Mitigating Climate Risks

An In-Depth Climate Scan for Rising Sea Levels

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Executive summary

This article explores the implications of climate change on the Dutch housing and mortgage market, with a focus on flood risks, as analyzed by Achmea Mortgages in collaboration with CAS. Climate change, evidenced by rising temperatures and extreme weather events, presents physical risks that may impact property values and investor interests. The Achmea mortgage portfolio, strategically diversified across regions, serves as a reliable representation of the broader market.

The Netherlands has a proactive approach to water management and climate adaptation, exemplified by the Delta Law and Programme, aiming for fundamental protection against sea-level rise by reinforcing dikes and investing in flood prevention.

Using Intergovernmental Panel on Climate Change (IPCC) guidelines, the analysis evaluates Hazard, Exposure, and Vulnerability across the mortgage portfolio. Flood risk probabilities and potential losses are estimated based on ECB price shocks and Fitch foreclosure matrix.

Our main conclusion is that while the Netherlands is well-protected against floods, the analysis highlights potential impacts on mortgage portfolios. Despite limited expected losses, the broader economic implications of climate events remain uncertain.

Introduction

There is considerable attention to climate risks and their potential impact on the housing and mortgage market. The climate change process is underway, and we are currently experiencing its effects. Apart from gradual temperature rises, we are increasingly witnessing extreme weather events such as heatwaves, hailstorms, and heavy rainfall. These are referred to as physical climate risks. These risks pose a threat to the interests of investors. Achmea Mortgages, in collaboration with CAS, conducted a comprehensive analysis of the various climate risks to which the portfolio of Dutch mortgages is exposed to, for its investors.

This article will focus on the key conclusions drawn from this analysis. Specifically, we assess the impact of flood risk on the portfolio. In our July 2023 article, we described flood risks for Dutch residential mortgages using a case study, concluding that the Netherlands is well protected against sea-level rise, and the risk for residential mortgages in general is low. In this article we reaffirm our conclusions and describe the potential impact to the Dutch housing market. The mortgage portfolio of Achmea Mortgages is strategically diversified across various regions of the Netherlands, rendering this climate scan and its conclusions a reliable representation of the broader Dutch mortgage market.

The main risks associated with climate change are divers

Here beneath we sum up the climate change risks which are recognized in the climate scan we have conducted.

Heat stress

Heat represents one of the most prominent consequences of climate change, directly affecting public health. The rising occurrence of tropical days and warm nights heightens the risk of heat stress among individuals. In the housing market, this phenomenon introduces risks wherein properties susceptible to heat stress may depreciate in value, presenting a potential concern for investors.

Effects of increasing precipitation and rising sea levels

Climate change leads to more rainfall and intensifies storms. Consequently, there is a greater risk of waterlogging. Moreover, the combination of increasing precipitation and rising sea levels raises the likelihood of flooding. This impacts the value of the collateral associated with a mortgage and may hurt the investors interest.

Risk of Drought: Foundation risk and risk of wildfires

In many parts of the Netherlands, the ground is sinking. Subsidence has various causes. Prolonged drought can accelerate subsidence processes. In recent years, there has been prolonged dry weather, leading to faster ground sinking in some areas. This can result in damage to the foundation of homes with a ‘foundation on soil’. These are homes founded on a shallow structure of concrete or stone. When the ground sinks rapidly, these types of homes can tilt or settle unevenly, a phenomenon known as ‘differential settlement’. The risk of differential settlement is highest in clay and peat areas. Homes founded on wooden piles. With a lower groundwater level, the tops of the piles may dry out more quickly, leading to rot. This can cause damage to the building or exacerbate existing problems.

The risk of wildfires escalates rapidly due to the synergistic effect of factors like drought, heat, and (low) relative humidity. Properties situated near natural areas face an increased risk of partial or total loss of the collateral. While fire risk is generally insurable, there remains a concern if a significant number of properties are simultaneously affected by this risk.

Flood risk due to rising sea levels

The Netherlands is particularly vulnerable to flooding due to rising sea levels. In addition to rising sea levels, another flooding risk emerges from heavy rainfall and the increasing melting of ice from neighboring countries, resulting in rivers overflowing their banks. In this analysis, we are focusing solely on rising sea levels and their potential implications. A significant portion of the country lies below sea level, with a considerable population and economic activities in low-lying areas. With the expected rise in sea levels due to climate change, the risk of flooding increases.

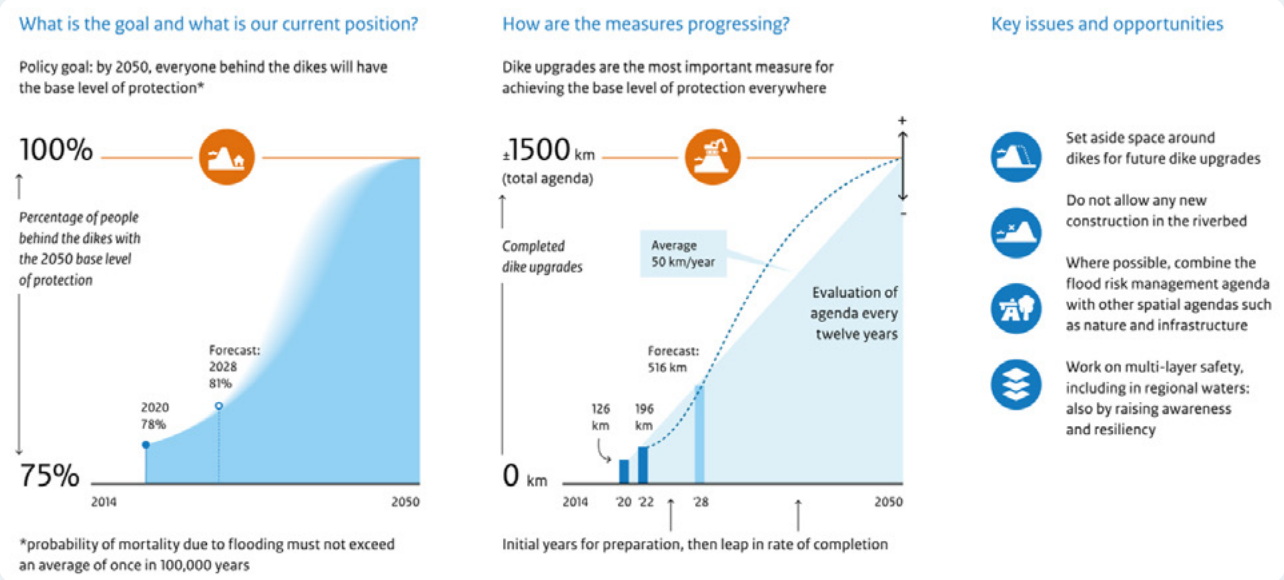
Internationally, the Netherlands is recognized for its advanced and proactive approach to water management and climate adaptation. The country has a long history of combating floods and has developed an extensive range of measures over the years to adapt to rising sea levels and climate change.

The Delta Law and Delta Programme to combat flood risk

To implement these measures, the Delta Law was enacted. Since 2012, the Delta Law has been in force, mandating the establishment of a Delta Programme. With an annual investment averaging 1.25 billion euros until 2037, the Netherlands is fortified against floods. The Delta Law also stipulates the appointment of a Delta Programme Commissioner to oversee the development and execution of the National Delta Programme.

The objective of the Delta Programme is to ensure fundamental protection against sea-level rise for all residents of the Netherlands by 2050. This is achieved by reinforcing and/or raising approximately 1500 km of dikes. The program entails the handling of approximately 50 km of dikes per year. Figure 1 illustrates the results achieved and the future planning.

Figure 1: Base sea level protection in 2025



Source: DP2024 Hoofdlijnen | Publicatie | Deltaprogramma

Potential Impact of Sea Level Rise

The underlying value of a mortgage is the property itself. The risk of damage to the property due to rising sea levels translates to the mortgage secured by it. Mapping physical climate risks of buildings (homes) is therefore important for assessing climate risks associated with a mortgage portfolio. We analyzed the aggregate housing exposures of the various mortgage brands we manage, which provides a good proxy for the Dutch mortgage market.

To define climate risk, we make use of the guidance provided by the Intergovernmental Panel on Climate Change (IPCC) AR6 report of 2022 for assessing physical

Figure 2: Risk Determinants

Source: IPCC AR6 SYR Longer Report

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climate risks where we make assessments on the mortgages portfolios for Hazard, Exposure, and Vulnerability.

If we zoom in further, physical climate risks for a building can be understood across various dimensions. Figure 3 illustrates this concept.

Implications for mortgage portfolios

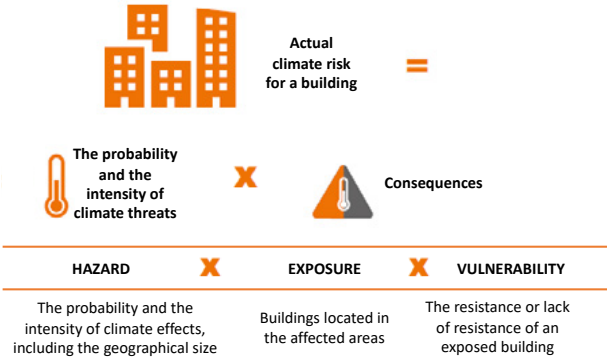
We will now illustrate the potential implications for the mortgage portfolios of Achmea Mortgages.

1. Hazard

The exposure of a property to rising sea-levels is determined by its location. For instance, properties situated in coastal provinces are more vulnerable than those located further inland in the Netherlands. CAS has developed maps based on scientific data, indicating where potential risks lie. Risk qualification has been derived from these maps. Figure 4 illustrates the distribution of risk for the mortgage portfolios of Achmea Mortgages regarding water damage resulting from a flood.

From figure 4, it can be observed that a limited portion (7.7%) of the portfolio faces a realistic risk of flooding. The vast majority of the portfolio faces no significant risks (52.0%). Additionally, there is a moderate risk associated with 21% of the properties. The remaining financed homes face a low to very low risk of flood damage. The percentage categorized as “unknown” is related to factors such as new construction where the postal code is not yet available.

Figure 3: Translation into the physical climate risks for a building.

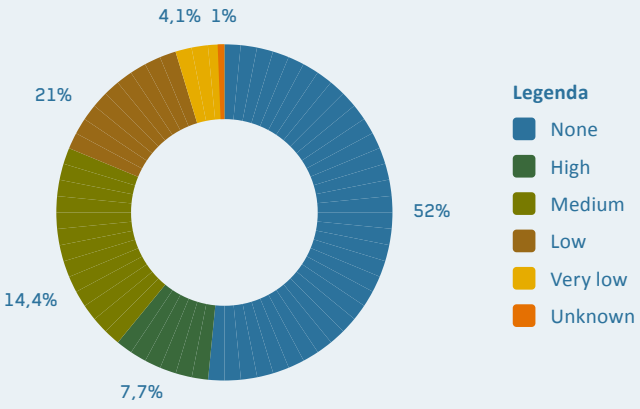


Source: Dutch Green Building Council

If we break down the High and Medium risk to the Provinces of the Netherlands we can observe that the risk associated with flooding are the highest in South-Holland and North-Holland with approximately 8.4% and 4.5% respectively (for both medium and high risk categories summed together). Figure 5 shows this breakdown per Province.

The information presented in figure 4 refers to the so-called environmental score, which can be seen as the gross climate risk, i.e., the risk before mitigation measures. The environmental score describes the climate risks for the immediate environment in which the property is located. The environmental score does not yet provide the likelihood of damage if a flood defense were to experience a breach. Please note that in our analysis the environmental score does not provide the likelihood of flooding risk probability.

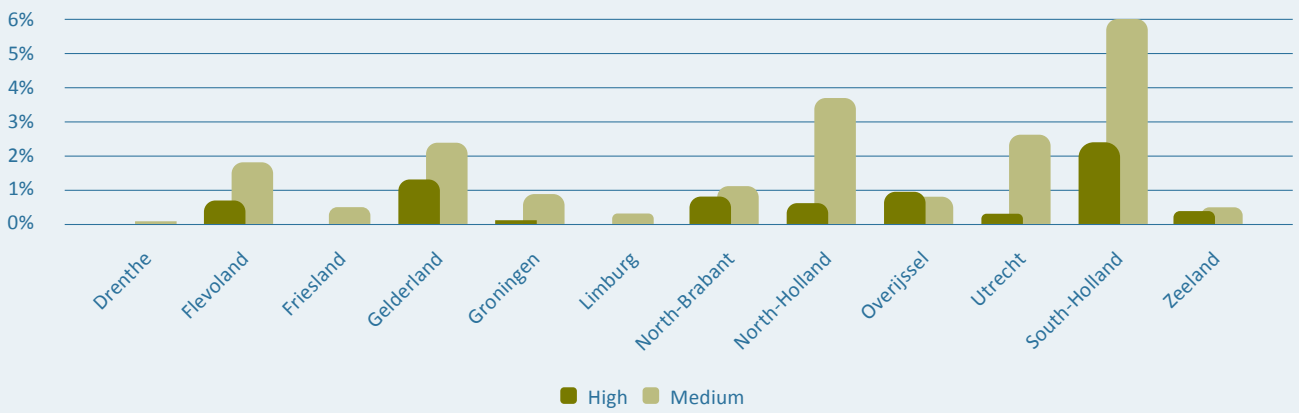
Figure 4: Flood hazard, according to the CAS classification



CAS classification

Classification	Maximum flood depth
None	No data / No significant risk
High	> 2.6 meters *(ceiling height building decree of 2012)*
Medium	> 1 meter - 2.6 meters
Low	> 0.2 meter – 1 meter
Very Low	< 0.2 meter

Figure 5: Flood hazard, for the High and Medium risk category per Provinces



2. Exposure

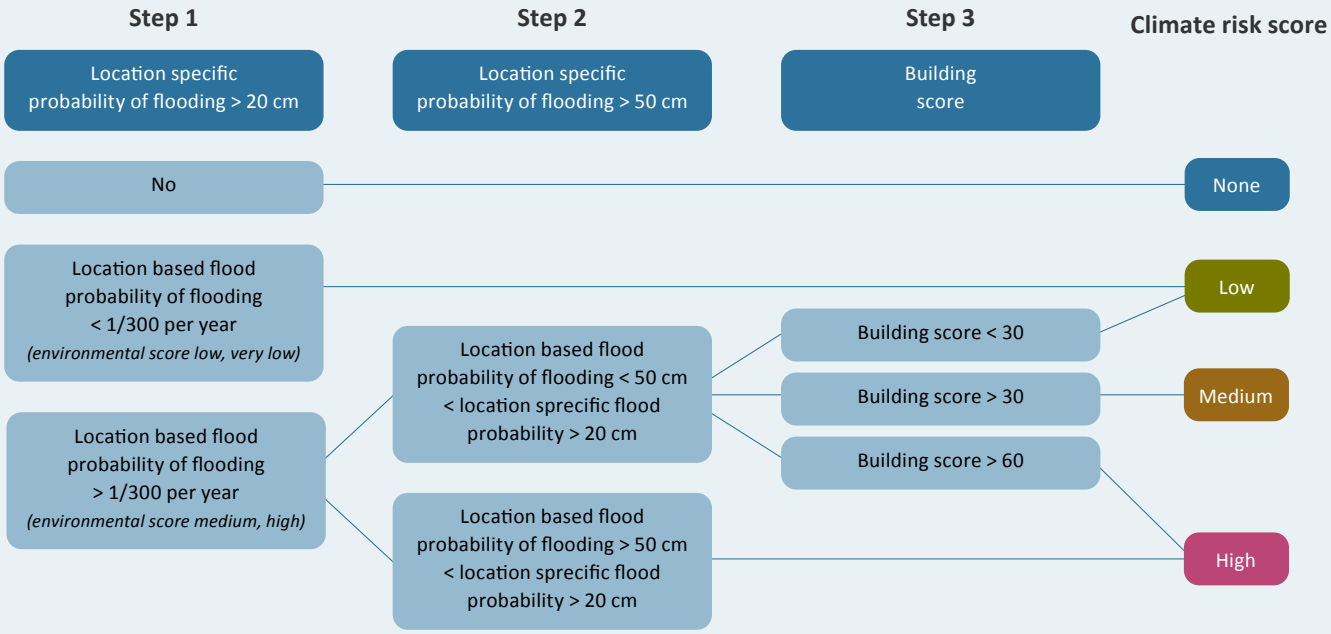
Exposure refers to the amount that can be lost if a flood defense actually breaches. This is the maximum potential loss amount in the event of such a breach. With a probability of 1, the maximum amount to be lost is equal to the outstanding principal amount. The distribution of the outstanding principal amount is approximately equal to the distribution in figure 4. It depends on the portfolio distribution what the actual value will be lost in case of a flood defense breach. In our calculations we will calculate the expected loss using the exposure at default.

3. Vulnerability

DGBC has developed a step-by-step plan to assess building damage in the event of a calamity. Figure 6 illustrates these steps.

For a mortgage portfolio, it is impractical to determine all building characteristics and thereby establish building scores. Therefore, for simplicity in this article, we assume a medium and high score is exposed to flooding.

Figure 6: DGBC Step-by-Step Plan for Climate Risk Score



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The outcome of our calculations

In practice, it is very difficult to assign a probability to a specific climate event. We can only express a risk in terms of frequency, such as once every certain number of years. Figure 7 provides such a classification.

To understand the financial risks, we have estimated the damage to the mortgage portfolio using European Central Bank (ECB) climate scenarios. We use a matrix of probabilities instead of providing a single point estimate. Figure 8 represents the price shock that is used by the ECB. Furthermore in our calculations we make use of Fitch's estimate for cost associated with foreclosures. This cost are estimated to be approximately 15% of the outstanding amount.

The ECB price shocks to the underlying property value are shown in figure 8.

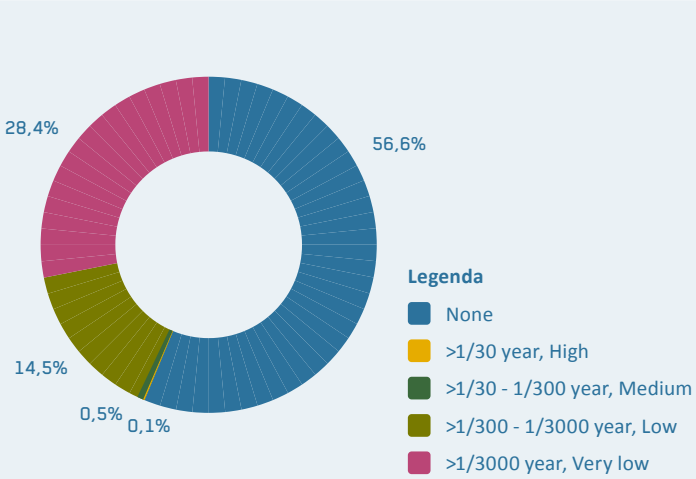
Figure 8: ECB's Price Impact on Property under a Certain Scenario

Risk Indicator	Price shock	Foreclosure costs
Small	-4%	15%
Low	-10%	15%
Medium	-19%	15%
High	-45%	15%

Further steps in assessing the impact on the portfolio

The price shocks shown in figure 8 are applied to the portfolio. The difference between the current Loan-to-Value (LTV) and the LTV after the shock represents potential damage. However, for an LTV, after applying the price shock, below 100%, we assume that the loss due to a flood is negligible. Mainly because in the event of possible default, the property value is still sufficient to cover the outstanding debt. The Dutch National Mortgage Guarantee (NHG) scheme is unique in Europe. It helps the borrower to take out a mortgage that is affordable from the start. And if the borrower is unable to repay the mortgage due to circumstances beyond the borrowers control, the National Mortgage Guarantee may provide a safety net and will repay the mortgage to the lender. There is however a threshold. The calculations shown in this article the NHG and its threshold are taken into account.

Figure 7: Location-focused flood hazard

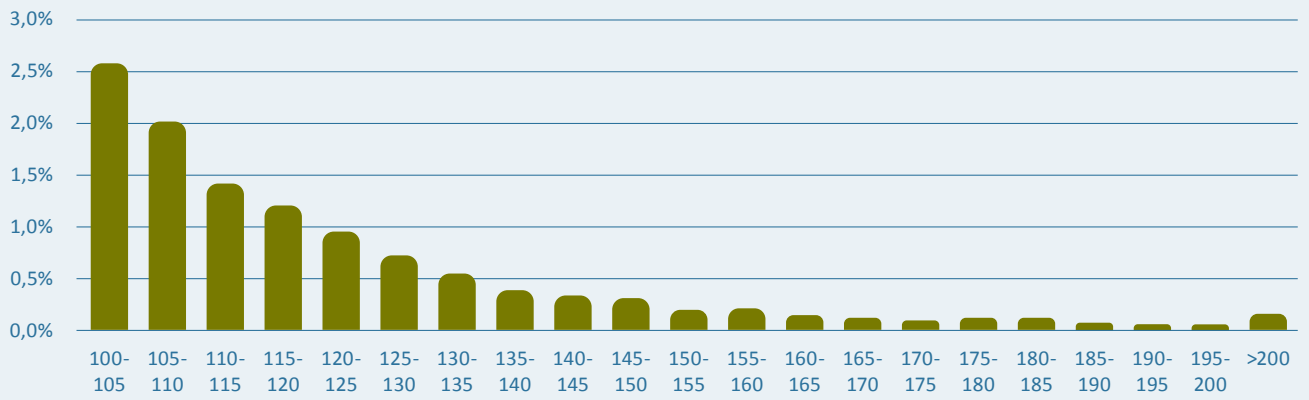


Exposure at Default (EAD) is a concept in risk management, particularly in the context of credit risk for financial institutions. In the case of a mortgage investment portfolio, EAD refers to the expected exposure a lender or investor faces in the event that a borrower defaults on their mortgage. For LTVs exceeding 100%, it implies a potential loss equal to the actual LTV after the price shock and foreclosure costs minus 100%.

As can be derived from figure 9, approximately 2.6% of the portfolio will have an LTV after the price shock ranging between 100% and 105%, which translates into an average of approximately 2.5% ((105%+100%)/2-100%). The loss will roughly amount to 2.6% x 2.5% = 0.065%.

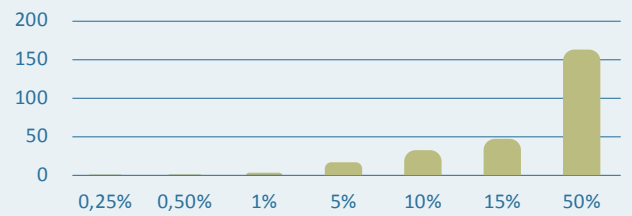
The likelihood of flood risk and of loss due to flood risk as mentioned, is difficult to quantify in terms of probability. We use a probability of 1 if the risks are quantified as high or medium, and 0 for the other classifications. Additionally, an estimate needs to be made for the likelihood of loss if a flood occurs. We deliberately did not estimate this loss probability, because in such a "life-changing" scenario, it is difficult to predict secondary effects. It is conceivable that the economy of a country like the Netherlands would experience a significant impact. The consequences for unemployment and therefore income are highly uncertain. Hence, we have taken different percentages for these probabilities. Figure 10 shows the potential loss at different default probabilities.

Figure 9: Tail distribution for the EAD of the portfolio after applying the ECB price shocks and foreclosure costs



The loss shown in figure 10 is the loss resulting from a climate event. The decrease in portfolio value due to these scenarios is related to the increase in the Loan-to-Value ratio resulting from a climate event. The increase in risk premiums for such mortgages due to the depreciation of the property and the subsequent increase in the loan-to-value ratio has not been included in the aforementioned figure 10. We estimate this impact on portfolio to be between 25 basis points and 30 basis points for our portfolio. This of course depends on the portfolio construction.

Figure 10: Potential loss in basis points given the probability of default



Calculating the possible loss using Fitch default probabilities

The calculations we've conducted were also performed taking into account the Fitch base frequency foreclosure (BSF) matrix. The outcome of these calculations are presented hereafter.

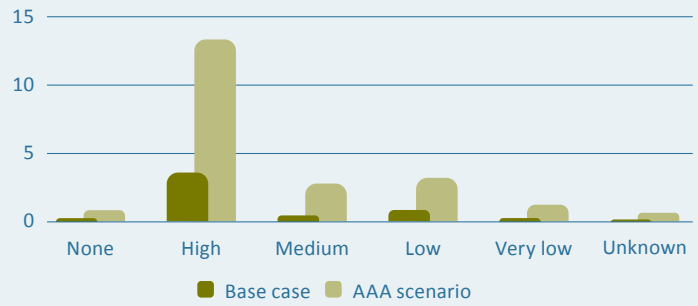
Figure 11: Base frequency of foreclosure matrix

OLTMV	Class 1 (<20)	Class 2 (>=20 and <30)	Class 3 (>=30 and <40)	Class 4 (>=40 and <50)	Class 5 (>=50)
<40	0,33	0,46	0,59	0,86	1,16
>=50	0,49	0,68	0,88	1,28	1,73
>=60	0,64	0,89	1,15	1,65	2,24
>=70	0,84	1,16	1,49	2,16	2,92
>=75	1,04	1,43	1,85	2,68	3,6
>=80	1,16	1,63	2,1	3,02	4,07
>=85	1,36	1,89	2,42	3,49	4,7
>=90	1,54	2,13	2,74	3,98	5,31
>=95	1,84	2,54	3,25	4,68	6,29
>=100	2,24	3,12	3,98	5,72	7,64
>=105	2,81	3,88	4,97	7,1	9,46
>=110	3,45	4,73	5,97	8,41	11,03
>=115	4,13	5,61	7,01	9,73	12,55

Al the other components of the calculations are expected to be the same as aforementioned.

In this specific case figure 12 shows the potential loss using the Fitch BSF foreclosure matrix.

Figure 12: Potential loss in basis points given the probability of default usisng Fitch BSF foreclocure matrix



Conclusion

We have provided insight into the impact of sea-level rise and the associated risk of flooding on the mortgage portfolio of Achmea Mortgages. We reaffirm the conclusion drawn in our July 2023 article, namely that the Netherlands is well protected and will remain so, partly due to the Delta Programme. Nonetheless, we have mapped out the potential impact of a climate event on the mortgage portfolio of Achmea Mortgages. Even with a default probability of 50%, the expected loss in the portfolio is expected to be limited. The decrease in portfolio value on top of this loss is also expected to be limited. However, it should be noted that it is assumed that the economic activities after such an event may continue more or less as usual.

Disclaimer

More information: www.achmeamortgages.nl

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