The Linear Liquidation Model "LLM"
For Valuation of "975" and "970" NHA MBS

Purpose of Document: The purpose of this document is to provide information on the recently announced NHA MBS Linear Liquidation Model. This model will be used by the NHA MBS dealer community as the industry standard for valuation of "975" and "970" NHA MBS pools. The LLM was announced at the Canadian ABS Conference on June 3, 2014 and is expected to be implemented September 1, 2014.

History and Overview: The 975 NHA MBS pool type was first introduced in 2001. The 975 pool type was created to reflect a change in the prepayment terms and conditions of the underlying insured, single family residential, fixed rate mortgages in 2000.

> *Before the change in prepayment terms and conditions of the underlying insured mortgages in 2000, borrowers were not permitted to liquidate their mortgages for financial advantage before the 3rd anniversary date of the mortgage (borrowers were charged a penalty equal to the mortgage rate differential if the mortgage was voluntarily liquidated before the 3rd anniversary date of the mortgage thus nullifying any benefit to lock in a lower mortgage rate in the first three years). On or after the 3rd anniversary date of the mortgage, borrowers could prepay their mortgages with a maximum penalty equal to three months of interest payments. Thus, if mortgage rates dropped by a sufficient number of basis points to cover the amortized 3 months of interest penalty and lower their monthly payments, borrowers had an incentive to refinance their mortgages.

> *Since the change in prepayment terms and conditions of the underlying insured mortgages in 2000, borrowers are now not permitted to liquidate their mortgages for financial advantage before the 5th anniversary date of the mortgage (borrowers are charged a penalty equal to the mortgage rate differential if the mortgage is voluntarily liquidated before the 5th anniversary date of the mortgage thus nullifying any benefit to lock in a lower mortgage rate in the first five years). Given that most fixed rate mortgages have maturities of 5 years and less, the prepayment option to borrowers has little or no value.

The current mortgage liquidation model for valuing single family residential mortgages is known as the Canadian Liquidation Vector (CLV). The CLV was developed and adopted for

the "970" pool type in the 1990's to reflect the liquidation behavior of mortgages where the borrower had the 3rd anniversary refinance option. The CLV is still being utilized today as the industry standard despite a change to the borrower's prepayment terms and conditions and the resulting move to the "975" pool type. The Canadian MBS dealer community has analyzed mortgage liquidation behavior in 975 pools since their introduction in the early 2000's. The dealer community has identified mortgage liquidation behavior which is materially different than the existing CLV model (see below). Based on the analysis, a new model, the Linear Liquidation Model, is to replace the existing CLV model as the industry standard.

Historical Liquidations "975" Pool Type: The MBS Committee of the Investment Industry Association of Canada undertook a mortgage liquidation study in 2013. There were two areas of focus: 1) whether changes in market mortgage rates during a mortgagor's 5 year term impacted mortgagor liquidation behavior, and 2) whether mortgage liquidation rates changed over the term of a 5 year mortgage. The results are summarized in the following chart:
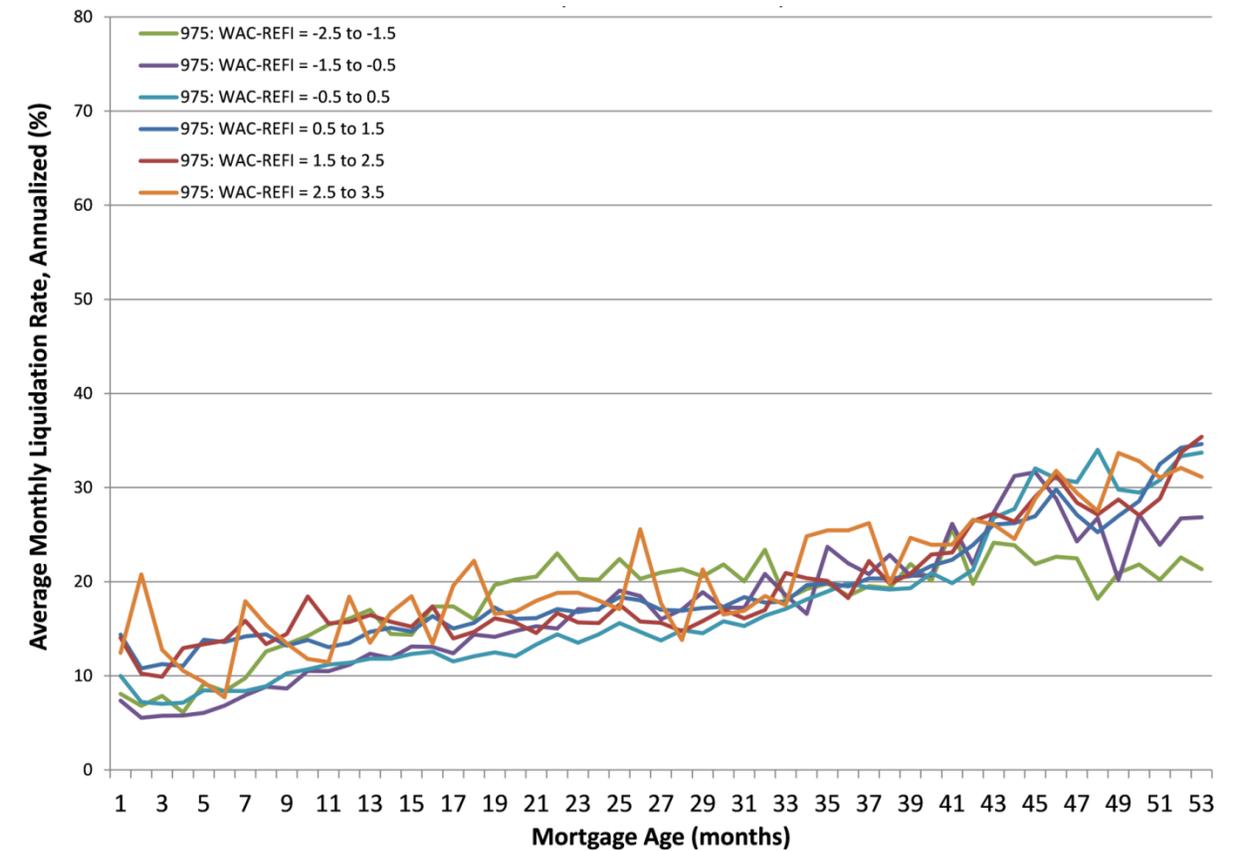

Chart Source: Scotia Capital Markets

The chart reveals an upward sloping liquidation trend. It also reveals no clear evidence of borrower refinance optionality in periods of low market mortgage rates. Based on these findings, the LLM was created.

The Linear Liquidation Model: The Linear Liquidation Model (LLM) is a very simple model. It is a positively slope line starting at a 1% annualized liquidation rate at month 1 IAD and increasing at a constant rate until IAD month 60 where it reaches 12% annualized and remains constant at 12% from there on.

The slope of the LLM is defined as $Y = 0.1865X + 0.8135$

> Where Y is the annualized liquidation rate, and

> Where X is # of months from the IAD of the NHA MBS pool

A graph of the LLM is provided here:
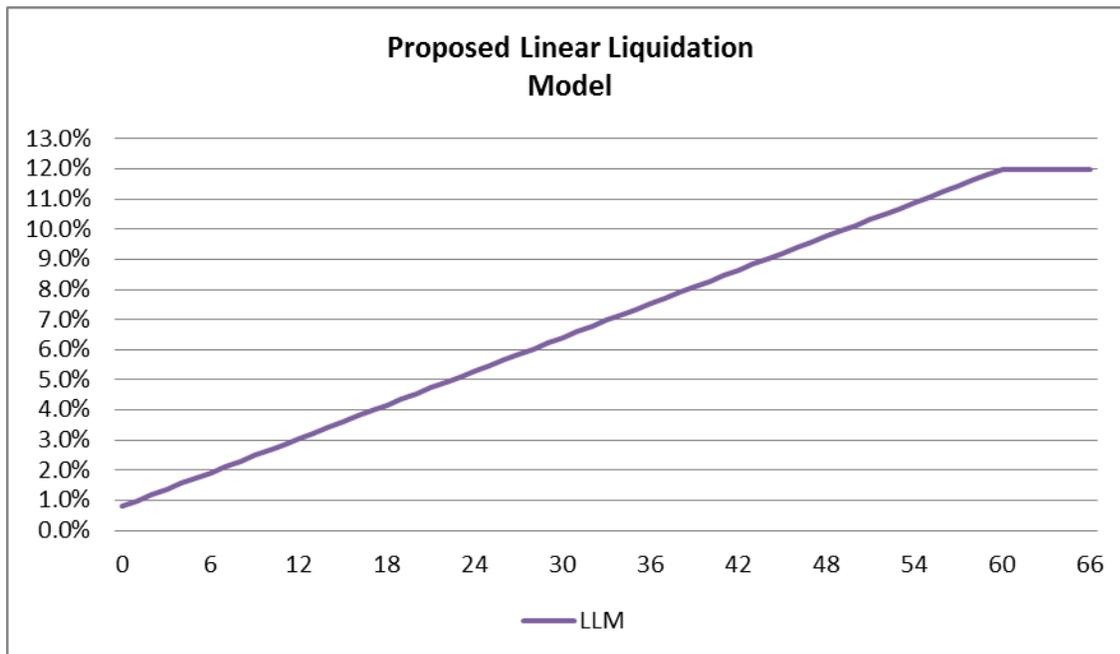
Unlike the CLV, there is no refinance variable in the proposed LLM. Historical data indicates and theory suggests there is no refinancing option in the first five years of a mortgage's life. The upward trending liquidation rate is merely a reflection of increasing core housing turnover as the mortgage seasons.

Rounding: The annualized rate for a given month is rounded to 2 decimal spots when the figure is expressed as a percentage. For example on the 60th month, the non-rounded annualized liquidation rate would be 12.00350%. The rounded annualized rate would be 12.00%.

The monthly equivalent rate = 1-(1- rounded annualized rate)^(1/12)

LLM Values (Annualized): The annualized values for each IAD period are provided below:

IAD Month	LLM	IAD Month	LLM	IAD Month	LLM	IAD Month	LLM
1	1.00%	19	4.36%	37	7.71%	55	11.07%
2	1.19%	20	4.54%	38	7.90%	56	11.26%
3	1.37%	21	4.73%	39	8.09%	57	11.44%
4	1.56%	22	4.92%	40	8.27%	58	11.63%
5	1.75%	23	5.10%	41	8.46%	59	11.82%
6	1.93%	24	5.29%	42	8.65%	60	12.00%
7	2.12%	25	5.48%	43	8.83%	61	12.00%
8	2.31%	26	5.66%	44	9.02%	62	12.00%
9	2.49%	27	5.85%	45	9.21%	63	12.00%
10	2.68%	28	6.04%	46	9.39%	64	12.00%
11	2.87%	29	6.22%	47	9.58%	65	12.00%
12	3.05%	30	6.41%	48	9.77%	66	12.00%
13	3.24%	31	6.60%	49	9.95%	67	12.00%
14	3.42%	32	6.78%	50	10.14%	68	12.00%
15	3.61%	33	6.97%	51	10.33%	69	12.00%
16	3.80%	34	7.15%	52	10.51%	70	12.00%
17	3.98%	35	7.34%	53	10.70%	71	12.00%
18	4.17%	36	7.53%	54	10.88%	72……..	12.00%

Eligible NHA MBS Pool Types:

The following two pool types would switch from the CLV to the LLM as the industry standard liquidation assumption: "975" and "970". These pools types are fixed rate, single family residential mortgages.

CLV vs. LLM:

The LLM was constructed based on historical "975" pool data. Although the shape of the two models is quite different, the valuations and risk parameters are very similar for "market" pools and quite similar for "non-market" pools. It is anticipated there will be minimal valuation differentials for a large majority of the outstanding "975" pools. For example, recently issued pool 97502888, TD 1.60% March 1, 2019 would have very similar characteristics under the two models (see next page). The WAL difference between the two models is 8 days and, looking at the current Government of Canada curve, the

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difference in Canada yields is only 0.4 basis points.   There should be very little disruption to the market and its participants with the change in liquidation models.

Input	
Pool:	97502888
Coupon:	1.600%
Maturity:	1-Mar-19
RAM:	289.614
WAC:	3.402%
Settle:	30-May-14
PPR:	1.00%

Output		
Model:	LLM	CLV
REFI:	NA	3.77%
Yield:	1.880%	1.880%
Price:	98.945	98.940
WAL:	3.723	3.744
WAL Date:	17-Feb-18	25-Feb-18
Mod Dur'n:	3.563	3.582
PV01:	$ 0.0353	$ 0.0355

Changes to Bloomberg Pages on Implementation Date:

Bloomberg has coded the LLM into the YA and CFT screens to enable users to compare/contrast the CLV with the new LLM. On the YA scree, to change from the CLV to the LLM, simply type LLM in the Prepay LQR input cell and hit <GO>, leaving 100 in the other LQR input cell. The Refi rate is non-applicable to the LLM and will be removed by Bloomberg by the implementation date.

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GRAB
            CANADIAN POOL YIELD ANALYSIS

CUSIP: 62936ZZT1    Pool: CAN 97502888      1.600%  3/ 1/19

Price:      98.945       98.945    Pool Type:  Indemnity
Yield s/a:   1.880        1.880    Issuer:     THE T-D BANK
                                   S/A Coupon: 1.6000
Settle:  5/30/14 Accrued: 0.1243  Maturity:   3/ 1/19
                                   WAM Date:   1/ 1/19
Prepay: LQR (liquid.)  100 LLM CLV SCC  WAC:  3.4020
                                   CPR
       73.3% of Base Vector w/ Refi= 3.773%  RAM (mths): 289.4610
       PPR (partial)   1.0 CPR     Orig Issue: C$ 1293714283.76
                                   Factor:     0.99188074 May 14
  WAL  yrs =   3.723              IAD:        12/ 1/13
  Mod  Dur =   3.563              Issued:      4/ 1/14
  Val  .01 =   0.03529
                                   Maturity Profile:
 Standard Bloomberg form of prepayment is "liquidation".  10/ 1/18   210,518,903.29
                                      11/ 1/18   197,355,071.03
                                      12/ 1/18   130,519,859.56
                                       1/ 1/19   244,987,440.89
                                       2/ 1/19   241,512,175.31
                                       3/ 1/19   258,316,826.48
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900     Singapore 65 6212 1000     U.S. 1 212 318 2000     Copyright 2014 Bloomberg Finance L.P.
                                          SN 168562 G716-897-1 05-Jun-14 11:01:21 EDT  GMT-4:00
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On the CFT (Cash Flow Table) screen, enter 100 and LLM in the upper right region of the screen and type C in the cell on the mid right region of the screen and hit <GO>.

```
GRAB

              PROJECTED  CASH  FLOWS
                                        PAGE   3 OF   7
Download: 22<GO>
CAN POOL 97502888      1.6%
Show 1 Cashflow          Settle 5/30/14              Delay 44( 14)
Net   1.6      Gross 3.402    Balloon or Lockout?Y   Prepayment  PPL
Orig Balance 10,000,000.00 May14      Balloon  4y 10m      100  LLM CPR
Curr Balance  9,918,807.40 0.99188074 Lockout   y   m   LLM       PSA
Term 24:  2 Rem WAM 24:  1 IO  :  0 Plan 0 LevelPay               SMM
Note: Cashflows are "as if" and do not use actual factors.
                 Principal            Regular      Prepaid
MONTH   Date      Balance    Interest Principal   _Principal    CPR Used
  1   6/15/14n 9,878,924.96 13,181.21 22,226.26   17,656.18     2.12
  2   7/15/14  9,837,497.89 13,128.21 22,249.06   19,178.01     2.31
  3   8/15/14  9,794,626.80 13,073.15 22,268.28   20,602.80     2.49
  4   9/15/14  9,750,245.04 13,016.18 22,284.10   22,097.66     2.68
  5  10/15/14  9,704,370.96 12,957.20 22,296.30   23,577.79     2.87
  6  11/15/14n 9,657,106.64 12,896.24 22,304.87   24,959.45     3.05
  7  12/15/14  9,608,388.18 12,833.43 22,310.00   26,408.45     3.24
  8   1/15/15  9,558,318.54 12,768.69 22,311.49   27,758.16     3.42
  9   2/15/15n 9,506,835.64 12,702.15 22,309.51   29,173.40     3.61
 10   3/15/15n 9,453,961.26 12,633.73 22,303.87   30,570.51     3.80
 11   4/15/15  9,399,799.43 12,563.47 22,294.56   31,867.27     3.98
 12   5/15/15  9,344,290.84 12,491.49 22,281.78   33,226.80     4.17
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900     Singapore 65 6212 1000    U.S. 1 212 318 2000   Copyright 2014 Bloomberg Finance L.P.
                                           SN 168562 G716-897-1 05-Jun-14 12:01:14 EDT  GMT-4:00
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The user is then able to see the LLM's assumed annualized liquidation rate for each month.

The LLM model on Bloomberg YA and CFT pages give the user the ability to parallel shift the default LLM either higher or lower to perform sensitivity analysis. The PPR (partial) would stay as it currently is: defaulted at 1% CPR with the ability to adjust PPR higher or lower than the default.

On the YA screen, it is suggested the drop down "Choose Prepayment Type:" provide LLM, CLV, SCC and CPR. At some point in time, the CLV and SCC could potentially be dropped. In the meantime, the REFI rate (used for CLV and SCC) obtained from the CAMRAVG Index would be updated and maintained.

On the CFT screen, the requested Prepayment default would be 100 LLM and PPR =1.0 CPR (like the YA screen). Additional liquidation options would include CPR, CLV and SMM.

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On the Main Menu screen for a particular NHA MBS pool, the YA option should be made available under the sub-heading Analytics. It is the YA screen which provides the correct functionality to users. YT should not be used because it does not provide industry standard functionality.

It is understood that Bloomberg is currently working on initiatives designed to further enhance NHA MBS. The design and implementation of any initiatives will need to incorporate the LLM.

June 10 2014

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