SNS Bank Residential Mortgage Portfolio - Fair Valuation of Dutch Residential Mortgages

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Executive Summary

This document valuates the fair values of a Dutch mortgage portfolio of SNS Bank as of 31 January 2013. The fair value of the portfolio is the trade value with the assumption of free trade between two knowledgeable and willing parties. We value the portfolio of SNS Bank for the purpose of providing third party evidence on the legal case against Dutch government and the valuation is based on the loan tape we received from SNS Bank on their portfolio as of 31 January 2013. We derive the valuation amount using a discounted cash flow analysis that combines bottom-up loan level risk parameters with top-down discount rates derived from SNS Bank mortgage rate data. Based on our valuation analysis we conclude that, in the neutral scenario, the overall portfolio is valued at 44,274,371,681 euros and 99.03 as a percentage of outstanding notional.

Portfolio	Current Balance	Scenario	Valuation Amount (% Current Balance)
SNS	44,706,021,827	Neutral	44,274,371,681 (99.03)
		Adverse	43,877,929,047 (98.15)

Table 1: Overview of the valuation of the portfolio. The valuations are based on macroeconomic scenarios. The valuation amounts are in Euro.

1 Introduction

This document contains the valuation outcomes for the residential mortgages portfolio of SNS Bank as of 31 January 2013. The purpose of this valuation is to determine the fair values of this mortgage portfolio.

The valuation method can be summarised as follows. We determine the cashflows for each mortgage loan part dependent on amortisation type up to the earlier of the interest reset date or scheduled maturity. On a reset date we assume that the borrower either repays the mortgage in full or continues at a market interest rate such that the market value upon reset is par. We assume that all cash flows are weighted by a prepayment probability specific to the risk characteristics of each borrower. We create discount curves from consumer mortgage market quotations of SNS Bank for new mortgages depending on certain risk characteristics (amortisation type, NHG guaranteed or not, loan to value bucket as of January 2013). The discount rate is adjusted for origination costs, offer and pipeline risks, and future economic movements. We assume that the adjusted discount rate includes a premium for credit loss and prepayment risk in excess of average expected prepayments that are used to adjust the cash flows.

The main difference between our valuation method compared to a plain cashflow discounting method is the use and design of risk parameters that are calibrated with a large set of loan level data from the European DataWarehouse (EDW)[1]. These risk parameters refer to expected repayment behaviour in future economic up- and downturns. For performing loans, the main risk parameter is the conditional prepayment rate (CPR). For loans in arrears, we adjust the cash flow for the significant increase in credit risk and in addition to the CPR use a probability of default (PD) and loss given default (LGD). For defaulted loans, the main risk parameter is LGD. The calibrated risk parameters we propose are sensitive to borrower and loan characteristics as well as conditional upon forward-looking macroeconomic scenarios.

Disclaimer: The valuations provided here are indicative of fair value only and there is no guarantee that the mortgages can be sold at the indicated prices. Finding the price for conducting a mortgage sale remains the responsibility of the seller and buyer.

2 Scope of Valuation and Limitations

We determine a fair market value of the mortgages as of 31 January 2013 in accordance with IFRS 13 using a loan data tape provided by SNS Bank. IFRS 13 does not specify a detailed approach to use for valuing assets. There is no market standard for the valuation of mortgages which are generally considered illiquid with no pricing information available for comparable transactions. If no observable prices are available, then IFRS 13.3 requires to make as much use as possible of relevant information from the market when determining

[1] The securitised part of the SNS portfolio is part of this dataset.

the fair value. The market value is the price that a knowledgeable and willing seller and buyer would agree in an orderly arm's length transaction at the reference date. IFRS 13 essentially requires to follow the same approach in valuation that such market participants would use to agree on the price. The Dutch Central Bank (DNB) has published guidance on the fair value determination of Dutch mortgages for prudential purposes (see DNB (2015)). The valuation method proposed here aims to meet both IFRS and prudential requirements.

The valuation method proposed here determines the interest and principal cash flow of each loan part based on the amortisation type and the interest reset structure. The present value of the cash flows under the mortgage uses an appropriate discount rate taking into account all relevant market data for mortgages with certain risk characteristics such as amortisation type, time to interest reset, and loan to value (LTV) as of January 2013. In line with the requirements of DNB, the valuation method thus uses the required number of risk characteristics:

1. The amortisation type of the mortgages (annuity, linear, bullet[2])
2. Time to interest reset of fixed rate mortgages[3]
3. The guarantee from NHG (if any)[4]
4. Loan to value of the mortgage as of January 2013

We assume that loans are valued at par or repay on the interest reset date. This approximation is in line with the guidance by DNB, however, the assumption that the loan resets to the market value upon reset is not strictly true as the borrower is offered a generic market rate by the loan issuer that may not fully capture all changes in the risk profile of the borrower since origination. While the approximation may be suitable for performing loans, recent guidance on IFRS 9 has revealed that loans that have suffered a significant increase in credit risk should be considered on a lifetime basis beyond the next reset date. At the current state of development, we value all performing and arrears loans at par on the reset date, but the cash flows prior to reset for under-performing loans are adjusted for the increased credit risk.

The loan tape does not include information on the interest rate type of the loans thus we assume all loans are with fixed interest rates which reset at the next contract negotiation date. Borrowers can have several loan parts and we value each loan part separately to reflect the individual cash flow and repayment characteristics of each loan part. We do not value the option to prepay using option-pricing formula, but rather determine a CPR at loan level to capture the cross-sectional heterogeneity in prepayment rates. Empirically, the relation between the interest rate on the loan and prepayments that is expected by option-pricing formula is not easy to observe for Dutch mortgages. The relation that loans with a high interest rate repay more often as their refinance incentive is in the money

[2] For a correspondence of the amortisation types defined in the loan tape and the valuation see appendix **??**.

[3] Capped at 30 years for loans that have a time to interest reset of above 30 years.

[4] Loans with Gemeente garantie or Nationale Hypotheek garantie. Gemeente garantie is substituted by NHG since 1995.

broke down post-crisis as lending became more credit constrained. Hence, in contrast to our empirical model of prepayments the option-based valuation methods may not fit the currently observed prepayment behaviour well.

3 Discounted Cash Flow (DCF) Analysis

The key portfolio characteristics are shown in section 5. We assume all loan parts have a fixed interest rate and the average remaining time to the interest reset is around 7 years. The loans have three main repayment types: annuity, linear, and bullet. Almost all loans are performing with very few loans in arrears or default.

The valuation method calculates the present value of principal and interest cash flow for each loan. Scheduled cash flows and unscheduled prepayments are determined bottom-up for each loan part. The loan cash flows are discounted with a discount rate derived from consumer market mortgage rates in a top-down approach that groups the loans in certain risk buckets by amortisation type, LTV and NHG guarantee.

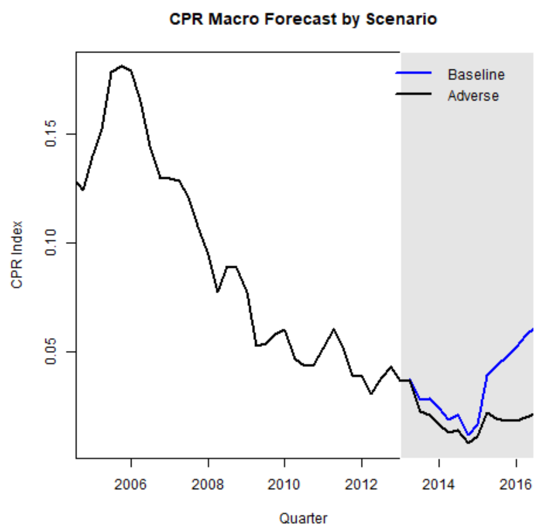
3.1 Amortisation Schedules

Principal and interest cash flows are generated for each loan part depending on the amortisation type. Annuity loans have a fixed monthly payment which covers interest and principal payment with an increasing portion of principal over time. Linear loans have a fixed linear repayment schedule where the monthly payment of the borrower decreases over time. Bullet loans pay interest only and are fully redeemed at maturity. The full committed amount in construction deposit is assumed to be drawn immediately and added to the outstanding balance of the loan.

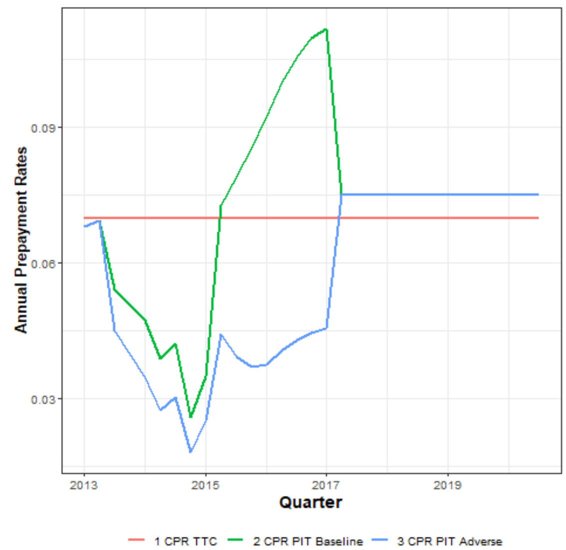
3.2 Prepayments

Most Dutch mortgage loans can prepay a certain amount every year and when the borrower moves house or when the loan reaches its next interest reset date. Looking at the historical prepayment rate, the pre-crisis refinancing boom peaking around 2006, then a subsequent drop in prepayments post crisis when new lending was constrained and many borrowers were trapped in negative equity. Since then prepayments have been on the rise even though they have not yet reached the pre-crisis peaks. The overall total prepayment rates consisting of repayment in full and partial prepayments average at around 5% per annum in 2012 (see Fitch (2017)).

Partial prepayments on average amount to 15% to 20% of total prepayments (see Rabobank (2016)). Our CPR estimations are on the conservative side due to the fact that calculating partial prepayments for loans with savings or investments is difficult for their unknown



(a) Market CPR Forecast



(b) Portfolio CPR Forecast

Figure 1

principal repayment schedule. However, as full prepayments dominate partial prepayments by a factor of four to five, the underestimation of partial prepayment has limited impact on the CPR and the portfolio value. Prepayment rates vary widely with the age of the loan, the LTV ratio, the interest rate, and the performance of the loans. Given the large potential deviation of realised prepayments rates for a specific portfolio from the overall market average we model CPR at the loan level based on a large historical data set from EDW. Figure 1a shows the modelled Dutch residential mortgage market prepayment index and its forecasts under the two scenarios we analyse: neutral and adverse, which correspond to the baseline and adverse stress test scenarios from the DNB and the European Banking Authority (EBA) for the Netherlands in 2012, respectively[5]. Furthermore, figure 1b presents modelled prepayment rates of the SNS Bank portfolio for under these two scenarios. The prepayment model uses loan level and pool level data from EDW covering the period 2003 to 2019 that covers a full business and housing cycle.

3.3 Discount Curve

The discount curve is determined from the reported consumer mortgage market quotations of SNS Bank for new mortgages (see appendix 9.1). Mortgage rates are available for certain risk buckets: in particular loans that have an NHG guarantee or, if not guaranteed,

[5]The neutral scenario is from European Commission 2013 winter prediction and DNB December 2012 projections. For the construction of the adverse scenario, we used the EC 2013 baseline scenario as a starting point and added the same deviations as were used in the EBA 2011 stress testing predictions.

fall into one of two bands by loan to indexed market value[6]. Further we distinguish two repayment structures: annuity/linear and bullet (interest only)[7]. Therefore, we construct six discount curves based on two LTV risk buckets and an additional NHG risk bucket and linear interpolate the maturities that are not reported. These constructed curves are bootstrapped to create mortgage loan zero curves providing a unique discount rate for each future cash flow.

Because we value an existing mortgage portfolio certain risks and costs during the origination phase no longer apply, but are still taken into account in the interest rate for new mortgages, we need to make an adjustment to the market interest rates before for use as an appropriate discount rate. We distinguish three cost elements: origination costs, offer risk, and pipeline risk; we also include the impact of the macroeconomic movements to the mortgage market by means of stress-tested discount rates.

3.3.1 Origination Costs

The origination cost is accompanied when a new loan is originated and is typically included in the market offer rate. This means that for an existing portfolio these costs were already taken by the originator and therefore should be added back to the valuation of the portfolio. The cost to originate residential mortgage loans can differ from one institution to the other and depends on the internal allocation of costs. Therefore, we have consulted several sources within the industry about what internal transfer prices are used between the origination group and the ultimate risk taker within one institution. Our quotes for the origination costs are priced at 50 bps upfront to each loan.

The 50 bps upfront cost for origination has a one-to-one relationship with the valuation of the portfolio. Increasing the upfront cost by 10 bps will increase the valuation by 10 bps.

3.3.2 Offer and Pipeline Risk

For the top-down approach the mortgage rate needs to be adjusted for offer and pipeline risk. Both risks are no longer relevant once the loan is paid out because any option offered to the client has expired. We distinguish three elements: When the offer is made to the client the offer remains valid for three months and the borrower has the option to extend the period by another three months. That means the client has got an option to accept the offer if the mortgage rate will be the same or higher but can reject the offer if the mortgage

[6]The indexed market value of the properties are calculated as following: when both $TAXATIEWAARDE\_BG$ and $TAXATIE\_DT$ are available, we index $TAXATIEWAARDE\_BG$ with HPI according to $TAXATIE\_DT$; when $TAXATIE\_DT$ is not available we use the value of $TAXATIEWAARDE\_BG$ itself; when both are missing we fill in the valuation with $\frac{ONDERPAND\_EXECUTIEWAARDE\_BG}{88\%}$ if $ONDERPAND\_EXECUTIEWAARDE\_BG$ is provided; and for those that do not have any indication of valuations we fill in with the sample median of the portfolio.

[7]Although with a bullet amortisation schedule, cashflows of loans with a savings account are discounted with the annuity/linear rates according to the guidelines of SNS Bank (see appendix 9.1).

rate is below the offered rate. Pipeline risk is the risk during the period after the offer has been accepted and before the loan has been paid out. In that period the interest rate is fixed between the client and the lender, but until the loan is extended, the mortgage rate can differ from the agreed rate as it will take a few weeks before the title to the house is transferred and the money is released.

We determine the pipeline and offer risk the mortgage rates bear on the basis of the LTV bucket, the time-to-interest reset, and the amortisation type. More precisely, the pipeline risk was computed using the Black 76 formula described in Black (1976) for pricing swaptions where the volatilities are retrieved from the mortgage rates observed. This allowed us to price the risks with an upfront premium which ranges from 4 bps to 7%, with the longer time-to-interest reset mortgage rates bearing more risk as expected. The detailed pipeline and offer risk parameters are reported in appendix 9.2. We then apply these upfront premia to each loan according to the amortisation type, LTV category and the time to interest reset.

3.3.3 Stress-testing of the Mortgage Market Rates

Future economic up- and downturns have effects on the credit risk the portfolio bears, which is incorporated in the loan level risk parameters. At the same time, such changes in macroeconomic conditions also have impact on the mortgage market. To reflect this influence, we stress-test the mortgage market rates.

We distinguish the macroeconomic setting from adverse and neutral. To derive the effective discount rates, in the neutral scenario, we apply the adjustments of the offer and pipeline risks as discussed above to the mortgage market rates. In the adverse scenario, we assume a deteriorated economic environment thus a higher mortgage rate compared to those under the neutral scenario. For simplicity and applicability, we forecast the 10-year mortgage rate for two year in correspondence with the EBA stress test period and calculate the average of the forecasted rates as our stress-tested 10-year mortgage rate.

The forecasted 10-year mortgage rates in the neutral scenario are based on the macroeconomic forecasts published by European Commission (EC) in EC (2013) and DNB in DNB (2012)[8]. The deviations from neutral in the adverse scenario are published by European Banking Authority (EBA) in EBA (2011). The historical mortgage rate data until year end 2012 are obtained from DNB's database(see DNB (2019)). The values can be found in the appendix. Deviations from the neutral in the adverse scenario for 2011 and 2012 by EBA are applied to the 2013 and 2014 predictions from EC and DNB to obtain an adverse scenario in 2013 and 2014. These scenarios are later expanded into quarterly observations using temporal disaggregation method from Dagum and Cholette (2006). This gives us a general macroeconomic scenario for the economy as a whole.

[8] EC Winter 2013 report was published in February 2013 and DNB 2012 report was published in December 2012.

We then estimated the 10 years mortgage rate regression model with the historical HPI growth and 10 Year Treasury Rate. The result of the model can be found in the Annex. Using this 10 year mortgage rate model and the future scenarios explained above, we predict the 10 year mortgage rate in the adverse scenario. To arrive at the amortisation type and LTV specific discount curves, we calculate the changes in the mortgage rate spreads as the two-years average of the difference between the 10-year mortgage rate in adverse scenario and the observed 10-year mortgage market rates. We then shift the 10 observed market rate curves according to these changes in spreads. This shift results in an increase of around 0.6% to the mortgage rates on average.

3.4 Valuation under Macroeconomic Scenarios

We apply a 50 bps origination cost and adjustments for the offer and pipeline risks calibrated on the mortgage rates in all our scenarios. These costs are run upfront. We use the mortgage rates reported by SNS Bank in the neutral scenario and a stress-tested SNS Bank mortgage rate for the adverse scenario for discounting the cashflows. Finally we adopt the credit risk parameters including CPR, PD, and LGD that are calibrated on a loan level based on macroeconomic data in correspondence with our two scenarios. The scenarios cover 2 years based on which the risk parameters will be scaled, after this 2 years the parameters will revert to its mean value.

3.5 Valuation Consistency

The valuation method needs to ensure the consistency between cash flows and discount rates. If, for example, expected credit losses are factored into the cash flows, these components are not taken into account in the discount curve. However, the risk premiums of credit loss would still belong in the discount rate, unless these risk premiums have been factored into the cash flows as well.

For default risk, we assume that consumer market rates include a compensation for the expected loss and the credit risk premium and we currently make no further adjustment to the cash flows for the credit risk of loans that were performing in January 2013. However, while this method is adequate for borrowers with a clean performance track record, we believe that borrowers who either have been in arrears historically or are currently in arrears must be treated differently. The market interest rate is available only for borrowers with a clean track record as there are no sub-prime mortgage products targeting borrowers with past credit problems. To compensate for the lack of adequate market rates for borrowers with credit problems, we adjust the cash flows for the loans that have current or prior arrears using the modelled PD and LGD. For those borrowers, the double counting of default risk is negligible as the default risk is much increased compared to the default risk of the performing loans and that increase is not reflected in the market rates. The portfolio is performing well with only a small number of loans in arrears or default. As such the details of the valuation of problem loans currently have no material impact on the valuation overall. Defaulted loans are treated differently as explained in the next section.

The market interest rates used for discounting also include a prepayment risk component. We believe that by market convention the cash flows are adjusted for expected prepayments and the adjusted cash flows are then discounted at the market rate. We expect that buyers and sellers will agree on a suitable CPR which reduces the effective maturity and then discount the CPR-adjusted cash flows with the market rate. While the CPR for the market overall is readily observed in the RMBS market and reported by information providers like Intex or Bloomberg, there may be less consensus on the appropriate CPR for a specific portfolio which may not be fully representative of the market. We expect that market participants will consider the actual prepayment rate for the transaction portfolio of SNS Bank. For this valuation we assign CPRs based on the prepayment model calibrated with data from EDW.

3.6 Valuation of Non-performing Loans

We define a credit default as a borrower being more than 90 days past due. Defaulted loans cannot be valued in the same way as performing loans as the borrower is not longer making the expected payments and the lender may have to foreclose on the underlying property. Many loans that default do not result in a loss to the lender. If the borrower sells the property voluntarily in a buoyant market then there is a chance that the lender recovers all amounts lent plus costs. It is also possible and quite common that a borrower recovers after default and cures any amounts in arrears such that the loan becomes performing again. Hence, the LGD of a mortgage depends on the probability of cure and the value of the collateral. The simple structural formula that a lender suffers a loss based on a fixed collateral haircut and foreclosure cost does not predict the observed losses well. Therefore, we prefer calibrating a loan level LGD model including the probability of no loss (cure) with a large data set from EDW. Average estimated LGDs for Dutch mortgages are quite low averaging around 4.2% for NHG guaranteed loans to 7.1% for non-guaranteed loans. For the valuation of defaulted loans we assign the modelled LGD with the assumptions that recoveries and cures on average occur one year after default. Recovery cash flows are discounted with the same discount rates as other cash flows.

4 Valuation Results Summary

We value the residential mortgage portfolio of SNS Bank as of 31 January 2013 under the neutral and adverse scenarios, resulting in 99.03% and 98.15% as percentage of portfolio notional, respectively. In these two scenarios, on macroeconomic level, we stress the discount rates with a mortgage spread model that yields an upward shift of around 0.1%; on portfolio level, we stress the credit risks of the individual loans in the portfolio. Given that the stress testing scenarios covers a two-year span, we focus on the effect of the stressing in this period and revert the risk parameters to their long term average afterwards. Considering that the discount rates are relatively high in absolute terms, the influence of the cashflows to be received after two years to the current portfolio valuation is less than those payable soon.

The portfolio has a short life of around seven years and the discount rates are roughly at the same level (in the neutral scenario) as the interest rates the loans bear. A short life and consequently a short duration of 5.94 years indicate that the portfolio is less sensitive to discount rate changes. Moreover, as the portfolio is largely formed with bullet loans, the interest and principal payments on the portfolio comes in a smooth schedule except when there are large number of bullet loans being paid off.[9]. In the case of the SNS Bank portfolio, an increase of 1% in the discount rate should result in a 6% decrease in the portfolio value. While the discount rate difference in our two scenarios is about 0.6%, along with a difference of 0.5% in the CPR, a valuation difference of around 3% is reasonable. The discount rate in the neutral scenario being at the same level as the portfolio interest rates also implies that the valuation should be around par.

4.1 Differences with the Deloitte valuation

We acknowledge the differences in methodology between the report from OSIS and the report from Deloitte and therefore provide an overview of the differences in the following table.

The method of Deloitte looks at the total possible cashflow as a whole without discounting the future value, which implies a discount rate of 0%. OSIS method discount the future cashflow to present values using the market rates. Another difference between OSIS method and Deloitte method is the use of data models or expert judgement. Deloitte method relies on expert to fill in the gaps that are not available in the loan tape, such as PD and LGD. For CPR, Deloitte uses the average of the historical CPR between 2005 and 2015 from Rabobank. For the expected losses, Deloitte relies on the assumption of the experts of 50 bps per year through out the lifetime of the portfolio for any loan and OSIS calculates the expected losses on loan level for both the first year and the average of the lifetime. Furthermore, the Deloitte method does not make a distinction of performing loans and loans in arrears or default. OSIS method uses data from EDW to estimate and apply the credit risks (PD, LGD, and CPR) to the loans according to the loan account status. Third, in terms of scenario analysis, OSIS uses scenarios published by EBA, while Deloitte changes multiple parameters to look at the sensitivity. Fourth, Deloitte assumes different renewal proceedings at the interest rate reset date where OSIS with its discounting method

[9]Assuming the pay-off date is the first interest rate reset date, a majority of this bullet principal payoff happens around 2020, causing a spike in the payment schedule. However this spike does not have trivial impact on top of the duration to the discount rate sensitivity of the portfolio as the duration in this case is already taking this spike into account.

Topic	OSIS	Deloitte
Core idea	Discounted Cash Flow	Sum of all cashflows
PD	Loan level model with data from EDW	N/A, implied by loss per year
LGD	Loan level model with data from EDW	Constant 15%
Expected loss percentage	N/A, implied by PD and LGD model	Constant 0.5% per annum
CPR	Loan level model with data from EDW	Constant 8.5% per annum
Discounting interest rate	Market rate at 2013 for different buckets of risk factors	N/A
Adverse scenario	Adverse scenario base on EBA	9 different scenarios using different risk parameters
Pipeline risk and Origination cost	Adjust the market rate because the loan are originated	N/A
Renewals	No renewals. Full repayment or valuation at par at maturity.	25% of loans are renewed with 6 months Euribor + 200 bps as interest rate
Amortization Schedule	Base on contract and risk parameters	Base on contract and risk parameters
Notary cost per year	N/A	6.3% of the interest income
Cap and Floor rates	Adjust the interest rates when it is outside of the boundaries	Assumed to be fixed interest loan

Table 2: Comparison of the methodology

assumes that new interest rates will be priced in a way such that the loan value is at par or that the loan will be repaid in full at the reset date.

4.2 Differences with previous OSIS valuation

OSIS performed a valuation exercise for the SNS Bank portfolio with a similar purpose in October 2017. For the October 2017 valuation no portfolio data was provided and the valuation was carried out on the securitised part of the SNS portfolio that was available on EDW and applied to the whole SNS portfolio without stress testing. The valuation result was 102.84% as a percentage of portfolio notional (see OSIS (2017)).

In the October 2017 exercise we did not consider the portfolio values under different macroeconomic scenarios. Further we assumed that the characteristics of the total portfolio were similar to those of the securitised part of the portfolio as no loan level data was received. However, loans selected to enter a securitisation are typically those never have been in arrears and therefore less likely to default in the future, which means that the securitised part of the SNS Bank portfolio, as a minor part of the whole SNS Bank portfolio, has a better risk profile. The discount rates for the October 2017 exercise were reported on 19 April 2013 while in this valuation we use interest rates from 01 January 2013, which can better serve as portfolio discount rates considering the portfolio is taken at the end of January 2013.

5 Portfolio Characteristics

5.1 Portfolio Overview

Key Characteristics	Overview
Outstanding Balance (EUR)	44,706,021,827
Number of borrowers	279,641
Number of loan parts	539,805
Average outstanding balance (borrower)	159,869
Average outstanding balance (loan part)	82,819
Weighted average current interest rate	4.65%
Weighted average seasoning (in years)	6.68
Weighted average maturity (in years)	22.12
Weighted average remaining time to interest reset (in years)	6.8
(Macaulay) duration (in years)	5.94
Weighted average CLTIMV	100.05%
% NHG	21.94%

Table 3: Key characteristics of the total portfolio.

5.2 Risk Bucket

	Current Balance	%	# of Loan parts	%
NHG	9,807,614,984	21.94%	133,024	24.64%
66%	7,464,932,724	16.70%	141,164	26.15%
Top	27,433,474,120	61.36%	265,617	49.21%
Total	44,706,021,827	100%	539,805	100%

Table 4: Balance and number of loan parts per risk bucket.

5.3 Repayment Type

	Current Balance	%	# of Loan parts	%
Spaarhypotheek	5,558,324,794	12.43%	81,616	15.12%
Annuiteit	730,079,810	1.63%	22,387	4.15%
Spaardepot	143,750,050	0.32%	2,473	0.46%
Spaarhypotheek +	136,355,072	0.31%	2,372	0.44%
Aflossingsvrij	31,817,804,867	71.17%	369,494	68.45%
Rendement hypotheek	3,870,444,438	8.66%	35,410	6.56%
Verpand depot	431,700,746	0.97%	3,204	0.59%
Verpand polis	931,783,932	2.08%	11,297	2.09%
PVP-hypotheek	70,188,856	0.16%	934	0.17%
Beleggen duurzame ASN fondsen	168,706,048	0.38%	1,292	0.24%
Beleggingshypotheek PP/Reaal	96,760,207	0.22%	1,092	0.20%
Lineair	649,801,916	1.45%	6,501	1.20%
Extra Inkomen Hypotheek	69,410,544	0.16%	591	0.11%
Netto-lasten	5,525,459	0.01%	88	0.02%
Jaarannuiteit	10,351,456	0.02%	978	0.18%
Managed Account Hypotheek	15,033,632	0.03%	76	0.01%
Total	44,706,021,827	100%	539,805	100%

Table 5: Balance and number of loan parts per repayment type.

5.4 Time to Interest Rate Reset

	Current Balance	%	# of Loan parts	%
0-1	7,188,384,206	16.08%	98,679	18.28%
1-5	19,090,217,381	42.70%	229,880	42.59%
5-10	10,080,120,613	22.55%	122,837	22.76%
10-15	1,754,561,226	3.92%	22,769	4.22%
15-20	1,605,274,240	3.59%	17,974	3.33%
20-25	3,744,101,076	8.37%	34,673	6.42%
25-30	1,243,363,086	2.78%	12,993	2.41%
Total	44,706,021,827	100%	539,805	100%

Table 6: Balance and number of loan parts per time to interest reset.

5.5 Account Status

	Current Balance	%	# of Loan parts	%
Performing	42,315,916,120	94.65%	516,454	95.67%
Arrears	1,262,223,251	2.82%	12,836	2.38%
Default	1,127,882,456	2.52%	10,515	1.95%
Total	44,706,021,827	100%	539,805	100%

Table 7: Balance and number of loan parts per account status.

5.6 Loan Seasoning

	Current Balance	%	# of Loan parts	%
0-1	1,106,966,798	2.48%	11,915	2.21%
1-5	14,062,291,273	31.46%	145,844	27.02%
5-10	22,640,263,808	50.64%	251,892	46.66%
10-15	5,469,176,530	12.23%	82,805	15.34%
$>$15	1,427,323,419	3.19%	47,349	8.77%
Total	44,706,021,827	100%	539,805	100%

Table 8: Balance and number of loan parts per seasoning bucket.

6 Valuation Results

6.1 Portfolio Overview

Portfolio	Current Balance	Scenario	Valuation Amount (% Current Balance)
SNS	44,706,021,827	Neutral	44,274,371,681 (99.03)
		Adverse	43,877,929,047 (98.15)

Table 9: Overview of the valuation of the portfolio. The valuations are based on macro scenarios. The valuation numbers are in Euro.

6.2 Risk Bucket

	Current Balance	Valuation Neutral (% Current Balance)	Valuation Adverse (% Current Balance)
NHG	9,807,614,984	9,919,499,032 (101.14)	9,707,849,351 (98.98)
66%	7,464,932,724	7,476,170,427 (100.15)	7,403,114,748 (99.17)
Top	27,433,474,120	26,878,702,222 (97.98)	26,766,964,948 (97.57)

Table 10: Valuation per LTV bucket under neutral and adverse scenario.

6.3 Repayment Type

	Current Balance	Valuation Neutral (% Current Balance)	Valuation Adverse (% Current Balance)
Aflossingsvrij	31,817,804,867	31,471,448,918 (98.91)	31,215,196,879 (98.11)
Annuiteit	730,079,810	717,031,074 (98.21)	708,471,879 (97.04)
Beleggen duurzame ASN fondsen	168,706,048	167,828,970 (99.48)	166,497,555 (98.69)
Beleggingshypotheek PP/Reaal	96,760,207	96,345,758 (99.57)	95,442,281 (98.64)
Extra Inkomen Hypotheek	69,410,544	72,550,601 (104.52)	72,216,551 (104.04)
Jaarannuiteit	10,351,456	10,842,613 (104.74)	10,629,269 (102.68)
Lineair	649,801,916	596,447,655 (91.79)	590,599,266 (90.89)
Managed Account Hypotheek	15,033,632	15,134,364 (100.67)	15,063,500 (100.20)
Netto-lasten	5,525,459	5,582,131 (101.03)	5,576,627 (100.93)
PVP-hypotheek	70,188,856	68,610,815 (97.75)	68,121,815 (97.06)
Rendement hypotheek	3,870,444,438	3,793,347,802 (98.01)	3,765,929,154 (97.30)
Spaardepot	143,750,050	148,384,408 (103.22)	147,145,792 (102.36)
Spaarhypotheek	5,558,324,794	5,620,067,361 (101.11)	5,541,240,708 (99.69)
Spaarhypotheek +	136,355,072	138,216,557 (101.37)	137,159,572 (100.59)
Verpand depot	431,700,746	425,817,801 (98.64)	422,472,028 (97.86)
Verpand polis	931,783,932	926,714,854 (99.46)	916,166,172 (98.32)

Table 11: Valuation per repayment method under neutral and adverse scenario.

6.4 Time to Interest Rate Reset

	Current Balance	Valuation Neutral (% Current Balance)	Valuation Adverse (% Current Balance)
0-1	7,188,384,206	7,199,347,307 (100.15)	7,194,928,689 (100.09)
1-5	19,090,217,381	19,287,915,989 (101.04)	19,198,343,315 (100.57)
5-10	10,080,120,613	10,296,313,094 (102.14)	10,150,662,645 (100.70)
10-15	1,754,561,226	1,744,120,981 (99.40)	1,714,804,969 (97.73)
15-20	1,605,274,240	1,448,541,900 (90.24)	1,417,541,390 (88.31)
20-25	3,744,101,076	3,220,616,542 (86.02)	3,151,527,423 (84.17)
25-30	1,243,363,086	1,077,515,867 (86.66)	1,050,120,616 (84.46)

Table 12: Valuation per time to interest rate reset under neutral and adverse scenario.

6.5 Account Status

	Current Balance	Valuation Neutral (% Current Balance)	Valuation Adverse (% Current Balance)
Performing	42,315,916,120	42,131,027,304 (99.56)	41,772,260,557 (98.72)
Arrears	1,262,223,251	1,165,256,275 (92.32)	1,127,580,388 (89.33)
Default	1,127,882,456	978,088,102 (86.72)	978,088,102 (86.72)

Table 13: Valuation per account status under neutral and adverse scenario.

6.6 Loan Seasoning

	Current Balance	Valuation Neutral (% Current Balance)	Valuation Adverse (% Current Balance)
0-1	1,106,966,798	1,122,811,193 (101.43)	1,105,142,581 (99.84)
1-5	14,062,291,273	13,942,790,326 (99.15)	13,776,690,422 (97.97)
5-10	22,640,263,808	22,340,234,167 (98.67)	22,178,260,755 (97.96)
10-15	5,469,176,530	5,417,809,111 (99.06)	5,380,348,449 (98.38)
>15	1,427,323,419	1,450,726,883 (101.64)	1,437,486,841 (100.71)

Table 14: Valuation per seasoning bucket under neutral and adverse scenario.

7 Summary risk parameters

7.1 Portfolio Overview

CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
6.17	5.64	1.39	1.47	14.25	18.73	0.24	0.32	0.17	0.24

Table 15: Risk parameters used in the valuation, excluding the loans in default. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

7.2 Risk Bucket

	CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
NHG	5.92	5.41	0.85	0.92	9.49	14.31	0.09	0.14	0.05	0.10
66%	7.50	6.87	0.44	0.48	9.93	14.54	0.05	0.07	0.03	0.05
Top	5.89	5.38	1.85	1.95	17.19	21.51	0.35	0.45	0.25	0.35

Table 16: Risk parameters used in the valuation, excluding the loans in default. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

7.3 Repayment Type

	CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
Aflossingsvrij	6.40	5.85	1.36	1.44	14.17	18.65	0.23	0.31	0.16	0.23
Annuiteit	5.91	5.40	1.24	1.31	11.82	16.43	0.19	0.26	0.13	0.19
Beleggen duurzame ASN fondsen	5.83	5.32	2.02	2.13	17.78	22.10	0.38	0.50	0.22	0.33
Beleggingshypotheek PP/Reaal	5.93	5.41	1.39	1.47	15.30	19.88	0.24	0.32	0.16	0.24
Extra Inkomen Hypotheek	6.16	5.63	0.92	0.99	14.05	18.79	0.13	0.18	0.06	0.11
Jaarannuiteit	9.06	8.32	0.23	0.26	5.07	9.49	0.01	0.02	0.01	0.02
Lineair	5.70	5.20	0.21	0.24	10.67	15.13	0.03	0.04	0.02	0.03
Managed Account Hypotheek	5.44	4.96	0.29	0.35	18.68	23.15	0.06	0.08	0.02	0.05
Netto-lasten	10.14	9.34	0.15	0.17	8.23	11.49	0.01	0.02	0.02	0.03
PVP-hypotheek	6.89	6.31	3.46	3.61	13.61	17.80	0.59	0.77	0.45	0.60
Rendement hypotheek	5.84	5.33	2.33	2.44	17.10	21.41	0.45	0.57	0.32	0.43
Spaardepot	5.65	5.15	0.47	0.51	11.48	16.02	0.07	0.09	0.05	0.07
Spaarhypotheek	5.20	4.74	0.99	1.06	13.52	18.11	0.16	0.22	0.11	0.17
Spaarhypotheek +	6.10	5.57	0.96	1.02	11.87	16.16	0.16	0.21	0.13	0.19
Verpand depot	5.63	5.13	1.65	1.75	16.43	20.85	0.30	0.40	0.20	0.29
Verpand polis	6.37	5.82	1.84	1.94	13.34	17.81	0.29	0.40	0.21	0.31

Table 17: Risk parameters used in the valuation, excluding the loans in default. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

7.4 Time to Interest Rate Reset

	CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
0-1	8.67	7.96	1.40	1.45	13.66	16.67	0.24	0.30	0.34	0.39
1-5	6.51	5.95	1.38	1.47	14.60	19.34	0.24	0.33	0.18	0.28
5-10	5.63	5.14	1.26	1.35	13.96	18.74	0.21	0.29	0.11	0.18
10-15	4.86	4.42	0.73	0.80	13.91	18.68	0.12	0.17	0.04	0.06
15-20	4.24	3.85	1.36	1.45	12.66	17.51	0.21	0.29	0.06	0.09
20-25	3.54	3.21	2.17	2.29	15.34	20.04	0.40	0.53	0.11	0.15
25-30	3.18	2.87	1.09	1.17	13.89	18.67	0.17	0.24	0.04	0.05

Table 18: Risk parameters used in the valuation, excluding the loans in default. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

7.5 Account Status

	CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
Performing	6.18	5.64	0.22	0.26	14.17	18.66	0.03	0.05	0.02	0.03
Arrears	5.98	5.46	40.64	42.20	16.95	21.20	7.23	9.36	5.21	7.18
Default	0.00	0.00	100.00	100.00	17.06	21.25	-	-	-	-

Table 19: Risk parameters used in the valuation. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

7.6 Loan Seasoning

	CPR (N.)	CPR (A.)	PD (N.)	PD (A.)	LGD (N.)	LGD (A.)	EL 1Y (N.)	EL 1Y (A.)	EL Life (N.)	EL Life (A.)
0-1	5.18	4.72	0.65	0.70	13.08	17.64	0.10	0.14	0.06	0.09
1-5	5.71	5.21	1.18	1.26	14.38	18.98	0.20	0.27	0.13	0.19
5-10	6.17	5.63	1.66	1.75	15.28	19.71	0.30	0.40	0.21	0.30
10-15	7.06	6.46	1.24	1.31	11.65	15.95	0.18	0.25	0.15	0.21
$>$15	8.12	7.45	0.30	0.33	7.82	12.38	0.03	0.04	0.02	0.03

Table 20: Risk parameters used in the valuation, excluding the loans in default. The CPR, PD, and LGD stand for one year portfolio prepayment rate, one year portfolio probability of default and one year portfolio LGD, respectively. EL 1Y stands for the expected loss of the first year and EL Life stands for the average expected loss per year. All parameters are scenario based: N. and A. stand for neutral scenario and adverse scenario, respectively. All numbers are in percentage.

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9 Appendices

9.1 Discount rates

SNS Bank

ADVIESWIJZER
Hypotheken

Hypotheektarieven

met ingang van
1 januari 2013
(op basis van maandbetaling)

Rentevariant	NHG	≤ 66% MW ≤ 75% EW	> 66% MW ≤ 125% EW
1 jaar vast	3,75%	4,05%	4,65%
3 jaar vast	4,00%	4,30%	4,90%
5 jaar vast	4,20%	4,50%	5,10%
6 jaar vast	4,65%	4,95%	5,55%
10 jaar vast	5,25%	5,55%	6,15%
12 jaar vast	5,85%	6,15%	6,75%
15 jaar vast	6,05%	6,35%	6,95%
20 jaar vast	6,35%	6,65%	7,25%
SNS Variabele rente *	3,10%	3,40%	4,00%
SNS Ideaalrente	4,20%	4,50%	5,10%
SNS Plafondrente	op aanvraag	op aanvraag	op aanvraag
SNS Rentedemper	op aanvraag	op aanvraag	op aanvraag
SNS Stabielrente:			
Bandbreedte 1%	3,90%	4,20%	4,80%
Bandbreedte 1,5%	4,30%	4,60%	5,20%
Bandbreedte 2%	4,70%	5,00%	5,60%
Bandbreedte 2,5%	5,20%	5,50%	6,10%
Bandbreedte 3%	5,60%	5,90%	6,50%
Bandbreedte 3,5%	6,00%	6,30%	6,90%

Dit zijn de tarieven voor de SNS Spaarrekening Hypotheek, SNS Annuiteiten Hypotheek en SNS Lineaire Hypotheek.
* Niet mogelijk in combinatie met een SNS Spaarrekening Hypotheek en SNS Spaarhypotheek.

Opslagen	
SNS Aflossingsvrije Hypotheek	+0,10%
SNS Hypotheek met Duurzame ASN Fondsen, SNS Rendementhypotheek, SNS Beleggingsrekening Hypotheek	+0,10%

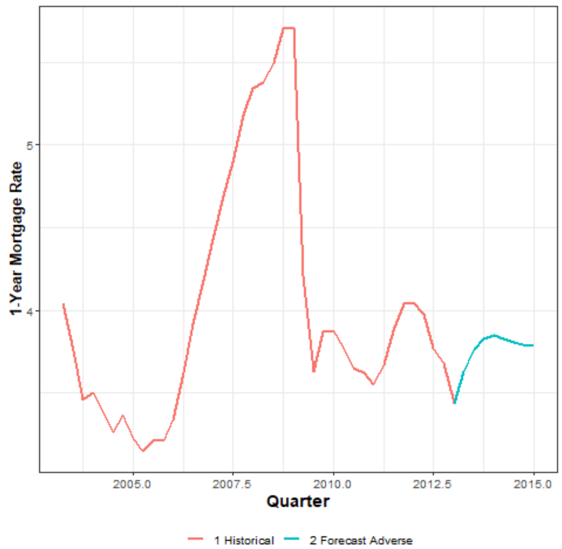
Overig	
SNS Overbruggingskrediet	4,45%
SNS Extra Ruimte Hypotheek	4,20%
SNS Rekening Courant Hypotheek	4,20%
Renteopslag voor recreatiewoningen en 2e hypotheken (1e hypotheek buiten SNS REAAL)	0,40%
Renteopslag bij betaling per kwartaal of halfjaar	0,20%

9.2 Summary Offer and Pipeline Risk Parameters

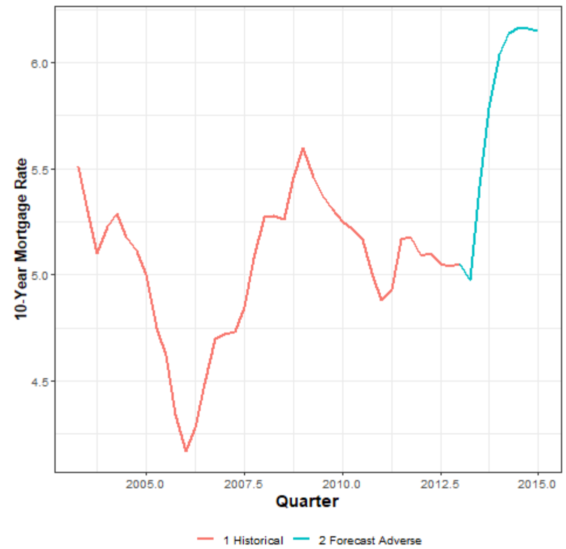
	NHG		66% LTV		Top	
	Time	Risk	Time	Risk	Time	Risk
Annuity	0	0	0	0	0	0
	1	0.19	1	0.19	1	0.24
	5	0.91	5	0.92	5	1.13
	10	2.01	10	2	10	2.4
	20	3.87	20	3.79	20	4.45
	30	2.66	30	2.72	30	3.42
Bullet	0	0	0	0	0	0
	1	0.35	1	0.39	1	0.48
	5	1.62	5	1.77	5	2.15
	10	3.18	10	3.42	10	4.02
	20	5.08	20	5.39	20	6.18
	30	5.72	30	6.05	30	6.9
Linear	0	0	0	0	0	0
	1	0.19	1	0.19	1	0.24
	5	0.81	5	0.81	5	1
	10	1.59	10	1.57	10	1.88
	20	2.51	20	2.46	20	2.89
	30	1.46	30	1.49	30	1.88

Table 21: Modelled upfront offer and pipeline risk parameters in percentage with corresponding time to interest reset (in years) used in the valuation.

9.3 Term Structure Forecast

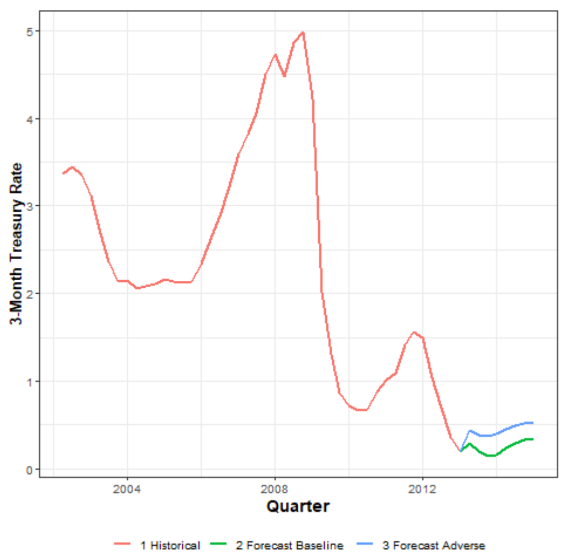


(a) 1-Year Morgage Rate

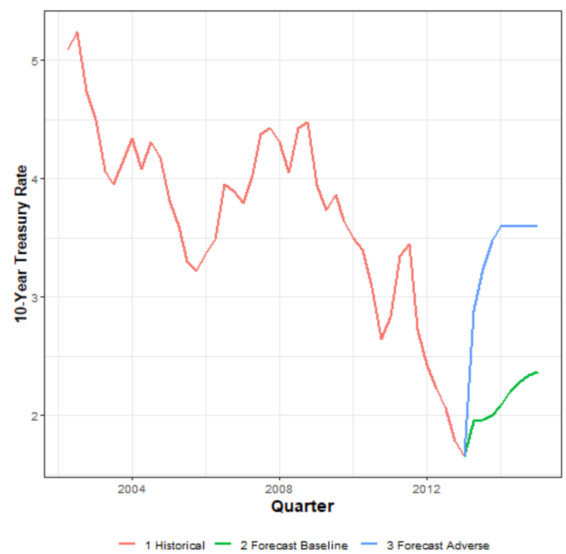


(b) 10-Year Morgage Rate

Figure 2



(a) 3-Month Treasury Rate



(b) 10-Year Treasury Rate

Figure 3

9.4 Macroeconomic scenarios

Macro Variable	Scenario	Source	2012	2013	2014
GDP growth	Baseline	EC Winter 2013	-0.90	-0.60	1.10
	Deviation	EBA 2011	0.00	-2.20	-2.50
	Adverse		-0.90	-2.80	-1.40
HPI growth	Baseline	DNB December 2012	-6.00	-4.00	-2.00
	Deviation	EBA 2011	0.00	-5.00	-6.40
	Adverse		-6.00	-9.00	-8.40
10 Years Treasury Rate	Baseline	DNB December 2012	2.00	2.00	2.30
	Deviation	EBA 2011	0.00	1.30	1.30
	Adverse		2.00	3.30	3.60
3 Months Treasury Rate	Baseline	DNB December 2012	0.60	0.20	0.30
	Deviation	EBA 2011	0.00	0.20	0.20
	Adverse		0.60	0.40	0.50

Table 22: Macroeconomic scenario

2012 observations are historical. The increase in mortgage rate in adverse scenario is related to the increase in uncertainty in the market. When the crisis come, investor require higher treasury rate for the extra risk they are taking. Mortgage rate is positively related with the treasury rate and negatively related with the HPI. This results into a jump in the mortgage rate. When the rate drops by the central bank, the economic starts to expand again, effectively stops the crisis.

9.5 Regression Summary of Mortgage Rates

Model	Variable	Estimate	Std. Error	t value	Pr(>|t|)
10 years mortgage rate	Constant	0.56	0.23	2.41	0.02
	t-1	0.55	0.06	8.42	0.00
	HPI growth	-0.08	0.01	-6.84	0.00
	Treasury 10Y Rate	0.43	0.06	7.90	0.00
1 year mortgage rate	Constant	1.68	0.26	6.35	0.00
	t-1	0.26	0.10	2.50	0.02
	HPI growth	-0.10	0.02	-5.24	0.00
	Treasury 3M Rate	0.52	0.07	7.03	0.00

Table 23: Regression Summary for 1 year and 10 Year Mortgage Rate