough of a recession. In Canada’s case this vigorous recovery was stimulated by:

1) Very low mortgage interest rates, induced by Bank of Canada policies to maintain the target rate at a rock bottom level,
2) To a lesser extent, the coming imposition of the Harmonized Sales Tax in Ontario and British Columbia, which would raise the costs of buying a home and particularly the cost of buying a new home. This lead some homeowners to try to enter the market in advance of the imposition of the tax in July 2010.

There was much concern about this vigorous recovery in the financial press, and some fear that Canada might be on the verge of the same kind of housing bubble that had just burst in the United States.\(^{11}\)

Even before the recession and recovery, in July 2008, the Canadian Finance Minister, Jim Flaherty was worried enough about the runup in housing prices that he tightened up mortgage requirements, reducing the maximum amortization period from 40 to 35 years and requiring at least a 5% downpayment on a mortgage, when previously no-downpayment mortgages were possible. Also, gross debt service ratios were limited to a maximum of 45%, while “interest only” mortgage payments were no longer allowed for insured mortgages. These measures took effect on October 15.\(^{12}\)

In February 2010, Mr. Flaherty introduced additional changes, forcing borrowers to qualify for a fixed rate mortgage with a five-year term even if they opted for a mortgage carrying a lower rate of interest. Also, to reduce speculative housing purchases, owners of one-to-four residential dwellings not for personal use were forced to put up a downpayment of 20% rather than 5% if they contracted a government-insured loan.\(^{13}\)

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\(^{11}\) See, for example, Athanasakos (2011), MacDonald (2010), Montreal Gazette (2010), Foster (2010) and Rosenberg (2010). In fact, concerns about a possible housing bubble had been expressed even earlier. See Thorpe (2008).

\(^{12}\) See McGugan (2009) and Carmichael (2010).

\(^{13}\) See Shields (2011).
These new measures, which came into effect on April 19, were introduced to moderate a housing price surge the government feared was getting out of control. Finally, on January 17, 2011, Mr. Flaherty announced some additional tightening of mortgage rules, the most important of which was a reduction in the maximum amortization period on government-backed insured mortgages by five years, making 30 years the new maximum. This change took effect on March 18.14

As Table 6 shows, the NP series for owned accommodation accurately mirrored what was happening in housing prices, taking account of its one-month lag and the lags imposed by the use of three-month and six-month percent changes for analysis. The 12-month percent changes (see Chart 315), which are the focus of the Bank of Canada’s attention for inflation targeting, decline steadily from March 2009 to December 2009, but there is a more or less continuous acceleration in the 12-month rates of change from August 2009 forward. In 2010, the 12-month rates of change cease to be negative and surge to 3.0%, at the upper bound of the Bank of Canada’s inflation band, in May 2010. By contrast, the official index only starts to decline in October 2009, when the recovery, and continues to decline until April 2010. In May 2010, it registers a barely positive 0.2%, much below the Bank of Canada’s lower 1% bound for inflation.

For the three-month rates of change (see Chart 4) the performance of the official index is, if anything, even worse. These percent changes are negative from March 2009 to September 2009, going negative while the economy was still in recession. However, the October increase was strictly related to the property tax series, which only increases in October, being included in the official index. This can be seen from the fact that the three-month change again goes negative in January, once the October increase has exited from the rate change, followed by positive increases thereafter. Difficult to analyze, undoubtedly difficult to forecast as well, the official index just isn’t a very useful indicator of inflation in owner-occupied housing. For the February 2010 to May 2010 period, although the rate of change is positive and continuously accelerating, even in May it only registers a 0.43% increase.

(Note that Dion and Sabourin (2009, p.45), even working with an inferior NP measure, found that its core index was easier to forecast than its official concept counterpart.)

The three-month rates of change for the replacement cost approach are more reasonable, at least for the recovery period, and show some changes in excess of 0.75% from October 2009 forward. But note that this series is even more severely distorted by October property tax hikes, suddenly spiking in October 2009 at 1.44%, then dropping way down to 0.26% when that October price change exits the three-month change, then rising thereafter.

15 In Charts 3 and 4, as well as in Table 4, September 2008 is shown as the peak month of the business cycle and July 2009 as the trough. These are certainly not to be taken as definitive but they are reasonably consistent with what would seem to be firm evidence that the Canadian recession covered the three quarters from 2008Q4 to 2009Q2.
The only series that properly conveys what was happening in the housing market is the NP series, which starts to decline in January 2009, a couple of months earlier than the other series, declines continuously through June 2009, the last month of the recession, then increases more or less steadily thereafter, showing a 1.42% increase in April 2011.

An alternative series based on the official concept was calculated using a mortgage interest cost index incorporating a proxy for variable rate mortgages. The differences from all the other series are dramatic: the 12-month changes of the series go negative in August 2008, diving to a low of -24.0% in September 2009, but even May 2010 registers a 1.6% decrease. These results were not shown because they were not based on a true variable mortgage series. Just the same, there is no doubt that such a series would be hugely more volatile than its NP counterpart. And in a situation such as the one we are now in where interest rates were pushed down and kept down by the central bank to avoid a more severe economic downturn, an official CPI with such a homeownership index would never provide any warning of an impending housing bubble, no matter how dramatic the upswing in prices.

What would have happened if none of the restrictive measures taken by the Minister of Finance in 2008, 2010 and 2011 had been carried out? Would Canada have experienced a full-fledged housing bubble? Of course, we will never know for sure. What can be said with a lot of confidence is if a bubble had happened, the official series for OA would not have provided any warning that something was amiss. Its 12-month percent change would probably have remained below 2% for all of 2011, and would certainly never have breached 3%.

Conclusion: Something’s Missing

This paper ends, as it began, with the US housing boom and bust. The personal expenditure price index excluding food and energy was ineffective at that juncture in warning the US Federal Reserve Board or policy analysts that a housing bubble was forming, nor did it provide any indication that it had burst. Yet in terms of its index formula it was the very model of a chain linked index with a superlative formula that Gregor Smith holds up wants the Bank of Canada to adopt as an inflation indicator. It was an annually-linked chain Fisher measure, much superior, in terms of its elimination of substitution bias, either to the official CPI or to what the official CPI will be in 2014, even if it moves to annual basket updates. All the missing links were in place, but something crucial was still missing or else the debacle that took place would not have happened.

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16 Dion and Sabourin (2009, p.42) report that the NP measure for OA had almost twice the variability as its official counterpart, but they tested an NP series including property taxes and an OA series whose mortgage interest component excluded variable mortgage rates. However the inclusion of variable mortgage rates is almost inevitable in the official index at some time in the future, at which time the official concept measure would be much more variable than any conceivable NP series for OA.
What was missing was a proper conceptual approach to calculating an inflation indicator, for the measure as a whole, but especially for the homeownership component. This is the missing element that must be supplied by Statistics Canada and adopted by the Bank of Canada. Both institutions should ignore those who create a false dichotomy between consumer prices and asset prices, as if a home price did not represent both. Nor should we accept that a central bank has no role in protecting a country from the ill effects a housing bust would create.

Constructing such an inflation indicator and making it the tool of monetary policy will be a great challenge of the current decade. By successfully meeting it, Canadians will not only better ensure our own economic future, and our children’s, but we will set a good example to our American neighbors, and to people all over the world.
Appendix: Statistics Canada’s Analytical Owned Accommodation Index Program

From 1985 forward Statistics Canada has calculated analytical consumer price indexes for owned accommodation (OA), and a continuous series for these at the Canada level now exists from January 1982 to August 2000. At the time of first publication, the goal was to update these very useful series every year, which was certainly a realistic and realizable objective. However, this frequency of publication was never realized for very long, and now the most recent month published is more than a decade past. Analytical series that are totally comparable with the national estimates in their concepts were published for the period January 1996 to December 2005 but these were for Ottawa only.

This study is part of a larger project to update these analytical OA series for the 2005 basket, that is, for the span from January 2005 to May 2011. After such a long hiatus this new updating of the analytical series is most welcome. It is to be hoped that in the future the analytical series will indeed be updated at least once a year. Beyond that, as this paper argues, events have given the analytical series based on the net acquisitions approach a crucial importance. It is hoped that in the near future these series will be updated every month, at the same time as the official estimates.

Besides the net acquisitions approach, analytical series will be calculated according to three alternative approaches:

- Rental equivalence,
- Payments,
- Omission of the OA component

Of these, the omission of the OA component is a new approach, the first new approach shown in these analytical series since the program started more than a quarter of a century ago.

Like the NP approach, the omission of the OA approach is geared to the use of the CPI as an inflation indicator. The other two approaches on the other hand, are more geared to the use of the CPI as an escalator.

The other approach to OA commonly mentioned in the literature is the opportunity cost approach, which takes account of the opportunity cost of the owner’s equity in their home. Except for one special study by Erdur and Prud’homme (2007), the analytical program has never included opportunity cost approach, which has been rarely employed in official practice, and until very recently, not at all.

Nevertheless, since this approach has acquired a considerable base of support in the expert community, Statistics Canada would be open to adding such an approach to its analytical program some time in the future. The Bureau would also consider calculating a series based on the recommendation of Erwin Diewert and Alice Nakamura (2009), which is really a hybrid of the rental equivalence and opportunity cost approaches.
It should be noted that while the NP approach differs dramatically from the payments approach they share a common philosophy. If one accepts that OA has a place in a consumer price indicator and one rejects the use of imputed expenditures, then the payments approach is the one to adopt for calculating an escalator, and the NP approach is the one to calculating an inflation indicator. This kinship can be seen from the fact that these two approaches for which weighting information is available directly from the Survey of Household Spending, without complicated adjustments. This is not true of any other approach including the modified user cost approach currently used in the official CPI.

Also, more than any of the other approaches that relate to the use of the CPI as an escalator series, the payments approach requires housing price index data of a high quality, both for new and existing housing. Rather than being a defect of this approach, it should rather be regarded as one of its advantages. If the official CPI’s OA component were based on the payments approach Statistics Canada would have to produce good quality price indexes for both new and resale housing. These series would have other uses in financial stress analysis, which would contribute to reducing the risk that Canada would ever suffer a severe housing bubble.

Both these points speak for prioritizing the update of series based on the payments approach as compared to the other escalator-type approaches.
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Table 1: 2005 Expenditure Weights at 2005 Prices in $,000 for Owned Accommodation for Official, Net Purchase and Replacement Cost Concepts for Canada

<table>
<thead>
<tr>
<th></th>
<th>Official Concept</th>
<th>Net Purchase (Used)</th>
<th>Net Purchase (Potential)</th>
<th>Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgage interest cost</td>
<td>29,507,942</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replacement cost</td>
<td>17,373,132</td>
<td></td>
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<td></td>
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<tr>
<td>Net purchases of owned homes</td>
<td>43,990,768</td>
<td>43,990,768</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net purchases of owned vacation homes</td>
<td>6,986,767</td>
<td>6,986,767</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land transfer taxes and registration fees</td>
<td>1,038,449</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Property taxes (including special charges)</td>
<td>18,692,913</td>
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<td></td>
<td></td>
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<tr>
<td>Homeowners' home and mortgage insurance</td>
<td>6,077,007</td>
<td>6,077,007</td>
<td>6,077,007</td>
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<tr>
<td>Homeowners' maintenance and repairs</td>
<td>8,680,623</td>
<td>8,680,623</td>
<td>8,680,623</td>
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<tr>
<td>Other owned accommodation expenses</td>
<td>8,561,553</td>
<td>6,180,000</td>
<td>6,180,000</td>
<td>8,561,553</td>
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<tr>
<td>Improvements in owned home</td>
<td>27,325,882</td>
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<td>Improvements in owned vacation home</td>
<td>4,015,180</td>
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<tr>
<td>Owned accommodation</td>
<td>88,893,171</td>
<td>72,953,614</td>
<td>104,294,676</td>
<td>59,385,229</td>
</tr>
</tbody>
</table>

Table 2: Expenditure Weight of Alternative Concepts as a Share of Official Concept Weight, 2005

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Net purchase (used)</td>
<td>0.821</td>
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<tr>
<td>Net purchase (potential)</td>
<td>1.173</td>
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<tr>
<td>Replacement cost</td>
<td>0.668</td>
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Table 3: 2005 Basket Shares of Components of Owned Accommodation for the Different Concepts for Canada

<table>
<thead>
<tr>
<th>Component</th>
<th>Official Concept</th>
<th>Net Purchase (Used)</th>
<th>Net Purchase (Potential)</th>
<th>Replacement Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgage interest cost</td>
<td>33.2</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Replacement cost</td>
<td>19.5</td>
<td>60.3</td>
<td>42.2</td>
<td>29.3</td>
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<tr>
<td>Net purchases of owned homes</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Net purchases of owned vacation homes</td>
<td></td>
<td>9.6</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>Land transfer taxes and registration fees</td>
<td></td>
<td>1.4</td>
<td>1.0</td>
<td></td>
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<tr>
<td>Property taxes (including special charges)</td>
<td>21.0</td>
<td>31.5</td>
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<td></td>
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<tr>
<td>Homeowners' home and mortgage insurance</td>
<td>6.8</td>
<td>8.3</td>
<td>5.8</td>
<td>10.2</td>
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<tr>
<td>Homeowners' maintenance and repairs</td>
<td>9.8</td>
<td>11.9</td>
<td>8.3</td>
<td>14.6</td>
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<tr>
<td>Other owned accommodation expenses</td>
<td>9.6</td>
<td>8.5</td>
<td>5.9</td>
<td>14.4</td>
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<tr>
<td>Improvements in owned home</td>
<td></td>
<td></td>
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<td>26.2</td>
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<tr>
<td>Improvements in owned vacation home</td>
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<td>3.8</td>
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<tr>
<td>Owned accommodation</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
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Table 4: Net Purchases of Owned Vacation Homes per Household (at 2005 Prices)

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<tbody>
<tr>
<td>Nfld</td>
<td>20.0</td>
<td>97.3</td>
<td>-332.5</td>
<td>243.7</td>
<td>146.3</td>
<td>20.6</td>
<td>35.7</td>
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<td>PEI</td>
<td>67.4</td>
<td>27.5</td>
<td>141.3</td>
<td>-194.9</td>
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<td>NS</td>
<td>-224.4</td>
<td>184.4</td>
<td>-284.1</td>
<td>-59.7</td>
<td>128.3</td>
<td>-70.7</td>
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<tr>
<td>NB</td>
<td>54.8</td>
<td>131.0</td>
<td>407.6</td>
<td>-38.4</td>
<td>550.7</td>
<td>307.1</td>
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<tr>
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<td>50.1</td>
<td>612.8</td>
<td>513.3</td>
<td>-196.4</td>
<td>419.4</td>
<td>245.0</td>
<td>279.6</td>
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<td>Ont</td>
<td>43.2</td>
<td>195.4</td>
<td>430.6</td>
<td>381.4</td>
<td>488.7</td>
<td>433.9</td>
<td>311.4</td>
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<td>Man</td>
<td>-167.3</td>
<td>360.0</td>
<td>252.9</td>
<td>-140.8</td>
<td>988.8</td>
<td>368.8</td>
<td>262.0</td>
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<td>Sask</td>
<td>115.6</td>
<td>14.0</td>
<td>-119.4</td>
<td>103.9</td>
<td>661.9</td>
<td>216.5</td>
<td>156.2</td>
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<td>Alta</td>
<td>444.2</td>
<td>849.7</td>
<td>34.0</td>
<td>999.0</td>
<td>2303.3</td>
<td>1,129.8</td>
<td>943.3</td>
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<td>BC</td>
<td>-291.1</td>
<td>-356.3</td>
<td>8.6</td>
<td>169.8</td>
<td>-241.5</td>
<td>-22.7</td>
<td>-140.4</td>
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<td>Yukon</td>
<td>14.2</td>
<td>0.0</td>
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<td>0.0</td>
<td>-420.4</td>
<td>-264.2</td>
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<td>NWT</td>
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<td>284.2</td>
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<td>Nunavut</td>
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<td>0.0</td>
<td>3022.2</td>
<td>0.0</td>
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<td>1,672.2</td>
<td>1,100.5</td>
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<td>Canada</td>
<td>24.6</td>
<td>288.3</td>
<td>299.4</td>
<td>209.5</td>
<td>555.1</td>
<td>356.2</td>
<td>278.4</td>
</tr>
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Table 5: CPI Strata Basket Shares for Home Purchase and Replacement Cost

<table>
<thead>
<tr>
<th>Code</th>
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Chart 1: The American Housing Price Bubble Never Happened Based on the US Fed’s Preferred Inflation Indicator

**US HPIs vs. Implicit Rent Index (2000=100)**
*(Semi-log Chart)*
Chart 2: Pace David Dodge, the CPI for OA Poorly Reflected the Big Increase in House Prices from 2000 to 2006

NHPI vs OA CPI for 2000 to 2006 (2000=100)
Semi-Log Chart
Chart 3: Only the Net Purchase Series Properly Reflects the Post-Recession Surge in House Prices

**Twelve-Month % Changes for OA CPIs (2005=100)**

- Official Concept
- Net Purchase
- Replacement Cost
Chart 4: Only the Net Purchase Series Are Not Distorted by Once a Year Property Tax Increases in October

Three-Month % Changes for OA CPIs (2005=100)