



VALUATION SERIES

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PUBLIC CHOICE ALTERNATIVES

Canada Mortgage and Housing Corporation

BY IAN MADSEN



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EXECUTIVE SUMMARY

Canada Mortgage and Housing Corporation (CMHC) is a dominant force in the Canadian mortgage market. It is also considered to be a risk to Canadian taxpayers as it is presently constituted, operating and tasked. It could be worth as much as \$29.9B if it were to be sold off, or it could be worthless should a bad recession or housing market correction affect the employment and income of its mortgage holders, particularly in the overheated and real-estate and construction-dominated Greater Vancouver and Toronto regions. Currently, its insurance covers and guarantees approximately 68.6 percent of all Canadian residential mortgages.

Several steps should be completed prior to partial or total sale of CMHC, including splitting up the firm and removing Ottawa's liability and solvency guarantee. CMHC generally insures the riskiest, most-leveraged borrowers.

INTRODUCTION

Canada Mortgage and Housing Corporation (CMHC) is a Crown corporation entirely owned by the Federal Government of Canada. CMHC insures and guarantees mortgage loans generally made to the lowest income and riskiest home buyers in Canada. Its insurance and securitization of mortgages constitute 68.6 percent of all residential mortgages in Canada.

CMHC's financial strength and stability are crucial to home buyers, the housing market, and the taxpayers and citizens who own CMHC. The federal government and its taxpayers are on the hook for any defaults on the mortgages insured by CMHC. The minimum amount an insured home buyer is required to put down is five percent of the home purchase price.

With the potential for a financial Armageddon, similar to the housing crisis that plagued the United States between 2007-2010, Canadians should be asking whether or not a Crown corporation should continue to be the entity that guarantees the solvency of the housing market?

This study estimates the value of CMHC as a commercial enterprise and suggests how Canadians might extricate themselves from a possible CMHC-centred financial debacle.

RATIONALE FOR DIVESTITURE OR PRIVATIZATION

In a democracy, it is up to the citizens through their elected representatives to decide if a Crown corporation or other government agency should be privatized, and what should be done with the proceeds to benefit citizens and taxpayers. There are, thankfully, some established reasons to embark on the privatization for some Crown Corporations:

1. Some people believe that governments have no mandate to own or run commercial enterprises. Libertarians and others averse to expanded or expansive, intrusive government, believe that governments should only provide for citizens' safety, security, and justice and the involvement of governments in private businesses is not good policy.
2. Regulation can usually accomplish any public policy reason for direct involvement in an industry. If regulation is not easily feasible, then a direct contract or subsidy to any affected individuals, entity or entities may be more efficient or effective and less economically disruptive or costly.
3. If a government-controlled or -sponsored enterprise has a monopoly position, near-monopoly, or effective monopoly in a line or lines of business or businesses, then opportunities are lost in one or more commercial or potentially commercial sectors for entrepreneurs and investors to try to create and grow businesses to enrich and sustain themselves, employees, suppliers, and others.
4. A monopoly, near-monopoly, or effective monopoly market position by a government-owned or sponsored entity could result in far higher prices for customers, the general public, or a section of the public, than would be the case in a fully competitive marketplace for the industry involved.
5. A government-owned or -sponsored enterprise may compete directly against private sector firms, which are owned by or employ citizens, or against individual citizens, all of whom the government is supposed to serve, not disadvantage.
6. The government-owned or -sponsored enterprise may compete unfairly against its private sector rivals in that it had or has access to lower-cost government-sourced and -guaranteed capital (debt). It may have a much larger debt component in its capital versus that which would be tolerated in the private sector. Thus, it may not have to meet high standards for profit and cost control, allowing it to offer lower than true free market-based competitive pricing.
7. Government-owned firms may not need to pay provincial or federal income taxes. This can allow such firms to supply goods or services more cheaply than the private sector companies they are competing with.
8. Government-owned or -sponsored enterprises may not have any kind of profit orientation or target, may be used as public policy vehicles and may be given preference in their activities or even in their transgressions, such as labour or environmental abuses.
9. Government-owned or -sponsored enterprises, by virtue of being public sector vehicles overseen by bureaucrats and politicians, may be places where favoured individuals find employment, particularly at management levels.
10. Since profit is a secondary goal of a government-owned or -sponsored enterprise, it is difficult to evaluate the effectiveness, efficiency or productivity of the enterprise or its employees. Consequently, these employees and assets may not be very productive or effective.

11. Government-owned or -sponsored enterprises are often creations of certain time-fixed circumstances and outlive whatever use or public policy role their creators may have conceived. Often, advances in technology; the modernization of transport, telecommunication or information technology; the evolution of the economy and available products and services and the increasing standard of living make these enterprises potentially obsolete. In the private sector, firms and individuals must adapt and evolve, or decline.
12. Government-owned or -sponsored enterprises perpetuate their possibly obsolete existences by virtue of the constituencies that build up around them: employees, managers, directors and bureaucrats, customers, suppliers and associated advocates or consultants. They can lobby to keep the enterprise going, despite dysfunction or losses. They are far more motivated to do so than are the taxpayers, whose average cost is much less per person and may be indirect, hidden or difficult to calculate.
13. Because they are not profit-oriented, government-owned or -sponsored enterprises are usually less efficient, and thus they lower the overall efficiency of the entire economy. This can make a whole nation less competitive than its global rivals are, whether nations or individual companies. The effects are worse the greater the government involvement in the economy. When taken to its most extreme, as happened in 20th-century communist nations, the countries were unable to compete against capitalist companies, despite their immense direct and indirect subsidies, government support and the lack of profit requirement.
14. Funds tied up in the capital of government-owned or -sponsored enterprises could be used to reduce government debt or lower taxes on individuals or corporations, which they could then spend or invest as they freely choose, and thus they could inject money back into the economy in more-lucrative and -constructive ways.
15. Governments, generally, have a poor record of picking winners, or creating or owning enterprises that have market-competitive profitability, or attractive returns on assets, equity, or even returns that exceed governments' own cost of debt service. If, rarely, they actually do, it generally turns out that they have been provided unusually good market, operational, regulatory, or other conditions not available to other, investor-owned firms.
16. The greater the number and size of government owned or government sponsored enterprises in an economy, the greater the size and power of the government, which is usually the largest single entity in society, increasing the dangers of abuse of power, including injuring individual citizens, companies, or groups. Effective capacity of opposition or recourse against this power diminishes as the portion of the economy the government occupies increases.

CANADIAN HOUSING AND MORTGAGE AND THE CANADIAN HOUSING AND MORTGAGE MARKETS

Affordable housing is always an issue in any society, but rarely does it rise to the level of a national priority, as it has in Canada in recent years. Homelessness, habitation insecurity, and lack of affordably-priced rental or starter-home housing have become urgent issues, and are driven by the same thing: escalating prices for single-family, attached and apartment homes in the major cities of the nation.

The federal government has allowed people to borrow from their Registered Retirement Savings Plans (RRSPs) and provincial and federal governments have given first-time buyers grants and tax exemptions, to help some people buy homes, but have also fuelled home buying demand.

There are numerous reasons debated for this problem. The previously mentioned home-buying incentives, historically low interest rates in the wake of the great recession and financial crisis, increasing homebuilding, environmental and construction regulations, scarcity of buildable land, restrictive zoning, misapplication/misorientation of property taxation (taxing property instead of land), and more recently, foreign buying and speculative buying. So, the role of financing for lower-income borrowers is important, and that is where CMHC has come in.

For decades (see history below), CMHC has provided mortgage insurance to young people with low-income, low-cash profiles looking to buy their first homes, allowing other financial institutions to lend money to buy their property with as little as five percent down payment, and at nearly the affordable maximum of permitted mortgage payment-to-income ratio (35 percent including principal, interest, taxes, heat). In terms of one criterion, involvement in aiding home purchase, CMHC has been eminently successful. At the end of 2016, 36 percent (down from 48.6 percent in 2012) of Canadian mortgages were insured by CMHC, and

32.6 percent (up from 28.5 percent in 2012) of Canadian mortgages were securitized (sold off as bond-like instruments for investment and tradable by investors and speculators). Combined, this means CMHC is party to, and ultimately backing, 68.6 percent of the mortgages in Canada. Importantly, this is the number of mortgages, not the share of the total amount of all the mortgage money lent out nationally.

So, about two-thirds of Canadian homes are insured by CMHC. What needs to be emphasized is that all of these mortgages are owed by people who did not qualify for regular, non-insured mortgages, (i.e., that all of these had initially low down payments and loan recipients who may be low income, have few years' work experience, and may be paying out as much as 35 percent of their gross income on housing costs, leaving little for other basic expenses). These are, by definition, the riskiest mortgages in Canada.

Well aware of these risks, and the overheated real estate markets in two large metropolitan areas, the Greater Toronto Area (GTA), and the Greater Vancouver Area (GVA), the federal government has sought to ensure that CMHC is not a ticking financial time bomb. In 2016, new and stricter underwriting standards were mandated. These standards were touted as being essential, and more than adequate to assure the public that all new mortgages insured or securitized by CMHC would be able to withstand economic or interest rate fluctuations that could dramatically increase loan default and subsequent foreclosure, forced home sales, and a precipitous drop in home values, such as was experienced about a decade ago in the United States.

The US and global financial crisis, starting from the peak in real estate prices in 2006 and not ending until several years later, with a USD\$187B bailout of Federal National Mortgage Association, 'Fannie Mae', and its smaller, similar government-sponsored entity, Federal Home Loan Mortgage Corporation, 'Freddie Mac' (both firms were also shareholder owned and publicly traded on stock exchanges), led to millions of people losing their homes and drops in property values in some cities and towns of more than 30 percent. Most of the mortgages

underwritten or insured by Fannie and Freddie were securitized and sold to investors, and were not as 'investment-grade' as they were rated to be.

Widespread fraud was also associated with the crisis, but was not the central cause of it. Easy loan terms, such as zero-down or even negative down payments, and low-interest rates fuelled buying by low-income and risky individuals, and also inflated home prices, which led to larger mortgages and less affordable payments. When the crisis caused the great recession, millions of people lost their jobs and could not afford their homes, leaving them renting or homeless, and the homes foreclosed and fire-sold to pay back what could be salvaged for the mortgage lenders, often a big loss.

The total loss was 34 percent before home prices started to recover, although years later homes new housing developments in places affected by the crisis, like Las Vegas, could still be purchased for a fraction of their construction costs, and old mansions in Detroit and other old industrial cities for just tens of thousands of dollars. Hundreds of decrepit, foreclosed or abandoned homes were demolished in many cities and towns.

In its 2016 Annual Report, CMHC asserts that it has rigorous underwriting standards, vetting and verification of employment and income data, credit history, and other information to make a well-founded decision to make each and every mortgage guarantee. Thus far, its loan loss experience has been satisfactory, which perhaps validates the confidence that management has in its risk control – and 'risk appetite' as it calls it.

However, this loan loss experience has been gradually rising, even as its tally of outstanding loans guaranteed gradually declines. Whether the decline in the latter is the result of tighter standards causing fewer loans to be approved for insurance or whether more potential buyers are qualifying for other lenders by stumping up 20 percent of home value is not clear, it could be both.

Although unemployment rates continue to decline, personal incomes increase and home values to rise, defaults are rising, and return on equity in CMHC is falling. These could be preliminary indicators

of weakness that could accelerate exponentially should unemployment escalate in a severe episode of financial volatility or economy recession. A small foretaste of that occurred in 2007 in Canada with the Asset-backed Commercial Paper fiasco, when interest-earning vehicles with unclear bank guarantees became illiquid; people could not redeem them, and the chartered banks issuing them attempted to deny responsibility for them.[†]

Mortgage terms in Canada are usually five years, and thence reset with a new interest rate. If rates rise, as short term ones already are doing, or paid work hours are cut back, many homeowners with CMHC-insured or CMHC-securitized mortgages could struggle to make monthly payments. The borrowers are already those most likely to lose their jobs, or have other difficulties making their payments, as they are at their credit limits.

In view of the risks, the valuation of CMHC has to be modified to reflect those risks. The potential value decrease is difficult to estimate, as a big increase in unemployment that could increase default and losses that CMHC must make good on to lenders or investors has not been experienced since 1982. This is uncharted territory, and some assumptions must be made.

The 1991-92, 2000-01, and 2008-09 recessions were relatively mild in Canada, at least in comparison to that massive 1982 credit crunch, and aside from Alberta in the early 1980s, real estate values were not as inflated as they are today. oday, they are at record levels, and a cause of worry not just to the federal Department of Finance, the Bank of Canada, and some bankers and economists, but to the International Monetary Fund and other international institutions as well.^{††}

While Canada is only seventh in the world in home unaffordability as measured by the home price to personal income metric, and fourth in the world in

[†] (See: <http://risk.econ.queensu.ca/wp-content/uploads/2013/10/Chant-The-ABCP-Crisis-in-Canada-Chant-English.pdf>).

^{††} (See <https://betterdwelling.com/imf-canada-overvalued-homes-g7-fourth-globally/>).

house price to rental cost index, both are at all-time highs. Even last year, when prices were lower, CMHC itself was warning that home prices were overpriced by 60 percent in nine Canadian metropolitan markets.[†]

Thus, if a true, conservative value for CMHC is to be determined, an estimate of potential loss must be incorporated. Hence, a large increase in unemployment, with disproportionate impact on the GTA and GVA, was used to calculate a 'risked' value for CMHC. The likelihood of such a devastating recession of the magnitude of the one in 1982 may be small, but its probability is not zero. Similarly, a more ordinary recession of the 2008-09 sort may be possible, and, some economists have argued, may be overdue, as such recessions occur roughly every 7-10 years.

There are threats that could cause such recessions out there already, such as oil supply disruptions around the world, possible wars, trade disputes, and financial panics. Should either a major, or even a minor recession occur in Canada, the GVA and GTA could be quite vulnerable. Much of the economic activity and employment in those regions is now generated by real estate and construction, all the firms involved, their employees, creditors and investors, and the peripheral ones that serve them, including lawyers, notaries, building supply companies, surveyors, engineers and many others.

[†] (See <http://business.financialpost.com/personal-finance/mortgages-real-estate/cmhc-warns-of-strong-overvaluation-in-canadian-housing-markets-very-high-evidence-of-problematic-conditions-in-vancouver>).

VALUATION OF CANADIAN MORTGAGE AND HOUSING CORPORATION

For the purpose of this study, a level of unemployment equal to the worst of the 1982 recession was used, with the difference between that level and the current one, where losses are relatively low (as yet) and manageable, used as the base to estimate the portion of CMHC's insured or guaranteed portfolio subject to total loss from the mortgage-holders defaulting. As the methods used in CMHC's stress testing were unavailable for scrutiny, others were used for this study. (For the results of CMHC's stress testing of six possible scenarios, please see Appendix 1.)

There are two generally accepted methods for valuing a company: its intrinsic value as a cash-generating enterprise, and its standard market value in comparison with peer companies. This study used both methods.

INTRINSIC VALUE, DISCOUNTED FREE CASH FLOW VALUATION

Using an intrinsic value method, and discounting the present Canada Mortgage & Housing Corporation's projected future free cash flows, the corporation's unrisksed value could range from \$7.5B to \$29.9B, with a median value of \$12B and a mean value of \$13.6B.

Using a probability-risked 2 percent chance of a bad-case scenario of 13.1 percent unemployment, 50 percent default rate in the GTA and GVA, and 10 percent in the rest of Canada, and an 11.8 percent chance (one out of 7–10 years) of a 'normal' recession of 9.5 percent unemployment (average of the last three in Canada) the value ranges from \$6.8 to \$29.2B, with a median value of \$11.3B and a mean of \$12.9B.

Using the full losses of a bad-case scenario of 13.1 percent unemployment, 50 percent default rate in the GTA and GVA, and 10 percent in the rest of Canada, the value ranges from -\$6.2B to positive \$16.2B, with a median of -\$1.7B and a mean value of -\$0.09B. Hence, it is obvious that serious consideration of potential losses in a recession, particularly in the highly valued GTA and GVA markets, bears a great weight on the value of CMHC. It should be noted that CMHC's book value of equity, i.e., assets minus liabilities, was \$21B at the end of 2016.

Table 1

Intrinsic Value, Using Discounted Free Cash Flow**Valuation Matrix** - Presented Value of Discounted Free Cash Flow = Estimated Next Year Free Cash Flow (Required Rate of Return = Growth Rate)**Projected Free Cash Flow for 2018 (\$M): \$597.7**

Matrix Values (\$M) $g=v; r=>$	4.00%	5.00%	6.00%	7.00%	8.00%	9.00%	10.00%
0.00%	\$ 14,943.5	\$ 11,954.9	\$ 9,962.4	\$ 8,539.1	\$ 7,471.8	\$ 6,641.6	\$ 5,977.4
1.00%	\$ 19,924.7	\$ 14,943.6	\$ 11,954.9	\$ 9,962.4	\$ 8,539.1	\$ 7,471.8	\$ 6,641.6
2.00%	\$ 29,887.2	\$ 19,924.8	\$ 14,943.6	\$ 11,954.9	\$ 9,962.4	\$ 8,539.1	\$ 7,471.8
3.00%	\$ 59,774.3	\$ 29,887.2	\$ 19,924.8	\$ 14,943.6	\$ 11,954.9	\$ 9,962.4	\$ 8,539.1
4.00%	--	\$ 59,774.3	\$ 29,887.2	\$ 19,924.8	\$ 14,943.6	\$ 11,954.9	\$ 9,962.4
5.00%	-\$ 59,774.3	--	\$ 59,774.34	\$ 29,887.2	\$ 19,924.8	\$ 14,943.6	\$ 11,954.9
Less:		Probability Risk Loss Estimate	\$ 697.5		Total Estimated Possible Losses	\$ 13,637.3	
Mean of Highlighted Values	\$ 13,551.5		\$ 12,854.0			-\$ 85.8	
Median of Highlighted Values	\$ 11,954.9		\$ 11,257.4			-\$ 1,682.5	
Minimum of Highlighted Values; Lower Boundary of Range	\$ 7,471.8		\$ 6,774.3			-\$ 6,165.5	
Maximum of Highlighted Values; Lower Boundary of Range	\$ 29,887.1		\$ 29,189.7			\$ 16,249.8	
Average of Mean and Median	\$ 12,753.2		\$ 12,055.7			-\$ 884.1	
Average of Minimum and Maximum	\$ 18,679.5		\$ 17,982.0			\$ 5,042.1	
Average of the Averages	\$ 15,716.3		\$ 15,018.9			\$ 2,079.0	

MARKET VALUE, MARKET COMPARISON VALUATION

It turns out that there are several viable comparisons available for CMHC. There are seven independent mortgage finance companies or mortgage insurance or guarantee companies in Canada (there is another, private one, whose figures are unavailable), the two large mortgage guarantee and securitizers in the United States, and the six largest chartered banks in Canada.

Metrics used included Trailing Price to Earnings and Forward Price to Earnings ratios (P/E), Price to Sales (P/S) ratio, Price to Book Value (P/BV), Enterprise Value to Revenue (EV/Rev), and several others (Please consult the accompanying valuation spreadsheet file in Excel for details).

Some metrics had to be discarded due to insufficient information on either the comparator companies or CMHC, or the inapplicability of the ratio to either the comparators or CMHC. Six ratios were ultimately used: Trailing P/E, Forward P/E, P/S, P/BV, and Price to Operating Cash Flow.

The results are in Table 2a, below. The table shows that for the raw, unrisks value, removing extreme values, the median value is \$27.7B, and the mean is \$27.5B, with a minimum value of \$14.6B.

Using a probability-risked 2 percent chance of a bad-case scenario of 13.1 percent unemployment, 50 percent default rate in the GTA and GVA, and 10 percent in the rest of Canada, and an 11.8 percent chance (one out of 7–10 years) of a 'normal' recession of 9.5 percent unemployment (average of the last three in Canada) the minimum is \$13.9B, with a median value of \$27.0B and a mean of \$26.9B.

Using a the full losses of a bad-case scenario of 13.1 percent unemployment, 50 percent default rate in the GTA and GVA, and 10 percent in the rest of Canada, the minimum value is \$0.94B, with a median of \$14.1B and a mean value of \$13.9B. Hence, it is obvious that serious consideration of potential losses in a recession, particularly in the highly valued GTA and GVA markets, bears a great weight on the value of CMHC.

Market Comparison Based Value of CMHC						
Valuation metrics applied to CMHC	Trailing P/E (Market Value to to Net Income)	Forward P/E (Market Value to Est. Net Income)	Price to Sales	Price to Book	Enterprise Value/Revenue (Subtracting Debt)	Price to Operating Cash Flow
Average Seven Canadian Mortgage Finance or Guaranty Cos. (As Is, Fully Taxed)	\$ 17,330.6	\$ 18,600.3	\$ 48,570.0	\$ 26,027.6	\$ 111,079.1	\$ 13,941.5
Average Two US Mortgage Finance Cos. (As Is, Fully Taxed)	\$ 290,358.3	\$ 2,671.5	\$ 2,653.7		\$ 508,844.1	\$ 6,496.4
Average Six Large Cdn. Chartered Banks (As Is, Fully Taxed)	\$ 17,629.2	\$ 17,232.0	\$ 17,587.1	\$ 44,708.0	-\$ 1,198.6	-\$ 8,804.3
Average of Cdn & US Mortgage Finance Cos. Average, (As Is, Fully Taxed)	\$ 59,466.6	\$ 12,586.3	\$ 24,752.2	\$ 22,844.1	\$ 182,191.6	\$ 8,906.2
Average of All of Above (As Is, Fully Taxed)	\$ 40,157.0	\$ 14,577.3	\$ 21,681.5	\$ 33,776.4	\$ 103,595.8	\$ 1,316.0

Table 2b

Market Value for All Comparable Companies and Five Variable Valuation Ratios

Figures in \$M	Mean	Median	Minimum
All Six Ratios	\$ 35,850.7	\$ 27,728.9	\$ 1,316.0
Removing Extreme Minimum and Maximum Values	\$ 27,548.1	\$ 27,728.9	\$ 14,577.3
Less: Expected Value of Loss in Severe and 'Normal' Recessions	\$ 702.8	\$ 702.8	\$ 702.8
Final Estimated Probability-Risked Value	\$ 26,845.3	\$ 27,026.1	\$ 13,874.5
Less: Alternative Full Losses at Risk	\$ 13,637.3	\$ 13,637.3	\$ 13,637.3
Final Full Loss Residual Value	\$ 13,910.7	\$ 14,091.6	\$ 940.0

CONCLUSION AND RECOMMENDATION

The decision on whether or not to keep or sell off all or part of a Crown corporation is up to the taxpayers of the province, or in this case, of all of Canada, usually through their elected representatives in the House of Commons. What makes the case of CMHC unique, however, is its outsized role in a very important part of the economy: home loan mortgage insurance and securitization.

Should there be a serious period of economic weakness or a sharp increase in interest rates, a large portion of the mortgage holders insured or guaranteed by CMHC could find themselves unable to make their monthly payments should their household incomes drop dramatically due to unemployment or underemployment. CMHC's borrowers are the riskiest in the mortgage market, that is why they legally require and get mortgage insurance in the first place.

As this study has attempted to estimate, the losses that CMHC could theoretically sustain could threaten its solvency. Of course, should CMHC sustain such losses, Ottawa would very likely provide emergency funding to CMHC to ensure that it could maintain operations and withstand all the claims that mortgage lenders would make in such a crisis.

This could ultimately be much worse than the potential losses projected in a dire scenario in this study. In the United States, \$187.5B was paid out by Congress to make up losses and recapitalize Fannie Mae and Freddie Mac. This would be roughly comparable to \$20B in Canadian dollars for a similar disaster here. While it appears to be the case that the underwriting standards CMHC uses are superior to those of those two GSE's in the US, in a severe financial crisis, even normally sound risks could turn bad and default.

It is an open and important question whether Canada should retain ownership in an entity such as CMHC when it could not only cost taxpayers dearly in either a bad recession or a housing market correction, even if the latter is just in the GTA and GVA. Related to this concern is the sheer size and market share of CMHC.

A good case can be made that the corporation should be restructured and even split up, even if it is not sold, and nearly certainly those two things can and should be done if it is eventually divested by the government.

There are several different alternative paths such a course of action could take. Some steps are obvious, others more contentious:

1. Introduce far more transparency and clarity in the stress tests CMHC has performed. Better knowledge of the types of borrowers, loan-to-value, delinquency experience, and other aspects of not just evaluating borrowers for insurance and loans for securitization, but how loans go bad.
2. Divide the company either geographically, by type of dwelling, size of loan, or type of operation, perhaps by two or all three ways.
3. Allow the two private sector mortgage guarantors, Genworth Financial and Canada Guarantee, to bid for business on random CMHC loans or on the riskiest ones, to determine if these market-disciplined firms would be willing to price insurance or guarantees. This could help determine whether or not CMHC needs to raise the fees it charges either lenders or borrowers (it is generally the latter) to insure or guarantee mortgages.
4. Clarify exactly what the Government of Canada is itself guaranteeing. Were it to extricate itself entirely from responsibility for CMHC, the latter would be on a much more accountable, market-assessed basis. This could require more capital from Ottawa.
5. Encourage and then fully require CMHC to reinsure itself with outside insurers and investors. There could be a multitude of insurance companies, pension funds, hedge funds, and other investors who might find such an opportunity attractive, should it become lucrative enough.
6. Tighten and strengthen underwriting standards further. While raising the minimum down payment may not be possible for political or other reasons, lowering the limit of house price might be, particularly in overheated markets such as the GTA or GVA, or in depressed towns or regions.

7. Remove the social housing program from CMHC and make it a separate entity. It complicates the understanding of CMHC and its core mission (Ottawa funds about two billion dollars of public housing via CMHC, but this figure fluctuates greatly).
8. Once most of the steps above are complete, CMHC can be considered for breakup and flotation on a stock exchange. Should it or its successor firms issue shares, the capital thus raised would best be retained by the firm or firms itself or themselves, at least in part, if the divestment is not whole, so as to better capitalize the company or companies for the possible trials that await it or them as a fully independent, investor-owned and government-liberated company or companies.
9. Initially, a large part of the shares in the entity, or ideally, several entities should be sold, but, preferably, not all of them at once, so that a market-determined value could be established before the whole firm or firms is or are sold off entirely.
10. Related to the point immediately above, it should be made absolutely clear that no remaining liability rests with the government of Canada. The ambiguous status of Fannie and Freddie led to a lot of assumed accountability to Washington, which allowed those entities to borrow at low rates and take on far more explicit and implicit debt and indirect liability than would be the case for fully commercial, investor-owned publicly-listed companies. It also led them to become more relaxed in their standards and scrutiny, with resultant fraud and very risky, low quality assets backed by borrowers with shaky employment, income, and credit history.

There should be no doubt about CMHC's or its successor firms' future independence and integrity should it or they be set free. Ideally, it would not be a single large entity, but several viable competing ones.

Introduce far more transparency and clarity in the stress tests CMHC has performed. Provide information on types of borrowers, loan-to-value, delinquency experience, and other aspects of not just evaluating borrowers from insurance and loans for securitization, but how loans go bad.

Canadians must make a choice: selling off a restructured, lower-risk CMHC or successor firms and redeploy up to \$20B, or perhaps much more if potential investors are encouraged by the restricting and de-risking of the firm(s). Potential sale proceeds could be used to hire as many as 5,000 new doctors or 10,000 new nurses or paramedics for twenty years, or to cross their fingers that they will not have to pony up a similar amount of money in a housing market debacle.

APPENDIX I

CAPITAL MANAGEMENT AND RISK ASSESSMENT AT CMHC[†]

CAPITAL MANAGEMENT

We conduct our Own Risk and Solvency Assessment (ORSA) to identify risks and assess our current and likely future capital needs and solvency positions. Stress testing is an important part of this, and is conducted across our organization in parallel with our annual corporate planning process.

STRESS TESTING

We use stress testing to evaluate how various extreme economic and operational scenarios could affect our financial performance, capital levels and risk tolerance thresholds.

Stress testing involves searching out extreme scenarios that have a very remote chance of happening and planning for them. Rigorous stress testing is an essential part of our risk management program and allows us to evaluate our capital levels against these scenarios.

The underlying variables within each of the stress testing scenarios were developed based on a combination of hypothetical and historical economic analysis. In 2016, we tested our mortgage loan insurance and securitization businesses against several extreme scenarios including:

Scenario descriptions

Base case: Non-stressed situation, base case economic assumptions of CMHC's Corporate Plan.

Global deflation: Severe and prolonged economic depression.

Oil price shock: Price of oil falls to US\$20 per barrel in 2017 and subsequently ranges between US\$20-30 for a further four years.

Earthquake: Multiple scenarios of a high-magnitude earthquake that disrupts critical infrastructure and services in a major urban centre, including broader financial impacts as a result of its effects on homeowners and businesses. Reporting reflects the most severe outcome of the simulations.

Reverse stress test: A sudden increase in interest rates leads to higher borrowing costs for both Canadian consumers and financial institutions, causing a severe drop in Canadian house prices and ultimately the failure of a Canadian financial institution.

US style housing correction: A 5 percentage point increase in the unemployment rate with a 30 percent decline in house prices.

CMHC follows the guidance set by OSFI with respect to stress testing. We also develop our own stress testing cases for business planning purposes.

The MCT is the ratio of capital available to capital required. Below 100 percent MCT, an insurance company may no longer be allowed to write new business. A level below 0 percent MCT indicates insolvency. The table below reports our lowest insurance capital (MCT) under both the current capital framework and based on our understanding of the new Advisory at the time the stress test was completed.

It is important to note that there were minor amendments to the Advisory between the time the stress test was completed to the time it was finalized.

The results of each scenario on CMHC's regulatory capital requirements for current MCT and new MCT are as follows:

[†] Source: Canadian Mortgage and Housing, 2017-2021 Summary of Corporate Plan, December 15, 2016. <https://www.cmhc-schl.gc.ca/en/corp/about/cre/upload/summary-corporate-plan-2017-2021-cmhc.pdf>. (Accessed January 9, 2018).

Table 3

Scenarios

Figures in \$M, unless otherwise indicated For the 2016-2021 Period	Base Case	Global Deflation	Oil Price Shock	Earthquake	Reverse Stress Test	US Style Housing Correction
Peak Unemployment Rate	6.6%	13.5%	8.8%	8.4%	11.3%	12%
Change in Housing Prices	9.0%	(25.0)%	(8.0)%	(1.0)%	(30.0)%	(30.0)%
Cumulative Net Income/Loss Insurance	\$ 7,550	\$ (2,235)	\$ 4,429	\$ 5,345	\$ (2,072)	\$ (1,211)
Lowest Insurance Capital (Percentage MTC) Current MTC	379%	304%	378%	376%	262%	286%
Lowest Insurance Capital (Percentage MTC) New MTC	235%	210%	238%	233%	190%	183%
Cumulative Net Income - Securitization	\$ 2,361	\$ 2,447	\$ 2,320	\$ 1,031	\$ 2,529	--
Lowest Point of Available Capital Securitization	\$ 2,050	\$ 2,202	\$ 2,180	\$ 1,067	\$ 2,178	--

Table 4

Summary Of The Corporate Plan 2017-2021

Figures in \$M, unless otherwise indicated	2015 Actual	2016 Estimate	2017 Plan	2018 Plan	2019 Plan	2020 Plan	2021 Plan
Corporate Results							
Total Revenues	4,636	5,151	5,885	5,263	5,032	5,095	5,227
Total Expenses (including Income Taxes)	3,148	3,845	4,464	3,701	3,291	3,217	3,201
Net Income	1,488	1,306	1,421	1,562	1,741	1,878	2,026
Operating Budget Expense Ratio	11.1%	12.1%	12.5%	13.1%	13.4%	13.3%	13.1%
Total Assets	252,107	259,104	269,234	270,746	280,452	282,146	282,552
Total Liabilities	232,468	238,168	247,222	247,387	255,622	255,295	253,494
Total Equity of Canada	19,639	20,936	22,012	23,359	24,830	26,851	29,058
Employees (Full-time Equivalents (FTE))	1,721.5	1,870.8	1,888.6	1,813.4	1,769.5	1,734.9	1,719.2
Revenue per employee (FTE)	1.7	1.9	2.3	2.0	1.8	1.8	1.8
Employee Engagement Score	74%	75%	80%	80%	80%	80%	80%
Women in Senior Leadership	43.0%	42.0%	54.4%	54.4%	54.4%	54.4%	54.4%
Women – Employment Equity Group	57.3%	57.4%	-	-	-	-	-
Visible Minorities – Employment Equity Group	19.2%	20.2%	22.1%	24.0%	25.9%	25.9%	25.9%
Persons with Disabilities – Employment Equity Group	3.4%	3.2%	3.7%	4.3%	4.9%	4.9%	4.9%
Indigenous People – Employment Equity Group	2.1%	2.2%	2.8%	3.3%	3.9%	3.9%	3.9%
Parliamentary Appropriations for Housing Programs	2,049	2,557	3,155	2,411	1,977	1,870	1,808
Net Income	25	19	14	19	0	5	(4)
Insurance-in-Force	525,511	519,511	511,894	502,639	494,294	488,384	484,120
Total Insured Volumes	80,447	91,030	85,859	82,646	81,159	81,531	81,624
Premiums and Fees Received	1,438	1,497	1,527	1,549	1,603	1,692	1,798
Premiums and Fees Earned	1,592	1,568	1,566	1,559	1,560	1,581	1,630
Insurance Claims	290	421	332	296	281	265	253
Net Income	1,264	1,074	1,109	1,178	1,297	1,388	1,504
Loss Ratio	18.2%	26.8%	21.2%	19.0%	18.0%	16.8%	15.5%
Operating Expense Ratio	13.3%	20.1%	23.8%	22.3%	21.2%	21.0%	20.8%
Combined Ratio	31.5%	46.9%	45.0%	41.3%	39.2%	37.8%	36.3%
Return on Capital Holding Target	12.9%	10.5%	10.7%	11.2%	11.8%	12.1%	12.5%
Capital Available to Minimum Capital Required (%MCT)	354%	379%	408%	432%	444%	461%	479%
Guarantees-in-Force	431,000	460,000	492,000	505,000	522,000	497,000	494,000
Annual Securities Guaranteed	115,722	145,000	171,000	179,000	186,000	193,000	200,000
Guarantee and Application Fees Received	473	593	646	655	661	667	678
Guarantee and Application Fees Earned	268	313	390	468	546	614	643
Net Income	215	239	295	359	424	479	508
Operating Expense Ratio	11.1%	12.1%	12.3%	10.4%	9.0%	8.5%	7.9%
Return on Required Capital	17.9%	20.1%	21.1%	21.3%	22.1%	23.5%	24.8%
Capital Available to Capital Required (%MCT)	159%	165%	167%	177%	190%	213%	234%

Source: Canada Mortgage and Housing. 2017-2021 Summary of Corporate Plan. December 15, 2016. <https://www.cmhc-schl.gc.ca/en/corp/about/core/upload/summary-corporate-plan-2017-2021-cmhc.pdf>. (Accessed January 9, 2018).

APPENDIX II

MORTGAGE LOAN INSURANCE

Mortgage loan insurance risk management

We assume the risk of loss from borrower default through mortgage insurance contracts entered into with Approved Lenders, exposing us

to the uncertainty surrounding the timing, frequency and severity of claims. Insurance risk management policies are in place to identify, mitigate, report and monitor this risk to ensure activities are managed within our risk appetite, tolerances and risk limits to successfully deliver on our mandate and meet our strategic directions.

We manage our exposure to insurance risk of loss through prudent product design, pricing, insurance underwriting policies, claims payment and default management, reserving, fraud and misrepresentation risk management, market diversification and borrower review and monitoring for the multi-unit portfolio and homeowner portfolios.

Product design

The development of mortgage loan insurance products takes into account changing client needs, new legislation and regulations, the evolving economic environment and our mandate to serve Canadians across the country, particularly in those market segments not served or less

well-served by the private sector. Product design is based on prudent underwriting practices combined with our goal to ensure that creditworthy borrowers have access to mortgage loan insurance products that meet their needs.

Pricing

Premiums are set based on projections of claim frequency, claim severity, return on investment, operating expenses, taxes and capital targets profitability considerations and market demand. In addition, pricing decisions also take into account other considerations related to competition, strategic direction and CMHC's public mandate. Pricing risk refers to the potential that these projections and considerations may substantively and persistently differ from actual developments and values in the long term, that could have significant implications for CMHC's risk of loss, profitability and achievement of mandate.

At least annually, we conduct a pricing review of our products to: i) ensure they support Canadians in meeting their housing needs for a wide range of housing types and tenures; ii) support the profitability and long-term viability of the Mortgage Loan Insurance activities; iii) foster competition; iv) support financial stability; and v) be in line with our appetite and tolerances.

Insurance underwriting policies

Risks related to underwriting could arise from: i) the lender; ii) the borrower; iii) the property; and/or iv) the market. As a result, we have developed prudent and disciplined underwriting policies and guidelines which set the contractual framework and general obligations with respect to underwriting, provides Approved Lenders with underwriting criteria for mortgage loan insurance and also includes policies to obtain the Approved Lender Designation.

In addition, for transactional homeowner products, risks related to insurance for different types of residential properties are assessed using our mortgage loan insurance risk assessment methodology and a rigorous underwriting and post approval due diligence process.

In the case of multi-unit underwriting, due to different risk characteristics, applications undergo additional individual in depth assessments to evaluate borrower, property, market and loan characteristics by our underwriters.

Claims payment and default management

Our Claims Payment Centre supports Approved Lenders in managing default related to homeowner and small rental loans to reduce risk of default on payment.

Regional centres work with Approved Lenders for multi-unit residential rental, licensed care or retirement properties in resolving default situations, evaluating workout alternatives and other matters. We consider workouts through effective management of projects in difficulty by following established frameworks.

We actively pursue recoveries which are amounts expected to be recovered from borrowers in order to mitigate our potential loss.

Reserving

Reserving risk refers to the risk that insurance liabilities differ significantly from the actual claim payments. We estimate insurance policy liabilities to cover future losses and payments on claims arising from our insurance activity. These policy liabilities are established based on projections of claim frequency, severity and timing, within the context of the economic environment and recent performance indicators such as arrears rates.

Fraud and misrepresentation risk management

Fraud risk management comprises all activities aiming to detect and prevent fraud or misrepresentation and mitigating losses due to fraud or misrepresentation. We mitigate fraud using models to identify mortgage loan applications that have a high probability of containing misrepresentation and taking the appropriate measures upon identification. We maintain specialized underwriting staff to review these claims and, if appropriate, require enhanced due diligence by the lender.

Market diversification[†]

Concentration risk may arise from insurance contracts issued in a particular geographical area where local economic conditions are significantly different from the national average that could expose the Corporation to a greater risk of loss. The relative impact of the outcome is mitigated as a result of the distribution of business across different geographic areas. We monitor the conditions of the housing market and economy in each region of Canada against pre-determined risk tolerances. The table below sets out the concentration of loan amount insured during the period:

[†] Source: From CMHC 2016 Annual Report p 93.

Market Diversification								
As percentages	2016				2015			
	Transactional Homeowner	Portfolio	Multi-unit Residential	Overall	Transactional Homeowner	Portfolio	Multi-unit residential	Overall
Atlantic	5.2	2.5	7.8	4.6	5.1	1.7	5.4	4.5
Quebec	23.1	16.7	27.9	21.5	20.4	14.8	28.0	20.6
Ontario	32.8	46.3	38.7	38.0	33.2	42.4	36.9	35.3
Prairies and Territories	26.4	14.3	12.8	20.7	28.9	17.1	16.4	25.3
British Columbia	12.5	20.2	12.8	15.2	12.4	24.0	13.3	14.3
Canada	100	100	100	100	100	100	100	100

Table 6								
Insurance in Force								
As percentages	2016				2015			
	Transactional Homeowner	Portfolio	Multi-unit Residential	Overall	Transactional Homeowner	Portfolio	Multi-unit residential	Overall
Atlantic	6.5	3.7	6.0	5.4	6.5	3.7	5.8	5.4
Quebec	20.6	12.9	29.3	18.9	19.9	12.3	30.1	18.2
Ontario	31.9	47.2	35.0	37.8	33.5	47.2	34.9	38.7
Prairies and Territories	28.6	18.1	17.4	23.4	27.1	18.0	16.5	22.6
British Columbia	12.4	18.1	12.3	14.5	13.0	18.8	12.7	15.1
Canada	100	100	100	100	100	100	100	100

Source: Canada Mortgage and Housing. 2016 Summary of Corporate Plan. December 31, 2016. <https://www.cmhc-schl.gc.ca/en/corp/about/core/upload/cmhc-annual-report-2016.pdf> (accessed January 9, 2018). Pg 92-93.

Monitoring

A comprehensive monitoring and quality assurance framework also enables CMHC's ongoing rigorous review of business trends, performance and lender compliance in order to make timely adjustments to underwriting and other risk management criteria and processes as needed.

Insurance-in-force

At 31 December 2016, insurance-in-force, which represents the maximum potential total risk exposure of the Mortgage Loan Insurance Activity, totaled \$512B (2015-\$526B). This amount includes \$608M (2015-\$788M) in outstanding loan balances from the Lending programs included in the Assisted Housing Activity (refer to Note 13).

Under Section 11 of the NHA, the total of outstanding insured amounts of all insured loans may not exceed \$600B (2015-\$600B). The following table presents the percentage distribution of insurance-in-force by region:

Table 7						
Provision for Claims						
Figures in \$M	As at December 31, 2016			As at December 31, 2015		
	IBNR, IBNER and CIP	SH and ILM	Total	IBNR, IBNER and CIP	SH and ILM	Total
Undiscounted estimated losses	446	154	600	456	186	642
Discounting	(5)	-	(5)	(6)	-	(6)
Discounted provision for adverse deviation	34	25	59	35	37	72
Total provision for claims	475	179	654	485	223	708

Methodology and significant factors

The key method we use for estimating insurance policy liabilities is the actuarial present value basis. There is a limitation to the accuracy of policy liability estimates as provided in the valuation report prepared by the Appointed Actuary. There is inherent uncertainty in any estimate of ultimate liabilities including for premium deficiency, IBNR, IBNER, CIP and SH and ILM because the ultimate liability for claims is subject to the outcome of events yet to occur.

Provisions are reviewed and evaluated at each reporting period in light of emerging claim experience and changing circumstances. The resulting changes in the estimated provision for claims are recorded in insurance claims expense in the year in which they are determined. Estimates of the timing of net cash outflows resulting from our recognized insurance liabilities are provided in Note 28. The provision for SH and ILM programs are estimated to settle after 12 months. As the SH and ILM programs are unique it is difficult to provide a more precise maturity profile beyond 12 months.

Earning patterns are determined by product type and by amortization period. Approximately 75 percent of the premiums written are recognized as premiums earned within the first five years of the insurance contract.

The following factors affect the key actuarial assumptions used in the determination of the provision for claims:

- Claim frequency – claim frequency, or probability of default is dependent on the loan-to-value, the underwriting year and other characteristics of the loans insured. It reflects historical and current trends and arrears reporting;
- Claim severity – claim severity, or average loss on claims, is dependent on the dollar value of claims, losses on sales of real estate properties, administrative expenses, payment delays and sale delays. These factors are generally based on historical experience; and
- Economic conditions – recent past and projected economic factors, such as unemployment rates, house price inflation and consumer price index, affect the forecast of future claim levels.

Sensitivity analysis

The following table presents the sensitivity in the significant assumptions that have the greatest effect on the measurement of the insurance contract liabilities. The percentage change in variables is applied to a range of existing actuarial modeling assumptions to derive the possible impact on income before income taxes and equity of Canada for reasonably possible movements in

key loss assumptions with all other assumptions held constant. In practice, this is unlikely to occur and changes in some of the assumptions might be correlated which might magnify or counteract the sensitivities. The relationship of a change in assumption to the change in value may not be linear. The methodology for sensitivity testing has not changed significantly from the prior year.

Table 9						
Impact on Possible Income						
	Change Indicator	Change in Assumptions	Impact on Income Before Income Taxes		Impact on Equity of Canada	
			2016	2015	2016	2015
Claim frequency	Relative	+10%	(38)	(41)	(29)	(31)
	Relative	-10%	35	37	26	28
Claim severity	Relative	+10%	(41)	(43)	(31)	(32)
	Relative	-10%	37	39	28	29
Economic sensitivity factor						
Unemployment rate	Absolute	+100 bps	(48)	(17)	(36)	(13)
Rate of house price inflation	Absolute	-100 bps	(65)	(50)	(49)	(38)
Mortgage rates	Absolute	+100 bps	(43)	(49)	(32)	(37)

Claims development

Incurred But Not Reported (INBR), Incurred But Not Enough Reported (IBNER) and Claims In Process (CIP)

The following table shows the development of the expected losses on IBNR, IBNER and CIP claims and their related expenses over a period of time and the

estimated ultimate cost of claims for 2009 through 2016 to present the earliest material claim that has arisen and for which there is still uncertainty about the amount and timing of claim payments. The information is presented on a default year basis where claims are related to the period in which the insured event occurred and not the period in which the policy was underwritten.

Figures in \$M, unless otherwise indicated	2009	2010	2011	2012	2013	2014	2015	2016	Total
Expected losses on claims in the default year	749	598	552	523	387	345	303	307	
One year later	706	573	512	427	368	327	328		
Two years later	730	574	490	430	369	353			
Three years later	741	584	491	437	374				
Four years later	755	591	494	439					
Five years later	737	596	495						
Six years later	733	595							
Seven years later	753								
Current estimate of cumulative claims	753	595	495	439	374	353	328	307	3,644
Claim paid in the default year	59	44	38	31	22	18	16	23	
One year later	402	314	268	223	191	174	179		
Two years later	204	167	134	132	119	123			
Three years later	48	42	39	39	29				
Four years later	11	20	12	12					
Five years later	10	8	3						
Six years later	(5)	(1)							
Seven years later	21								
Cumulative payments to date	750	594	494	437	361	315	195	23	3,169
Provision for claims	3	1	1	2	13	38	133	284	475
Current estimate of surplus (deficit)	(4)	3	57	84	13	(8)	(25)		
Surplus of initial expected loss on claims	(1)%	1%	10%	16%	3%	(2)%	(8)%		

Source: Canada Mortgage and Housing. 2016 Summary of Corporate Plan. December 31, 2016. <https://www.cmhc-schl.gc.ca/en/corp/about/core/upload/cmhc-annual-report-2016.pdf>. (Accessed January 9, 2018). Pg 94-96.

