General Insurance Pricing Practices Market Study Final Report

Annex 2: Simulation of remedy impact

September 2020 (Updated December 2020)

1 Introduction

December 2020 – To address a coding error we have updated figures, tables and text in this Annex. These changes affect pages 5-6, 9, 11, 14-15 and 18-29. Changes have been highlighted in the text.

1.1 This Technical Annex presents our estimates of the impact of the proposed pricing remedy. Estimates are based on a forward-looking quantitative simulation with 2022 as the first year of the prospective remedy. The objective of this exercise is to forecast the impact of the remedy on premiums charged in the market, switching rates, firm revenues and profitability. The results we obtain in this simulation feed into our Cost Benefit Analysis for the pricing remedy.

1.2 The simulation exercise, which is described in more detail below, lets us compare market outcomes in a baseline scenario (no remedy) to the proposed remedy scenario. The differences observed in this comparison are our quantitative estimates of the impact of the remedy.

1.3 As with any prediction exercise, there is a degree of uncertainty associated with our quantitative forecasts. In addition, the simulation is solely focussed on a pricing remedy and cannot explicitly model the expected impact of non-pricing remedies, as well as changes to the market that lead to better consumer decision making (such as Open Insurance). In the simulation exercise, we use different competitive scenarios to assess the effect of competition.

1.4 This Technical Annex is structured as follows. First, we describe the different parts of the simulation, inputs and outputs, assumptions, limitations and the definition of baseline and remedy scenarios. Second, we cover the methodology in detail, including the specifications of the statistical models underpinning the simulation. Finally, we present simulation results and use these to assess the impact under the different simulation scenarios.

Data sources

1.5 We use policy-year level data over a 5-year period (2014 to 2018) provided by a total of 24 legal entities (insurance and intermediary firms) across home and insurance markets on a sample of approximately 15% of their policies ("transaction level dataset"). For each policy in the dataset, the data include general information on the insurance policy (for example inception and duration, characteristics, sales channel), price and cost information (of core policy, addons), ancillary fees and information on the policyholder. This was the same dataset that we used for the analysis presented in our Interim Report (MS18/1.2). The dataset contains nearly 7 million observations for over 2 million unique policies for home insurance and 10 million observations for nearly 4 million unique policies for motor insurance, which cover cars, motorbikes, vans, motorhomes and motorised tricycles.

1.6 To make the transaction level dataset representative of the broader market, we performed the sample adjustment described in MS18/1.2 Annex 2. This ensures that

any impact estimates are consistent with the most recently observed relative shares of firms and the within-firm distribution of policies at different levels of tenure.

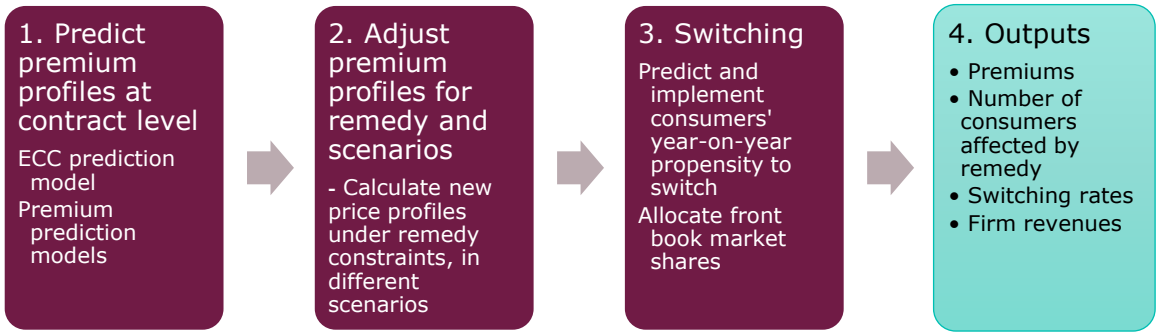
Simulation overview

1.7 The process shown in Figure 1 describes the simulation exercise at a high level. The process consists of several steps that involve a combination of empirical and theoretical models, described in the boxes. We now discuss each of these steps in more detail.

1.8 As a **first step**, we project Expected Claims Cost (ECC) and premium for each contract in the simulation, based on patterns observed in the transaction level dataset. These two predictions give us a future premium and expected margin (premium minus ECC) schedule for each contract, under the baseline (no remedy).

1.9 The **second step** is to project firms' premium schedules under the proposed remedy. This includes changes in premiums in the front book (new business prices), and to long standing customers relative to the baseline. We also analyse different scenarios on the extent of competitive pressure in markets, which are detailed at the end of this section.

Figure 1: Overview of simulation exercise



1.10 The **third step** is the prediction of switching and front book growth at the market-firm level, year-on-year. A prediction model, estimated on the historical transaction data, yields individual propensities to switch based on tenure, firm and price change in the last year. Individual propensity to switch then determines the likelihood of a customer switching away as the simulation rolls forward another year.

1.11 The switching model is subject to a data limitation. The historical data does not include the destination firm, or lack thereof, of customers who do not renew. As a result, we cannot distinguish between those individuals leaving the market and those switching. We therefore cannot observe flows of consumers switching between firms, as we cannot track consumers after they do not renew their contract. Similarly, for new customers we do not know whether a customer is buying a product for the first time, or has instead switched from another provider.

1.12 We model the number of policies as being constant over time, and so the number of new contracts entering the market in a given simulation-year is equal to the number of existing contracts predicted to leave the market due to switching. This means we model that the remedy does not cause changes in the number of consumers entering

the market, or the number of consumers leaving the market, compared to the no remedy baseline. We did this to conservatively model firm revenues and compare across baseline and remedy scenarios, as well as allow for better comparability between different years of the simulation. It was also in line with growth rates observed for 2014-2018 in our transaction dataset. Compared to positive market growth scenarios, our zero market growth assumption does not affect our estimates for average premiums, margins and the percentage of consumers paying high or very high margins.

1.13 New contracts are allocated to firms based on the front book market shares observed in the last year of historical data (2018). Within each firm, a sampling procedure from historical data generates ECC-premium pairs, which are then used to generate inflation-adjusted projections for future years.

1.14 In the **fourth step**, we aggregate data across individual markets to calculate the outputs from our simulation over time. The dataset for a given simulation-year gives us effectively a forecast of what the market will look like in the next year, assuming that recently observed trends in the data continue. By thus rolling forward the dataset several years and aggregating these data points at the market level, separately for the baseline and the proposed remedy, we can assess the effects of the proposed remedy.

1.15 In line with Cost Benefit Analysis requirements to cover a 10-year period, we roll forward the simulation model 10 years from the prospective implementation – from 2022 to 2032. Since we have historical data up to 2018, the first year of the simulation is 2019.

Assumptions

1.16 Wherever possible we have estimated economic relationships with the data in the transaction dataset. But to operationalise our simulation model, keep it tractable and predict inherently uncertain quantities such as internal strategic decisions and exogenous future events, we have had to make certain assumptions. Most of these assumptions are our best estimates of how the market will evolve based on data submitted to us by firms, although as with every forward prediction there is some uncertainty. Here we describe our key assumptions.

1.17 When firms facing the remedy decide on their premium schedules in the second step of the simulation, they are constrained in what they can charge existing customers but face a decision in how to set prices for new customers. We assume that each firm takes into account any changes to switching rates (churn) due to changes in premiums and/or consumer behaviour, using the coefficients in the switching model estimated in the third step. This means that firms' price setting is consistent with their beliefs on changes to switching rates. For example, if firms expect that a flatter post-remedy premium schedule will reduce switching rates (increase retention) then contract profits will be earned over longer expected contract tenures. Details of the uplift factor methodology are described in 2.32-2.33.

1.18 We model the realised premiums, rather than modelling quoted premiums and any negotiations from quoted premiums.

1.19 The number of policies at the market level in each simulation year's front book is equal to the sum of all contracts that left the market in the previous simulation-year.

This effectively means we assume the number of policies within each market does not grow over time – in line with the growth rate observed in our transaction level dataset. It also means that any differences between the baseline and remedy forecasts are not due to different rates of market growth.

1.20 We allocate new customers in each simulation year to firms by maintaining the front-book market share of existing firms in the transaction dataset. If a firm had a 10% front-book market share in policies in 2018 (the most recent year of historical data), it will have a 10% front book market share in the simulation of new customers. Due to the data limitation on switching mentioned above, we have opted for using recent historical data as our best estimate of front-book market shares.

1.21 We assume there are no shocks to ECC, either at the individual contract level or at aggregate level.

Limitations

1.22 An important limitation of the simulation exercise is that by its nature it cannot predict strategic decisions made by firms: for example, whether to remain in or exit a market and what types of contracts to offer. We also cannot predict whether firms will pursue different strategies with respect to price setting; instead, we follow a scenario-based approach for the whole market – described below.

1.23 We also cannot model the participation constraints of the demand side of the market, which means we cannot predict endogenous market growth or shrinkage based on consumers' reservation prices (the maximum price consumers are willing to pay). As documented above, we have thus decided to make an assumption of zero market growth. Given the compulsory nature of some of the insurance types covered, this may be a minor limitation. We have not revised these assumptions due to the ongoing Covid-19 situation, as there is no clear evidence that Covid-19 will lead to long term impacts on the scale of the markets.

Remedy definition and scenarios

1.24 We use the definition of the proposed remedy set out in the final report. This means that a firm's equivalent new business price for customers of longer tenure should not exceed the new business price for a new business customer.

1.25 We simulate this relationship by constraining a customer's margin (premium minus ECC, as a proportion of premium) to be constant over time.

1.26 In order to model the remedy for existing customers, who have their margins reset to the equivalent new business price, we match their margin to the distribution of the front book. That is, if a customer in tenure year 3 is in the 70^{th} percentile of margins for year 3, we match them to the 70^{th} percentile in the front book. This maintains some variation in margins across customers, which is appropriate as tenure is not the only reason why customers pay different margins. It does not mean that we expect margins to remain constant over time for each customer, but should be interpreted as a simplifying assumption that on average the expected change of margin is zero.

1.27 A key part of simulating the remedy impact is the modelling of premium levels and the distribution of premiums for new customers at the firm level. We generated these

responses off-model under two different scenarios, which are described immediately below. It is important to note that the two scenarios are based on empirical inputs: notably the market-level cost information provided to us by firms.

1.28 Firms are likely to vary in how they respond strategically to any remedy. Some firms may look to protect their margins, while other firms may compete more aggressively for market share. Firms may also have mixed strategies, pricing high at some times and lower at others. However, to make our simulation exercise operational we have abstracted from this complexity. Our approach is instead to consider two scenarios that vary in the nature and intensity of competition.

1.29 It should be noted that the simulated average (mean) premium in each market may respond differently to the various factors affecting it. Besides competitive intensity as covered by our two scenarios, the two key factors are (i) changes in the tenure distribution due to the remedy and (ii) changes in switching rates/churn due to the remedy. Depending on the tenure distribution in each market prior to the remedy, the effect of the former factor may be positive or negative. Changes to switching rates are typically expected to be negative (less switching), such that firms can spread initial customer acquisition cost over a longer time period, which would lead to average prices falling. The combined effect of our scenarios and these two factors could lead, in a given market, to either an increase or decrease in average premiums for customers of all tenures, although we would expect it to lead to a decrease of average premiums for backbook customers relative to frontbook customers.

1.30 We use these two scenarios in the Cost Benefit Analysis to illustrate the potential effects of our proposed pricing intervention. However, they should not be taken as the upper and lower bounds of the expected impact.

Scenario 1

1.31 Scenario 1 describes a scenario with no change in the intensity of competition. We assume that firms design new premium schedules such that the expected profit of policies starting after the remedy is introduced remains the same as under the baseline. This is a relatively conservative scenario, as it does not assume a downward pressure on premiums from increased competition (eg, due to other aspects of the remedy package or easier price comparisons).

1.32 Under our simulation assumptions, this results in contracts with constant margins in each year of tenure. This ensures that, holding constant consumer circumstances, ECC and front-book margins, the consumer will pay the same premium for a new contract as for extending an existing contract with the same firm.

1.33 To set the margins for front-book customers, we assume firms multiply the premiums of new contracts under the baseline with a market-level 'uplift' factor such that the expected profit (i.e. the margin) of the average contract in that market remains the same as in the baseline. In this calculation, firms also take into account changes to customer churn due to the new shape of the pricing profile (typically a flattening of the margin and/or premium profile).

1.34 The reset of premium schedules described above can be applied directly to new contracts, with premiums in a given year simply representing ECC adjusted by the fixed margin implied by the multiplier calculated by the firm. For existing contracts, we take ECC as given and allocate a margin from the distribution of margins in the front book based on the corresponding margin percentile in the baseline, as

described above. ECC plus margin then gives us the premium for that contract under the remedy.

1.35 The assumption about profit maintained in Scenario 1 is that the expected profit of policies starting after the remedy is introduced remains the same as under the baseline. This could be the case if the intensity of competition in the market is unchanged as a result of the remedy.

Scenario 2

1.36 Scenario 2 represents a more competitive situation, relative to scenario 1, leading to a reduction of average lifetime profit per policy. This scenario was designed to model a scenario in which there is downward pressure on premiums from greater competition.

1.37 We apply the same method as in Scenario 1, but now the uplift factor is calculated on the assumption that the new margin level will yield 80% of the expected profit compared to the baseline. We chose 80% because operational cost data submitted to us by firms indicated losses below this level.

1.38 Again, changes to customer churn are taken into account and premiums for existing contracts are reset in the same way as in Scenario 1.

1.39 By design, Scenario 2 predicts lower margins and premiums than Scenario 1.

Outputs

1.40 Below we describe the outputs, mainly quantitative but some qualitative, from our simulation model.

1.41 We use the simulation model to generate key outcome metrics, both at market level and at firm level. We show how premiums and margins evolve over time and by tenure. We also measure how different groups of consumers are affected by the proposed remedy.

1.42 Although many of our quantitative outputs are generated at the firm as well as the market level, we do not publish any firm-specific output in this Technical Annex as this information is commercially sensitive. Where we note important patterns in the data that hold across multiple firms, we do describe these qualitatively, but in such a way that individual firms cannot be identified.

1.43 We separately consider the impact on new business premiums, on renewal premiums and the overall impact under the two different scenarios reflecting different intensity of competition. We also look at switching rates (proxied by attrition or churn) by tenure, both at market level and by firm.

1.44 We use the simulation results to quantify the impact on revenues (aggregate premiums minus aggregate expected costs of claims) both at market and at firm level under different scenarios. This allows us to understand the differential impact on firms and feeds into the analysis of business models and strategic incentives different firms face. These figures are not presented in this Technical Annex, but they are used as inputs into our Cost-Benefit Analysis.

1.45 To assess the effectiveness of the proposed remedy in reducing the number of consumers paying (very) high premiums[1], we compare the overall proportion of consumers paying (very) high premiums against the baseline. Again, we calculate these numbers at both market and firm level.

[1] We use the same definition of (very) high premiums as in the interim report, as set defined in paragraph 6.30 of that publication. High premiums are defined as being at least 50% higher than the premium corresponding to the market average margin. Very high margins are at least 100% higher.

2 Methodology

2.1 This section describes the simulation methodology in detail, including the statistical models estimated on the transaction level dataset. For the simulation of the baseline (no remedy), we also present several comparisons between the simulated data and the transaction level dataset.

Baseline (no remedy) simulation

2.2 To estimate the baseline, we estimate the following models:

- New business ECC/premium sampling
- ECC prediction model
- Premium prediction model
- Switching/churn model

These are now described in turn.

New contract ECC/premium sampling

2.3 In each year of our simulation, we need to add new customers representing the front book (tenure 0), which will then be part of future simulation years. To be used in the simulation, each new customer data point needs to be allocated a market, firm, initial ECC and initial premium.

2.4 We choose the total number of new customers in each year of the simulation. As explained in the previous section, for the purposes of simulation we assume the number of contracts in all individual home and motor is fixed. This means that if 10% of customers leave in one year (as per the churn model described later in this section), 10% of customers the next year will be new customers.

2.5 We allocate new customers to firms by maintaining the front-book market share of existing firms in the transaction dataset. If a firm had a 10% front-book market share in policies in 2018 (the most recent year of historical data), it will have a 10% front book market share in the simulation of new customers.

2.6 To get initial ECCs and premiums for new customer data points, we draw from observations in the front book in 2018 for the firm that the customer was allocated to. This allows us to maintain variation in both ECCs and premiums and to preserve their correlations. The premium is actually computed by randomly drawing an ECC and margin (as a percentage of premium) from the empirical distribution of front book margins, which are then used to calculate the premium.

2.7 To ensure that the nominal values of initial ECCs and premiums account for inflation and market trends over time (eg, technology) we adjust initial ECCs with an inflation factor of 2%.

2.8 Note that, since initial premiums are calculated using the margin, we do not need to adjust initial premiums for inflation.

ECC prediction model

2.9 During our simulation, we predict how ECCs change year-on-year for each customer. We use a linear model whose parameters are estimated on the transaction level dataset.

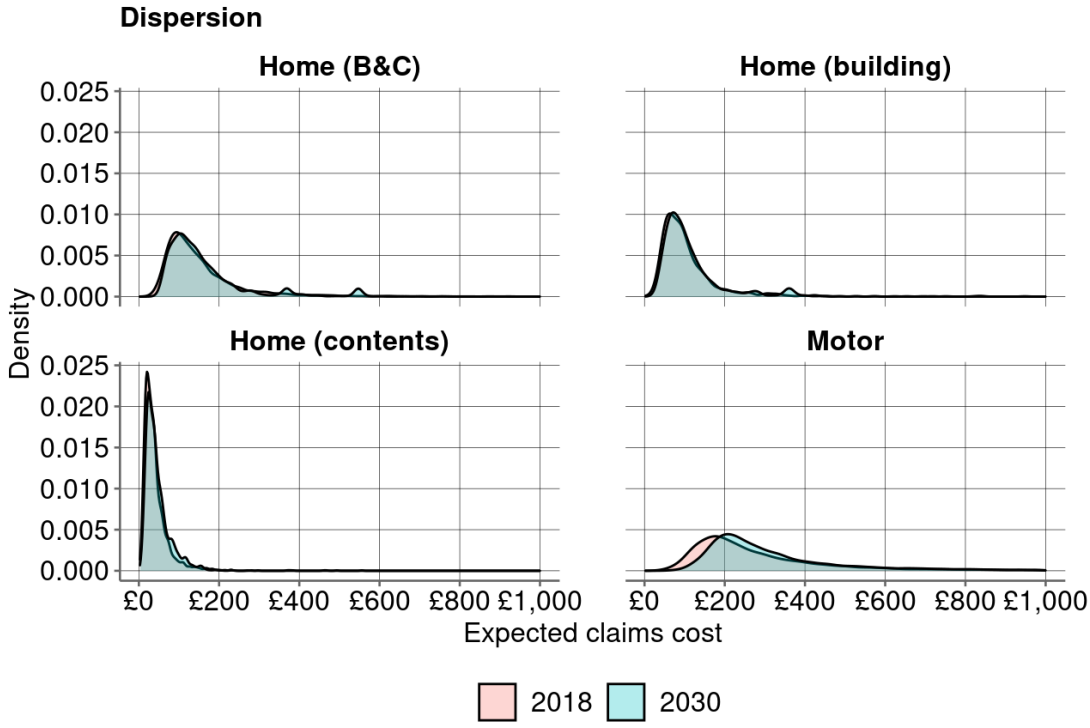
2.10 In order to predict ECCs in year t (ECC_t) we use the following contract-level information:

- The contract's previous ECC (ECC_{t-1}).
- A set of 20 quantile variables, indicating how high the contract's ECC is in relation to other contracts that year ($qECC_{t-1}$).
- Indicator variables for firms and tenure years..

2.11 To allow for differences in ECC trends between markets, we estimated a separate model for each of the four products (home building, home contents, home building and contents, motor).

2.12 Model outputs are reproduced in Appendix A. Fixed effect terms are redacted for brevity and to ensure firm confidentiality. To verify that ECCs predicted by our models are representative of the baseline, Figure 2 shows the distribution of ECCs in each of the four markets in 2018 (the last year of historical data) and for the simulation year 2030. As the figure shows, the ECCs used by our simulation are in line with the latest historical data.

Figure 2: Distribution of Expected Claims Cost (ECC), actual and simulated



Premium prediction model

2.13 We also predict how premiums change over tenure. Our approach for modelling premiums is similar to our approach for ECCs. Again, we create a linear model.

2.14 Since the premium prediction model is estimated after the ECC prediction model, firms can have regard to 'current' ECC information when setting prices.

2.15 To predict premiums in year t ($Premium_t$) we use the following contract-level information:

- The contract's previous year's premium ($Premium_{t-1}$).
- A set of 20 quantile variables, indicating how high the contract's premium is in relation to other contracts that year ($qPremium_{t-1}$).
- The contract's current ECC (ECC_t).
- The contract's previous year's previous ECC (ECC_{t-1}).
- Indicator variables for firms and tenure years..

2.16 As with the ECC model, we create a separate model for each of the four products.

2.17 Model outputs are reproduced in Appendix A. Fixed effect terms are redacted for brevity and to ensure firm confidentiality. To verify that premiums predicted by our models correspond are representative of the baseline, Figure 3 shows the distribution of premiums in each of the four products in 2018 (the last year of historical data) and for the simulation year 2030. As the figure shows, the distributions are similarly shaped for both years, with nominal premiums forecasted to be slightly higher in 2030, which is consistent with accounting for inflation by increasing front-book ECCs, as described in paragraph 2.7. When we compare the simulated output for 2018 to the actual data, shown in Figure 4, we see that the distributions closely overlap.

Figure 3: Distribution of premiums, actual and simulated

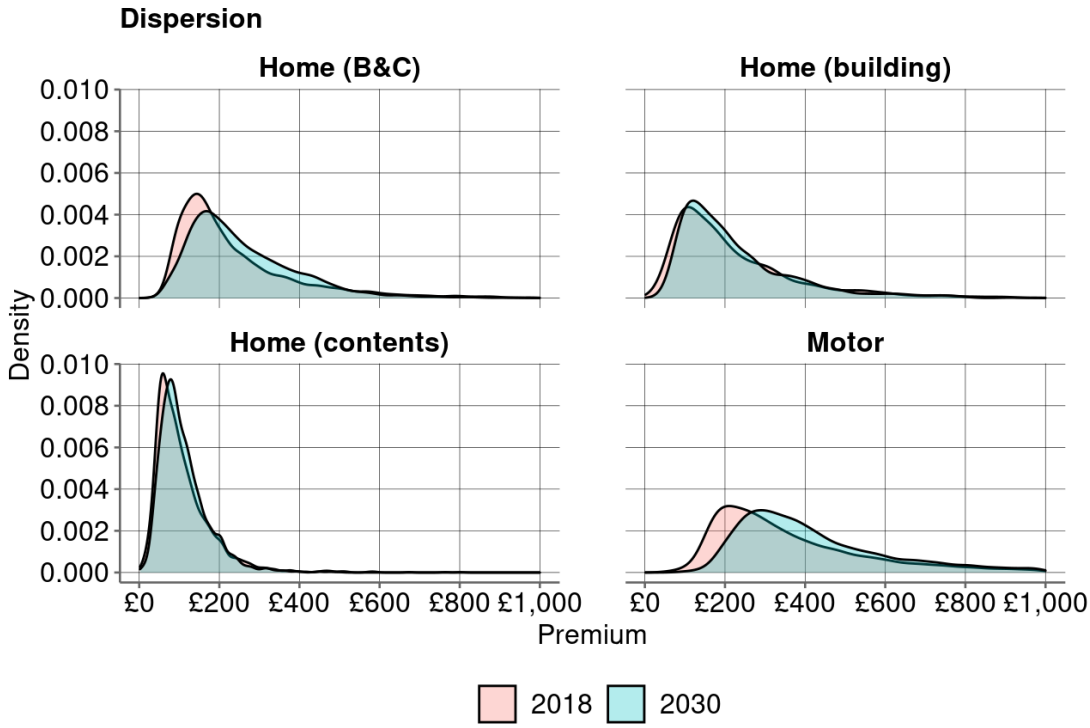
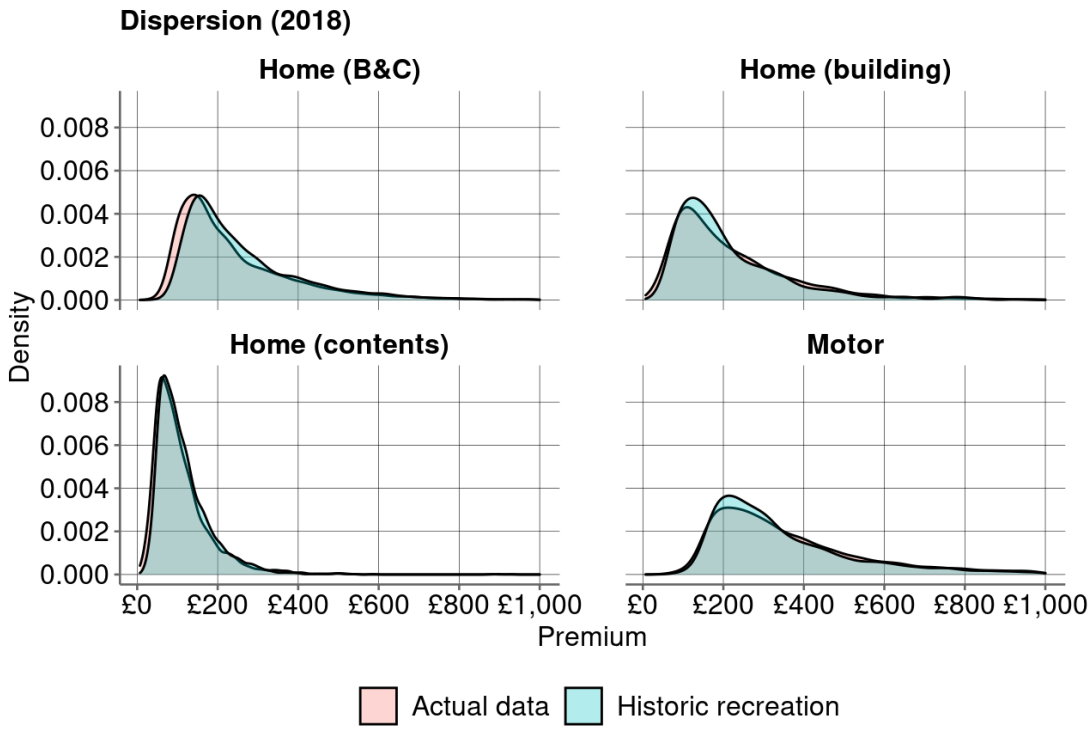


Figure 4: Distribution of premiums, actual and simulated (2018)



Switching/churn model

2.18 To determine a contract's likelihood of switching in a given year of the simulation, we estimate a churn model on the transaction level dataset. We estimate models of a binary variable that indicates whether a contract renews (i.e. it remains in the dataset for the next year) in a given year, regressed on the main determinants of switching and accounting for differences between markets and firms.

2.19 More specifically, we regress the binary outcome of renewal on a contract's tenure and the (imputed) price change from last year, plus fixed effects for the type of policy and firm. The coefficients of this regression, implemented as Probit and Ordinary Least Squares (OLS) for transparency, then give the propensity to renew a contract based on the following variables:

- The contract type (home insurance contracts only).
- The contract's tenure.
- The percentage change in premium from last year.
- Indicator variables for the firm (fixed effects).

2.20 In line with expectations, we find that contracts are less likely to renew in the early years of tenure and that greater increases in premium lead to a smaller likelihood of renewal.

2.21 We consider the renewal premium quoted to the customer as the relevant metric for calculating the percentage change in premium. Since we only observe premiums for contracts that renew, we impute quoted premiums for those contracts that lapse. The imputation is done by a statistical model that uses the variables listed above for the propensity to renew model, as well as a wider set of customer level information including geographical ONS clusters, product and book names, whether the customer was on auto-renewal, and home and motor specific variables. This effectively means that we are proxying the predicted price increase of those who have left the firm with the realised price increase of those who have stayed with that firm – controlling for all consumer characteristics we have in our dataset. The advantage of doing this imputation within each firm is that it allows us to account for the possibility that firms price-walk different customers to similar degrees, after controlling for consumer characteristics.

2.22 Since the churn model is estimated on recent historical data, one limitation is that it may not accurately represent changes in switching rates driven by changes in consumers' perceptions. For example, if consumers become more likely to switch under the proposed remedy because they believe that the market has become less opaque, the churn model will not capture this mechanism. However, consumers may also choose to switch less as they appreciate more stable premium levels; it is ex ante unclear which one of these mechanisms, if any, will be more important.

Remedy simulation

2.23 The rest of this section describes our simulation of the remedy. It mostly relies on the same statistical models as the baseline simulation, with the notable exception of the prediction of premiums, as we assume that firms will adapt their pricing strategy to the constraints posed by the remedy.

New contract ECCs/premiums

2.24 Our approach for simulating new customers is similar under the remedy as it is in the baseline. We still maintain the overall size of the market and we still sample ECCs from 2018 observations. We also maintain the relative front-book market shares.

2.25 Since our approach implies the reasonable assumption that uplift factors do not affect ECCs, differences in outcomes between the baseline and remedies do not reflect ECC differences.

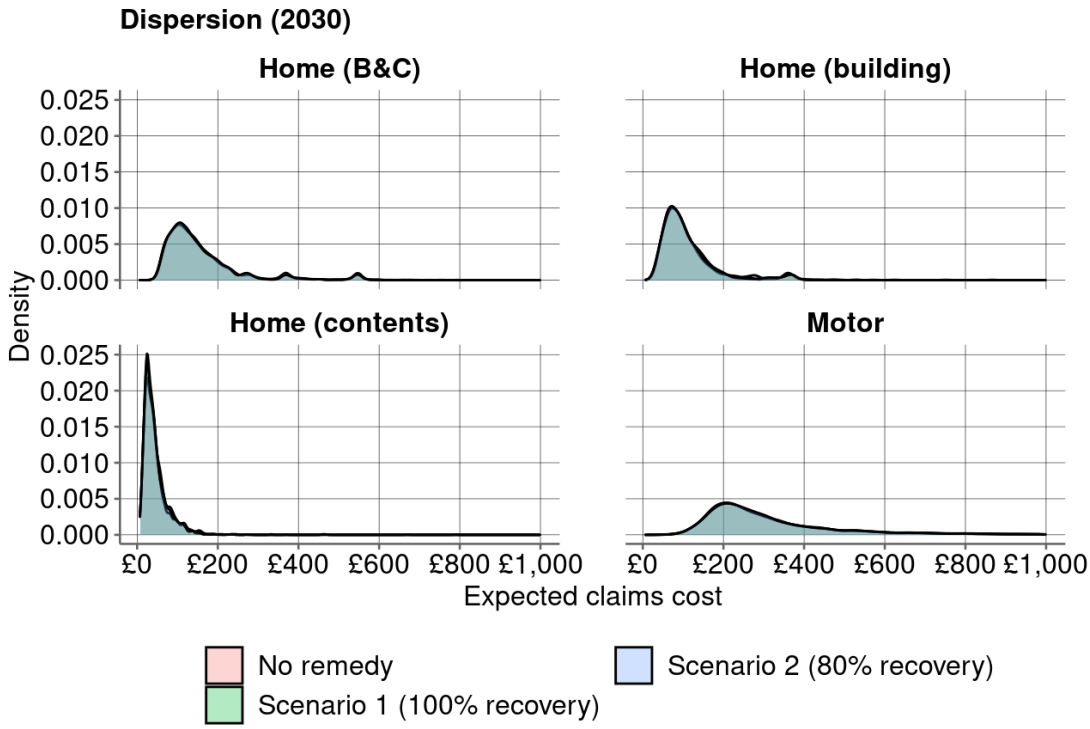
2.26 After sampling the ECC and the counterfactual (no remedy) margin and thus premium, a counterfactual premium schedule is calculated. This represents the predicted premium schedule in the absence of a remedy. To obtain the pricing schedule under the remedy, including the premium for new contracts, a market-firm level uplift factor is calculated as described in Section 1. Multiplying the counterfactual premium for a new (tenure 0) contract with this uplift factor gives us the premium for a new contract under the remedy. As described in Section 1, we estimate two sets of uplift factors, in line with Scenario 1 and 2.

ECC prediction

2.27 We use the same ECC prediction model when modelling remedies as we do in the baseline. This is because while remedies can affect prices and switching behaviour, we do not expect substantial changes in the underlying projected costs of insurance.

2.28 Figure 5 shows the distribution of forecasted ECCs in 2030, under the baseline and the two remedy scenarios. As the figure shows, there are no differences in ECCs between the three different settings. Any differences between the baseline and the remedy scenarios predicted by the simulation are therefore not due to differences in ECC.

Figure 5: Distribution of Expected Claims Cost (ECC), simulated



Premium prediction

2.29 The extent to which premiums move is strongly constrained by the remedy. We therefore do not use the premium prediction model to directly estimate premiums under the remedy. The premium prediction model is used to predict a counterfactual (no remedy) premium schedule, which is subsequently adjusted for the remedy by use of an 'uplift' factor. The new contract premium, that is to say the premium at tenure 0, is multiplied by the uplift factor to give the premium under the remedy. Given the contract's ECC, we now know the margin for the contract in tenure year 0. As explained earlier, we assume this margin remains constant for the duration of the contract.

2.30 For contracts in existence at the point of the remedy coming into force, we predict premiums using a different method. We first determine which percentile of the firm's margin distribution the contract was in, in the year before the remedy. We then match this percentile with the corresponding percentile in the firm's margin distribution of new (tenure 0) contracts under the remedy (after the uplift adjustment). The margin at this percentile is then imposed on the contract after the remedy comes into force. This way we generate a premium that is plausibly representative of a new business price for that firm, whilst accommodating differences in ECC and retain some relative variation in pricing that may be due to non-ECC factors.

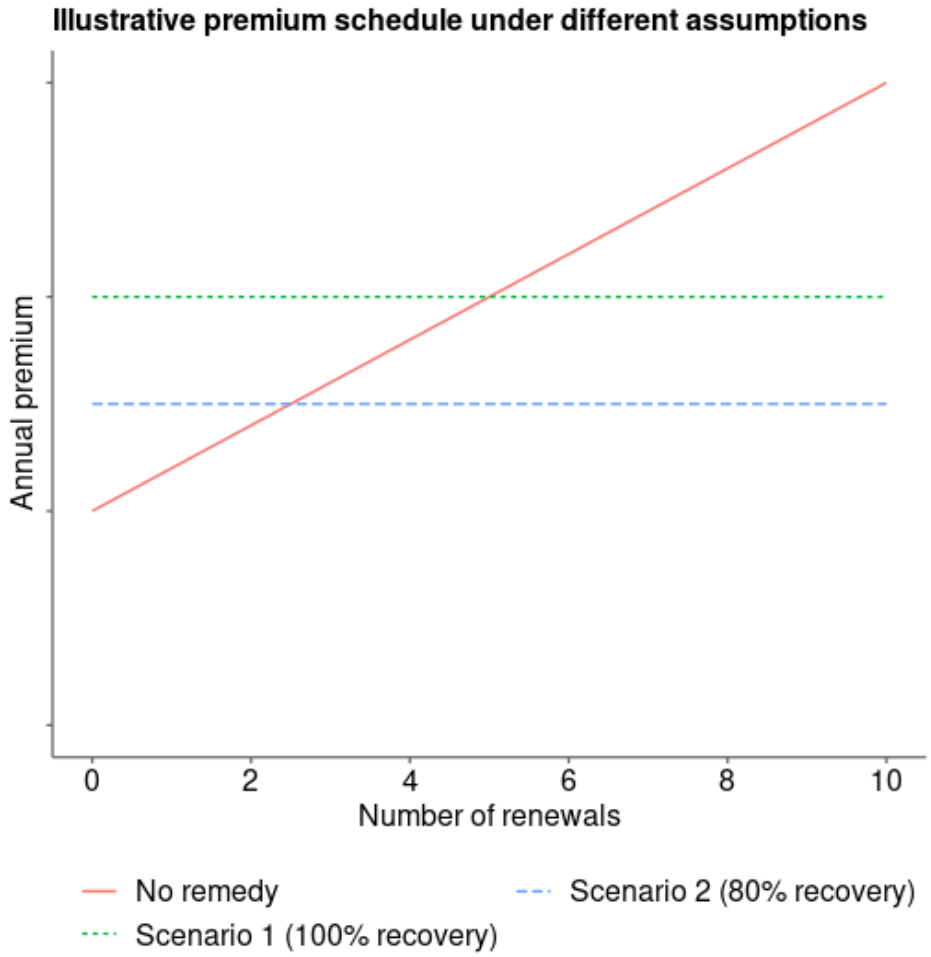
2.31 Customers are matched at the firm and market level, not book or product levels. This means that we are able to simulate the remedy for closed books, so long as the firm is not entirely comprised of closed books.

Calculating uplift factors

2.32 To calculate uplift factors we simulate the remedy assuming no uplift to front book prices, and calculate under our baseline assumptions what the uplift would have to be for a firm's revenue to be unaffected by the remedy (Scenario 1), in terms of absolute margin (premium minus ECC) . We look 15 years ahead from the implementation of the remedy, and model firms as discounting the nominal future gross profits at a rate of 3%. The uplifts are not materially sensitive to alternative discount rates.

2.33 We use two scenarios to capture different states of competition post-remedy. We also calculate uplifts under different assumptions of how much margin firms recover. For example, the uplift for firms to only recover 80% of margin (Scenario 2) would be lower than to recover 100%. By varying the percentage figure, the uplifts respond to the assumed intensity of competition. More intense competition is consistent with lower recovery of margins, and therefore lower uplifts. This is illustrated in Figure 6, where Scenario 2 (more intense competition) leads to lower average premiums than Scenario 1.

Figure 6: Illustration of forecasted premium schedules



Switching/churn model

2.34 We use the same model for churn as we do for the baseline. To recap, the model is dynamic with consumers reacting to changes in tenures as well as changes in premiums.

2.35 As the remedy is designed to reduce premium increases between tenures, and we found that contract renewal becomes more likely with smaller premium increases, we predict that consumers will switch less and average tenures will become longer. In Section 3, we present the predictions of the model for the remedy.

3 Results

3.1 In this section, we describe the results obtained from the simulation exercise.

3.2 We separately present results for the baseline (no remedy) case and for the remedy – the latter under the two scenarios presented earlier. We also describe the differences between the two sets of results as they form our estimates of the impact of the remedy – how it would compare to a situation in which there was no pricing remedy.

Margins and premiums

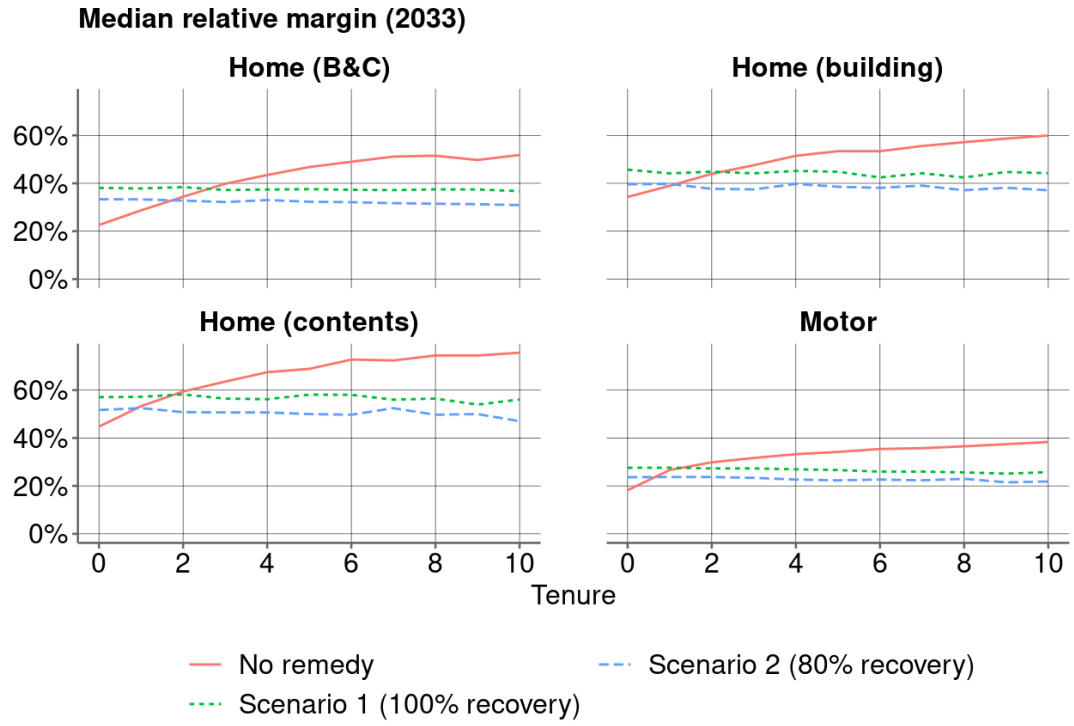
Margins

3.3 Figure 7 shows median margin as a percentage of premium, which by definition ranges between 0 and 1, at different tenure levels. Note that our definition of margin, premium minus ECC, matches the interim report. We show 2033 predicted figures.

3.4 In each of the four products, the baseline prediction is an upward-sloping margin curve. This represents the margin walking phenomenon documented in our interim report.

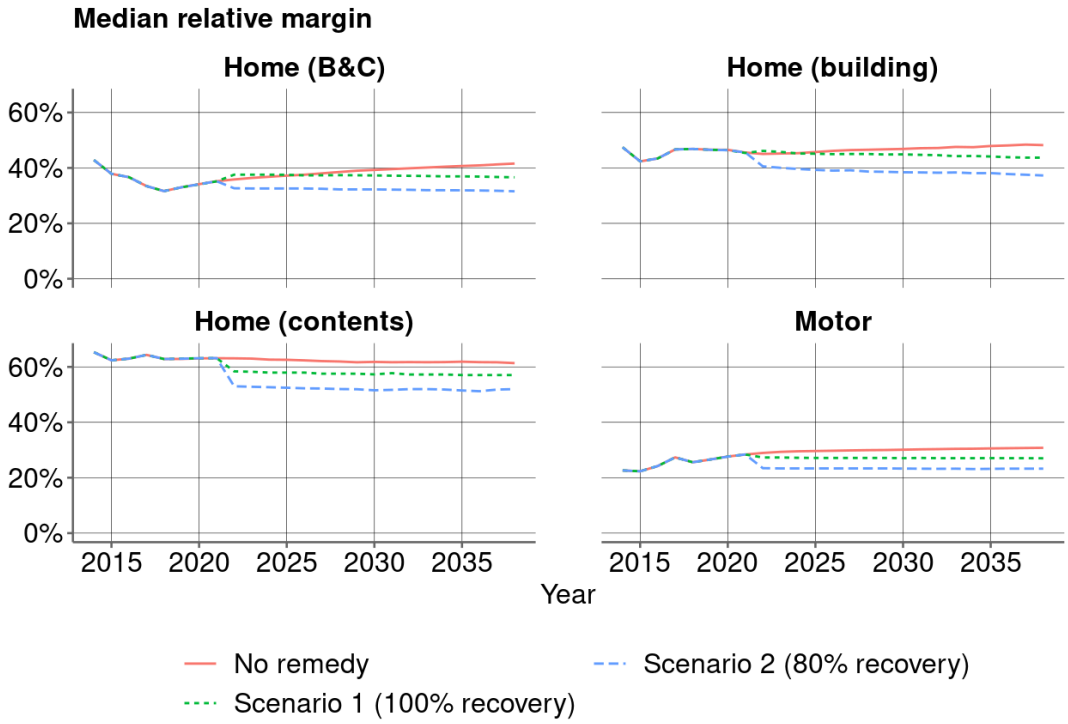
3.5 The remedy predictions, however, are approximately horizontal. As expected, the margins in remedy Scenario 2 are lower than those in Scenario 1. The crossing over point between baseline and remedy margins is between tenure year 2 and 4, similar to the median premium predictions shown earlier.

Figure 7: Median margin by tenure, for baseline and remedy scenarios



3.6 Figure 8 shows median margin over time. As with predicted premium levels, when the remedy comes into force in 2022 we see a notable drop in margin across most product markets. For some of the markets, however, there is only a slight difference between median margins in the baseline and the remedy under Scenario 1. Under the more competitive Scenario 2, the difference is pronounced in all markets.

Figure 8: Median margin over time, for baseline and remedy scenarios



3.7 Next, we examine the impact of the remedy on the number of customers paying high- or very-high margins, in order to explore how individual consumers are impacted by the remedy. Although not a like-for-like comparison, due to differences in switching rates between baseline and remedy, we can compare margins paid at the same tenure. Our metric is the percentage of consumers that pay a high margin, following the definition in our interim report, the same metric used in the interim report. Figure 9 shows the percentages of consumers paying a high margin at different tenures, for the baseline and remedy scenarios.

3.8 Figure 9 shows the predicted percentage of consumers paying high margins, following the definition in our interim report. The predicted percentage of consumers paying high margins at tenure 0 is higher under the remedy scenarios in all home insurance markets. However, for later tenures the percentage of consumers paying high margins drops considerably. Customers who stay with their insurer for more than 4 years are much less likely to be paying a high margin. Under the baseline, we can see that more than half of these customers would be paying high margins; under the remedy, we predict this would be limited to 20-30%.

3.9 In the motor market, we do not see as large differences. This is likely due to the fact that margins in the motor market are much lower than in home insurance markets, as can be seen in Figure 8 above. As set out in Annex 3: Analysis informing the proposed pricing remedy the numbers of longer tenure customers and the average increase in price above the new business price is similar in motor to home. Due to a higher average price for motor policies the percentage increase is smaller.

Figure 9: Proportion of consumers paying high margins, for baseline and remedy scenarios

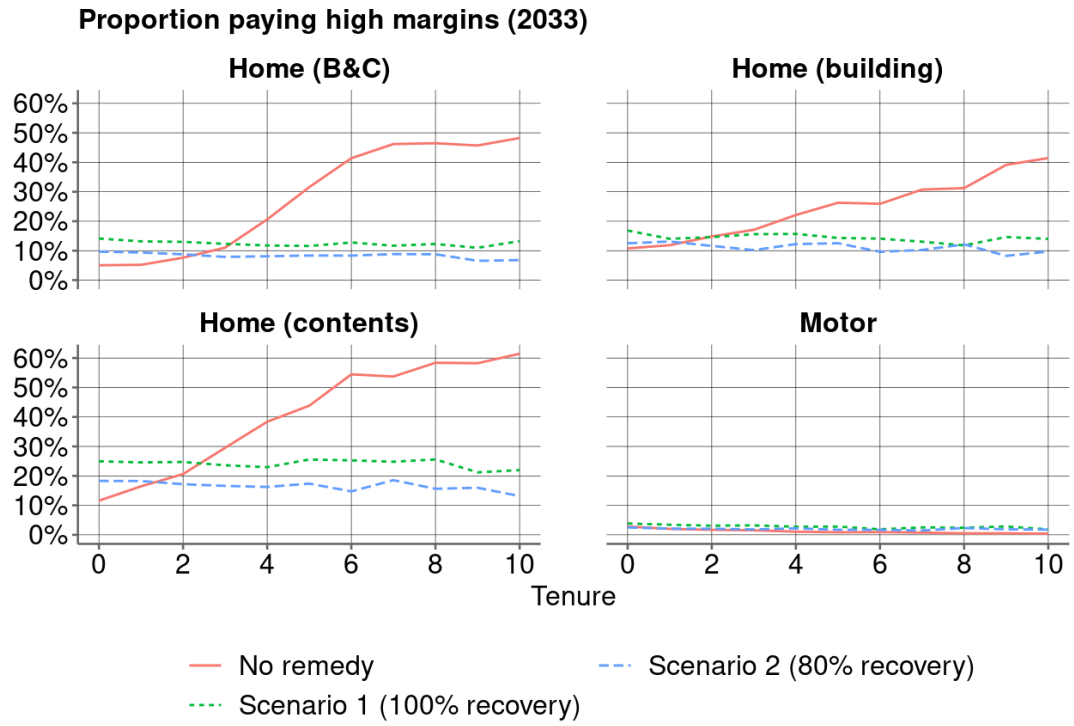
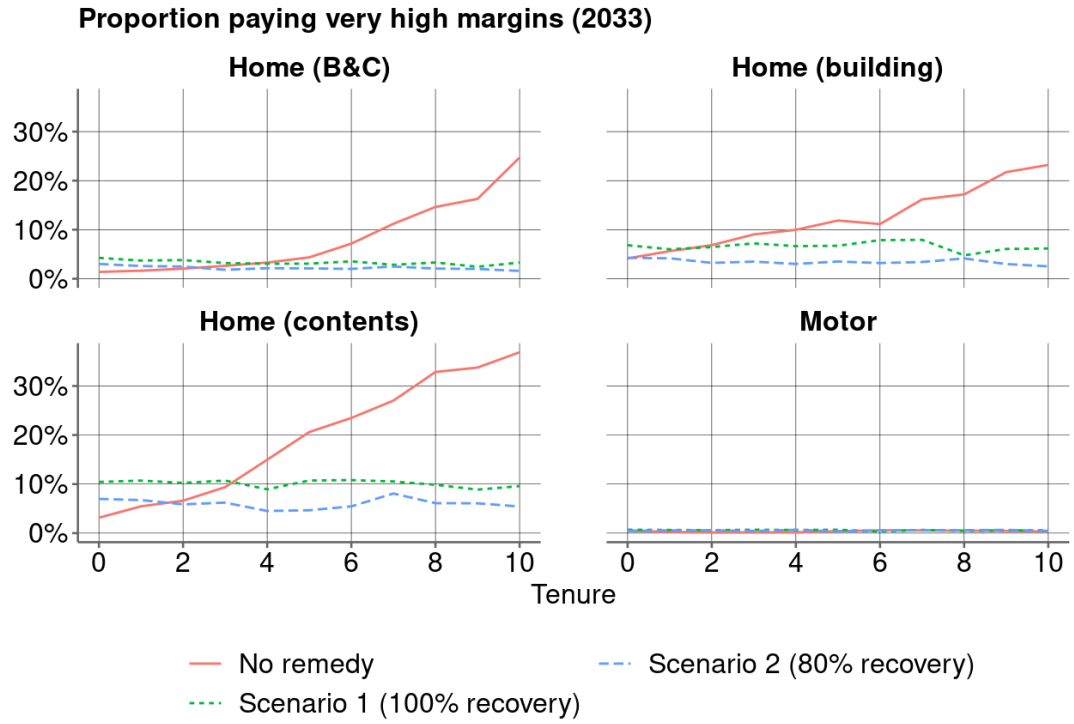


Figure 10: Proportion of consumers paying very high margins, for baseline and remedy scenarios

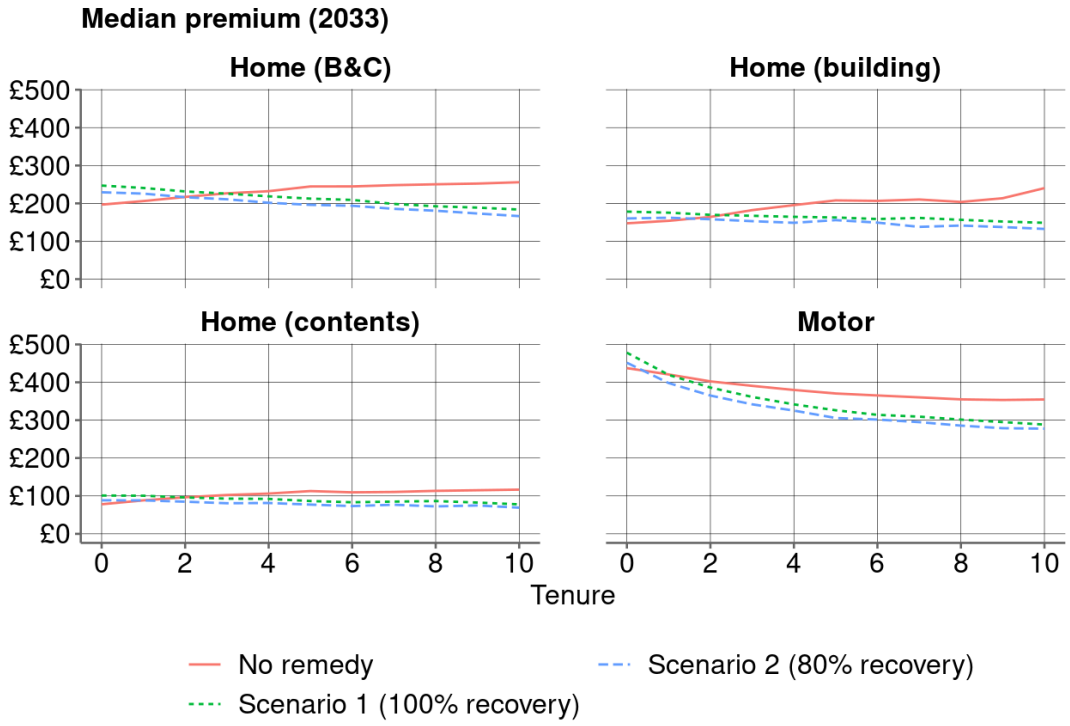


3.10 Figure 10 shows the predicted percentage of consumers paying very high margins, again following the definition in our interim report. Although the percentages are naturally lower than those paying high margins, the patterns are very much the same. Consumers who stay with their home insurer beyond 4 years of tenure are much more likely to be paying very high margins under the baseline than under the remedy. For motor, there is again no discernible pattern.

Premiums

3.11 Figure 11 below shows, for each of the four insurance products separately, predicted median premium at different tenure levels. The estimates presented here are for 2033, although they differ very little from other years of the simulation.

Figure 11: Median premium by tenure, for baseline and remedy scenarios



3.12 As expected, there is an upward-sloping premium curve in the baseline for the home insurance markets. In the motor market, this curve is slightly downward-sloping. For both remedy scenarios, we see different curves. In the three home insurance markets, the curves are predicted to be more or less horizontal. This is because the remedy is designed to prevent price walking, hence resulting in a horizontal premium profile when ECC is broadly stable. In the motor market, the remedy scenario curves have a steeper downward slope in early tenures. This reflects the fact that motor insurance markets are characterised by a decreasing ECC over time, thus the remedy prevents the 'margin walking' taking place under the no remedy scenario.

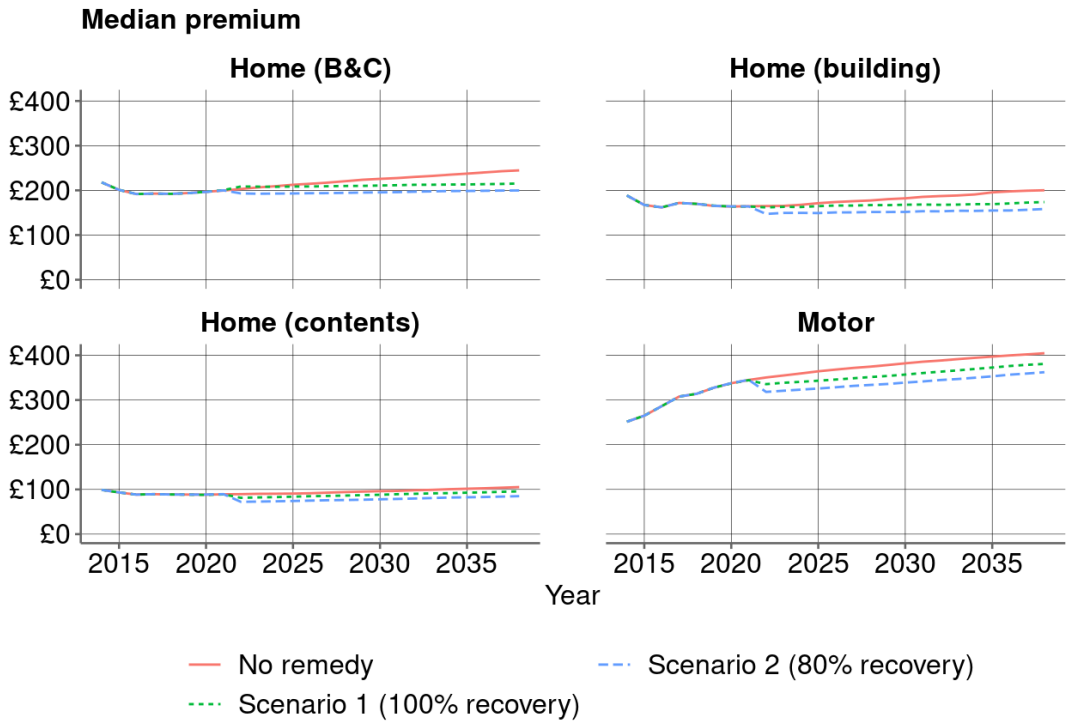
3.13 If we compare prices at given points in tenure, we see that in the home insurance markets the predicted remedy premium is higher than the baseline premium in the first 2-4 years and lower thereafter. It is instructive to see where the baseline and remedy curves 'cross over' for each market. This reflects our prediction that under the remedy consumers will be paying more when they are lower tenure customers than under the baseline, and paying less when they are of higher tenure. For customers who have renewed 5 times, median premiums are projected to fall by 12% for combined home building/contents customers, and 15% for motor customers. For customers with tenure greater than 10, we are projecting falls of 34% and 27% for those product markets respectively.

3.14 Looking at the predicted median premium paid in the market in each calendar year, in Figure 12, we see that the remedy is predicted to lead to lower premiums than the baseline from 2022 onwards. As we would expect, the difference is larger for Scenario 2, in which there is greater downward competitive pressure on premiums.

For customers who have renewed 5 times, median premiums are projected to fall by £26 for combined home building/contents customers, and £52 for motor customers. For customers with tenure greater than 10, we a projecting falls of £130 and £100 for those product markets respectively.

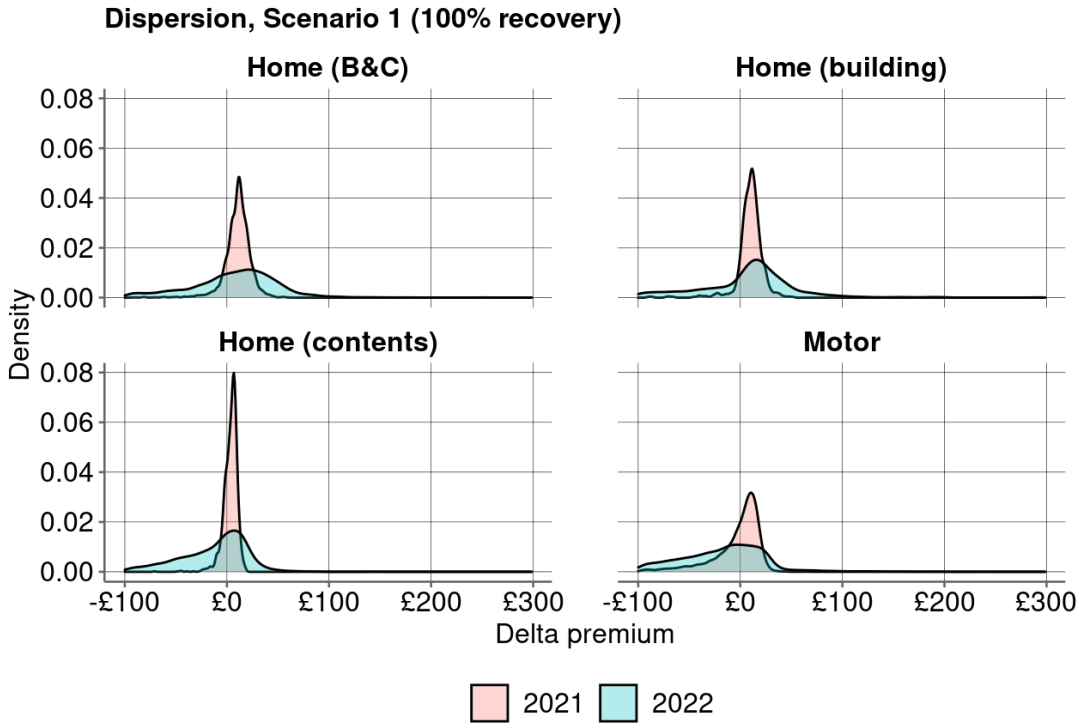
3.15 It is notable that the difference between baseline and remedy scenarios does not meaningfully change over time; this is a consequence of the remedy applying to both new and existing contracts at the same time.

Figure 12: Median premium over time, for baseline and remedy scenarios



3.16 When the remedy comes into force in 2022, the simulation model predicts it will have an immediate impact on premiums paid on existing contracts. In Figure 13, we show the predicted distribution of premium differences – the amount by which premiums will change under Scenario 1. The 2021 distribution shows premium differences in the last year before the remedy. In 2022, the distribution flattens but there are price decreases for existing customers.

Figure 13: Simulated distribution of change in premiums, 2021 and 2022



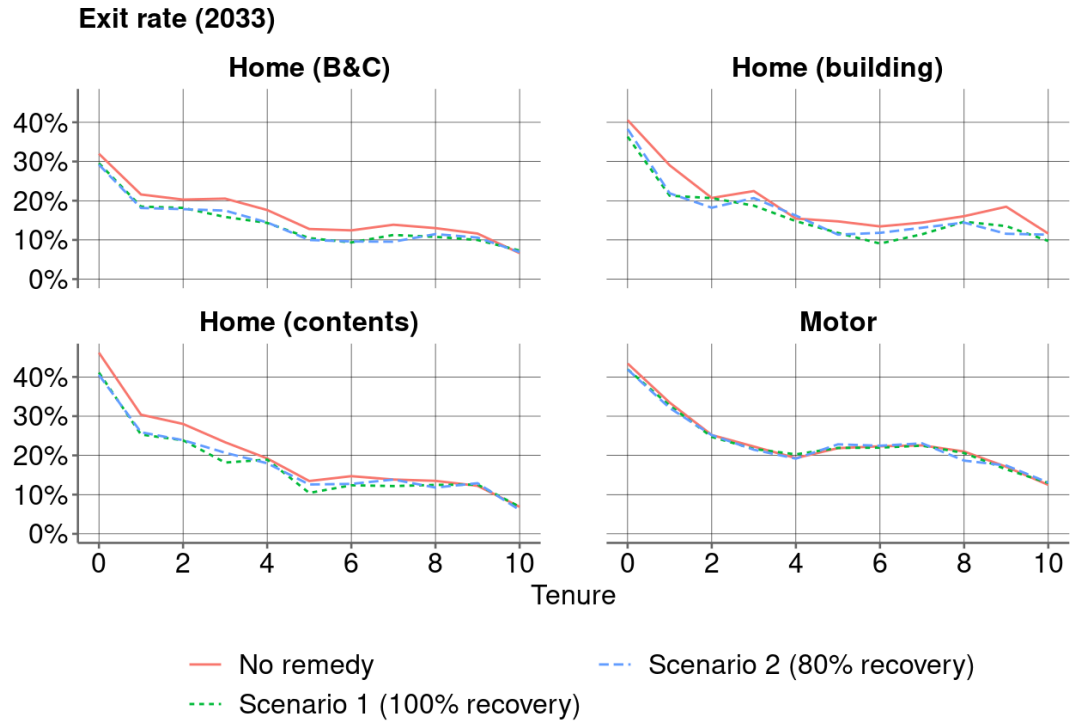
3.17 When the remedy comes in effect in 2022, we project that median premium change for home building/contents customers who have renewed 5 times will be -£18, compared to a counterfactual of an increase of £14. For motor insurance, these figures are -£55, compared to a counterfactual median increase of £2.

3.18 For customers with tenures greater than 10, we project that the median premium change will be -£96 for home building/contents (compared to a counterfactual of +£0) and -£98 for motor (compared to a counterfactual of +£5).

Switching/churn rates

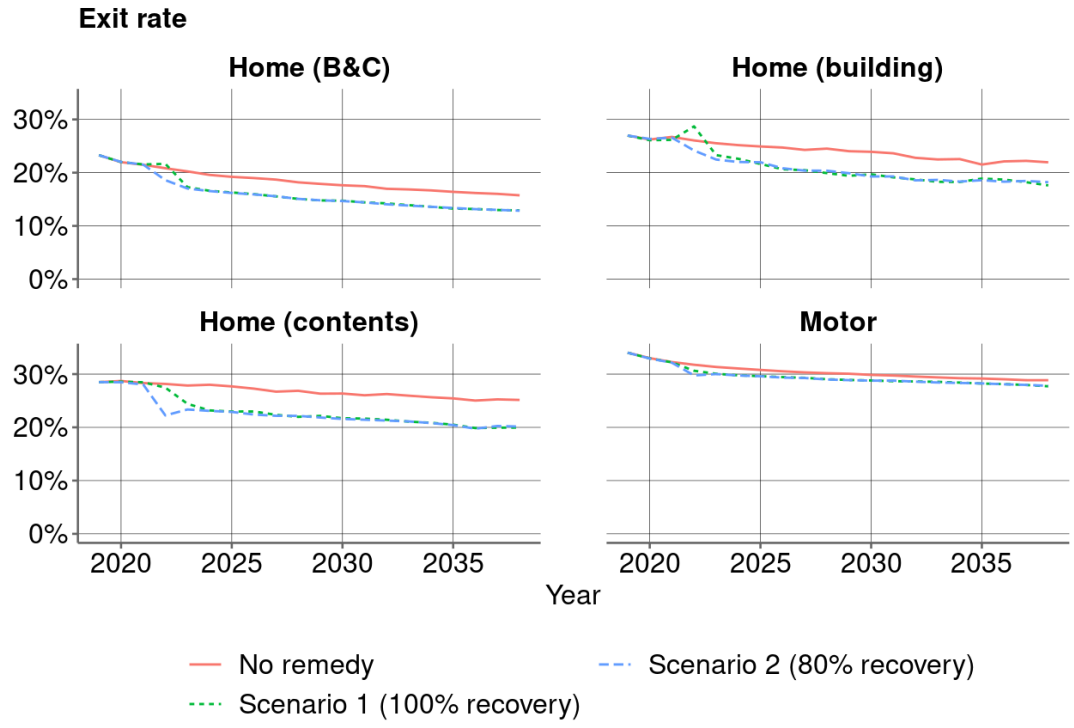
3.19 Our simulation model also predicts switching rates in the market, as a function of various contract parameters including the premium paid (see Section 2 for more detail). Figure 14 shows the predicted mean 'exit rate' for different tenures in 2033. For the three home insurance markets, the baseline exit rate is noticeably higher than the remedy exit rate in earlier tenure years. The pattern is less clear in later tenure years. Since most consumers are in early tenure years, this translates into a much lower average switching rate under the remedy. For the motor market, there is no meaningful difference between exit rates under the baseline and the remedy.

Figure 14: Exit rates by tenure, for baseline and remedy scenarios



3.20 Figure 15 shows the mean exit rate over time. Under the remedy (especially Scenario 1), there is an initial increase in switching rates in 2022, when the remedy first comes into force. This is due to a predicted response to premium increases for customers in early years of tenure, some of which will see a premium increase that is larger than the one they would have faced under the baseline.

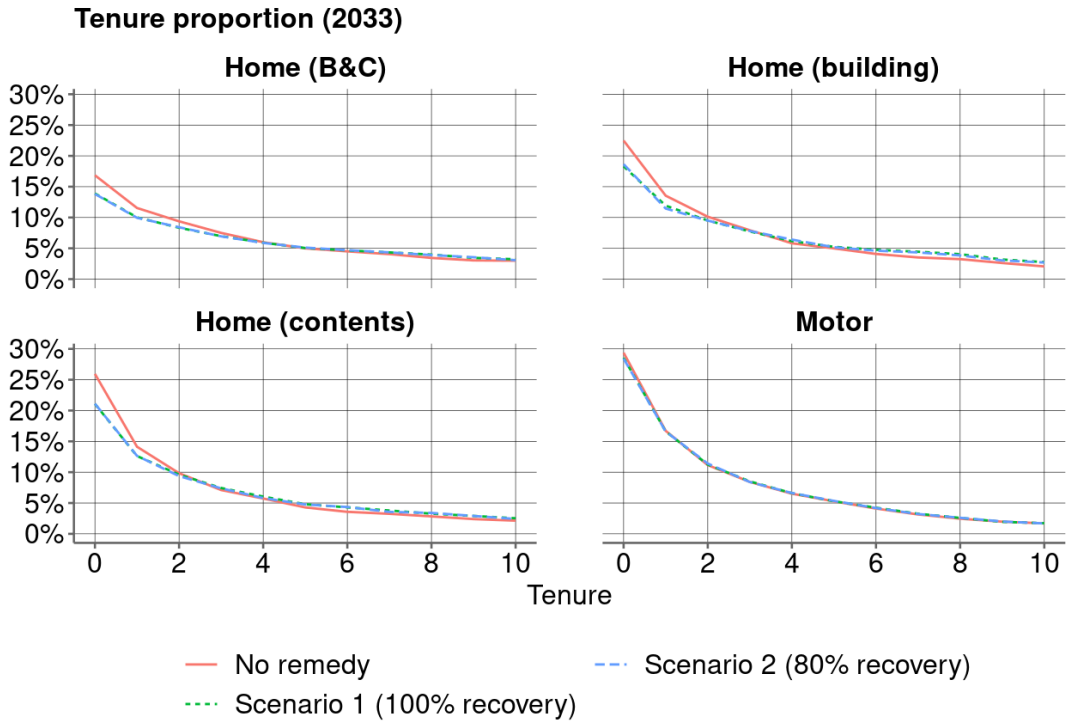
Figure 15: Exit rates over time, for baseline and remedy scenarios



3.21 As expected, the overall trend in home insurance markets is lower exit rates after the remedy comes into force. The differences are especially pronounced in the home building and home contents insurance markets, with around 5 percentage points decreases in switching – equivalent to between a quarter and a third reduction in overall switching. In the motor market, the simulation does not predict such a reduction in switching.

3.22 One consequence of a reduction in switching in the home insurance markets is that the average tenure length will go up. Figure 16 graphically shows the distribution of consumers over tenures under the baseline and the remedy. As expected, the proportion of consumers in tenure years 0 and 1 goes down under both remedy scenarios. In the motor market, we do not predict a difference; in this market new contracts (tenure 0) continue to account for around 30% of contracts in the market.

Figure 16: Tenure distribution, for baseline and remedy scenarios



Appendix A: Model estimates

ECC prediction model

1. For our functional form, we use an Autoregressive model (AR(1)) using logarithmic terms, with additional dummies as described above.

$$log(ECC_t) \sim log(ECC_{t-1}) + qECC_{t-1} + firm + tenure_t$$

2. We then estimate this model using OLS. The below table shows the results for the parameters except the firm, tenure and quartile fixed effects.

	Estimate	Std. Error	t value	Pr(>|t|)
Home (building)				
(Intercept)	0.9068	0.0116	77.8823	<0.0001
$log(ECC_{t-1})$	0.7432	0.0026	289.3693	<0.0001
Home (contents)				
(Intercept)	0.5102	0.0081	62.9297	<0.0001
$log(ECC_{t-1})$	0.8541	0.0020	418.4339	<0.0001
Home (building & contents)				
(Intercept)	1.8924	0.0084	225.8467	<0.0001
$log(ECC_{t-1})$	0.5092	0.0013	398.4032	<0.0001
Motor (all)				
(Intercept)	1.3193	0.0327	40.3016	<0.0001
$log(ECC_{t-1})$	0.7256	0.0009	808.219	<0.0001

Premium prediction model

4. We use a log-log model to predict how firms will set prices.

$$log(Premium_t) \sim log(Premium_{t-1}) + log(ECC_t) + log(ECC_{t-1}) + qPremium_{t-1} + firm + tenure_t$$

5. We then estimate this model using OLS. The outputs of this result are shown below, with the exception of the firm, tenure and quartile fixed effects.

	Estimate	Std. Error	t value	Pr(>|t|)
Home (building)				
(Intercept)	0.3197	0.0110	29.3001	<0.0001
$log(Premium_{t-1})$	0.8182	0.0024	342.0160	<0.0001
$log(ECC_{t-1})$	-0.0825	0.0011	-77.3287	<0.0001
$log(ECC_t)$	0.1712	0.0011	161.7156	<0.0001
Home (contents)				
(Intercept)	0.2410	0.0076	31.5747	<0.0001
$log(Premium_{t-1})$	0.8556	0.0017	492.7352	<0.0001
$log(ECC_{t-1})$	-0.1506	0.0007	-213.8192	<0.0001
$log(ECC_t)$	0.2216	0.0007	316.3107	<0.0001
Home (building & contents)				
(Intercept)	0.1893	0.0062	30.2908	<0.0001
$log(Premium_{t-1})$	0.8655	0.0011	815.9747	<0.0001
$log(ECC_{t-1})$	-0.0983	0.0004	-232.8325	<0.0001
$log(ECC_t)$	0.1844	0.0004	445.9166	<0.0001
Motor (all)				
(Intercept)	0.5131	0.0222	23.12878	<0.0001
$log(Premium_{t-1})$	0.6568	00.0006	1028.3893	<0.0001
$log(ECC_{t-1})$	-0.2907	0.0004	-812.2913	<0.0001
$log(ECC_t)$	0.5338	0.0003	1832.9862	<0.0001

7. How firms set prices varies by firm, but from the results we can see that:
   - The previous premium is the best predictor of the new premium
   - Current ECC is a good predictor of the new premium, indicating that firms react to changes in ECC by changing prices.
   - Previous ECC is also a good predictor, with the sign in the other direction. This indicates that firms are not substantially smoothing changes to ECC over time.
   - Tenure and firm dummies are also important, showing that each of the above factors are mediated by firm and tenure effects.