

---

# **Rates & Dates**

Potential Implications of Interest Rate Increases:  
*How much can we handle?*

---

Prepared by  
**David Baxter and Andrew Ramlo**  
The Urban Futures Institute

**June 2013**

---

**URBAN FUTURES**  
Strategic Research to Manage Change

---

Reproduction of this report in whole or in part without permission of the Urban Futures Institute is prohibited. Brief extracts for review purposes may be made with due acknowledgment of the source. The information contained in this report has been compiled from sources believed to be reliable but the accuracy of the information is not guaranteed. E&OE

## Rates & Dates

### Potential Implications of Interest Rate Increases:

*How much can we handle?*

**David Baxter and Andrew Ramlo**

**The Urban Futures Institute**

It may seem a bit weird to be discussing interest rates increases right now (June 2013), given the past three decades of a long run decline in mortgage rates (Figure 1), the context of recent interest rate cuts in Europe, the US Fed's pledge to hold rates at the current level until sometime in 2015, inflation in Canada being below the Bank of Canada's long term target, and the Canadian dollar bouncing around par. Contrasting the reality of the current situation, concerns about interest rate increases have been duly noted; Finance Minister Jim Flaherty has said that he is concerned about "people taking on larger obligations than they would be able to afford were interest rates to go up, as they inevitably will" and, despite the outgoing Bank of Canada's Mark Carney continuing to hold rates constant for the longest period since the 1950's, concern over "record-high household debt" has led the Bank of Canada to maintain a bias toward raising borrowing costs in the "not-too-distant" future.

As rate increases are inevitable, there is really no point discussing "if" they will go up. What is discussable, however, is "when" and "by how much". Unfortunately, there is not much guidance from those who talk about the inevitable interest rate increases about their timing or magnitude. The reason little is said about timing or magnitude is that they are largely unpredictable, as they are, ultimately, a matter of policy which is nominally concerned with inflation, but functionally concerned with unemployment, currency levels and economic growth. In this regard, be it in Europe, the United States, China, or by default in Canada, there seems to be little appetite for immediate rate increases, and no indication of when the hunger for these might return.

This means that discussion of rate increases must turn from when or by how much, to contemplation of how much of an interest rate increase could borrowers support over time. More specifically, as mortgages represent the most significant share of many homeowners debt, it is interesting to consider how much mortgage rates could increase over the coming years without increasing the current debt service burden of borrowers.

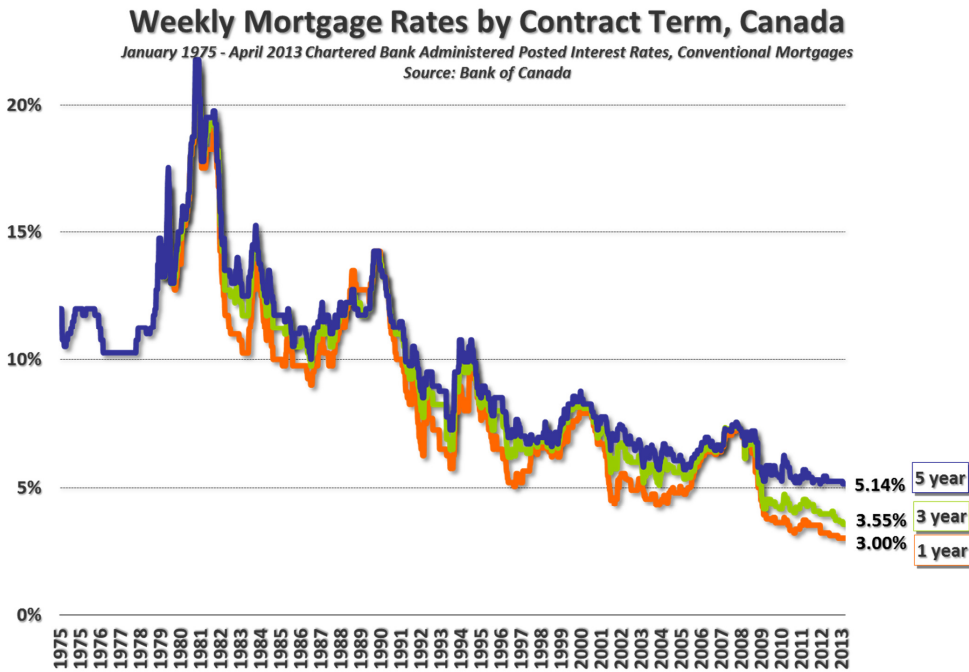
**I. Debt Service and Interest Rate Change:** The changing burden of mortgage debt service on a borrower over time is a function of three things: changing interest rates, changes in a borrower's income level and the rate at which mortgage debt is incrementally repaid (amortized). As indicated above, while we cannot predict when interest rate will change, we can reasonably project changes in the other variables, namely incomes and amortization. In doing so we can describe the interest rate envelope within which mortgage borrowers would not experience an increase in debt service burdens relative to their income.

To make what is a rather dry mathematical exercise a bit more palatable, the math will be couched within an example of a hypothetical average household in British Columbia. Statistics Canada's data shows that the average weekly earnings of an employed British Columbian in February of 2013 was \$875.45<sup>1</sup>. Assuming two of these folks in a household gives a household income of \$1,732.62 per week, or \$90,006.24 per year<sup>2</sup>. The same data source indicates that over the past 14 years, average weekly earnings have increased by

1 Statistics Canada. CANSIM Table 281-0049 - Employment, average hourly and weekly earnings including overtime and average weekly hours (SEPH), seasonally adjusted, for the industrial aggregate excluding unclassified businesses for Canada, province and territories, monthly.

2 While employment rates would suggest that not all households would have both people working, detailed information on employment and participation rates for owned households in BC will not be available from the most recent Census (2011) until late 2013. As such, for purposes of these scenarios, our average BC household has two people working.

Figure 1



2.2 percent per year. Over the same period Statistics Canada's Labour Force Survey indicates that average weekly wage rate increased by 2.4 percent per year<sup>3</sup>. Presuming that over the next few years incomes will increase at the (lower) average of 2.2 percent per year allows an estimate of the future income stream that will be available to our average BC household to service its debt.

There are two formats in which interest rates are typically discussed. The first is in the formal context of posted mortgage interest rates published by the Bank of Canada each week for conventional mortgages; for the last week of February 2013 these rates were 5.24 percent for a 5-year term mortgage, 3.65 for a 3-year term, and 3.00 for a

one-year term<sup>4</sup>.

The second is the rates that borrowers actually pay, as in times of falling rates borrowers are often offered discounted rates well below the posted rate, with as much as 1.75 percent knocked off five year mortgage rates (a one third discount). As interest rates increase, the discounts shrink, then disappear, and the posted rates prevail. In this paper, the baseline measurement will be based on posted rates as there is a published source for these numbers. That said, with this baseline in mind, consideration is also given to the outcome using discounted rates.

The connection between incomes, interest rates, and debt servicing is called underwriting or borrower qualification. In this process, a set of standards is applied to determine how large a loan a borrower can obtain given current interest rates. The standard provisions considered here are a) that borrowers can spend a maximum of 27 percent<sup>5</sup> of their monthly income on mortgage payments and b) that the loan amortization period is 25 years. Certainly there will be variance on these parameters in practice, but they provide a good base for the discussion at hand.

**Example A) Five year term conventional first mortgage at posted rate (Table 1).** Under the conditions that prevailed in February of this year, the average household with its \$90,006.24 per year income, when subject to a 27 percent debt service ratio and a 25-year amortization period could borrow \$344,096.61 at 5.24 percent, a rate that will prevail for the next five years given the fixed term of the mortgage. At the end of January 2018, the outstanding balance of this household's loan would be \$305,687.76, with the household

3 Statistics Canada. CANSIM Table 282-0073 - Labour force survey estimates (LFS), wages of employees by job permanence, union coverage, sex and age group, unadjusted for seasonality, monthly (current dollars unless otherwise noted), CANSIM (database).  
4 Per annum, compounded semi-annually not in advance, [www.bankofcanada.ca/rates/interest-rates/canadian-interest-rates/](http://www.bankofcanada.ca/rates/interest-rates/canadian-interest-rates/). Date selected to match most recently published income data.

5 The current practice is 32 percent of income for mortgage payments, property taxes, and heating costs. Netting out an estimated 5 percent for taxes and heating leaves 27 percent for debt service. The average household in British Columbia spends 4.4 percent of its annual income on property taxes, electricity, natural gas and other fuel, a figure that includes both tenant and owner-occupier households, and hence the use of a higher 5 percent estimate. Source: Statistics Canada. Table 203-0021 - Survey of household spending (SHS), household spending, Canada, regions and provinces, annual (dollars), CANSIM (database).

Table 1

| <b>Amortization, Income Growth, &amp; Interest Rate Change</b> |                     |                     |                     |                     |                     |                     |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|  | February<br>2013    | February<br>2014    | February<br>2015    | February<br>2016    | February<br>2017    | February<br>2018    |
| <b>Household Income</b>  | <b>\$91,046.80</b>  | <b>\$93,049.83</b>  | <b>\$95,096.93</b>  | <b>\$97,189.06</b>  | <b>\$99,327.22</b>  | <b>\$101,512.42</b> |
| <b>Example A - 5 year posted rate</b>                          | 5.24%               | 5.24%               | 5.24%               | 5.24%               | 5.24%               | 7.75%               |
| <b>Monthly Payments</b>  | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,284.03          |
| <b>Payments to Income</b>                                      | 27.0%               | 26.4%               | 25.9%               | 25.3%               | 24.7%               | 27.0%               |
| <b>Loan Amount</b>   | <b>\$344,096.61</b> |                     |                     |                     |                     | <b>\$305,687.76</b> |
| <b>Outstanding Balance End of Year</b>                         | \$337,188.30        | \$329,913.25        | \$322,251.99        | \$314,184.02        | \$305,687.76        |                     |
| <b>Example B - 1 year posted rate</b>                          | 3.00%               | 3.46%               | 3.92%               | 4.37%               | 4.82%               | 5.26%               |
| <b>Monthly Payments</b>  | \$2,048.55          | \$2,093.62          | \$2,139.68          | \$2,186.75          | \$2,234.86          | \$2,284.03          |
| <b>Payments to Income</b>                                      | 27.0%               | 27.0%               | 27.0%               | 27.0%               | 27.0%               | 27.0%               |
| <b>Loan Amount</b>   | <b>\$432,873.21</b> | <b>\$421,035.46</b> | <b>\$410,213.90</b> | <b>\$400,306.27</b> | <b>\$391,222.63</b> | <b>\$382,883.68</b> |
| <b>Outstanding Balance End of Year</b>                         | \$421,035.46        | \$410,213.90        | \$400,306.27        | \$391,222.63        | \$382,883.68        | \$375,219.28        |
| <b>Example C - 5 Yr discounted rate</b>                        | 3.49%               | 3.49%               | 3.49%               | 3.49%               | 3.49%               | 6.08%               |
| <b>Monthly Payments</b>  | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,048.55          | \$2,284.03          |
| <b>Payments to Income</b>                                      | 27.0%               | 26.4%               | 25.9%               | 25.3%               | 24.7%               | 27.0%               |
| <b>Loan Amount</b>   | <b>\$410,598.71</b> |                     |                     |                     |                     | <b>\$354,221.25</b> |
| <b>Outstanding Balance End of Year</b>                         | \$400,090.37        | \$389,211.74        | \$377,949.76        | \$366,290.92        | \$354,221.25        |                     |
| <b>Example D - 1 Yr discounted rate</b>                        | 2.00%               | 2.47%               | 2.94%               | 3.41%               | 3.86%               | 4.31%               |
| <b>Monthly Payments</b>  | \$2,048.55          | \$2,093.62          | \$2,139.68          | \$2,186.75          | \$2,234.86          | \$2,284.03          |
| <b>Payments to Income</b>                                      | 27.0%               | 27.0%               | 27.0%               | 27.0%               | 27.0%               | 27.0%               |
| <b>Loan Amount</b>   | <b>\$483,775.44</b> | <b>\$468,691.04</b> | <b>\$454,951.49</b> | <b>\$442,414.60</b> | <b>\$430,956.17</b> | <b>\$420,467.35</b> |
| <b>Outstanding Balance End of Year</b>                         | \$468,691.04        | \$454,951.49        | \$442,414.60        | \$430,956.17        | \$420,467.35        | \$410,852.46        |

having reduced their debt by \$38,408.85. Over the five years, based on the long run average gain of 2.2 percent per year, their household income would have increased to \$101,512.42. As they will be faced with negotiating a new mortgage for the outstanding balance in early 2018, the question is: What is the maximum interest rate that our average household could afford so as to not exceed the 27 percent debt service to income ratio? Presuming the same underwriting terms (i.e., a 25 year amortization) the answer is (after all the boring math) that they can afford to pay up to a 7.75 percent rate,

2.5 percentage points, or 48 percent, higher than their current rate. The reason for their ability to pay a higher rate is twofold: their incomes have increased by 11.5 percent and they have reduced their debt by 11.2 percent.

**Example B) One year term conventional first mortgage at posted rate (Table 1).** The same income and underwriting standards in Example A would have supported a \$432,873.21 mortgage at a one-year rate of 3.00 percent in February of 2013. Each year the household will pay a bit of principle, thereby reducing their debt a bit, and will experience an increase in their incomes, which will help in their annual re-negotiation of a new mortgage to pay their outstanding balance. As shown above, the result will be that as the household moves forward over the next few years, they will be able to support a higher interest rate and remain at the 27 percent debt service limit. By the end of January 2018, when this household is negotiating their 5th refinancing, they will be able to support a one-year mortgage rate that is in the range of 5.26 percent, 2.26 percentage points, or 75 percent, higher than the rate that prevails today.

**Example C) Five year term first mortgage at discounted rate (Table 1).** Given the widespread practice of discounting mortgage loans, it is informative to consider how this might position households going forward. Using a one third discount on the 5-year posted rate of 5.24 percent, an estimate of an initial discounted rate would be 3.49 percent, which would give our average household the ability to have borrowed \$410,598.71 in February of this year. At this rate, in five years time they would have an outstanding balance of \$354,221.25, having reduced their mortgage debt by \$56,377.46. Given their higher income (again 2.2 percent growth per annum), they could refinance at a rate of up to 6.08 percent without exceeding the 27 percent debt service ratio. This rate is 2.6 percentage points (74 percent) higher than their initial rate of 3.49 percent. Note that the relative increase in rate on this discounted option is higher than in the 5-year posted option, the result of the increased amortization of debt that will happen with the lower rate over the same amortization period.

**Example D) One year term first mortgage at discounted rate (Table 1).** The lowest rate to be considered here is 2.0 percent, the result of discounting the 3.0 percent posted one year rate by one third. At this rate, our average household could have supported a \$483,775.44 loan in February of this year. By February of 2018, after five years of negotiating new terms and income growth, the household would have reduced their mortgage debt by 15 percent (or by \$72,923), owing \$410,852.46. With a 15 percent smaller mortgage and an 11 percent greater income, by February of 2018 our average household would be able support an interest rate of 4.31 percent, 2.3 percentage points, (2.2 times) above the 2.0 percent rate it would have started with in February of this year.

**II. Conclusions:** Consideration of amortization and income growth demonstrate that mortgage interest rate increases in the range of 2.3 to 2.6 percentage points over the next five years (averaging half a percent per year) will impose no additional mortgage debt service burden on households relative to their incomes. Such rate increases would mark a return to levels experienced at the end of 2008. In the current environment, where it is reasonable to anticipate no increases in the coming year or two, this suggests that households in the province could accommodate increase in the range of just under one percent per year for each of the three years thereafter.

Thus the math shows that interest rate increases in the future can be accommodated, so long as they are gradual, modest, and anticipated, something central bankers can, and should, assure us of. Only if increases are sudden, significant and unanticipated, as they were in 1981, need we worry. It would therefore be useful for central bankers to let us know how they intend to increase interest rates, even if they cannot tell us when, so that we may govern ourselves accordingly.