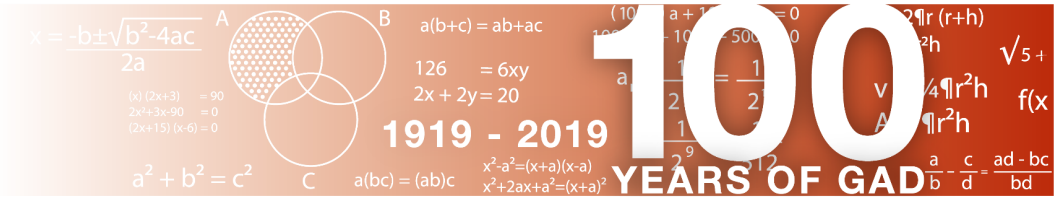
Government Actuary's Department



Vnuk Impact Analysis

Combined Report

23 August 2019

Matt Kirkpatrick

Contents

Overview

The Government Actuary's Department has been working with the Department for Transport to investigate the potential impact in the United Kingdom of a judgment by the European Court of Justice regarding compulsory motor insurance. This report combines all of the analysis that has been carried out since 2017, including an external peer review by Grant Thornton UK LLP.

Purpose

1.1 This report has been prepared by the Government Actuary's Department ('GAD') at the request of the Department for Transport ('DfT'). The report provides a single document which contains all of the analysis carried out by GAD between 2017 and 2019 exploring the potential impact of the 2014 judgment by the European Court of Justice regarding compulsory motor insurance (the 'Vnuk judgment'). This report also contains documentation relating to an external peer review of the work by Grant Thornton UK LLP ('GT').

1.2 The purpose of creating a combined report is to help DfT to share information on the United Kingdom's ('UK') analysis of the Vnuk judgment. GAD understands that DfT intends to distribute this report to other government departments and partners in the European Union. GAD will separately provide written permission to DfT that specifies who the report may be shared with and the conditions that must be met when sharing the advice.

1.3 Other than DfT, no person or third party is entitled to place any reliance on the contents of this report, except to any extent explicitly stated herein. GAD has no liability to any person or third party for any action taken or for any failure to act, either in whole or in part, on the basis of this report.

Executive Summary

Background

1.4 On 13 August 2007 an accident occurred whereby Mr Vnuk, a worker on a farm in Slovenia, was injured as a result of being knocked off a ladder by a trailer attached to a tractor which was reversing across the farm. The pertinent facts of the incident are that i) the farm was on private property and ii) compulsory insurance had been purchased for the tractor in order to comply with national law in Slovenia, which was designed to satisfy the requirements of the European Commission's Motor Insurance Directive ('MID').

1.5 Mr Vnuk brought a claim for damages against the insurance company which had provided the compulsory motor insurance policy. The claim was initially rejected by the Slovenian courts but in 2014 the case was referred to the European Court of Justice which ruled in favour of Mr Vnuk.

1.6 As a result of the Vnuk judgement, the UK's current interpretation of the MID may no longer be correct. Current domestic legislation, the Road Traffic Act (1998), requires motor vehicles used "on a road or other public place" to have unlimited insurance cover for third party bodily injury losses ('TPI' claims), and a minimum of £1.2m cover for third party property damage losses. It does not require motor vehicles to be insured for incidents that occur on private land. A motor vehicle is defined as being "a mechanically propelled vehicle intended or adapted for use on the roads".

1.7 In the UK, any insurer providing compulsory third party liability insurance must be a member of the Motor Insurers' Bureau (MIB) which provides compensation to victims of uninsured and untraced drivers. A levy is charged to members to cover these costs.

1.8 DfT asked GAD to consider the impact of five potential courses of action following the Vnuk ruling:

Option 1a - Comprehensive Option with unlimited TPI liability: To modify domestic legislation to comply with the new interpretation of the MID. This would mean extending compulsory insurance to cover additional types of vehicle and to also cover the use of vehicles whilst on private land. Please see 1.10 of the 'Original Vnuk impact analysis' section for further details on the implications of this option on different vehicle categories.

Option 1b - Comprehensive Option with limited TPI liability, MID minimum scenario: In addition to the modifications described in option 1a, further modify legislation to remove the requirement to provide unlimited liability for TPI claims, and instead replace it with a defined upper limit.

The level of the cap is based on the minimum amount as set out in the Motor Insurance Directive. The cap is prescribed in Euros. This has been converted to Sterling. This gives a cap of £1.1m per claimant and £5.3m per claim. Please see 4.7 to 4.11 of the 'Effect of introducing a cap on third party bodily injury claims' section for further details.

Option 1c - Comprehensive Option with limited TPI liability, £5m / £10m scenario: In addition to the modifications described in option 1a, further modify legislation to remove the requirement to provide unlimited liability for TPI claims, and instead replace it with a defined upper limit of £5m per claimant and £10m per claim.

Option 1d - Comprehensive Option with limited TPI liability, £25m / £50m scenario: In addition to the modifications described in option 1a, further modify legislation to remove the requirement to provide unlimited liability for TPI claims, and instead replace it with a defined upper limit of £25m per claimant and £50m per claim.

Option 2a - Amended Option with unlimited TPI liability: To modify the Road Traffic Act to comply with the proposals by the European Commission, in anticipation that the MID will be amended in the near future. Coverage would only be required to the extent that the vehicles operate on a road or other public place. The vehicles impacted are generally contained in the Miscellaneous vehicle category and include electric bikes and mobility scooters. Please see 1.9 of the 'Original Vnuk impact analysis' section for further details.

Results

1.9 There have been several iterations of GAD's analysis since 2017 which can be followed by referring to the Analysis Chronology section. The estimates below are the latest estimates requested by DfT and include the updated UK Motor Sport exposure considered in the analysis presented in March 2019. GT peer reviewed the analysis on the 10 July 2019 and concluded that "GAD's methodology and assumptions as described in the GAD Report are reasonable and fit for purpose given the data and information available". Please refer to the 'External Peer review by Grant Thornton UK LLP' section for further details.

1.10 The table below summarises GAD's estimate of the additional premiums which would be charged to supply Road Traffic Act compliant policies under the options. These figures are a forecast for the 2018 calendar year, which means that they include an allowance for exposure and claim trends (such as inflation) up to this date.

1.11 There is considerable uncertainty in the estimates presented below. This uncertainty is illustrated throughout the report using a range of sensitivity tests and is discussed briefly below.

Vehicle Category	Change in premium costs for the UK 2.5% PIDR (£m)				
	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a
	Comprehensive Option Unlimited TPI Liability *(With Motor Sports adj.)*	**Comprehensive Option Limited TPI Liability MID minimum scenario** *(With Motor Sports adj.)*	**Comprehensive Option Limited TPI Liability £5m/£10m** *(With Motor Sports adj.)*	**Comprehensive Option Limited TPI Liability £25m/£50m** *(With Motor Sports adj.)*	**Amended Option Unlimited TPI Liability** *(With Motor Sports adj.)*
Existing - Motorcars	1,227	-902	-167	809	0
Existing - Motorcycles	65	-34	3	48	0
Existing - Business Vehicles	105	-312	-213	-82	0
Motor Sports	458	358	371	395	0
Other Business	198	145	155	184	0
Miscellaneous	8	7	8	8	7
Total (PIDR 2.5%)	**2,060**	**-737**	**157**	**1,363**	**7**
Impact of the option if PIDR was 1%					
Total (PIDR 1%)	**2,305**	**-1,320**	**-223**	**1,243**	**7**

1.12 The figures presented above were produced on a best estimate basis with no allowance for prudence or optimism and under the personal injury discount rate (PIDR) applicable at the time of the analysis. The PIDR directly impacts the level of compensation received by claimants. On the 5th August 2019 the PIDR changed from -0.75% to -0.25% in England and Wales. The PIDR in Scotland is -0.75% and is currently under review. The PIDR in Northern Ireland is 2.5%.

1.13 A lower PIDR directly causes higher claim settlements and, consequently, an increase in premiums. At the time the analysis was produced there was uncertainty concerning the future PIDR which was then under review. To help illustrate the uncertainty, GAD provided an estimate of the impact of the options based on a 1% PIDR. On a 1% PIDR basis larger savings are made when TPI liabilities are limited at the same fixed amounts. This is because a higher number of cases would be expected to exceed the cap.

1.14 The extension of compulsory insurance cover, option 1a, would increase premium costs for the UK by £2,060m on a 2.5% PIDR basis. The majority of the increased costs, £1,227m, would be borne by existing motorcar policy holders. A linear extrapolation of the figures presented above indicates that the total additional UK premium under option 1a on a -0.25% PIDR could be approximately 20% higher. The use of linear extrapolation cannot be used to provide approximate estimates for options that include TPI limits.

1.15 The extension to private land creates two additional sources of loss for insurers – legitimate claims due to increased exposure on private land, and new fraudulent claims. Under option 1a, the additional costs for existing Motorcars and Motorcycles due to fraud are expected to be £743m and £41m respectively on a 2.5% PIDR basis. This represents approximately 60% to 65% of the additional costs.

1.16 Under option 1b, the impact of the ruling on UK premiums would be a decrease of £737m on a 2.5% PIDR basis. Approximately 325 UK claims each year would be expected to exceed the limits based on a 2.5% PIDR. In this case the savings to UK premiums due to the introduction of the limits would exceed the increase to UK premiums due to the extended cover implemented following the ruling.

1.17 Under option 1c, the impact of the ruling on UK premiums would be an increase of £157m on a 2.5% PIDR basis. The higher limits would mean fewer claims would be expected to exceed the limits, approximately 75 claims each year based on a 2.5% PIDR. As a consequence, the increase to UK premiums as a result of the extended cover implemented following the ruling would exceed any savings to UK premiums due to the introduction of the limits under this option.

1.18 Under option 1d, the impact of the ruling on UK premiums would be an increase of £1,363m on a 2.5% PIDR basis. The higher limits would mean even fewer claims would be expected to exceed the limits, approximately 10 claims each year based on a 2.5% PIDR. The increased limits would further reduce savings to UK premiums.

1.19 Consideration should be given to the parties that would be liable for any costs beyond the limits of the insurance contract. The savings would be made to premiums and the cost would be incurred elsewhere. Furthermore, if limits were introduced insurance providers could offer cover beyond the minimum prescribed limits.

1.20 The impact of the ruling under option 2a is far less material, an increase of £7m. This would be borne by the owners of Miscellaneous vehicles.

Assumptions and Uncertainty

1.21 In order to assess the costs associated with the new risks as a result of the judgement GAD has made a number of assumptions about the losses that may arise, and how the insurance industry may develop suitable products.

1.22 Where possible, GAD has based these assumptions on relevant evidence which we were able to obtain during the course of the project. This may be quantitative data provided by the market participants, qualitative data from industry experts, or broader research which has been provided to GAD. In the absence of these data sources, we have used our judgement to guide our assumptions. Consequently, the estimates presented in this report are subject to a high-level of uncertainty. Actual future experience could differ to the assumptions selected as part of this analysis.

1.23 The sensitivities of the assumptions subject to the largest uncertainty under option 1a, as illustrated in 1.18 and Appendix A of the 'Original Vnuk impact analysis section, are described below. These estimates pre-date the adjustment from the update of the UK Motor Sport exposure.

- Increased claim frequency due to the extension of cover to private land – alternative reasonable estimates indicate the total additional UK premium (2.5% PIDR) could be 24% higher or 22% lower.

- Increased claim frequency due to the extension of fraud on private land – alternative reasonable estimates indicate the total additional UK premium (2.5% PIDR) could be 62% higher or 43% lower.

1.24 As demonstrated by these sensitivities, alternative reasonable assumptions could produce very different results. The figures have been presented in £m to allow the reader to consider the implications for all vehicle categories. When evaluating the results consideration should be given to spurious accuracy. For example, a sensible conclusion when considering the impact to UK premiums under Option 1a would be an estimate of around £1bn to £3bn of additional premiums on a 2.5% PIDR basis.

Analysis Chronology

This report contains the following documents:

- Original Vnuk impact analysis (August 2017)

  This document describes the data, methodology and assumptions underlying the original model that GAD built to help explore the potential costs of the Vnuk Judgment. As well as providing a central estimate of costs, there is extensive work highlighting the uncertainties surrounding this figure.

- Effect of introducing a cap on third party bodily injury claims (December 2017)

  DfT subsequently commissioned GAD to estimate the impact on our analysis if compulsory motor insurance was further modified to remove the requirement to provide unlimited liability for third party bodily injury claims, and instead replace it with a defined upper limit. This document explores the potential effects of such a change.

- Effect of increasing motor sports exposure (March 2019)

  In the most recent analysis performed by GAD, DfT requested that the assumptions relating to motor sport activity in the UK were revisited. This reflected new research that suggested the amount of unlicensed activity was higher than originally anticipated.

  This document also included additional analysis relating to the Personal Injury Discount Rate, a key assumption that underlies our work. In our original analysis the data underlying our model corresponded to a period of time when this rate was +2.5% p.a.[1]. However, when the work was carried out the rate had recently been revised to -0.75% p.a in England. In our original report we performed a sensitivity test to assess the potential impact of this change on our work. This memo carried out a further sensitivity test to assess the impact if the rate was +1.0% p.a.

[1] Noting that the Personal Injury Discount Rate is defined as a margin above or below the Retail Prices Index

We further note that at the time of creating this combined report the rate has been changed to -0.25% p.a in England.

- External Peer review by GT (July 2019)

  DfT has arranged for all three phases of GAD's work to be peer reviewed by GT. This document summarises the results of GT's review, including their key conclusion and a list of the peer review observations ranked as 'high', 'medium' and 'low'.

- GAD's response to the external peer review (July 2019)

  This document sets out GAD's responses to the peer review points raised by GT. The response focuses on the 'high' ranked review points and includes further sensitivity testing to assess the potential effects of changes to the model.

Format of this report

In order to avoid unnecessary duplication between the documents describing GAD's work we did not repeat the text describing our methodology and assumptions where these had not been adjusted. This allowed each document to focus on the key changes made during that phase of the analysis. This combined report contains each document reproduced in full.

As a result of this approach, all documents should be considered as components of a larger, aggregated report. As such, all of the documents should be considered in their entirety - individual sections, if considered in isolation, may be misleading and conclusions reached by review of some sections on their own may be incorrect. The documents taken in aggregate provide all the detail that is needed.

We draw your attention to the limitations and reliance restrictions which were described in our original report and which also apply to this document. Please see paragraphs 2.15 to 2.20 of our original for details of the limitations that apply. In particular, we would note that:

- The report has been prepared for the exclusive use of DfT. Other than DfT no person or third party is entitled to place any reliance on the contents of this report.

- The report must not be reproduced, distributed or communicated in whole or in part without GAD's prior written permission.

- Calculations are based on data and research available at the time of the analysis. For example, the original report was based on data and research available between January and June 2017.

Our analysis and advice to DfT has been carried out in accordance with the applicable Technical Actuarial Standard: TAS 100 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.

Original Vnuk impact analysis

August 2017

Government Actuary's Department

Vnuk Impact Analysis

Date: 29 August 2017

Author: Matt Kirkpatrick

Reviewer: Ian Rogers

Contents

1 Executive summary

Introduction

1.1 This report has been prepared by the Government Actuary's Department ('GAD') at the request of the Department for Transport ('DfT'). The purpose of the report is to provide an estimate of the potential costs to private individuals and businesses of extending the scope of compulsory motor insurance in the United Kingdom. These considerations are a result of a judgement in the European Court of Justice in 2014 (the 'Vnuk judgement').

1.2 As a result of the Vnuk judgement, the UK's current interpretation of the Motor Insurance Directive may no longer be correct. In particular:

- more vehicles may be required to purchase a compulsory third party liability insurance policy
- compulsory insurance may need to be extended to private land

1.3 DfT have asked us to consider two potential courses of action. The first, which we refer to as the 'Comprehensive option' is to modify domestic legislation to comply with the new interpretation of the Motor Insurance Directive. This would mean extending compulsory insurance to cover additional types of vehicle and also the use of vehicles whilst on private land. The second, which we refer to as the 'Amended option' only considers modifying legislation to include the additional types of vehicle to the extent that they are used on a road or other public place.

Methodology

1.4 Following discussion with DfT we have organised our analysis to consider the impact of the Vnuk judgement on four categories of vehicle. These vehicle categories are:

- Existing - Vehicles that are already within the scope of the Road Traffic Act.
- Motor Sports - Vehicles participating in racing events. Such events take place on private land, or roads which have been temporarily closed to the public, and participants are therefore not subject to the current Road Traffic Act.
- Other Business - Vehicles used to carry out business activities which are not already subject to the Road Traffic Act. This category includes construction and agricultural vehicles such as fork lift trucks and tractors.
- Miscellaneous - All other vehicles that would be brought within scope as a result of the broader definition arising from the Vnuk judgement. This includes mobility scooters and electrically assisted pedal cycles.

1.5 In order to quantify the effect of the Vnuk judgement on each of these categories, we have first constructed a model for private motorcar losses under the existing legislation in the United Kingdom. We have chosen private motorcars as this is where the greatest amount of public information is available to assist with parameterisation and validation of the model.

1.6 Having constructed this base model, we make a series of adjustments so that it is appropriate for each of the new vehicle categories under consideration, and also to consider the effects of extending coverage to private land. The information available to support these adjustments varies depending on the vehicle category under consideration. In some cases we were able to analyse historical data or consult with industry specialists to help guide the adjustment. In other cases, information has been limited and a greater reliance has been placed on our judgement.

Estimated impact of the Vnuk judgement

1.7 The table below summarises our estimate of the additional premiums which would be charged to supply Road Traffic Act compliant policies under both the Amended and Comprehensive options. These figures are a forecast for the 2018 calendar year, which means that they include an allowance for exposure and claim trends (such as inflation) up to this date.

	Additional premium costs for the UK (£m)	
Vehicle Category	**Amended Option**	**Comprehensive Option**
Existing - Motorcars - Extension to private land	0	484
Existing - Motorcars - Additional fraud	0	743
Existing - Motorcycles - Extension to private land	0	23
Existing - Motorcycles - Additional fraud	0	41
Existing - Business Vehicles - Extension to private land	0	105
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	0	229
Other Business	0	198
Miscellaneous	7	8
Total	7	1,831

Table 1.1: Additional premiums associated with each option, £m. These figures are for the 2018 calendar year.

1.8 The table shows that our estimate of the premium that would be charged to implement the Vnuk judgement in the 2018 calendar year is £7m for the Amended option and £1,831m for the Comprehensive option.

1.9 The cost of the Amended option is relatively small as only a small number of new vehicle types would be affected. In particular:

> Existing vehicles are, by definition, already included within the scope of domestic legislation and are therefore not impacted by Amended option.

> Motor Sports vehicles typically take part in races which are on private land or roads which are closed to the public. Whilst there may be specific circumstances where insurance coverage would be required under the Amended option, the vast majority of races would not be affected.

> Also by definition, Other Business vehicles are those which typically do not use public roads and in the vast majority of cases would be unaffected by the changes.

> This leaves the Miscellaneous vehicles category which includes electric bikes and mobility scooters. Both of these vehicle types are used on public roads and would therefore be required to purchase compulsory third party liability insurance.

1.10 The cost of the Comprehensive option is significantly higher as each category of business is affected:

> Existing vehicles will need to purchase an enhanced policy which provides additional cover whilst operating the vehicle on private land. The extension to private land creates two additional sources of loss for insurers – legitimate claims due to increased exposure on private land, and new fraudulent claims as existing systems may struggle to cope with the change in cover.

> Motor Sports vehicles would now be required to purchase a third party policy in order to compensate other race drivers, spectators and stewards who are injured as a result of racing accidents where the driver is held liable. The nature of racing activities means that severe third party bodily injuries are more likely to occur, and this is a major driver of the premium that would be charged. Currently the event organiser purchases more limited public liability insurance which covers spectators and stewards only. We assume that this would no longer be purchased (as the enhanced motor policy would provide more generous cover) and we allow this saving to offset the cost of the new policies. Unlike the existing vehicles category, we also assume that fraud is a negligible risk for motor sport vehicles.

> Other Business vehicles, which includes agricultural and construction vehicles, would now be required to purchase a third party liability policy to provide compensation for accidents that occur on the private land on which they operate. Existing employers' liability policies cover bodily injury losses arising from these vehicle types, typically up to a limit of £10m, and we have allowed for this within our calculations. Fraud is assumed to be negligible for business vehicles.

> The majority of costs in the Miscellaneous vehicles category are attributed to mobility scooters and electric bikes which were also considered under the Amended option. Costs are greater again under the Comprehensive option as other types of vehicles, for example golf buggies, would now be within scope. Given the small size of premiums associated with this category, we have not made an explicit assumption regarding fraud.

1.11 The average additional cost per premium can be calculated by dividing the information in table 1.1 by the estimated number of policyholders. The results of this calculation are shown in the table below:

	Average additional premium per policy (£)	
Vehicle Category	**Amended Option**	**Comprehensive Option**
Existing - Motorcars - Extension to private land	0	19.36
Existing - Motorcars - Additional fraud	0	29.71
Existing - Motorcycles - Extension to private land	0	32.24
Existing - Motorcycles - Additional fraud	0	57.52
Existing - Business Vehicles - Extension to private la	0	27.38
Existing - Business Vehicles - Additional fraud	0	0.00
Motor Sports *	0	457.70
Other Business	0	159.49
Miscellaneous	16.93	16.93

* premium is given for 1 'ride'. A participant may have multiple rides in a year

Table 1.2: Additional premium (per policy) associated with each option, £. These figures are for the 2018 calendar year.

Derogation

1.12 We have also considered the impact of certain vehicle types being derogated. This removes the requirement for compulsory insurance to be purchased, but any subsequent third party losses must be paid by the Motor Insurers' Bureau ('MIB').

1.13 The MIB is funded by a levy on insurers who write compulsory third party liability for motor vehicles under the existing legislation. Whilst the MIB will look to recover their costs from the responsible party, any amounts which cannot be recovered will be funded from the levy. We have assumed that any increase in the levy as a result of derogation will ultimately be passed on to businesses and members of the public via higher premiums for compulsory third party liability policies.

1.14 We have assumed that the MIB will only require additional funding to meet the cost of claims and any associated expenses. This contrasts to a commercial insurance premium which would be higher as it includes additional loadings for items such as profit and insurance premium tax.

1.15 The table below shows the total levy that the MIB would require if the Comprehensive option is pursued and all of the new vehicles impacted by the Vnuk judgement are derogated. The table also shows the increase in the average consumer's premium.

Vehicle Category	Additional levy required (net of recoveries)	
Derogated	Total levy (£m)	Levy per policy (£)
Motor Sports	148	5.00
Other Business	128	4.32
Miscellaneous	6	0.19
Total	281	9.51

Table 1.3: Additional levy required by the MIB in the 2018 calendar year to fund derogations under the Comprehensive option. Both the total levy (£m) and the levy per policy (£) are shown.

1.16 We highlight that the total levy required for derogating each vehicle category (table 1.3) is less than the corresponding cost of purchasing insurance policies (table 1.1). This is because the MIB, unlike a commercial insurer, is not required to make a profit or hold capital to guard against unusually large losses.

Uncertainty

1.17 The Vnuk judgement is concerned with motor risks where existing insurance is limited or non-existent. As a result of exploring these new risks, relevant information is often limited or unavailable and this creates significant uncertainty. In order to capture and quantify these uncertainties we have taken the following steps:

- Key assumptions have been captured in a log which categorises the supporting evidence as poor, acceptable or good.
- The materiality of each key assumption has been assessed by considering reasonable high and low alternative assumptions, and calculating the impact on the expected cost of implementing the Vnuk judgement. Materiality is categorised as low (less than a 5% impact on our cost estimates), medium (an impact of between 5% and 25%) and high (an impact of greater than 25%).

1.18 The results of our uncertainty analysis are shown in the table below:

Assumption	Alternative assumptions	Reasonable low	Selected	Reasonable high	Evidence quality (good / acceptable / poor)	Materiality (low / medium / high)
Core model – upper limit for TPI claims	Assumption	£30m	£52m	£100m		
	Result (£m)	£1,818m	£1,831m	£1,942m		
	% change	-1%	0%	6%		
Core model – correlation between TPI and TPD losses	Assumption	0%	25%	50%		
	Result (£m)	£1,829m	£1,831m	£1,833m		
	% change	0%	0%	0%		
Core model – return on capital	Assumption	3%	6%	12%		
	Result (£m)	£1,792m	£1,831m	£1,911m		
	% change	-2%	0%	4%		
Existing Vehicles – claim frequency for motorcycles	Assumption	0%	84%	150%		
	Result (£m)	£1,802m	£1,831m	£1,851m		
	% change	-2%	0%	1%		
Existing Vehicles – increased claim frequency due to extension to private land	Assumption	0%	5%	10%		
	Result (£m)	£1,426m	£1,831m	£2,264m		
	% change	-22%	0%	24%		
Existing Vehicles – increased claim frequency due to fraud on private land	Assumption	0%	10%	25%		
	Result (£m)	£1,047m	£1,831m	£2,961m		
	% change	-43%	0%	62%		
Motor Sports Vehicles – upper limit for TPD claims	Assumption	£50m	£125m	£200m		
	Result (£m)	£1,804m	£1,831m	£1,861m		
	% change	-2%	0%	2%		
Other Business Vehicles – additional exposure uplift	Assumption	0%	5%	10%		
	Result (£m)	£1,822m	£1,831m	£1,841m		
	% change	-1%	0%	1%		
Miscellaneous Vehicles – additional exposure uplift	Assumption	0%	5%	10%		
	Result (£m)	£1,831m	£1,831m	£1,832m		
	% change	0%	0%	0%		
Core model - Potential impact of Ogden discount rate changes	Assumption	n/a	+2.5%	-0.75%		
	Result (£m)	n/a	£1,831m	£2,318m		
	% change	n/a	0%	27%		

Table 1.4: Summary of uncertainty analysis

2 Introduction

Compulsory motor insurance in the UK

2.1 The European Union ('EU') has adopted a number of items of legislation regarding motor insurance, the most recent of which is Directive 2009/103/EC (the 'Motor Insurance Directive'). Individual Member States of the European Union are responsible for incorporating this Directive into their own national law.

2.2 In Great Britain, the Road Traffic Act (1998) is the domestic legislation which incorporates the Motor Insurance Directive. The Road Traffic Act includes the following key features:

- third party liability insurance is compulsory when a motor vehicle is used "on a road or other public place"
- a motor vehicle is defined as being "a mechanically propelled vehicle intended or adapted for use on the roads"
- the insurance must provide unlimited cover for third party bodily injury losses, and a minimum of £1.2m cover for third party property damage losses
- any insurer providing compulsory third party liability insurance must be a member of the MIB which provides compensation to victims of uninsured and untraced drivers

2.3 Separate legislation is in place for Northern Ireland. This is the Road Traffic (Northern Ireland) Order (1981). Whilst the exact language used in this legislation differs from the Road Traffic Act, we understand that the key features of the Road Traffic Act are also part of the Road Traffic Order. Our modelling, which assesses the impact of the Vnuk judgement across the whole of the United Kingdom ('UK'), therefore does not distinguish between Northern Ireland and the rest of the UK.

The Vnuk Judgement

2.4 On 13th August 2007 an accident occurred whereby Damijan Vnuk, a worker on a farm in Slovenia, was injured as a result of being knocked off a ladder by a trailer attached to a tractor which was reversing across the farm. The pertinent facts of the incident are that i) the farm was on private property and ii) compulsory insurance had been purchased for the tractor in order to comply with national law in Slovenia, which was designed to satisfy the requirements of the Motor Insurance Directive.

2.5 Mr Vnuk brought a claim for damages against the insurance company which had provided the compulsory motor insurance policy. The claim was initially rejected by the Slovenian courts but in 2014 the case was referred to the European Court of Justice who ruled in favour of Mr Vnuk.

2.6 As a result of this judgement, the UK's previous interpretation of several key aspects of the Motor Insurance Directive no longer appears to be correct. In particular:

- more vehicles may be required to purchase a compulsory third party liability insurance policy

- compulsory insurance may need to be extended to include private land

We highlight that the Vnuk judgment does not affect any of the other key features of compulsory motor insurance in the UK which were highlighted in paragraph 2.2. In particular, a valid insurance policy must still provide cover for third party bodily injury and third party property damage claims.

2.7 The European Commission (the executive arm of the EU which takes decisions on political and strategic direction) has issued an Inception Impact Assessment on the case. This indicated that the judgment was unexpected and proposed high level amendments to the Motor Insurance Directive which would clarify that use of vehicles on private land would not be within the scope of the Directive. The broader definition of vehicles would not be affected.

2.8 As a result of the European Commission's Inception Impact Assessment there is uncertainty about whether the Motor Insurance Directive will remain in its current form or be subject to changes in the near future. As a result of this uncertainty, both options have been considered in our work.

Scope

2.9 DfT issued an Impact Assessment on 20 September 2016 which considered the following three options:

- Do not modify the existing legislation. This was given as a baseline option for comparison only.
- Modify the Road Traffic Act to comply with the proposals by the European Commission, in anticipation that the Motor Insurance Directive will be amended in the near future. This would mean only extending coverage to a wider category of vehicles. In line with the existing Road Traffic Act, this coverage would only be required to the extent that the vehicles operate on a road or other public place. In our report we refer to this as the 'Amended option'.
- Modify the Road Traffic Act to comply with the new interpretation of the Motor Insurance Directive following the Vnuk ruling. This would mean extending coverage to private land and a wider category of vehicles. In our report we refer to this as the 'Comprehensive option'.

2.10 During December 2016 DfT commenced a technical consultation in order to gather evidence relating to the impact of the Vnuk judgement on the insurance industry and other interested stakeholders. This consultation closed on 13 April 2017 and DfT have shared relevant aspects of the consultation response with GAD.

2.11 The purpose of this report is to consider the costs to private individuals and businesses of having to purchase compulsory insurance that would satisfy the revised Road Traffic Act under both the Amended and Comprehensive options. This is calculated by first considering the expected loss cost (i.e. the additional losses that would occur as a result of the changes) and then making various adjustments to determine a commercial premium which would be charged to the purchaser of the insurance. The costs presented in this report are for the 2018 calendar year.

2.12 We have also considered the impact on private individuals and businesses of certain vehicle types being derogated. This removes the requirement for compulsory insurance to be purchased with any subsequent third party losses paid by the MIB in the first instance. The MIB is funded by a levy on insurers writing compulsory third party liability motor insurance, and we have assumed that this levy is passed on to existing consumers via increased premiums.

2.13 The United Kingdom is in the process of leaving the European Union. However, whilst this process is ongoing the United Kingdom remains a Member State and will continue to implement and apply EU legislation such as the Motor Insurance Directive. This report does not consider any changes that may take place once the United Kingdom has left the EU.

Assistance

2.14 In the course of our work we have met with a number of organisations to better understand various aspects of the UK motor insurance market. We would like to extend our thanks to the following organisations who have met with us to share their expertise and views on the challenges of the Vnuk judgement:

- Bikmo Cycling Insurance ('Bikmo') which is a provider of specialist insurance products for cyclists in the UK, including electric power assisted cycles.
- DTW 1991 which is a delegated underwriting syndicate operating in the Lloyd's of London market place. DTW 1991 underwrites a number of specialist insurance products including event insurance for motor sports.
- First Senior Group which is a provider of specialist insurance products for the mobility sector.
- The Association of British Insurers ('ABI') which is a body which represents over 250 insurance companies in the UK. The ABI's remit is to promote best practice, transparency and high standards within the insurance industry and works with regulators and policymakers to achieve these goals.
- The Bicycle Association which is the national body representing the bicycle industry in the UK.
- The Insurance Fraud Bureau ('IFB') which is a not-for-profit company established to lead the insurance industry's collective fight against insurance fraud.
- The Motor Insurers' Bureau ('MIB') provides compensation to victims of uninsured and untraced drivers. It is funded by a levy on UK motor insurers.
- The Third Party Working Party ('TPWP') which is a research group of the Institute and Faculty of Actuaries, the professional body representing actuaries in the United Kingdom.
- The Motor Sports Association ('MSA') which is the governing body for 'four-wheeled' motor sport in the UK which includes rallying, karting, and circuit racing.
- Jardine Lloyd Thompson ('JLT') are a large brokering company that provides assistance to organisations looking to purchase insurance. One of JLT's specialities is in negotiating third party liability insurance for motor sport events.

Reliance and limitations

2.15 This report has been prepared for the exclusive use of DfT. Other than DfT no person or third party is entitled to place any reliance on the contents of this report, except to any extent explicitly stated herein, and GAD has no liability to any person or third party for any act or omission taken, either in whole or part, on the basis of this report.

2.16 This report must be considered in its entirety, as individual sections, if considered in isolation, may be misleading. In particular, conclusions reached by review of a section or sections of the report on an isolated basis may be incorrect.

2.17 This report must not be reproduced, distributed or communicated in part without GAD's prior written permission.

2.18 Our premium calculations are based on available data and research between January 2017 and June 2017. There may be material changes to the UK motor insurance market or underlying economic conditions in the future, and as such the premium should be kept under review.

2.19 The assumptions used are based on the information available to us, which at times is limited due to the emerging nature of the risk. We have supplemented this data with research and judgement, but significant uncertainty remains in our calculations. As a result of this uncertainty and in the absence of an active commercial market for this risk, there is a wide plausible range of alternative premiums. In order to help understand these uncertainties we have carried out a range of sensitivity analysis in Appendix A of this report.

2.20 In line with GAD's internal guidance, the methodology and calculations underlying our work have been overseen by Matt Kirkpatrick who is an Actuary within GAD's Insurance and Investment department. The work has then been subject to a peer review by Ian Rogers who is a Chief Actuary within the same department.

Actuarial Standards

2.21 This work has been carried out in accordance with the applicable Technical Actuarial Standard: TAS 100 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.

3 Model Overview

Introduction

3.1 In order to assess the impact of the Vnuk judgement we have constructed a model that estimates the additional third party liabilities that may arise if either the Amended or Comprehensive options are adopted. This section provides an overview of this model whilst sections 4 to 9 describe individual aspects of the model in greater detail.

Core motor insurance model and extensions

3.2 The starting point for our model is a consideration of third party losses from private motorcars under the existing Road Traffic Act. Using publicly available data we have constructed separate models for third party bodily injury and third party property damage. The construction of these models is described further in section 4.

3.3 The private motorcar models are then extended to include private motorcycles and existing business vehicles which are currently subject to the Road Traffic Act (i.e. business vehicles which are used on public roads). This gives the Existing Vehicles section of our model which is described further in section 5.

3.4 There are a number of additional vehicle types which may be affected by the Vnuk judgement. In addition to the Existing Vehicles described above, we have created three further analysis categories: Motor Sport Vehicles, Business Vehicles and Miscellaneous Vehicles. These categories have been chosen to reduce the heterogeneity of risk types within any single risk category, whilst still allowing meaningful analysis to take place. This approach is summarised in the figure below.

GAD modelling category	Vehicles within category
Existing Vehicles	Private motorcars
	Private motorcycles
	Existing business vehicles
Motor Sport Vehicles	Two-wheeled vehicles
	Four-wheeled vehicles
Other Business Vehicles	Construction vehicles
	Agricultural vehicles
	Fork lift trucks
	Additional uplift (+5%)
Miscellaneous Vehicles	Electrically assisted pedal cycles
	Segways
	Ride-on lawnmowers
	Mobility scooters
	Golf buggies
	Children's toys
	Fairground rides
	Quad bikes
	Additional uplift (+5%)

Figure 3.1: Model overview

3.5 Models for the additional vehicle types are based on the private motorcar models with the following high level adjustments to address differences in risk profiles:

- Motor Sport Vehicles – The frequency of accidents is assumed to be significantly higher than for private motorcars. Furthermore, once an accident does occur it is more likely to result in a severe loss. The realistic worst case scenario is also much higher than for private motorcars. The model for Motor Sport Vehicles is discussed in section 6.
- Other Business Vehicles – We were unable to gather any evidence that supported a change to the frequency and severity assumptions used for private motorcars. We have made adjustments for the overlap with existing Employers' Liability insurance products and the likelihood that the services of a specialist insurance broker will be required. Business Vehicles are discussed in section 7.
- Miscellaneous Vehicles – The frequency of accidents is assumed to be much lower than for private motorcars. Severity is also assumed to be significantly lower, with most accidents resulting in losses of a few thousand pounds. The potential for large losses remains, but these are thought to be much less likely to occur. Other Vehicles are discussed in section 8.

3.6 We note that our modelling approach has been motivated by the data limitations inherent in this project. Where third party liability insurance is currently provided, the detailed data collected by commercial insurers is commercially sensitive and proprietary in nature. Where insurance is not currently offered, only limited data has been recorded and made available for analysis. Access to additional sources of data may mean that alternative modelling approaches become feasible and that a different approach is more appropriate.

3.7 We also note that whilst our analysis categories have been designed to reduce heterogeneity, different types of risk remain in each category.

3.8 Whilst acknowledging these limitations, we consider the model to be appropriate for analysing the potential impacts of the Vnuk judgement.

Statistical distributions and simulation

3.9 For each vehicle category we have created a model by assigning statistical distributions to both:

- the number of claims that will occur (the 'frequency' distribution); and
- the size of each individual claim (the 'severity' distribution')

A statistical distribution means that rather than being a fixed amount, these quantities are able to take a range of values each with certain probabilities. This approach allows an assessment of both the expected (or average) outcome as well as the more extreme loss outcomes. The more extreme loss outcomes are required when considering the commercial premium that an insurer would charge.

3.10 Having chosen the statistical distributions, we take a large number of random samples from them in order to assess what the range of overall losses is likely to be. This approach, which is known as Monte Carlo simulation, works as follows:

> Sample from the frequency distribution. This will give the total number of individual claims that have occurred.

> For each individual claim, sample from the severity distribution to determine the size of that claim.

3.11 The process described above (sampling from the frequency distribution, then for each claim sampling from the severity distribution) is known as a simulation. A single simulation gives a value for the total losses that could occur for that particular vehicle category during the calendar year 2018. In order to assess the range of possible results we perform 10,000 simulations for each vehicle category. The choice of 10,000 simulations strikes a balance between the time taken to run the model whilst generating enough results to be able to accurately assess the range of different outcomes.

Amended and Comprehensive options

3.12 The model includes the functionality to consider the Amended and Comprehensive options separately.

3.13 Under the Amended option (additional vehicles, but not on private land) the third party losses generated from the four analysis categories are affected as follows:

> Existing Vehicles – No change, as this category is defined as vehicles which are already subject to the Road Traffic Act insurance requirements.

> Motor Sport Vehicles – We assume that this category is not impacted as races take place on private land, or public roads which have been closed and the Road Traffic Act requirements are suspended. To the extent that these vehicles are also driven on public roads, they are already captured within the existing vehicles category.

> Other Business Vehicles – Similarly to motor sports vehicles, we assume that there is no impact on this category of vehicles.

> Miscellaneous Vehicles – This category is affected as it contains vehicle types (mobility scooters and electrically assisted pedal cycles) which are used on public roads but which are currently not subject to the Road Traffic Act.

3.14 Under the Comprehensive option (additional vehicles and private land) all four analysis categories are affected, as described below:

> Existing Vehicles – The extension to private land increases the number of third party claims, both through legitimate claims and an increased propensity for fraud.

> Motor Sport Vehicles – These vehicles are now affected as insurance is required when racing on private land or public roads which have been closed. The losses considered include liabilities to other participants, as well as spectators and stewards.

- Other Business Vehicles – The vehicles are also affected as liability may arise to employees and other third parties following an accident on the business premises, which is likely to be private land.
- Miscellaneous Vehicles – In addition to the affects described in the Amended option, additional vehicle types (such as quad bikes and golf buggies) need to be considered under the Comprehensive option.

Derogations

3.15 A derogation is an exemption from a law, which in the context of the Vnuk judgement means exempting one or more of the new vehicle categories from the requirement to purchase compulsory third party liability insurance.

3.16 The model includes the ability to derogate any of the new vehicle categories (i.e. any combination of Motor Sport Vehicles, Other Business Vehicles and Miscellaneous Vehicles). Derogation removes the compulsory requirement for the vehicle owner to purchase third party liability insurance. In the event of an accident, the third party which suffers property damage or bodily injury can claim for compensation from the MIB instead of the owner of the vehicle. The MIB are required to take steps to recover their costs from the responsible vehicle owner, to the extent that they can be traced, proved to be at fault and have sufficient assets to make a payment to the MIB.

3.17 The MIB is currently funded by a levy paid by insurers who underwrite insurance policies which provide third party liability insurance where this is compulsory under the current Road Traffic Act, i.e. the vehicles we have grouped together in the category 'Existing Vehicles'. For the purpose of our model, we have assumed that this will continue to be the case regardless of which policy option is being considered.

Other key features of the model

3.18 The previous paragraphs described the modelling categories we have used and the ability to choose whether or not to derogate each category. In addition to this functionality, our model includes the following features:

- Overlap with other liability insurance products – The potential extensions of compulsory third party motor insurance can result in duplication of insurance cover with existing policies such as event insurance. Our model recognises this by including an option to reduce the costs of implementing the Vnuk judgement to remove this duplication. This is equivalent to assuming that the existing policy will be re-written to exclude the duplication and the cost savings are passed on to the customer.
- Increases in the level of fraud – Our model includes the option to apply a higher frequency of fraudulent claims when considering the Comprehensive option. The principle reasons why fraud may be higher are i) the increased scope for fraudulent claims to be staged on private land, and ii) fraud prevention systems taking time to adapt to any changes in legislation, whilst the fraudsters themselves have proven to be quick to exploit such changes.

- MIB recovery rate – Where the decision is taken to derogate a vehicle type to the MIB, they are required to seek to recover their costs from the party who is responsible for the accident. Our model includes a recovery rate parameter to reflect the amounts received through this recovery process.
- Expense and profitability – Our models initially calculate the expected cost of the third party liability losses from each modelling category. In order to derive a commercial premium which can be charged for this cover, additional loadings need to be added for expenses and the insurer's target profitability.
- Trend analysis for private motorcars – The base model for private motorcars includes an analysis to adjust the underlying data for any trends in claim frequency or severity. The underlying data covers the period 2006 to 2015, and any trends are forecast out to the 2018 year which is the subject of our analysis.

Structure of this report

3.19 The remainder of this report provides a detailed description of how our model has been constructed. These sections are:

- Section 4 – Private Motorcars. This section describes how we have constructed the private motorcar models from publicly available information. These models are referred to as the 'core' models as they are used as the template for our subsequent analysis of the other vehicle types. There are separate models for third party bodily injury and third party property damage.
- Section 5 - Existing Vehicles. The core model is used to calculate the direct impact of the Vnuk judgement on existing vehicles. Principally, this is the extension to private land under the Comprehensive option, which means more accidents fall under the scope of compulsory insurance and there is also an increased chance of fraudulent claims.
- Section 6 - Motor Sport Vehicles. A number of adjustments are made to the core model to make it applicable to motor sport racing. These adjustments are supported by data made available to us by the main organisations representing two-wheeled and four-wheeled motor sports.
- Section 7 - Other Business Vehicles. The core model is used to estimate the cost of the Vnuk judgement on business vehicles which currently do not require compulsory third party liability insurance. Our adjustments are based on high level, publicly available data which provides an indication of the loss characteristics for these vehicles.
- Section 8 - Miscellaneous Vehicles. The core model is again used to estimate the cost of insuring a number of miscellaneous vehicle types which do not currently fall under the scope of the Road Traffic Act. This section describes how we have met with industry experts to help support these calculations.
- Section 9 - Derogation and the Motor Insurers' Bureau. This section considers the effects of derogating one of more of the vehicle categories. Any derogation would mean that valid claims are met by the MIB in the first instance, but these costs are expected to be passed on to the general motoring public.

- Section 10 – Assumptions and Uncertainty. This final section captures the key assumptions underlying our work, and how our premium calculations would change if alternative assumptions were used.

4 The Core Model: Third Party Losses From Private Motorcars

Introduction

4.1 Our assessment of the impact of the Vnuk judgement begins with a consideration of the third party losses from private motorcars under the exiting Road Traffic Act requirements. This section describes how we have created a model for these losses which is then used, in adjusted form, to assess the cost in each of our modelling categories.

4.2 This approach has been driven by the availability of data. The nature of the Vnuk judgement means there is limited information on the new types of risk that are being considered. We have therefore used data from the existing liability regime to help estimate the potential costs of the new areas under consideration.

Private motorcars - Modelling third party liability losses

4.3 When considering a model for third party liability losses for private motorcars, it is useful to consider the approach which would be taken by a commercial insurer. Such an insurer would have access to significant volumes of detailed data concerning the insured (such as their age and vehicle type) and their accident history (the number of accidents and the monetary amount of any third party liability).

4.4 This volume of detailed information is typically analysed using a specific modelling technique called Generalised Linear Modelling. This seeks to create a mathematical formula which uses the data about the insured to estimate the size of the insurance claims they will make. The expected insurance claims would then form the basis of the premium quoted to each individual insured.

4.5 In contrast, the data which we have been able to obtain for our modelling exercise is much higher-level in nature and describes the overall loss characteristics from the entire UK market for private motorcar insurance.

4.6 Whilst this data would not be suitable for a commercial pricing exercise, we consider it to be appropriate for generating a broader model for third party liability losses from private motorcars. The data allows us to generate an understanding of the overall frequency of losses for the market, and how the size of individual liability losses can vary.

4.7 Two base models have been constructed for private motorcar third party liability losses, one for third party property damage ('TPD') and one for third party bodily injuries ('TPI'). We have chosen to separate the two types of third party liability as they have significantly different claim characteristics which are more accurately assessed with separate models rather than a single combined model. The data which we have obtained for this exercise also supports this approach.

4.8 For both TPD and TPI, there is a further split in the modelling so that the frequency of losses is considered separately to the severity of losses. As with the decision to model TPD and TPI claims separately, we have chosen this modelling approach as we believe it better captures the characteristics of the losses, and our data is sufficiently detailed to support this approach.

4.9 Such a modelling approach is referred to as a 'frequency-severity' model and this is a technique often employed when considering general insurance risks in the absence of significant volumes of detailed data. Compared to a model which only considers the overall loss amount, a frequency-severity model better captures the characteristics of each quantity, and makes it easier to transform the model to other vehicle categories.

Private motorcars - Data sources

4.10 We have obtained the following data to support out private motorcar models:

- data made publicly available by the TPWP as result of the research they carry out on the UK motor insurance industry
- data provided to us from the ABI which is based on a survey of UK insurers

4.11 The TPWP work with commercial UK motor insurers to investigate the latest trends and topics of interest in the motor insurance market. The TPWP publish an annual report which summarises the work they have undertaken and we have utilised the two most recent reports dated January 2015 (the '2015 report') and September 2016 (the '2016 report').

4.12 The TPWP research is based on data provided by the UK's largest motor insurers including Admiral, Ageas, Aviva, Direct Line Group and Liverpool Victoria[1]. Due to the commercial sensitivity of this data, only summary statistics are made publicly available in the TPWP's annual reports. The lack of granularity means the data could not be used to construct a commercial pricing model such as that described above, as insurers would require a number of additional data fields to determine an appropriate price for an individual policy.

4.13 The ABI is an organisation which represents UK insurers. As well as campaigning on behalf of the industry, the ABI collates high level data on the insurance market.

4.14 For private motor insurance, we have obtained ABI data showing the number of insured vehicles, claim frequency, and the average premium paid for a policy. The companies participating in the ABI's data collection exercises are similar to those that assist the TPWP, and represent the vast majority of the UK market.

Private motorcars - Size of the UK market

4.15 The figure below shows the size of the UK market for private motorcar insurance measured in millions of 'vehicle years' and as recorded by the ABI.

- A vehicle year represents one vehicle being insured for one calendar year. This concept also extends to vehicles which are insured for less than a complete year, e.g. a vehicle insured for 6 months is equivalent to 0.5 vehicle years.

[1] Based on Ernst & Young's report "UK Motor Insurance: Seminar Results" dated 16 June 2016, these are the top 5 motor insurers during 2016. These insurers alone have a 65% market share (based on insured vehicle years), and when combined with other contributors the TPWP reports cover more than 91% of the total UK market.

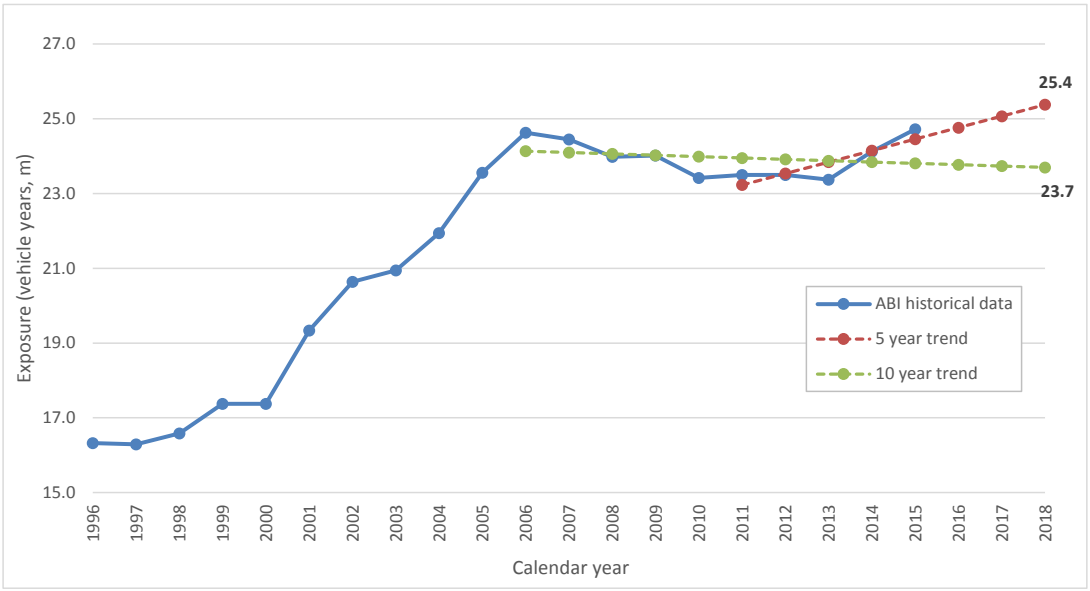


Figure 4.1: ABI's estimate of the size of the private motorcar insurance market measured using vehicle years (millions). The 5 year and 10 year trends are also shown.

4.16 The blue line represents the ABI's recorded data for the calendar years 1996 through to 2015. This shows an initial peak in 2006 (24.6m vehicle years) followed by seven years of general decline to 2013 (23.4m vehicle years) before more recent increases during 2014 and 2015 (24.7m vehicle years).

4.17 For the purposes of our work we require an estimate of exposure for the 2018 calendar year. To do this we have analysed the ABI's recorded data in order to calculate the trend over recent periods of time. Because of the volatility in the recorded data over the last decade, our forecasts for the 2018 calendar year will vary depending on the length of the historical period being considered. The dashed green line shows the 10 year trend which is one of gradual decline, estimating an exposure of 23.7m in 2018. By contrast, only considering the more recent 5 year trend result in an exposure estimate of 25.4m.

4.18 We have assumed that exposure will be 25.0m in 2018. This gives more weight to the 5 year trend which forecasts an increase in exposure which is in line with the longer term experience over the entire history of the ABI data. Less weight is given to the 10 year trend which appears to have been adversely affected by the 2008-2009 recession.

4.19 Based on an analysis of the market in 2015, the largest insurers have a market share of approximately 10% each, medium sized insurers have a market share of around 5% each and small insurers will be writing less than 1% each. Applying these percentages to our exposure estimate in 2018, a large insurer will be writing 2.5m million vehicle years of business, a medium sized insurer 1.25m and small insurers 0.25m.

4.20 We have based our analysis on an insurer writing 1.0m vehicle years of insurance in 2018 – approximately a medium sized insurer. This is an important assumption as writing larger volumes of business will increase the certainty that an insurer will have when predicting their claims experience. In turn, this reduces the level of capital that an insurer will hold, and enables them to charge a lower premium. Conversely, if an insurer is assumed to write smaller volumes of business, the premium they charge will need to be increased.

Private motorcars - Third party bodily injury

TPI Frequency

4.21 The 2015 report from the TPWP considers the accident years from 2006 to 2013 inclusive. For each accident year, the report gives the number of third party bodily injury losses per million vehicle years, excluding nil claims. These technical terms are described below:

> An accident year refers to the group of losses that occurred during a particular calendar year, for example the 2013 accident year represents all losses that occurred between 1 January 2013 and 31 December 2013.

> A nil claim is one which is ultimately settled without any payment from the insurer.

4.22 As well as the giving the total number of claims, the report provides this information split by the size of the loss, for example the number of claims where the loss was less than £1k, between £1k and £10k etc. The information on loss size is before any deductible is applied and is given in 2010 terms (which is discussed further in paragraph 4.37).

4.23 The more recent 2016 report from the TPWP provides additional information on the 2014 and 2015 accident years. However, the additional split by size of loss is not available in this edition of the report. For the purposes of our analysis we have assumed that losses are split in the same proportion as observed in the 2006 to 2013 accident years[2]. This information is shown in table 4.1.

Accident	Claim category (size of loss, £k or £m as indicated)											Total
Year	0-1k	1k-10k	10k-20k	20k-50k	50k-100k	100k-250k	250k-500k	0.5m - 1m	1m-2m	2m-5m	>5m	Claims
2006	1,810	5,332	1,766	746	133	60	19	9	5	2	2	9,883
2007	2,043	5,680	1,715	704	120	56	17	8	4	2	1	10,349
2008	1,348	6,100	1,718	725	110	50	16	7	4	2	1	10,081
2009	913	6,628	1,940	823	116	45	16	7	5	3	1	10,497
2010	948	7,260	1,835	737	109	43	14	6	3	2	1	10,958
2011	1,028	7,508	1,763	702	105	44	15	6	3	2	1	11,176
2012	1,046	7,965	1,739	665	97	42	15	6	3	2	1	11,582
2013	788	7,899	1,189	423	86	40	15	6	3	3	1	10,453
2014	1,252	6,859	1,724	697	111	48	16	7	4	2	1	10,720
2015	1,238	6,783	1,705	689	109	47	16	7	4	2	1	10,602

Table 4.1: Number of claims in each accident year, before trending. Claims are shown per million vehicle years

[2] We understand that the TPI claims environment can undergo rapid changes as a result of amendments to legislation, transformations in fraud detection processes, and changes in fraudulent claims activity. However, in the absence of any significant information to support a change, we have assumed that experience for 2006 to 2013 will be repeated in 2014 and 2015.

4.24 The figures within table 4.1 are per million vehicle years, and as such they have already been adjusted for changes in exposure for each accident year. In order to make the figures applicable for the target year of our analysis (2018) we analyse each claim category to identify any trends in the claim frequency.

4.25 For example, the figure below shows that the £0-£1k category exhibits signs of a decreasing claim frequency over time of approximately 5.5% per annum (this gives the approximate line of best fit through the observed data).

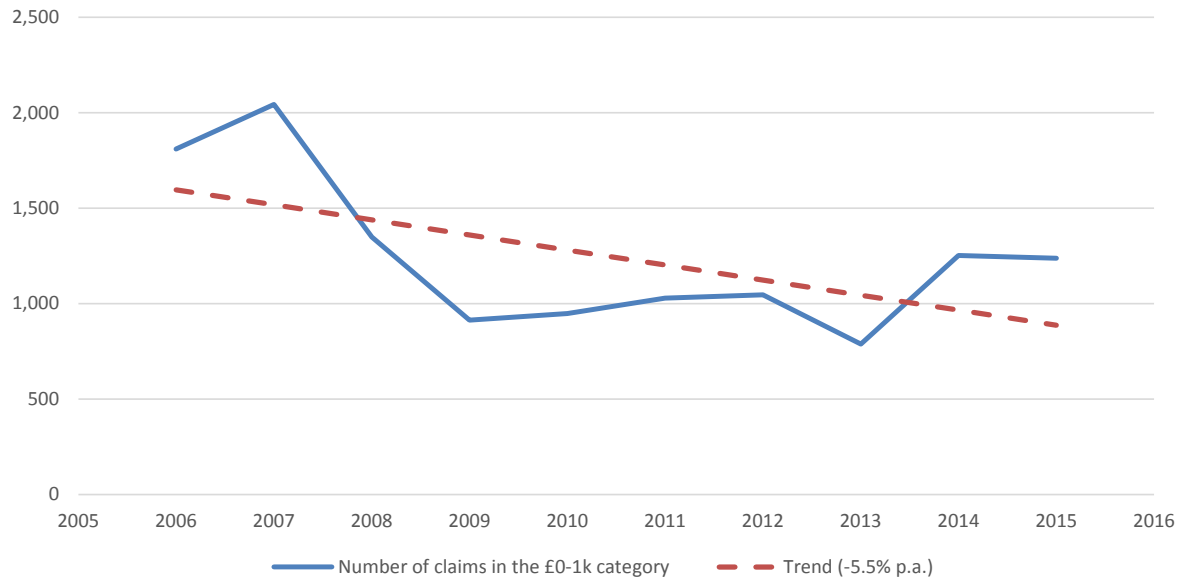


Figure 4.2: Number of claims (per million vehicle years) in the £0-1k category and the identified trend

4.26 There are a number of reasons which may explain why the claim frequency has decreased over time, for example changes in consumer behaviour or improvements in fraud detection technology, and further analysis could be undertaken to identify the causes of this trend how likely it is to continue in the future. In the absence of this analysis, we have assumed that it would not be appropriate to base our assumption for the 2018 calendar year on the historical data without first adjusting for the observed trend. Taking this approach is a simplification of the pricing process which a commercial insurer would undertake.

4.27 In order to make this adjustment, we have assumed that the historical observations need to be reduced by 5.5% per annum so that they are appropriate for the claims environment in the 2018 calendar year. These adjusted values are then directly comparable to one another, and are also relevant to the 2018 calendar year which we is the focus of our analysis. In doing so we are attempting to answer the question of how the historical years would look if the claims experience were repeated in the current claims environment.

4.28 All categories are analysed for underlying trends. The trend is first calculated by considering the linear trend that best fits the recorded data between 2006 and 2015. The data is then inspected for any outliers and if any are observed a manual adjustment is made to avoid overstating or understating the trend.

4.29 The table below shows the results of adjusting the frequency data for underlying trends and rebasing the frequencies to 2018 terms.

Accident	Claim category (size of loss, £k or £m as indicated)											Total
Year	0-1k	1k-10k	10k-20k	20k-50k	50k-100k	100k-250k	250k-500k	0.5m - 1m	1m-2m	2m-5m	>5m	Claims
2006	918	8,057	1,473	585	98	44	16	6	3	3	2	11,205
2007	1,097	8,293	1,452	564	91	42	14	6	3	2	0	11,564
2008	766	8,605	1,477	592	85	39	14	5	3	3	1	11,589
2009	549	9,033	1,693	686	92	36	14	5	3	3	1	12,117
2010	603	9,560	1,626	627	89	35	12	5	2	2	1	12,562
2011	692	9,552	1,586	609	88	37	13	5	3	2	1	12,588
2012	745	9,791	1,588	589	83	36	14	5	3	3	1	12,858
2013	594	9,382	1,102	382	76	35	14	5	3	3	1	11,597
2014	998	7,871	1,623	643	100	43	15	6	3	3	1	11,306
2015	1,045	7,521	1,629	649	101	44	15	6	3	2	1	11,017

Table 4.2: Number of claims in each accident year, after trending. Claims are shown per million vehicle years

4.30 Having adjusted the frequency data to allow for underlying trends, we have fitted a statistical distribution to the overall number of accidents per million vehicle years. To do this we have considered the types of statistical distribution which are typically used to model frequency in a general insurance pricing exercises. We have not considered a bespoke distribution because of the limited number of observations (10, one for each accident year between 2006 and 2015) and the low variance within those observations.

4.31 The two commonly used distributions are the Poisson distribution and the Negative Binomial distribution. These are both discrete distributions, which means they can only take whole numbers. They also have a positive skew, which means that rather than being symmetrical there is a greater allowance for large results rather than small results, which is a common characteristic we would expect to see in claim frequency distributions. We selected the Negative Binomial distribution as this has two parameters which better help to fit the distribution to the data, and provide more flexibility when adjusting the model for the other vehicle categories.

4.32 To fit the Negative Binomial distribution to the frequency data (adjusted for trending), we used the 'method of moments' methodology. This means setting the theoretical average for the distribution to the observed average from the data, and also the theoretical variance (or spread) to the observed variance from the data. The fitted distribution is shown in figure 4.3 below.

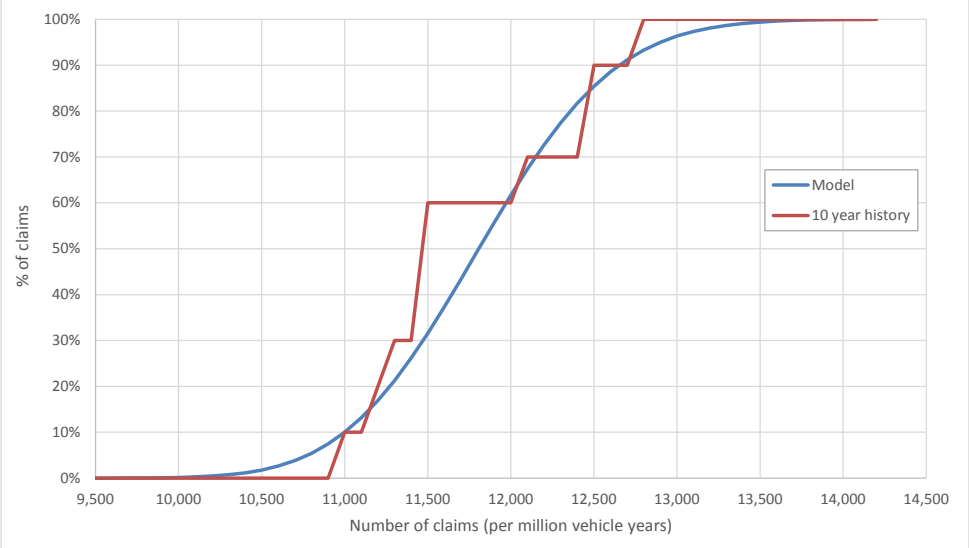


Figure 4.3: Fitted Negative Binomial distribution and actual observations.

4.33 The figure above shows the following information:

> The blue line represents the probability of the model generating a result below the amount indicated on the horizontal axis. The line increases rapidly in the range 11,000 to 12,500 claims per million vehicle years, indicating that the model is most likely to generate a result within this range.

> The blue line extends out as low as 9,500 and as high as 14,500 claims per million vehicle years. This gives an indication of the range of possible results.

> The red line show the percentage of observed results below the amount indicated on the horizontal axis. Given the small number of observations, we would not expect a perfect match to any fitted distribution, but a comparison of the observations with the fitted model indicate that the fitted distribution is not unreasonable.

TPI Severity

4.34 The 2015 report from the TPWP also gives the average size of a claim within each claim category. For example, the smallest claim category is £0-£1k and the report gives the average claim size for all the claims that were within this category.

4.35 As previously noted, the 2015 report only considers the accident years 2006 to 2013 inclusive. By additionally considering the 2016 report we obtain more up-to-date information on these accident years as well as additional information on the 2014 and 2015 accident years.

4.36 However, the 2016 report only gave the overall average claim size and does not provide the information split by claim category. For the purposes of our analysis we have assumed that losses are split in the same proportion as observed in the 2006 to 2013 accident years. This information is shown in table 4.3.

Accident	Claim category (size of loss, £k or £m as indicated)										
Year	0-1k	1k-10k	10k-20k	20k-50k	50k-100k	100k-250k	250k-500k	0.5m - 1m	1m-2m	2m-5m	>5m
2006	215	4,183	10,553	22,388	52,109	116,802	258,628	530,334	1,047,774	2,536,330	7,311,236
2007	169	4,489	11,690	24,564	57,669	128,870	294,986	595,502	1,161,737	2,537,235	7,471,395
2008	210	4,608	12,376	25,858	60,256	134,793	307,346	626,948	1,211,494	2,959,434	8,114,227
2009	222	4,821	13,048	26,987	63,792	139,938	327,605	651,504	1,287,858	3,461,943	7,599,420
2010	293	5,117	13,934	29,114	67,971	149,115	346,086	697,925	1,477,932	3,382,007	9,210,474
2011	285	5,114	14,266	29,853	69,857	156,077	376,455	725,347	1,581,539	3,455,157	8,477,674
2012	264	5,203	14,785	31,018	72,080	158,657	387,545	800,308	1,592,644	3,578,275	8,644,950
2013	218	5,017	15,580	32,584	73,971	163,768	415,050	839,536	1,645,502	3,589,288	9,301,516
2014	251	5,167	14,237	29,800	69,380	153,850	363,673	732,707	1,475,019	3,417,304	8,862,442
2015	248	5,103	14,061	29,432	68,524	151,953	359,188	723,672	1,456,830	3,375,164	8,753,157

Table 4.3: Average claim size within each claim category and accident year. All figures in 2010 terms using a 7% p.a. adjustment factor

4.37 The TPWP report states that the average figures have already been adjusted to be in 2010 accident year terms using a 7% p.a. adjustment factor which reflects both claims inflation and any underlying trends. We note that the details of the adjustment are not publicly available and we are unable to review the rationale behind the 7% adjustment.

4.38 The choice of a single parameter means is likely to mean that whilst the figure was seen as an appropriate overall adjustment, for any individual claim category it may be too high or too low. The claim bandings (£0-£1k, £1k-£10k etc.) are also in 2010 terms.

4.39 We have adopted the same 7% figure to adjust the figures so they are relevant to the 2018 accident year. By doing this we make the further assumption that the 7% assumption is appropriate for the additional period between 2016 and 2018 (i.e. the period after that considered in the latest TPWP report). The adjusted information is shown in the table below:

Accident	Claim category (size of loss, £k or £m as indicated)										
Year	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	>8.6m
2006	485	9,421	23,768	50,422	117,360	263,061	582,480	1,194,414	2,359,787	5,712,302	16,466,305
2007	356	9,448	24,606	51,703	121,384	271,252	620,902	1,253,444	2,445,284	5,340,504	15,726,180
2008	413	9,065	24,346	50,866	118,534	265,158	604,595	1,233,302	2,383,192	5,821,654	15,961,912
2009	408	8,863	23,988	49,614	117,280	257,271	602,289	1,197,763	2,367,674	6,364,641	13,971,224
2010	503	8,792	23,942	50,023	116,786	256,208	594,639	1,199,166	2,539,363	5,810,917	15,825,309
2011	457	8,212	22,907	47,938	112,175	250,625	604,505	1,164,748	2,539,606	5,548,227	13,613,292
2012	396	7,808	22,189	46,550	108,172	238,102	581,600	1,201,047	2,390,130	5,370,026	12,973,739
2013	306	7,037	21,851	45,700	103,748	229,694	582,129	1,177,493	2,307,902	5,034,162	13,045,857
2014	329	6,772	18,661	39,062	90,942	201,667	476,701	960,429	1,933,449	4,479,388	11,616,854
2015	304	6,251	17,225	36,056	83,945	186,149	440,021	886,529	1,784,679	4,134,721	10,722,994
Average	396	8,167	22,348	46,793	109,033	241,919	568,986	1,146,834	2,305,107	5,361,654	13,992,367

Table 4.4: Average claim size within each claim category and accident year. Overall average across all accident years is also shown. All figures in 2018 terms using a 7% p.a. adjustment factor

4.40 We highlight that in the table above the original claim categories (£0 - £1k, £1k - £10k etc.) have also been adjusted to the 2018 accident year (£0 – £2k, £2k - £17k). The overall average for each claim category is also shown.

4.41 The final claim category in the original TPWP report is 'claims that are greater than £5m' which has been adjusted to 'claims that are greater than £8.6m' in 2018 terms. In order to apply our claim fitting methodology to this category, we require a value for the top end of the category. To assess this we have considered what a realistic disaster scenario would look like for private motorcar insurance. A realistic disaster scenario is one which is expected to be very rare but which is nevertheless plausible, even if there have been no actual instances in recent history.

4.42 We have based our realistic disaster scenario on publicly available information regarding third party bodily injury claim settlements, predominantly as a result of medical negligence. Within this particular subset of bodily injury claims, the highest reported individual claims are in the region of £20m to £25m and typically follow serious injuries to young children, such as brain damage as a result of negligence during childbirth. These figures relate to the claims environment between 2000 and 2014 and rely on a series of economic and medical assumptions in order to determine loss amounts.

4.43 There is evidence to support the view that settlements such as these are also possible in a motor insurance context. According to publicly available news articles on large motor insurance losses, the largest ever recorded loss is £23m.

4.44 We note that the amounts described above are for losses to a single individual whilst in a motor insurance context there is the potential for multiple injuries to arise from a single loss event. Given this, we have assumed a value of £30m for the top end of the range in 2010 monetary terms. In practical terms this represents an accident which results in extreme, life changing injuries to two or three young people, all of whom require substantial medical support for the remainder of their lives. We have inflated this by the same 7% trend factor used by the TPWP which broadly reflects a mix of medical inflation and other inflationary pressures such as increased litigation costs. This gives an adjusted value of £52m in 2018 terms.

4.45 Using the adjusted claim frequency data (which is shown in table 4.2) we are able to calculate the percentage of claims within each claim category. This is shown in the table below:

Accident	Claim category (size of loss, £k or £m as indicated)										
Year	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	>8.6m
2006	8.2%	71.9%	13.1%	5.2%	0.88%	0.39%	0.14%	0.06%	0.03%	0.02%	0.01%
2007	9.5%	71.7%	12.6%	4.9%	0.79%	0.36%	0.12%	0.05%	0.03%	0.02%	0.00%
2008	6.6%	74.2%	12.7%	5.1%	0.74%	0.33%	0.12%	0.04%	0.03%	0.02%	0.01%
2009	4.5%	74.5%	14.0%	5.7%	0.76%	0.30%	0.12%	0.05%	0.03%	0.03%	0.01%
2010	4.8%	76.1%	12.9%	5.0%	0.71%	0.28%	0.10%	0.04%	0.02%	0.02%	0.01%
2011	5.5%	75.9%	12.6%	4.8%	0.70%	0.29%	0.10%	0.04%	0.02%	0.02%	0.01%
2012	5.8%	76.1%	12.4%	4.6%	0.65%	0.28%	0.11%	0.04%	0.02%	0.02%	0.01%
2013	5.1%	80.9%	9.5%	3.3%	0.65%	0.30%	0.12%	0.04%	0.03%	0.03%	0.01%
2014	8.8%	69.6%	14.4%	5.7%	0.88%	0.38%	0.13%	0.05%	0.03%	0.02%	0.01%
2015	9.5%	68.3%	14.8%	5.9%	0.92%	0.40%	0.14%	0.06%	0.03%	0.02%	0.01%
Average	**6.8%**	**73.9%**	**12.9%**	**5.0%**	**0.77%**	**0.33%**	**0.12%**	**0.05%**	**0.03%**	**0.02%**	**0.01%**

Table 4.5: Percentage of claims within each claim category and accident year. Overall average across all accident years is also shown. All figures are based on frequency data adjusted to 2018 terms

4.46 Combining the two previous tables gives the likelihood of a claim being within a certain claim category, and the average claim size within that category. This is summarised in table 4.6:

	Claim category (size of loss, £k or £m as indicated)										
	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	>8.6m
Average claim size (£k or £m)	0.4k	8k	22k	47k	109k	0.24m	0.57m	1.15m	2.31m	5.36m	13.99m
Likelihood of claim within category	6.83%	73.93%	12.90%	5.02%	0.77%	0.33%	0.12%	0.05%	0.03%	0.02%	0.01%

Table 4.6: Summary of claim severity analysis

4.47 In order to assign a statistical distribution to this claim severity data we first considered a number of standard distributions which are typically used to model claim severity for general insurance products. These included the Log Normal, Gaussian and Pareto distributions. However, none of these standard distributions were able to accurately represent both i) the large likelihood of small claims ii) the small likelihood of very large claims.

4.48 Instead we have created a bespoke distribution based on the observed data. To do this we have carried out the following steps:

> assume that the probability of a claim being within any given category is as observed, e.g. a 6.83% chance of a claim being within the £0-£2k category

> having assigned a claim category, assume that the claim value is equally likely to be any value within that category

4.49 The second part of this process, i.e. an assumption that a claim is equally likely to be any value within the claims category, ensures that the model does not understate volatility (which would be the case if claims only took a fixed value within the category). The need for such an assumption is one of the limitations of the available data, and more granular data would remove this uncertainty.

4.50 In reality, claims may not be equally likely to take any value and may be clustered toward the top or bottom of the range. Indeed, this can be seen in Table 4.6 as the average claim is not always close to the middle of each claims category. To adjust for this we apply a scaling factor based on the ratio of:

> The implied average claim based on the assumption that claims are equally likely to take any value. This is £21.1k (calculated using the midpoint of each claim category and the likelihood in table 4.6)

> The average claim from the TPWP paper data, which incorporates the data on the average claim within each claim category and better reflects the true distribution of claims within each category. This is £17.0k.

4.51 This gives a scaling factor of 81% (£17.0k / £21.1k). Overall, this means that our assumption leads to an overstatement of claims.

TPI aggregate distribution

4.52 In order to derive an aggregate distribution for TPI claims we have used the Monte Carlo simulation methodology which has been described in paragraphs 3.9 to 3.11. The distribution is shown in the figure below:

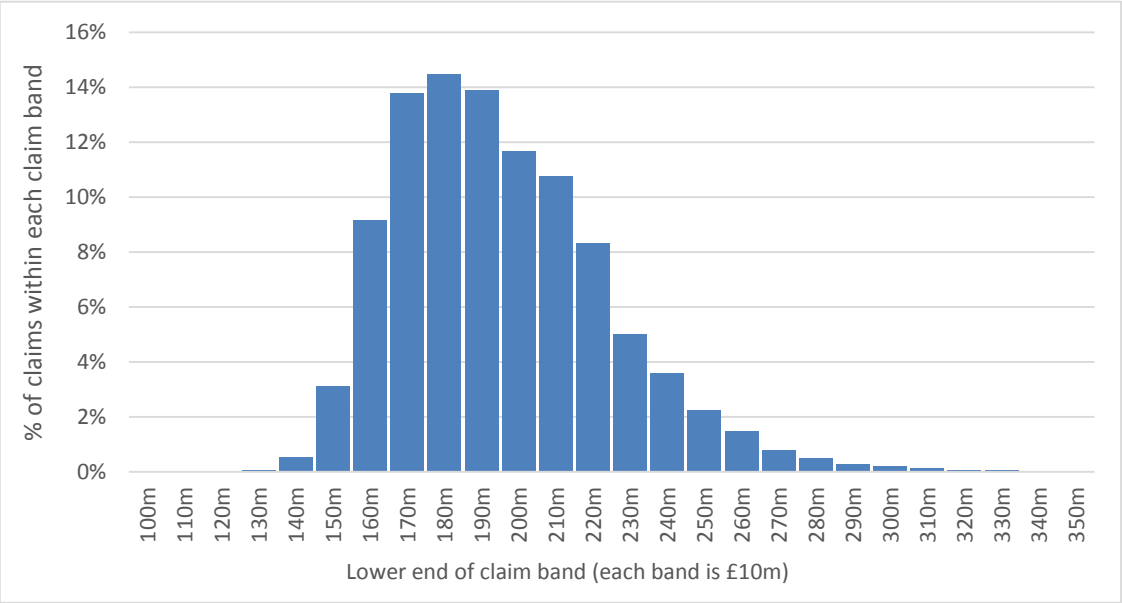


Figure 4.4: Distribution of aggregate losses for 1 million vehicle years

4.53 The key features of the distribution are as follows:

- The expected aggregate loss is £200m.
- The 25th percentile of the losses is £179m. This means we would expect a loss less than this every 4 years.
- The 75th percentile of the losses is £218m. We would expect a loss greater than this every 4 years.
- The 99.5th percentile of the losses is £297m. We would expect a loss greater than this every 200 years.

Private motorcars - Third party property damage

TPD Frequency

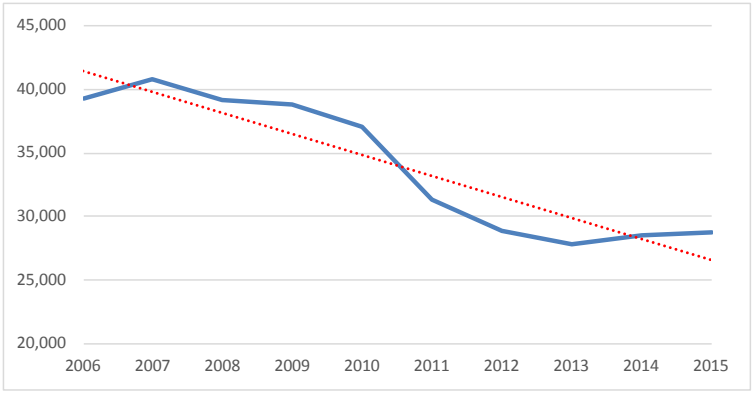
4.54 The process for modelling TPD frequency is very similar to that for TPI. The TPWP data is again the basis or the model, but in both the 2015 and 2016 reports the frequency data is only available in total for each accident year - there is no split by claim category.

4.55 The first stage of the modelling process is therefore simplified to adjusting for any trends in the overall frequency data, in order to adjust the figures to the 2018 calendar year. As shown in the figure below, there is a strong trend underlying the data which is a reduction in frequency over time. We have adjusted for this by assuming a 4% p.a. reduction in frequency to adjust the data to 2018 terms.

a) Before trending

Accident Year	Total Claims
2006	39,221
2007	40,840
2008	39,185
2009	38,849
2010	37,042
2011	31,268
2012	28,896
2013	27,805
2014	28,467
2015	28,708

b) Graph of data before trending



c) Trended data

Accident Year	Total Claims
2006	24,031
2007	26,066
2008	26,051
2009	26,904
2010	26,722
2011	23,496
2012	22,619
2013	22,671
2014	24,178
2015	25,399

Figure 4.5: TPD frequency data before trending (tabulated and graphed) and after trending (tabulated only). Claims are shown per million vehicle years.

4.56 In line with the approach for modelling TPI frequency, we have fitted a Negative Binomial distribution using the method of moments methodology. The fitted distribution is shown in figure 4.5:

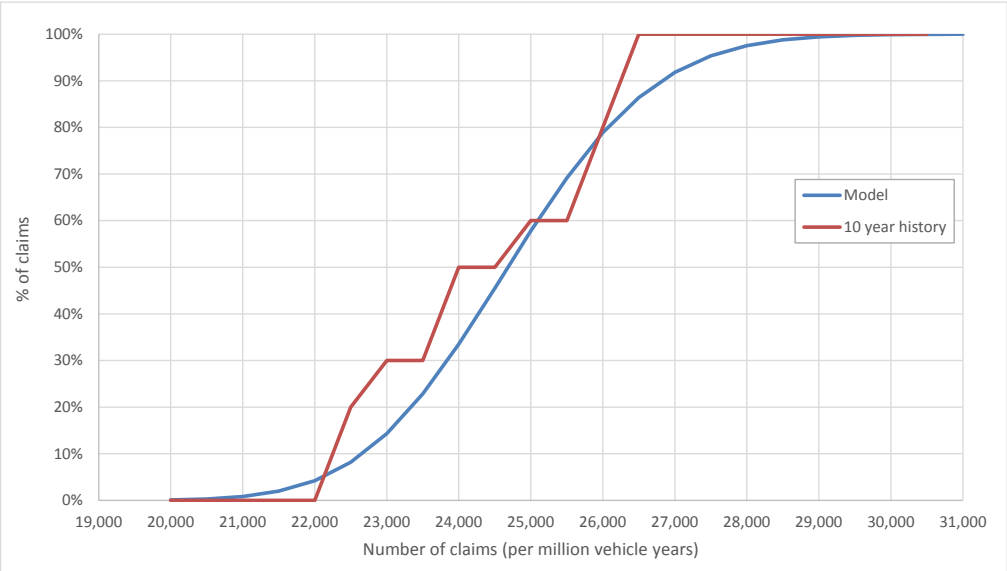


Figure 4.6: Fitted Negative Binomial distribution for TPD frequency and actual observations

4.57 The figure shows that:

> The fitted distribution assumes that in most cases the frequency will be between 22,000 and 27,000 claims per million vehicle years.

> However, the distribution can also generate more extreme results as low as 20,000 and high as 30,000 claims per million vehicle years.

> The small number of observed results indicate that the fitted distribution is not unreasonable.

TPD Severity

4.58 The TPWP reports also provide data on the average size of TPD losses, but unlike the TPI losses, this information is only given at an overall level for each accident year, i.e. there is no breakdown by claim category. The severity data within the TPWP reports has already been adjusted to 2010 terms using the 7% p.a. adjustment factor. We use this same adjustment factor to put the data in 2018 terms.

a) Data adjusted to 2010

Accident Year	Average Claim size
2006	1,533
2007	1,703
2008	1,815
2009	1,864
2010	1,941
2011	2,072
2012	2,236
2013	2,271
2014	2,359
2015	2,409

b) Data adjusted to 2018

Accident Year	Average Claim size
2006	3,453
2007	3,585
2008	3,570
2009	3,427
2010	3,335
2011	3,327
2012	3,356
2013	3,185
2014	3,092
2015	2,951

Table 4.7: Average claim size for each accident year. The first table is taken from the TPWP report and is adjusted to 2010 terms. The second table has been adjusted to 2018 terms

4.59 The absence of the average claim size by claim category means that the methodology used to create a bespoke statistical distribution for TPI severity cannot be applied here. Instead, the approach taken is as follows:

> Given that we are not able to construct a bespoke distribution, we have selected from the standard statistical distributions which are commonly used for pricing general insurance products in the absence of more specific information. From these, we have selected the LogNormal statistical distribution to model TPD claim severity. We have selected the LogNormal distribution as:

- This is the default assumption within the Solvency II Standard Formula[3] model used for regulatory assessment of insurers' capital requirements.
- The distribution makes an allowance for very large losses compared to the average value, which is a characteristic we would expect to see.

> We are unable to use the method of moments methodology to fit the LogNormal distribution as the only observable information is the average claim size. We have therefore used an amended version of the method of moments based on:

- Ensuring that the average value of the distribution is equal to the average observed value from table 4.7 (£3.3k).
- Setting the variation in individual claims based on a judgemental calibration that 1 in 200 losses (i.e. the more extreme losses) would resulting in a TPD liability of approximately £100,000.

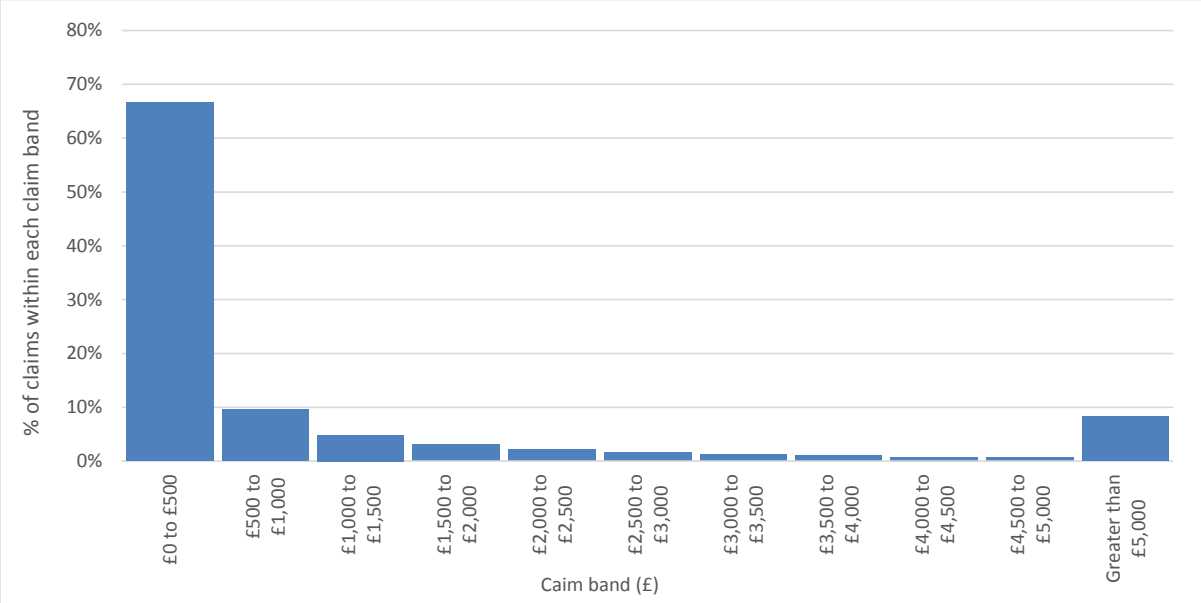


Figure 4.7: Distribution of TPD losses for an individual claim

4.60 The figure shows that:

> There is small likelihood of generating a much larger claim. The final category in the diagram is labelled as 'greater than £5,000' and has an associated probability of 8%.

> The average claim size is £3.3k, which is equal to the observed average in the data. This overall average is a balance between a large number of smaller claims and a small number of very large claims.

> The majority of the claims are for small amounts – 75% are for less than £1,000.

[3] Solvency II is the name of the European wide capital setting regime for insurers. Within this regime, individual insurers may either develop their own bespoke model or rely upon a pre-defined model constructed by the regulator. This pre-defined model is referred to as the Standard Formula.

> The 99.5th percentile is a claim of £90,000. This means we would expect a claim at least this large once in every 200 claims.

TPD Aggregate distribution

4.61 The aggregate distribution for TPD claims is constructed using the Monte Carlo simulation methodology which has previously been discussed. The distribution is shown in the figure below:

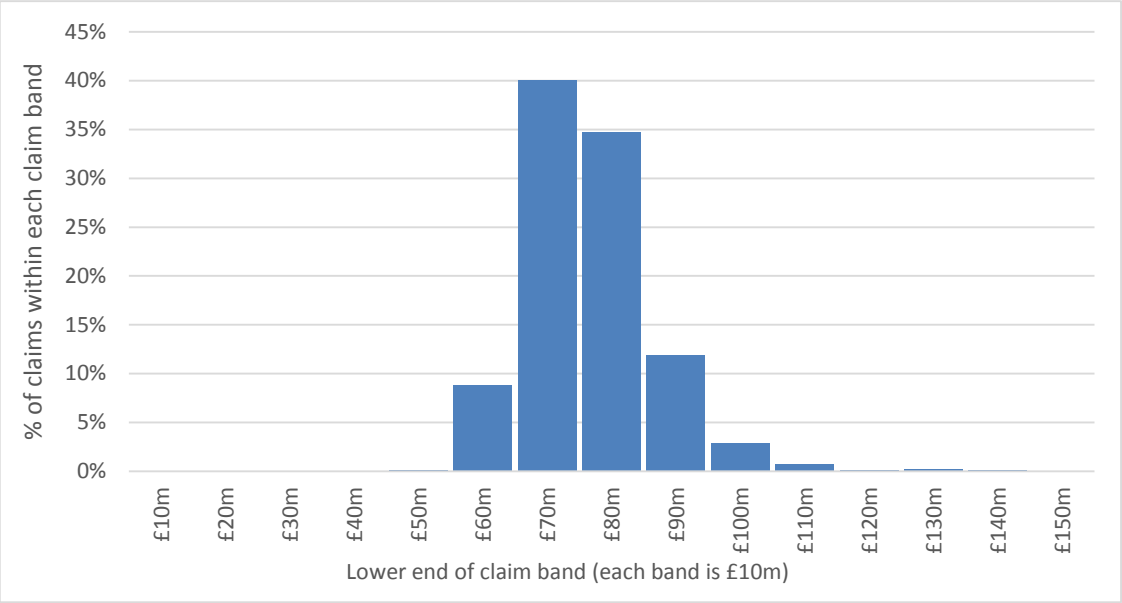


Figure 4.8: Distribution of aggregate losses for 1 million vehicle years

4.62 The key features of the distribution are as follows:

> The expected aggregate loss is £81m.

> The 25th percentile of the losses is £75m. This means we would expect a loss less than this every 4 years.

> The 75th percentile of the losses is £89m. We would expect a loss greater than this every 4 years.

> The 99.5th percentile of the losses is £120m. We would expect a loss greater than this every 200 years.

Private motorcars - Combining TPI and TPD aggregate distributions

Considering the connection between TPI and TPD

4.63 Having derived separate distributions for aggregate TPI and TPD losses, the two need to be combined to give an overall distribution of third party liability losses. This section describes how we have performed this combination by considering the 'correlation' between TPI and TPD losses.

4.64 Correlation is a mathematical measure of how related, or connected, two variables such as TPI and TPD are. Correlation is measured on a scale between -100% and +100% as follows:

- A correlation of 0% (or no correlation) means there is no connection between the two variables, i.e. they are assumed to happen independently of one another.
- A positive correlation (between 0% and 100%) means that if one variable takes a high value, the other variable is also likely to take a high value. The closer the correlation is to 100%, the stronger this relationship
- A negative correlation (between -100% and 0%) means that if one variable take a high value, the other variable is likely to take a low value. The closer the correlation is to -100%, the stronger the relationship.

4.65 Sampling from each distribution independently, then adding the simulations together, is equivalent to assuming that the correlation is 0%.

4.66 In reality, there is likely to be a positive correlation between the two, for example if there are very high TPI losses this makes it more likely that there would also be very high TPD losses. This is because there is a causational link through the physical event (accident) causing the losses – a significant accident is likely to generate high losses for both TPI and TPD.

4.67 The extent of the correlation could be measured using granular data on individual claims, and we would expect a commercial insurer to take this approach. In the absence of this data we have based our assumption on the regulatory rules underlying Solvency II. For those insurers relying on the standard formula to calculate their capital requirements, they are required to assume a 50% correlation between the generic classes referred to as 'Motor Vehicle Liability' and 'Other Motor'. This comparison is not entirely applicable as both groups will contain an element of TPI and TPD losses, which is likely to increase the correlation. As such we have applied our judgment to select a lower correlation factor of 25%.

Creating the desired correlation

4.68 In order to create the desired correlation of 25%, the following procedure has been used:

- Step 1 – Select two random simulations from the TPI aggregate distribution and swap them.
- Step 2 – Select two random simulations from the TPD aggregate distribution and swap them.
- Step 3 – Measure the correlation before and after the changes. If the correlation after the changes is closer to the target correlation, then keep the change. Otherwise reject the change.
- Step 4 – Repeat the process until the target correlation is reached.

4.69 The combined, correlated distribution is shown in the figure below:

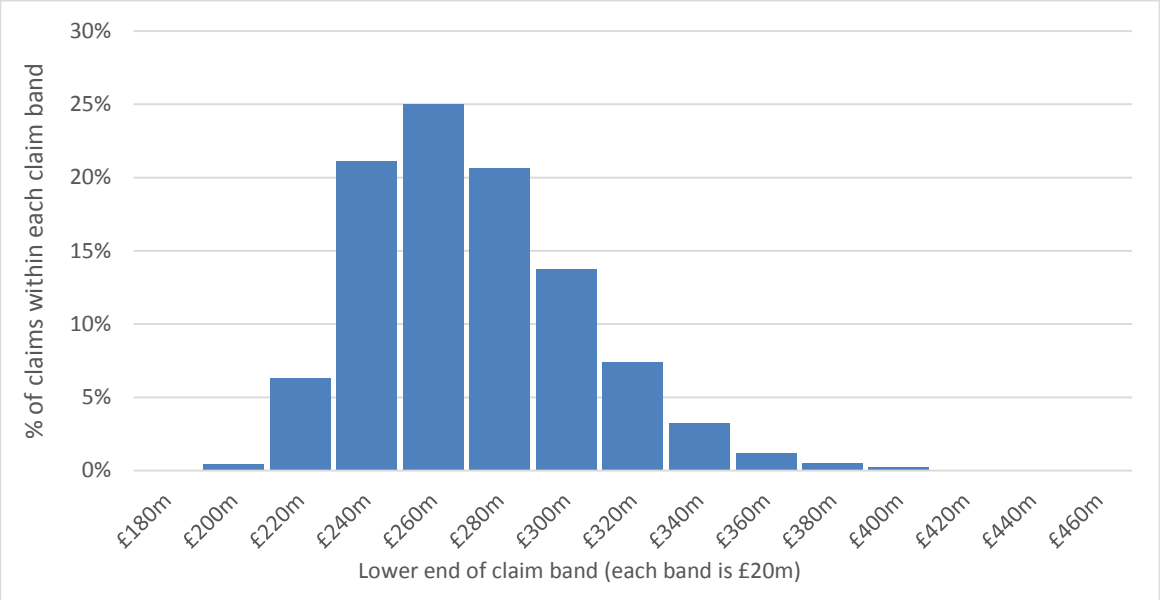


Figure 4.9: Distribution of aggregate TPI and TPD for 1 million vehicle years

4.70 The key features of the distribution are as follows:

> The expected aggregate loss is £282m. We highlight that this is the sum of the expected loss from the aggregate TPI distribution (£200m) and the TPD distribution (£81m).

> The 99.5th percentile of the losses is £389m. This is less than the sum of the 99.5th percentiles from the TPI distribution (£297m) and the TPD distribution (£120m) as our correlation assumption (25%) is less than 100%. This means that very high TPI losses are not guaranteed to give equally high TPD losses.

Deriving a commercial premium

4.71 The previous paragraphs have been concerned with the distribution of third party losses. This allows us to estimate the expected size of losses which is a significant component of the premium which a commercial insurer would charge. However, the final premium will include a number of additional loadings to cover items such as expenses, profit and taxes. All of the components making up the final premium are described below:

Expected loss cost

4.72 The expected loss cost will make up the majority of the premium for classes such as private motor. As discussed in the previous sections, this is £282m per million vehicle years.

Capital costs (including profit loading)

4.73 A commercial insurer will also have a regulatory requirement to hold capital to guard against unusually high losses. For simplicity, we only consider the capital requirements directly connected to third party liability risks for private motorcars, during the 2018 calendar year. In reality a commercial insurer is likely to be writing other lines of business which would reduce the average capital requirement as a result of diversification.

4.74 At the outset of the year the capital requirement is typically set at the 1 in 200 year level, i.e. capital should be held such that there are only insufficient funds once every 200 years. The aggregate claims distribution gives the 1 in 200 year loss as £388m, meaning that an insurer would need to initially hold £107m of regulatory capital in addition to providing form the expected loss (£388m - £282m).

4.75 After the end of the first year we assume that capital is only held in relation to reserve risk, which is the risk that the reserves held to pay for future claims are insufficient. This is a simplifying assumption as a commercial insurer will also be required to hold capital for other risk types, such as liquidity and operational risk. We consider this to be reasonable as the capital associated with these risk types is typically much lower than for reserve risk.

4.76 To calculate the central estimate of reserves we have used a claim payment pattern for motor liability insurance claims which we have taken from Solvency II. This pattern is shown below and assumes that it takes 10 years to fully pay out all claims.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Paid Claim %	5.00%	12.50%	27.50%	46.25%	61.25%	73.75%	85.00%	93.75%	98.75%	100.00%

Table 4.8: Assumed payment pattern for motor third party liability claims

4.77 The longer the payment pattern takes to reach 100%, the longer an insurer needs to hold capital to guard against their claims reserves being insufficient. Because capital is held for longer, the commercial insurer will require more premium in order to generate the same return on capital, and the premium will be increased as a result. Conversely, the shorter the pattern, the lower the premium.

4.78 We have assumed that the regulatory requirement for reserve risk is that capital is held to protect against reserve deteriorations up to the 1 in 200 year return period. We have estimated that this return period corresponds to 138% of the central reserve estimate (this factor can be derived from paragraph 4.74 as £388m / £282m).

4.79 These assumptions result in the following capital requirements:

- £107m at the start of the first year.
- £102m at the start of the second year. This is largely unchanged, reflecting the fact that only a small amount of the claims are expected to be paid out within the first year.
- £94m at the start of the third year, £77m at the start of the fourth year and so on, with the requirement falling as more claims are paid out and less reserves are required.

4.80 To derive a cost of capital we have made an assumption for the return on capital rate required for this business, i.e. the profitability that we would expect a motor insurer to target. Based on our market experience we would expect insurers that write large, bespoke risks to typically target a 15-20% return on capital. However, less volatile business such as liability insurance for private motor cars will have a lower target return as a result of the reduced risk to capital. We have assumed a 6% return on capital which is equal to the default assumption in the Solvency II Standard Formula model and represents a long term return across all insurance classes.

4.81 We note that in reality the return targeted by commercial insurers will vary over time depending on market dynamics, such as the level of competition. Our assumption of 6% is designed to be a long-term average which is commensurate with the average risk profile of the types of motor insurance being considered. The assumption is not designed to reflect our view on the returns that would be made during the 2018 calendar year, which may be higher or lower depending on the market dynamics at that time.

4.82 We explore the effect of alternative return on capital assumptions as part of our uncertainty analysis which is set out in Appendix A. Alternative return on capital assumptions would be appropriate when considering specific parts of the market cycle (e.g. when competition is high and lower returns are acceptable) or specific elements of the motor risks considered in this report (e.g. motor sport vehicles which have a more risky profile and are likely to require higher returns).

Allowance for expenses

4.83 Based on our industry experience we have assumed that expenses are equal to 15% of the expected loss cost.

Brokerage

4.84 Given the typical distribution channels for private motor insurance, we have assumed that brokerage costs are 10%. This is because motor insurance is typically purchased without taking specific advice from an intermediary which reduces brokerage fees. This contrasts to other forms of insurance where these services are required.

Insurance Premium Tax

4.85 From 1 June 2017 Insurance Premium Tax ('IPT') was increased to 12% and we have assumed that this is the rate which will apply throughout the 2018 calendar year.

Summary

4.86 The final cost is summarised in the table below:

Item	Contribution to costs 1m vehicle years	Individual policy
Expected loss cost	281,819,827	281.82
Capital costs (including profit loading)	31,824,101	31.82
Expenses	42,272,974	42.27
Brokerage	28,181,983	28.18
IPT	42,710,028	42.71
Total	426,808,912	426.81

Table 4.9: Summary of costs (£)

Verification of the private motorcar model

4.87 In order to verify the model we have obtained information from the ABI on the average premium for private motorcar insurance between 2012 and 2016. This is shown in figure 4.9, noting that:

- The ABI data (represented by the blue line) is the average cost for comprehensive policies, i.e. policies that include coverage for accidental damage, fire and theft. These additional heads of damage will lead to an increased premium compared to our model, which only considers third party liability costs.
- The ABI data reflects market conditions which vary from year to year. In order to make a like for like comparison we have made the following adjustments to our premium estimate (our adjusted estimate is shown in figure 4.9):
    - Our premium has been based on data adjusted to the 2018 calendar year. We have assumed that our premium can be deflated by 7% p.a. to make an allowance for the difference in calendar years under consideration (this was the assumed trend for TPI and TPD severity).
    - Our figure included IPT at 12%. For 2012-2015 we have reduced this to 6% which was the rate at that time. For 2016 we have reduced it to 9.5%.
    - We note that we have assumed a constant return on capital of 6%. In contrast the ABI data will reflect market conditions in each individual year, which may mean that higher or lower returns were generated by insurers. We have not adjusted for this difference.

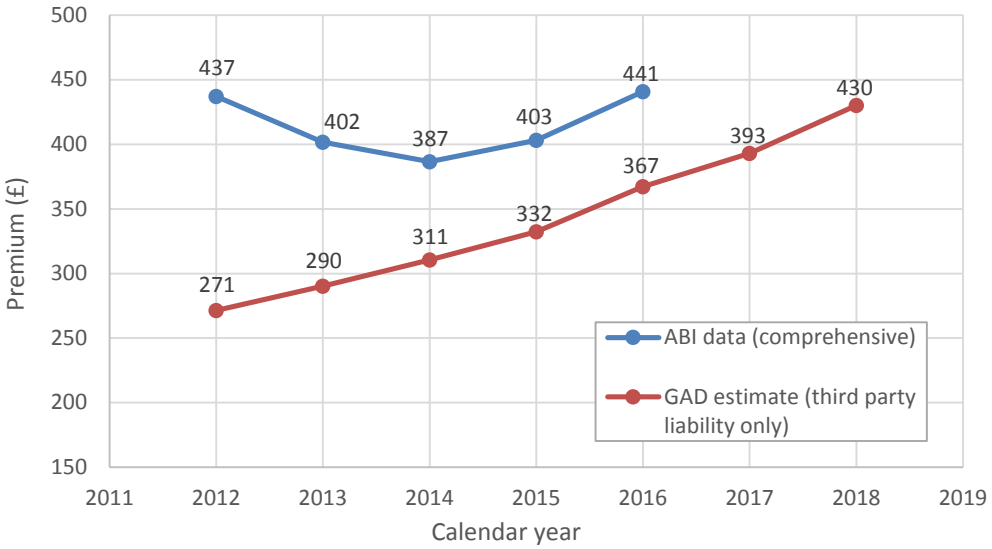


Figure 4.10: Comparison of ABI data (for comprehensive insurance) and our modelled premium (for third party liability only)

4.88 The figure shows that on a like-for-like basis our estimate of the premium for third party liability risk is between £70 and £170 less than the premium for a comprehensive policy. Given the differences in coverage, and the volatility caused by changing market conditions in the ABI data, this difference does not appear unreasonable and provides verification that our core model is an accurate representation of the third party liability risk for private motorcars.

5 Existing Vehicles

Introduction

5.1 This category includes all vehicle types which are currently required to have third party liability insurance in place as a result of the existing Road Traffic Act. The category is dominated by private motorcars but also includes the following vehicles:

- private motorcycles
- existing business vehicles

5.2 For commercial vehicles, we highlight that it is only their use on public roads which are considered within this modelling category. Where a commercial vehicle is also used on private land, this portion of the vehicle's risk is considered separately in the modelling category Business Vehicles. We have taken this approach to clearly distinguish between the additional costs to vehicles already affected by the Road Traffic Act, and the costs to vehicles which are not currently within the Act's scope.

Existing Vehicles – Impact of the Amended and Comprehensive options

5.3 Under the Amended option there is no direct impact on this analysis category – private motorcars, private motorcycles and commercial vehicles (as defined above) are already vehicle types which fall within the scope of the Road Traffic Act when they are used on public roads. There is an indirect impact if any of the new vehicle types are derogated, and this is considered separately in section 9 which discusses the derogation process[4].

5.4 Under the Comprehensive option we have assumed that the impacts are as follows:

- Private motorcars and motorcycles that currently purchase liability insurance will need an extended policy which also covers these vehicles whilst being used on private land. This increases the risk that there will be an accident resulting in third party liability losses.
- The number of fraudulent claims is likely to increase as a result of the extension to private land.

5.5 These impacts are considered in the remainder of this section, alongside a discussion on how the core private motor model can be used to model private motorcycles.

Using the core model for private motor cycles

5.6 As discussed in paragraph 3.3, our approach to assessing other vehicle types is to use the base model for private motorcars and make a series of high level adjustments based on our understanding of the difference in risk profiles.

[4] The insurance premium for Existing Vehicles includes a levy to fund the MIB. If any of the new vehicle types are derogated, the MIB will be responsible for third party liability claims and the levy will need to be increased.

5.7 In order to assess how motorcycle third party liability claims differ from those considered in the core model, we have analysed data contained in the DfT report 'Reported Road Casualties Great Britain: 2015 Annual Report' dated September 2016. This report collates information on motor accidents within Great Britain which were reported to the police during the 2015 calendar year.

5.8 Within this report is an exhibit labelled 'RAS10012' which details the number of accidents that were reported to the police and resulted in 'fatal', 'serious'[5] or 'slight' injury to pedestrians, and further breaks down this information between accidents which involved motorcars and those that involved motorcycles. The table below summarises this information.

	Motorcycles		Motorcars	
Pedestrian injury type	**Number**	**% of total**	**Number**	**% of total**
Fatal	10	1.1%	212	1.3%
Serious	197	20.8%	3,443	21.0%
Slight	738	78.1%	12,771	77.7%
Total	**945**	**100.0%**	**16,426**	**100.0%**
2015 exposure (m)	0.8		24.7	
Pedestrian injury type	**Frequency**	**% of total**	**Frequency**	**% of total**
Fatal	0.001%	1.1%	0.001%	1.3%
Serious	0.025%	20.8%	0.014%	21.0%
Slight	0.095%	78.1%	0.052%	77.7%
Total	**0.122%**	**100.0%**	**0.066%**	**100.0%**

Table 5.1: Summary of key information from the DfT report, exhibit RAS10012

Claim frequency

5.9 Table 5.1 shows the following information:

- The first set of rows is taken directly from the DfT report and gives the number of accidents resulting in a pedestrian injury, split by the 'fatal', 'serious' and 'slight' categories.
- The first set of rows also show the proportion of the total accidents that fall within each category. This can be interpreted as the likelihood of an accident being within a certain category given that an accident has occurred. We note that these likelihoods are very similar for motorcycles and motorcars.
- The middle row is the exposure measure for the 2015 calendar year, measured in millions of vehicle years. This is taken from the ABI data and the motorcar exposure figures have previously been discussed in paragraphs 4.15 to 4.20. This shows that there are far fewer insured motorcycles than motorcars.

[5] A serious injury is defined as an injury for which a person is detained in hospital as an inpatient, or any of the following injuries whether or not they are detained in hospital: fractures, concussion, internal injuries, crushings, burns (excluding friction burns), severe cuts, severe general shock requiring medical treatment and injuries causing death 30 or more days after the accident. It is noted that the police classify the severity of a casualty using information available within a short time of the accident (often at the scene). Therefore the classification of severity will generally not reflect the results of a medical examination or medical expertise.

> The final set of rows is the frequency per million vehicle years, i.e. the number of accidents divided by the exposure. This allows for a like-for-like comparison between the two vehicle types. This shows that the frequency for motorcycles is 84% higher than the frequency for motorcars (0.122% / 0.066% -1).

5.10 Based on this final observation we have chosen to increase the overall frequency assumption by 84% compared to the core model for TPI. In doing this we note that the DfT report is only relevant to a subsection of the TPI claims we are analysing, namely those that result in bodily injury to pedestrians which are reported to the police. The report does not give any insight into the relative frequency of wider types of TPI claim that occur. We are therefore making the assumption that these types of liability claim will also be higher.

5.11 In order to make this change we have continued to use Negative Binomial distribution to model frequency. To parameterise this distribution we have assumed the average claim frequency is 84% greater than the average for motorcars. We have also assumed that the relative spread of results[6] is the same.

5.12 In making this adjustment we note that the report RAS100012 only consider third party pedestrians, not third party vehicle drivers/occupants (as this information was not available). It may be the case that if these were included, the relativity between motorcars and motorcycles would change.

5.13 This report gives no insight into the relative frequency of TPD claims. In the absence of specific information on TPD claims, we have assumed that the core model is appropriate without adjustment.

Claim severity

5.14 The first set of rows within Table 5.1 provides evidence that the TPI severity distribution for motorcycles is similar to that of motorcars (subject to the caveats previously discussed). As such we have assumed that the claims severity distribution is unchanged.

5.15 The report gives no insight into the severity of TPD claims. In the absence of specific information on TPD claims we have assumed that the core model is appropriate without adjustment.

[6] The relative spread of results is measured using the Coefficient of Variance ('CoV'). This is a statistical term defined as the standard deviation of a distribution divided by a mean. As a result of this definition, the CoV is a standardised measure of spread which is comparable across distributions.

Estimating exposure

5.16 The table below shows the size of the UK market for private motorcycle insurance measured in millions of vehicle years and as recorded by the ABI.

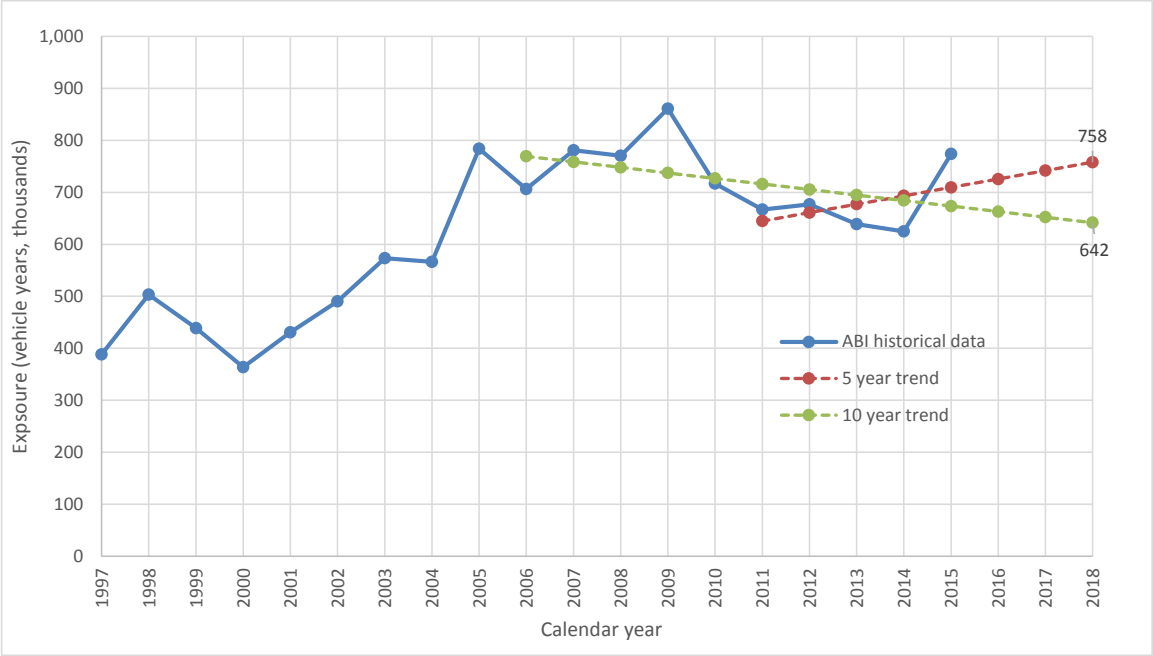


Figure 5.1: ABI's estimate of the size of the private motorcycle insurance market measured using vehicle years (thousands). The 5 year and 10 year trends are also shown

5.17 As with the equivalent analysis of the private motorcar data (figure 4.1), insurance volumes have seen a similar pattern of a peak in 2009 (861k vehicle years), followed by five years of general decline to 2014 (625k vehicle years) before a more recent rise in 2015 (774k vehicle years). As a result, forecasts forward to 2018 will vary depending on the period of time which the assessment is based on.

5.18 The dashed green line shows the 10 year trend which is one of gradual decline, estimating an exposure of 642k in 2018. By contrast, only considering the more recent 5 year trend result in an exposure estimate of 758k in 2018.

5.19 We have assumed that exposure will be 720k in 2018. This gives more weight to the 5 year trend which shows an increase in exposure over recent years.

Premium impact

5.20 Making these adjustments to the core model gives an annual premium of £670 per motorcycle compared to £427 per private motorcar (see paragraph 4.86).

Extending coverage to private land

Estimating the impact using the core model

5.21 For private motorcars and motorcycles which currently purchase a third party liability policy, the Comprehensive option will mean that such policies will need to be extended to cover private land as well as public roads.

5.22 Leaving aside the issue of increased fraud risk (which is considered separately), the extension to private land increases the likelihood of an accident occurring. This is because operating a vehicle on private land is now covered, and accidents will arise as a result of this additional activity.

5.23 We have not been able to obtain any data to help quantify the extent to which cars are used on private land, and we have therefore used our judgement to make the following assumptions:

> Our considerations are limited to accidents that occur when motorcars or motorcycles are used on private land where the public does not have access. We understand that the public access test will ultimately be interpreted by the courts, but that many types of privately owned land (e.g. car parks) are considered to be areas where the public has access (and are therefore already covered in the core model).

> Should an accident meet the criteria described above, current motor insurance policies will not cover the loss. We have also conducted research (see paragraph 5.26) that shows that the public liability aspect of a household policy will also not cover the loss. As a result, there does not appear to be any widely available insurance policy that provides any level of protection to the general public from their liability should an accident occur. The driver responsible for the accident would still be liable under civil law and legal action could be taken against them to recover costs.

> Both of these points indicate that the potential for non-fraudulent accidents is limited. Firstly, this is because the vast majority of places where motorcars and motorcycles are used are not classified as private land. Secondly, the fact that personal liability would arise in the event of an accident means that if these losses regularly occurred, it is likely that they would be a concern to the general public. The lack of any notable press coverage of such issues suggests that these claims occur infrequently.

> As such we have assumed that it is appropriate to make a small allowance for such claims. We have assumed that the frequencies in the core TPI and TPD models would be increased by 5%. This assumption is highly dependent on our judgement, and as such we have performed sensitivity tests in section 10 to explore the effects of making different assumptions.

> In the absence of any evidence to support a view that the severity of an accident on private land will be more or less severe than one on public land, we have assumed that once an accident occurs the severity has the same statistical distribution as in the core model.

5.24 In order to implement the above, we have created a replica of the core model but have increased the expected frequency by 5% of the original value. The relative spread of results (measured by CoV) has been kept the same.

Adjusting for overlap with existing liability policies

5.25 For private individuals, we have assumed that the only potential source of overlapping liability cover comes from the public liability section of a standard home insurance product. Having reviewed a sample of home insurance policies it is clear that losses from private motorcars and motorcycles are explicitly excluded. We have therefore assumed there is no overlapping insurance.

5.26 The table below summarises the research that has been carried out on to assess the public liability coverage within home insurance policies. The table shows the detailed results for three insurers – similar results were found for five further insurer which are not shown in the table (Aviva, More Than, Tesco Insurance and Direct Line).

Company	What is covered	What isn't covered
Allianz	Personal liability and liability because you live in the home. We will pay all amounts you legally have to pay: • as a private individual while in and away from your home; • because you live in the home; • while you live in the territories shown in General Exclusion 1 of this policy during any journey or temporary visit to any country in the world in which you do not own a property; In respect of: • compensation and claimant's costs and expenses; and • legal costs and expenses you pay with our written permission in connection with defending any claim; arising from accidental: i injury to any person; ii loss of or damage to property. If you die, your personal representative will have the benefit of this section for any liability you have that is covered by this section.	The policy will not pay more than £2m. Liability for fines, penalties or liquidated damages or aggravated, punitive or exemplary damages or any damages resulting from multiplying compensatory damages. Liability for loss of or damage to any property belonging to you or in your charge or control unless this is covered under 29b. Liability for loss, damage or injury caused by or arising out of the following: a You owning, possessing, or using (other than as a passenger) any mechanically or wind propelled or assisted vehicle (other than a self-propelled golf trolley or a pedestrian-controlled or ride-on garden tool which is not licensed for road use and you do not need a certificate of insurance for). This also applies for a trailer attached to the vehicle, or aircraft, hovercraft or watercraft (other than any hand-propelled boat, pontoon, sailboard or surfboard or any boat hired to you for no more than 12 hours and which is under 18 feet long and cannot travel faster than 17 knots). b You owning, possessing or using a dangerous animal or a specially-controlled dog, as described inthe Dangerous Dogs Act 1991. c Using any horse for hunting, racing or polo. d Any passenger lift which you are responsible for maintaining. e You being a tenant or living on any land or in any building other than your home, other than for events 29b and 29c.
Axa	We will pay up to the limit for any one claim or series of claims arising from any one event or one source or original cause that you or your family become legally liable to pay as compensation (which includes costs and expenses agreed by us in writing) occurring during the period of insurance for accidental:	Legal liability to pay compensation or costs arising from: • any business, trade, profession or employment; • you carrying out any deliberate, wilful or malicious act, including but not limited to assault and alleged assault; • you living in or occupying land or buildings other than the home or its land; • the transmission of any contagious disease or virus; • owning, possessing or using vehicles or craft; • owning, possessing or using caravans; • owning, possessing or using a dangerous dog of one of the following breeds: Pit Bull Terrier, Japanese Tosa, Dogo Argentino, Fila Brasileiro and cross breeds of these with any other breed; • owning any species of animal not domesticated in the UK; • any action for damages brought in a court outside the United Kingdom; • any action brought against you or your family by you, your family, your domestic staff and anyone resident in the home.

	• Death, bodily injury or illness to anyone other than you, your family, your domestic staff and anyone resident in the home. • Damage to property not belonging to or in the custody or control of you, your family or domestic staff. Arising from: • the occupation of the home (but not its ownership); • the private pursuits of you or your family; • the employment by you or your family of domestic staff. Limit – please refer to your schedule.	
Zurich	15. We cover you or your family for any legal	We will not pay if the liability arises from you or your family:

Table 5.2: Summary of the public liability coverage within a home insurance policy for three of the largest UK insurers

Premium impact

5.27 For private motorcars, the premium increases from £427 to £446, an increase of £19 per policy. Scaling up for the expected exposures in 2018 gives a total additional cost of £484m (£19 x 25m vehicle years).

5.28 For private motorcycles, the premium increases from £670 to £703, an increase of £33 per policy. Scaling up for the expected exposures in 2018 gives a total additional cost of £23m (£33 x 720k vehicle years).

Existing Vehicles – Adjustment for fraud on private land

Background

5.29 The core model for private motorcars is based on actual data recorded by UK insurers and as such will include an element of undetected fraudulent claims. Extending the core model to private land (as described above) assumes that the level of undetected fraud will be the same once private land is included.

5.30 However, having discussed the issue of fraud with industry experts (in particular the IFB) we note that:

> The compulsory nature of motor insurance is believed to be one of the main reasons why motor insurance has been targeted by fraudsters. The compulsory aspect means that fraudsters are aware that almost any vehicle being used on a public road will have an insurance policy in place, and this makes fraudulent activity more attractive. This has clear repercussions for the Vnuk judgement as it would extend the number of vehicles with compulsory insurance.

- Because fraud has been a significant concern for the motor insurance industry over a number of years, insurers have developed sophisticated systems which are able detect and prevent material levels of fraud. These systems are believed to be at their weakest when considering claims where there are few witnesses, and as a result they may struggle with extension to private land.
    - It was further noted that over an extended time period, fraud detection systems may adapt to any post-Vnuk changes to better detect and prevent fraud on private land. However, in the context of the estimating the potential impact in the 2018 calendar year, it is unlikely that systems will have been updated.
- The majority of fraud is organised rather than opportunistic. As such, it tends to be well organised and quick to adapt to any changes in the insurance environment. The disruption caused by Vnuk is likely to create opportunities for fraud which will be exploited before insurers are able to protect themselves.
- The majority of fraudulent claims relate to third party bodily injury, not first party or third party property damage. Again, this is directly relevant to the Vnuk judgement which is looking to extend third party bodily injury coverage.

5.31 We also note that during the course of our work we have met with insurance professionals who specialise in mobility scooters and event insurance for motor sport races. In both instances, the potential for fraud on private land exists but does not appear to have been exploited – the insurance professionals we met in these areas did not consider fraud to be a material concern. We raised this point with the IFB who noted that the current lack of compulsory insurance, combined with the relatively small size of the markets, is likely to explain the discrepancy.

Adjusting for increased levels of fraud

5.32 Given the arguments put forward by industry participants, we believe it reasonable to make an enhanced allowance for fraud under the Comprehensive option as a result of the extension to private land.

5.33 The IFB informed us that the annual level of detected fraud across all insurance products totalled £0.8bn across 70,000 claims, implying an average £11,500 per fraudulent claim. The distribution of fraudulent claims was believed to be in the region of £11,000 to £18,000. There are instances of very large fraudulent claims (circa £1m) but these were opportunistic in nature and potentially less of a concern as the higher values attract increased scrutiny.

5.34 The IFB also noted that undetected fraud is difficult to calculate but studies have been carried out and a figure of £2.1bn has been suggested, again across the entire insurance market.

5.35 Given the above, we have adopted the following approach:

- We have created a version of the core model which includes the allowance for private land but without the additional uplift for an increase in fraud
- The expected TPI frequency was 1.184% in the core model. This was increased to 1.243%, i.e. a 5% uplift, with the existing allowance for the extension to private land.
- We have extended this further to 1.362% to allow for additional fraudulent claims. This is a further 10% uplift on the core model, taking the total uplift to 15%
- In practical terms this further increase represents approximately 45,500 claims. This compares to the 70,000 detected fraudulent claims across the whole of the UK insurance industry.
- We have not adjusted the TPI severity distribution. This currently targets an average claim size of £17.0k which we consider to be reasonable in the context of the typical fraud claims seen by the IFB. We note that whilst the average is reasonable, the model allows fraudulent claims to take much larger (and smaller) amounts in line with the distribution of TPI losses in the core model. This is a potential area of conservatism within our approach, as it will attract additional capital loadings which will be passed on to consumers.
- We have not adjusted the TPD losses. This is in line with the comments from the IFB that the majority of fraudulent claims relate to bodily injury claims rather than property damage.

5.36 Whilst our calibration has been based on the information provided by the IFB, this is clearly an area of considerably uncertainty where judgement is required. We have explored the impact of alternate assumptions in appendix A.

Premium impact

5.37 For private motorcars, the original premium of £427 increased to £446 when considering private land without additional fraud. This increases further to £476 with the extra allowance for fraud, an increase of £30 per policy. Scaling up for the expected exposures in 2018 gives a total additional cost of £742m (£30 x 25m vehicle years).

5.38 For private motorcycles, the original premium of £670 increased to £703 when considering private land without additional fraud. This increases further to £760 with the extra allowance for fraud, an increase of £57 per policy. Scaling up for the expected exposures in 2018 gives a total additional cost of £41m (£57 x 0.72m vehicle years).

Using the core model for existing business vehicles

Estimating exposure

5.39 The table below shows the size of the UK market for commercial vehicle insurance measured in millions of vehicle years and as recorded by the ABI[7].

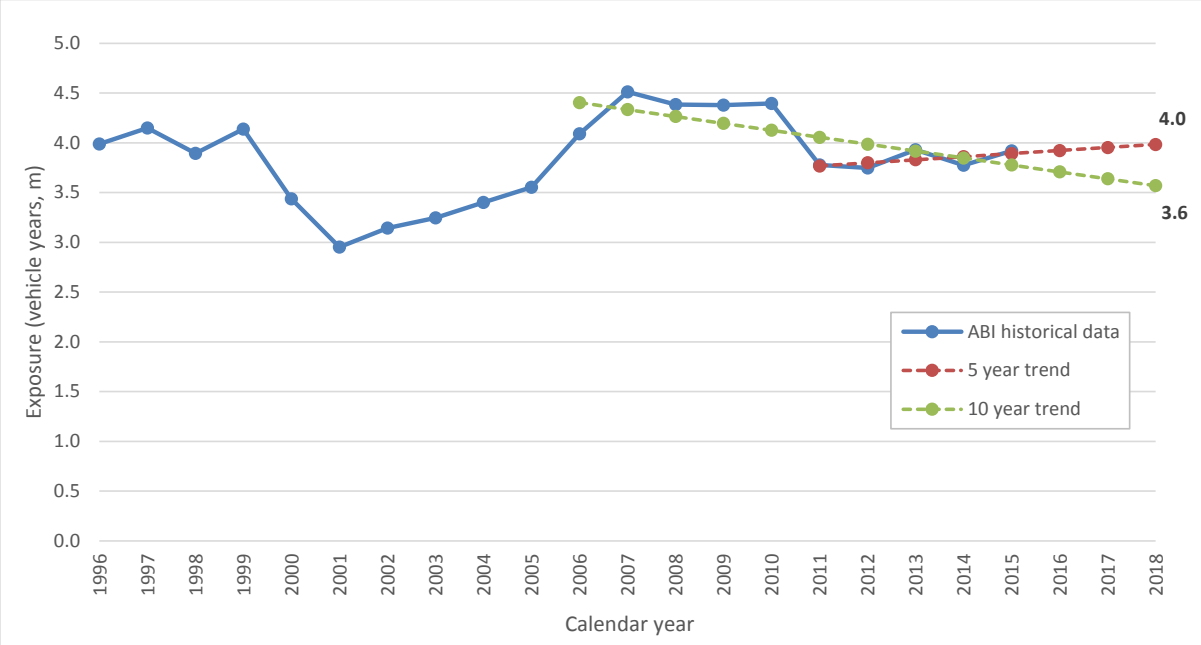


Figure 5.2: ABI's estimate of the size of the commercial vehicle insurance market measured using vehicle years (millions). The 5 year and 10 year trends are also shown.

5.40 As with the equivalent analysis of the private motorcar and motorcycle data, insurance volumes have seen a similar pattern of a peak in 2010 (4.4m vehicle years), followed by a sharp decline in 2011 (3.8m vehicle years) before a more recent rise in 2015 (3.9m vehicle years). As a result, forecasts forward to 2018 will vary depending on the period of time which the assessment is based on.

5.41 The dashed green line shows the 10 year trend which is one of gradual decline, estimating an exposure of 3.6m in 2018. By contrast, only considering the more recent 5 year trend result in an exposure estimate of 4.0m in 2018.

5.42 We have assumed that exposure will be 3.85m in 2018. This gives more weight to the 5 year trend which shows an increase in exposure over recent years.

[7] We have contacted the ABI to confirm our understanding of what is included in this category. The ABI informed us that this includes "all commercial vehicles and fleet business" and that it "also includes other vehicles which are not private cars such as motorhomes"

Claim frequency and claim severity

5.43 The TPWP last reported on commercial vehicles in their 2011 report where they noted a lack of contributors and generally poor quality of data. Because of these issues, analysis of commercial vehicle data was not repeated in future years and we have not been able to find a more recent alternative data source.

5.44 The 2011 TPWP report provided high level statistics on the claim frequency for commercial vehicles. Whilst the frequency for TPI claims was broadly similar, there was a significantly higher frequency for TPD. The paper gives an average TPD frequency of approximately 6%. No information was given on the severity of either TPD or TPI claims.

5.45 We have therefore assumed the only appropriate change to make to the core model is to increase the TPD frequency to 6%. The relative spread of results (measured by CoV) has been kept the same.

Adjusting for private land and enhanced fraud

5.46 The previous discussion on extending coverage to private land also applies to commercial vehicles – it is likely that a small proportion of their use would take place on private land and that this will generate additional claims which will need to be covered by insurance. As before, it is difficult to assess the proportion of time on private land due to a lack of relevant data. We have therefore maintained our assumption that frequency should be increased by 5% to compensate for the higher exposure.

5.47 The IFB did not indicate that commercial vehicle fraud was a particular concern for the insurance industry. As a result, we have limited our allowance for enhanced fraud rates to private motorcars and motorcycles. We have not made an additional fraud allowance fraud for existing business vehicles.

Premium impact

5.48 For existing business vehicles, our model gives a premium of £611 before any adjustments. This increased to £639 when considering private land without any additional fraud loading, an increase of £27 per policy. Scaling up for the expected exposures in 2018 gives a total additional cost of £105m (£27 x 3.85m vehicle years).

6 Motor Sport Vehicles

Introduction

6.1 This category consists of vehicles which are used in motor sport racing, an activity that typically takes place on private land or roads which have been temporarily closed to the public. Where an event organiser has a permit from the relevant governing body for an on-road racing event in England, regulations allow the temporary lifting of parts of the Road Traffic Act such that participants are not required to purchase third party liability insurance. Similar regulations are expected to be made for on-road racing in Wales.

6.2 It is useful to note that motor sport accidents can result in two broad categories of third party liability: those involving other racing participants and those involving spectators and stewards.

6.3 In theory, an accident between participants may result in one driver being legally liable to compensate another. However, we understand that the existing legal environment and racing culture means it is extremely unusual for any legal action between participants to occur. Instead, participants consider losses to be an integral part of the racing environment and they absorb any losses themselves.

6.4 The organisers of a motor racing event on a road temporarily closed for the purpose must be authorised by a governing body and given permission to carry out racing activities by the local council. The local council will require a liability policy to be purchased which provides more limited third party liability insurance that covers spectators and stewards (but not the participants themselves).

Governing bodies for motor sports

6.5 We understand that the Road Traffic Act Off Road Event Regulations (1992) allow the organisers of any racing event in 'public places other than a road' to seek authorisation by one of eleven governing bodies[8] thereby exempting participants from the driving offences in sections 1 to 3 of the Road Traffic Act. Of the eleven governing bodies there are two which authorise the vast majority of events:

- The Auto-Cycle Union ('ACU') represents motorcycle or 'two-wheeled' racing in Britain. It issues permits for approximately 3,500 events each year.
- The Motor Sports Association ('MSA') is the governing body for 'four-wheeled' motor sport in the UK which includes rallying, karting and circuit racing. It issues permits for approximately 5,000 events each year.

[8] More information on the regulatory background and the eleven governing bodies can be found at http://iopd.org.uk/

6.6 The MSA have estimated that in total the MSA and ACU represent 80-85% of the total events in the UK. We have therefore limited our investigations to the activities of these two governing bodies, which we then assume are representative of the wider population. We have been able to obtain data from both the MSA and ACU to help support our analysis. In addition, we have met with the MSA to discuss their data and challenges of the Vnuk judgement.

6.7 Whilst we understand that there are likely to be differences in the risk profile for two-wheeled and four-wheeled vehicles, our modelling approach has been to combine these into a single modelling category. This decision reflects both the limited availability of data (which makes it difficult to quantify differences between the vehicle types) and our overall scope which is to consider the impact of the Vnuk judgement across all areas of the UK. Where it has been possible to analyse two-wheeled and four-wheeled data separately we have done so, and we have looked to select a weighted average assumption for use within the model.

Estimating exposure

6.8 When either the ACU or MSA issue a permit, this allows a racing event to take place. A particular racing event will involve a number of separate races, and any individual race will involve a number of participants. Because of this uncertainty, the number of events is not the most appropriate measure of exposure.

6.9 Instead we have used the number of 'rides' as our exposure measure. A 'ride' represents a single participant taking place in a single race.[9]

6.10 The ACU expect to issue approximately 3,500 permits a year and we have assumed that this will continue to be the case in the 2018 calendar year. In order to calculate the corresponding number of rides we have carried out the following calculation:

- The ACU has provided us with more detailed information for the 2014 calendar year. In this particular year, the ACU issued 3,368 permits and recorded 295,120 rides.
- Based on the 2014 data the average number of rides per event is 88. We have assumed this is an appropriate average to use for the 2018 calendar year.
- As such, we estimate that there will be 310,000 rides (calculated as 3,500 permits x 88 rides, rounded to the nearest ten thousand).

6.11 The MSA are expected to issue approximately 5,000 permits a year and we have assumed that that this will continue to be the case in the 2018 calendar year. Based on an analysis of the 2014 calendar year we calculate that on average there are 28 rides per event. As such, our exposure measure for the 2018 calendar year is 140,000 rides.

6.12 As previously noted, the MSA have estimated that in total the MSA and ACU issue permits for 80-85% of the total events in the UK. We have assumed that:

[9] We understand that a small number of motorsports involve several participants competing in one vehicle (e.g. a co-driver). For simplicity, we treat this as a single 'ride'.

- The midpoint of the range (82.5%) is appropriate for the 2018 calendar year.
- As such we have assumed that the total number of events in 2018 is 10,300 (3,500 + 5,000 / 82.5%, and rounded to the nearest hundred).
- This is equivalent to estimating that in addition to the MSA and ACU events there will be 1,800 events organised by the other governing bodies.
- The majority of these governing bodies are concerned with sports which appear to be similar to four-wheeled racing. As such we have assumed that the MSA average of 28 rides per event is appropriate. This give 50,000 rides for the additional events (1,800 events x 28 rides, rounded to the nearest ten thousand).

6.13 Our total exposure estimate for the 2018 calendar years is therefore 500,000 rides. This is calculated as 310,000 (from the ACU) plus 140,000 (from the MSA) plus 50,000 (from other bodies).

Liability data provided by the ACU

6.14 The ACU have provided us with a spreadsheet listing all accidents that resulted in bodily injury at one of their events between 6 January 2008 and 6 September 2015. We note the following in respect of this data:

- Each individual injury was recorded as a separate data item. An accident leading to multiple bodily injuries therefore creates multiple data items.
- For each injury there is a qualitative description of the body part damaged (abdomen, arms, head etc.). In some cases the body part damaged is listed as 'no injury'. This occurs when a participant is involved in an accident that causes them to fall from their motorcycle but they did not sustain any injuries. We have excluded such losses from our analysis which is consistent with the removal of nil-claims from the core model.
- For each injury there is also a record of whether an overnight hospital visit was required. The information is recorded as either 'true' or 'false' and no further information is given.
- No information is available on the financial amounts associated with the loss, such as medical costs or loss of earnings.

6.15 The database has been constructed using information obtained by the racing officials who are present at each event. As a result, it is likely that the data is subject to the limitations of what can be collected during the event or shortly afterwards. In particular, there may be accidents which are initially recorded as 'no injury', or not requiring hospitalisation, which deteriorate after the event and become more severe. We understand that such deteriorations would not be recorded in the data.

6.16 We also highlight that the data does not enable us to make an assessment of who is liable for the injury. Whilst in some cases the injury will have been caused by the negligence of a driver, there will also be examples of where the injured party is partly or fully responsible for the loss, and a third party liability policy would not respond.

6.17 We have not adjusted for either of these potential distortions in the data.

Liability data provided by the MSA

6.18 The data provided by the MSA is higher level in nature. They have provided us with a spreadsheet showing the notified insurance losses under the event insurance policies between 1 January 2000 to and 31 December 2016. There are three significant differences compared to the ACU data:

- The event insurance will only cover liabilities to spectators and stewards. The data therefore excludes any injuries to participants.
- The data contains property damage and bodily injury losses. We have manually allocated each claim based on a qualitative description of the loss contained within the data.
- The data will only contain losses notified to the insurers. Whilst we understand from the MSA that the loss amounts have not been reduced for the policy deductibles, they appear to be subject to the limits and exclusions of the policy. These limits and exclusions may be different from a compulsory third party liability policy required under the Road Traffic Act.

Using the core model for motor sport vehicles

6.19 We set out below the high level adjustments made to the base model for private motorcars in order to adjust for the difference in risk profiles.

TPI - Adjustments for frequency

6.20 Using the ACU data we have calculated that the number of non-nil accidents across the entire data period (6 January 2008 to 6 September 2015) is 10,277.

6.21 In order to match the claims frequency with our measure of exposure, we note that:

- During the period of time covered by the accident data, the ACU has informed us that they issued 24,738 permits.
- As previously discussed, during the 2014 calendar year the average number of rides per event is 88. We have assumed this is an appropriate average to use across the entire data period during which data was collected. As such, we assume that there were 2,176,944 rides (88 x 24,738) across the entire data period.

6.22 The assumed frequency of TPI accident is therefore 0.472% per ride (10,277 accidents / 2,176,944 rides).

6.23 The same process has been repeated but with participant and spectator/steward accidents separated - this allows for a comparison with the more limited MSA data. The gives a frequency of 0.449% for participant losses and 0.024% for spectator/steward losses.

6.24 We have applied similar analysis to the MSA data, but noting that they have only supplied data for spectator/steward losses and we have manually identified bodily injury losses. The MSA have also provided the number of permits and rides corresponding to their data. This gives a frequency of 0.009% for spectator/steward losses.

6.25 We note that the frequency for ACU spectator/steward losses is approximately 3 times larger than for MSA losses. Based on our conversations with industry specialists, we had expected two-wheeled and four-wheeled sports to have different risk characteristics, but no quantitative data had been supplied to support any directional views on these differences. This analysis provides some evidence that four-wheeled racing results in fewer spectator/steward accidents (however we note there is no such evidence for participant accidents).

6.26 As a result we have assumed that:

- For all types of racing, there is a 0.449% frequency for participant injuries.
- For two-wheeled racing only, the frequency of spectator/steward losses is 0.024%. For four-wheeled racing only, the frequency is lower at 0.009%.
- Based on the exposure estimates in paragraph 6.13, the weighted average frequency for spectator/steward losses is 0.018%.
- The overall frequency is therefore 0.467% (0.449% + 0.018%)

6.27 In order to make this change we have continued to use Negative Binomial distribution to model claim frequency. To parameterise this distribution we have assumed the average claim frequency is 0.467% (as above) and the spread of results is the same as the core model.

TPI - Adjustments for severity

6.28 The frequency analysis described in the previous paragraphs concluded that the vast majority of injuries arise from participant accidents. We have therefore assumed that the severity distribution should only be based on these types of losses and we have used the ACU data to help support this analysis.

6.29 As previously noted, the data ACU data does not provide monetary amounts associated with the losses. We have therefore applied the following procedure to estimate the magnitude of the loss.

- The data set contains information on the body part damaged. We have subjectively categorised the severity of the loss as 'very high, 'high', 'medium' or 'low'. The guidelines we used for this assessment are based on an analysis of personal injury policies, and are set out below:
    - very high: the body part listed as damaged is either 'death', 'head injury', or 'multiple injuries'
    - high: the body party injured relates to the sensory organs (eyes, ears, hands)
    - medium: the body part injured relates to the limbs or torso

- low: the body part injured relates to the extremities (thumbs, toes, fingers)

> The data set also contains information on whether an overnight hospital stay was required. We have used this as an additional check on our categorisation – if no hospital visit was required then the loss is re-categorised as 'low'.

6.30 In order to compare the ACU data with the core model, we have constructed the figure below. The first set of rows are directly from the TPI severity distribution for the core model, originally introduced in paragraph 4.46. In the second set of rows we have used our judgement to aggregate the core model into the four high level categories used to analyse the ACU data: 'Low', 'Medium', 'High' and 'Very High'. This judgement has been based on the types of losses within the ACU data which have been mapped to the categories, and our experience with the likely cost of such claims. The third set of rows are the ACU data for comparison.

	Claim category (size of loss, £k or £m as indicated)										
	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	8.6m-52m
Average claim size (£k or £m)	0.4k	8k	22k	45k	106k	0.23m	0.55m	1.11m	2.24m	5.19m	13.50m
Likelihood of claim within category	6.83%	73.93%	12.90%	5.02%	0.77%	0.33%	0.12%	0.05%	0.03%	0.02%	0.01%

High level claim category	Low	Medium	High	Very High
Likelihood of claim within category	80.77%	17.91%	1.10%	0.22%

ACU data	70.48%	23.09%	2.12%	4.31%

GAD assumptions for motorsport model

	Claim category (size of loss, £k or £m as indicated)										
	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	8.6m-125m
Likelihood of claim within category	5.96%	64.51%	16.62%	6.47%	1.48%	0.64%	4.21%	0.05%	0.03%	0.02%	0.01%

Figure 6.1: Comparison of TPI severity distribution from the core model and the ACU data

6.31 Figure 6.1 shows that the ACU data had a smaller proportion of low claims and a higher proportion of medium, high and very high claims.

6.32 For the low, medium and high categories we have adjusted the more granular core model categories to reflect these changes, e.g. the £17k-£34k category has been uplifted by 29% (which is 23.09% / 17.91% - 1).

6.33 For the very high category we have only adjusted the first of the more granular categories, i.e. the £0.4m to £0.9m category, so that the overall probability of a very high loss is in line with the ACU data. We have taken this approach as i) the ACU data indicates that higher claims are more likely so an increase to this part of the distribution is justified, however ii) there is no reliable data about extreme losses to justify increases throughout this part of the distribution.

6.34 Whilst we have not uplifted all of granular categories within the very high section of the distribution, we have made a further change to the core model category labelled '£8.6m-£52m'. The upper end of this category is based on a consideration of a realistic disaster scenario, which is discussed below.

TPI - Adjustments for severity – realistic disaster scenario

6.35 In line with approach for the core model, we have set the upper bound for losses by considering a realistic disaster scenario. Based on feedback from Syndicate 1991 and JLT, we have assumed such a scenario would involve a vehicle penetrating safety barriers and hitting a crowd of spectators.

6.36 Over the last 20 years (which is the period that Syndicate 1991 and JLT are familiar with) the most severe racing loss in the UK has been the Jim Clark Rally which occurred in 2014. During this event a car lost control and exited the road, killing three spectators and injuring several more.

6.37 Whilst this represents an extreme loss, following our discussions with industry experts we believe that a realistic disaster scenario would result in more severe losses.

6.38 The 1955 Le Mans disaster has been highlighted as a more comparable loss. During this event a major crash caused large amounts of debris to hit spectators, killing 83 and injuring several hundred. Whilst we appreciate that a number of safety improvements have been made since this disaster, we believe that this loss justifies making a more significant allowance than would be implied from the Jim Clark Rally event.

6.39 Following these considerations we have assumed that a more reasonable upper limit for losses is £125m (expressed in 2018 terms). This represents a large crash which kills and seriously injures a significant number of people. Given the particular uncertainty in this assumption we have carried out a sensitivity test in section 10 to assess the impact of taking an alternative view in this area.

TPD - Adjustments for frequency and severity

6.40 Our ability to analyse TPD losses has been limited by a lack of available data with neither the ACU nor the MSA recording any information on participant to participant property damage. In the absence of such data, we have taken a more pragmatic approach to estimating TPD losses.

6.41 The core model suggests that the frequency of TPD losses is approximately twice as high as the frequency of TPI losses (the exact figure is 2.095). In the absence of any additional information, we have assumed that this ratio applies to motor sport vehicles as well. The frequency is therefore 2.095 x 0.467% = 0.979% per ride.

6.42 We have taken the pragmatic approach of assuming that the severity distribution from the core model is appropriate to be used without adjustment. In doing so we highlight that there is a wide variation in the value of most motor racing vehicles, ranging from several hundred pounds to tens of thousands of pounds. By adopting the TPD distribution from the core model, we are assuming that the forecast range of losses is suitable for motor vehicles. For reference, the 99.5th percentile of the TPD claims distribution was £90,000.

Adjusting for overlap with existing liability policies

6.43 As previously noted, local councils require that event organisers purchase an insurance policy which will respond to liability claims from spectators and stewards. The extent of the insurance requirement varies from council to council, but having discussed this with Syndicate 1991 (a provider of event insurance) we understand that most event organisers choose to purchase a policy with a £10m limit. This means that insurers will pay any individual loss up to £10m. For losses greater than £10m, the event organiser will retain liability for the excess amount.

6.44 In the event that the Comprehensive option is pursued, we have assumed that event insurance policies will be amended so that there is no overlap with the Road Traffic Act policies which racing participants would be required to purchase. This would mean that event insurance would no longer cover spectator/steward liabilities when they are caused by the negligence of a racing participant. Because the cover has been restricted, we expect a commensurate reduction in premium.

> We note that real-world premiums are often anchored to the amount charged in previous years, so this reduction may take time to filter through to the insured. The amount of time will be reduced if the market is competitive and the insured (or their representatives) are experienced market participants. For simplicity, we assume that the entire saving will be realised in the 2018 calendar year.

6.45 Our scope is to consider the overall impact to business and individuals of the potential Vnuk changes. In the context of motor sport vehicles and the Comprehensive option, there are two effects: participants will have to pay for an insurance policy, but it is likely that event organisers will be able to obtain cheaper insurance as they will no longer seek cover for the risks now borne by the participants. The overall cost is therefore the amount paid by participants less the amount saved by event organisers.

6.46 We have allowed this reduction (the amount saved by the event organisers) as follows:

> Paragraph 6.26 states that for TPI claims, our overall frequency assumption of 0.467% is made up of a 0.449% loading for participant injuries and a 0.018% loading for spectator/steward injuries.

> We have therefore assumed that 3.854% of claims (calculated as 0.018% / 0.467%) overlap with existing event insurance. As a result, for 3.854% of the generated claims we have reduced the loss by up to £10m (which is the typical limit purchased by event organisers).

Additional considerations

6.47 In the core model we assumed that brokerage costs would be 10% given the typical distribution channels for private motor insurance. Insurance for motor sport vehicles is a more specialist product and the services of a broker are likely to be required to help facilitate the purchase of insurance. We have assumed brokerage of 15% which is in line with our experience of brokerage fees for niche insurance products underwritten by specialist insurers.

Premium impact

6.48 We estimate that the total premium required to providing Road Traffic Act compliant insurance cover for motor sport vehicles in the 2018 calendar year is £229m. This is net of our adjustment for overlapping insurance.

6.49 To provide context for this figure we note that the cost per ride is £458 (£229m / 500,000 rides). If an individual participated in 6-12 rides per year, their annual premium would be between £2,748 and £5,496.

Overall premium impact

6.50 When either the ACU or MSA issue a permit, this allows a racing event to take place. A particular racing event will involve a number of separate races, and any individual race will involve a number of participants. Because of this uncertainty, the number of events is not the most appropriate measure of exposure.

7 Other Business Vehicles

Introduction

7.1 This category consists of vehicles which are used for business activities but are not currently subject to the Road Traffic Act as they only operate on private land. This category includes agricultural vehicles, forklift trucks and construction vehicles.

7.2 We highlight that business vehicles which are already subject to the Road Traffic Act, such as trucks and vans, have already been considered under the Existing Vehicles category of our analysis.

7.3 This is the only category where we were unable to meet with industry experts to discuss the key assumptions underlying our analysis. As a result, we have relied on information which has been made publicly available or has been disclosed to us as part of the consultation exercise. Whilst we consider this information to be a reasonable source of data in the context of our work, an absence of engagement with industry increases the uncertainty associated with this modelling category.

Estimating exposure

7.4 In order to estimate the size of the UK market for business vehicles we have considered three sub-types which have been selected based on DfT's Impact Assessment. These are: agricultural vehicles; forklift trucks and construction vehicles.

7.5 For each vehicle type we have conducted a desk-based review in order to estimate the size of the UK insurance market, i.e. the number of vehicles which we expect to be in active use during the 2018 calendar year. Our review is based on publicly available documents from industry representatives, such as annual reports, press articles, and customer newsletters.

Agricultural vehicles

7.6 The Agricultural Engineers Association ('AEA') is a trade association representing UK manufacturers and importers of agricultural machinery and outdoor equipment. Their website includes an analysis of the number of new units of farm equipment sold in the UK between 2011 and 2016.

7.7 In order to estimate the size of the UK insurance market, we have carried out the following steps:

- The AEA data gives the estimated number of sales for a number of agricultural vehicle types, such as tractors, sprayers and utility vehicles. This information is given for the 2016 calendar year in isolation, the 2015 calendar year in isolation and the 2011-2014 calendar years in aggregate.
- Because much of the information is aggregated, we are unable to perform any meaningful trend analysis to help forecast sales figures to the 2018 calendar year. Instead we have assumed that the average annual sales recorded during the 2011-2016 period will continue into the future (i.e. for 2017 and 2018) and the recent past (2004 to 2010).

- To convert the number of sales into the number of vehicles in active use, we have assumed that the agricultural vehicles will last an average of 15 years before they are replaced with more modern machinery. This is a subjective assessment based on:
  - A 2012 study by the International Journal on Agricultural and Natural Sources which estimated a tractor's useful lifespan to be between 10 and 30 years, with an average of 22 years.
  - Broader statistics collated by the Driver and Vehicle Standards Agency (an executive agency which is part of DfT). An analysis of commercial vehicles failing their annual tests (which are similar to the Ministry Of Transport tests for personal cars) suggest that the average lifespan of heavy goods vehicles and trailers is less than 10 years.
  - Noting that whilst tractors are a significant vehicle type within the agricultural category, there are a number of other vehicle types as well. In the absence of specific academic studies estimating the lifespan of these other vehicles, giving some weight to the broader UK statistics seems reasonable.

7.8 Based on this analysis we estimate the number of agricultural vehicles in active use during 2018 to be 550,000.

Forklift trucks

7.9 The British Industrial Truck Association ('BITA') is a trade association for forklift truck manufacturers and suppliers in the UK. Similar to the AEA, BITA has provided high level statistics on new sales of forklift trucks in the UK.

7.10 Applying the same methodology described in paragraph 7.7, and assuming the average lifespan is 10 years[10], we estimate the number of forklift trucks in active use during 2018 to be 270,000.

Construction vehicles

7.11 The Construction Equipment Association ('CEA') is the trade association that represents the UK construction equipment sector. Whilst much of the CEA's data is not publicly available, their website includes some high level information on global sales. For the 2015 calendar year there were an estimated 685,000 construction vehicles sold throughout the world.

7.12 In order to estimate the UK's share of the global market, we have calculated the UK's Gross Domestic Product as a percentage of the global amount (3.5%). Applying this percentage to global sales suggests that UK sales would be in the order of 24,000 per annum.

7.13 Applying our lifespan assumption of 15 years to this annual static, we estimate that the number of construction vehicles in active use during 2018 is 360,000.

[10] https://www.tmhnc.com/blog/how-long-will-a-forklift-last-and-forklift-average-use

Additional uplift

7.14 The three sub-categories defined above (agricultural, forklift, and construction) are believed to capture the vast majority of other business vehicles which may require compulsory insurance. However, in recognition that there may be other business vehicles which have not currently been identified, but may be required to purchase insurance under the Comprehensive option, we have made an additional increase to our exposure estimate.

7.15 For example, shortly after DfT's Impact Assessment was issued, industry representatives highlighted that a number of airport vehicles were likely to fall within the scope of the Comprehensive option. These vehicle types had not previously been considered.

7.16 There is also the risk that some of the vehicles in the sub-categories defined above are used on public roads and already purchase insurance, in which case they are considered within our model under the Existing Vehicles section.

7.17 To allow for both of these uncertainties, we have increased our exposure estimate by 5%. The selection of 5% is subjective and we have performed sensitivity testing around this assumption in section 10.

Total exposure

7.18 The total exposure is shown in the table below:

Vehicle category	Estimated UK market
Agricultural	550,000
Forklift trucks	270,000
Construction	360,000
Additional uplift (5%)	59,000
Total	**1,239,000**

Figure 7.1: Estimate of the number of 'other business' vehicles in the UK during the 2018 calendar year

Adjusting for overlap with existing liability policies

7.19 This section describes how we have investigated the potential overlap between a Vnuk compliant motor insurance policy under the Comprehensive Option, and existing employers' liability insurance policies.

7.20 The legal requirements for employers' liability insurance are summarised in the document entitled 'Employers' Liability (Compulsory Insurance) Act 1969 - A brief guide for employers' issued by the Health and Safety Executive[11]. The key aspects which are relevant to our work are as follows:

[11] http://www.hse.gov.uk/pubns/hse40.pdf

- The requirement to purchase employers' liability insurance extends to virtually all commercial businesses. There are limited exemptions for very small companies which are either: a) companies with only one employee who is also the majority shareholder, b) privately held companies where all employees are closely related to the business owner. We expect these exemptions to be rare, so we make the simplifying assumption that all companies purchasing a vehicle within this category will have an employers' liability policy in place.

- The legal minimum amount of cover that must be purchased is £5m. However, as noted in the guidance, most insurers will offer cover of at least £10m, and we understand that most employers purchase at this level. We have therefore assumed that a £10m policy will be in place.

7.21 To understand whether motor vehicles are excluded from employers' liability policies, we have reviewed two example policies from Zurich and Axa. The results are set out in the table below.

Company	What is covered	What isn't covered
Zurich	If any person under a contract of service or apprenticeship with the Insured shall sustain any bodily injury or disease caused during any Period of Insurance and arising out of and in the course of his employment by the Insured in the business above mentioned, the Insurer will indemnify the Insured against all sums for which the Insured shall be liable in respect of any claim for damages for such injury or disease settled or defended with the consent of the Insurer. The Insurer will in addition pay claimants' costs and expenses and be responsible for all costs and expenses incurred with the consent of the Insurer in defending any such claim for damages.	It is agreed that with effect from 1 July 1994 this policy does not provide any indemnity in respect of any liability for which compulsory motor insurance or security is required under the Road Traffic Act 1988 as amended by the Motor Vehicles (Compulsory Insurance) Regulations 1992 and the Road Traffic (Northern Ireland) Order 1981 as amended by the Motor Vehicles (Compulsory Insurance) Regulations (Northern Ireland) 1993 or any other Compulsory Road Traffic Legislation.
Axa	**Awards of damages cover** We will pay the amount of damages for which you, or any of the additional persons insured, are liable at law and claim costs in respect of accidental bodily injury to any employed person caused during the period of insurance arising out of and in the course of their employment by you in connection with the business. **Compensation for court attendance cover** We will compensate you at the rate of £250 per day for each day that your attendance is required at court, if we request any director, partner or employed person to attend as a witness in connection with a claim, for which an award of damages is paid or may be payable under this section.	**Road Traffic Act exclusion** We will not cover legal liability for bodily injury to an employed person in circumstances where it is necessary to arrange compulsory motor insurance or security under any Road Traffic Legislation.

Table 7.1: Summary of employers' liability coverage from Zurich and Axa

7.22 Firstly, we note that both policies are only concerned with TPI claims, not TPD claims. Both policies also explicitly exclude any liability that would be covered by the existing Road Traffic Act legislation, i.e. the types of business vehicle we considered in section 5 under the heading of Existing Vehicles. However, the additional vehicle types which we are considering under Other Business Vehicles, which are not currently the subject of the Road Traffic Act, are not excluded. Employers' liability policies will therefore respond to any TPI claim involving these types of vehicle.

7.23 Given that we are assessing the overall impact of the Vnuk judgement on businesses and individuals, we have allowed this overlap to reduce our estimates of the costs associated with purchasing a Vnuk compliant policy under the Comprehensive option. We have achieved this by assuming all TPI claims below £10m would be paid by an existing employers' liability policy. The costs associated with the Comprehensive option are therefore the cost of extending the TPI coverage cap from £10m to unlimited, and introducing TPD coverage.

7.24 In practice, we note that employers' liability policies would evolve to exclude the new vehicle types if the Comprehensive option was pursued. Give these new vehicle types were previously included within the coverage, there should be a corresponding reduction in premium. This would offset the new premium paid by employers as a result of having to purchase additional motor insurance for the new vehicle types.

Adjustments to the core model

7.25 As previously noted, we have not been able to meet with any industry experts to discuss the key assumptions underlying our analysis, in particular how the core model may be adjusted to allow for differences in the risk profiles.

7.26 Without the guidance of industry experts, we do not believe there are any clear arguments to support making material adjustments. Whilst commercial vehicles tend to be heavier, operate in more confined spaces, and carry out more dangerous activities, they are also operated by more highly trained individuals who are subject to health and safety procedures (such as wearing protective clothing) which are designed to minimise risk.

7.27 We have therefore not adjusted the frequency and severity assumptions within the model. However, there are other aspects of the model which have been adjusted:

> All simulated TPI claims below £10m are assumed to be zero, to allow for the overlap with employers' liability policies. All simulated claims above £10m are reduced by £10m to allow for the maximum possible recovery under a typical employers' liability policy.

> The core model assumes that brokerage costs would be 10% given the typical distribution channels for that type of business. Business vehicles are a more specialist product and the services of a broker are likely to be required. We have assumed brokerage of 15%.

Premium impact

7.28 We estimate that the average premium for each business vehicle will be £159 per annum. Scaling up for the total anticipated exposure in 2018 means the total premium required to provide Road Traffic Act compliant insurance is £198m.

8 Miscellaneous Vehicles

Introduction

8.1 This category considers a number of miscellaneous vehicle types which are not captured in the other categories but are potentially affected by either the Amended or Comprehensive options. The main vehicle types within this category are mobility scooters and electric bikes.

Estimating exposure

8.2 In order to estimate the exposure for this category we have considered a number of specific vehicle types which were identified in DfT's Impact Assessment. We have also added a general loading to capture additional vehicle types which have not been specifically identified.

Mobility Scooters

8.3 In order to assess the size of this market we met with First Senior Group who are a provider of financing and insurance products for mobility scooters. First Senior estimated that between 75,000 and 80,000 mobility scooters are sold each year, however a high mortality rate amongst consumers means that the total number of scooters in active use is a low multiple of the annual number.

8.4 Based on their experience within the market, First Senior estimated that the total number of scooters actively being used during 2017 is between 200,000 and 250,000. To make an allowance for continued growth in the market, which in turn reflects the aging demographic within the UK, we have selected the top end of this range for our exposure estimate in 2018. We are therefore assuming that there will be 250,000 mobility scooters in 2018.

8.5 We highlight that the ratio of the total market (250,000) to the annual sales (75,000 to 80,000) is between 3.1 and 3.3. This is significantly lower than the ratio of 15 which was used to convert annual sales of business vehicles to give an estimate of the total size of the market. This is a reflection of the differences between the two vehicle types which perform very different activities and the target markets which have significantly different demographic profiles.

Electric power assisted cycles ('electric bikes')

8.6 In order to assess the size of the market for electric bikes, we met with Bikmo who provide specialist insurance products for this market. Bikmo described how the UK market is currently undergoing rapid growth from a small base, and estimated that 20,000 electric bikes were sold in 2014, the most recent year for which reliable statistics were available. Bikmo estimated that the size of the market during 2017 was approximately 100,000 vehicles.

8.7 We highlight the ratio of annual sales to the annual sales in 2014 is 5.0. This was discussed with Bikmo who noted that many of the vehicles have a battery life of approximately 4 to 5 years, after which they are often replaced with a new vehicle rather than repaired with a new battery.

8.8 Bikmo estimated that rapid growth in sales would mean a total UK market of 150,000 vehicles in in 2018. We have adopted this figure in our analysis.

Golf buggies

8.9 We have not been able to meet with any industry experts to provide assistance with the assessment of the number of golf buggies. We have also been unable to obtain reliable statistics on the annual sales of golf buggies, which has been the basis of estimating the size of the UK market for other types of vehicle.

8.10 Based on information made available by the sport's governing bodies, there are approximately: 1,900 golf courses in England[12]; 600 in Scotland[13]; 150 in Wales[14]; and 100 in Northern Ireland[15]. This gives a total of 2,750 golf courses.

8.11 Based on a small sample of individual golf courses we have assumed an average of 10 golf buggies for each golf course. This gives a UK market of 27,500 vehicles.

Segways

8.12 A Segway is a branded, two-wheeled electric vehicle which is designed to be used as a personal transportation device. In the UK we understand that the current legal environment means that Segways are only permitted to be used on private land.

8.13 Segway UK is the official distributer of Segways in the UK. In late 2009 Segway UK gave an interview to the Daily Telegraph in which they disclosed that sales were approximately 200 during the 2008 calendar year, which was a moderate increase of 11.5% on the previous year. Segway UK also estimated the total size of the UK market to be 2,000 at that time. We were unable to find any further information on UK sales.

8.14 In order to estimate of the size of the UK market in 2018 we have made the following assumptions:

- Annual growth continued to be 11.5% per annum.
- The ratio between annual sales and the total size of the market continued to be 10.0

8.15 Applying these assumptions we assume that the size of the UK market in 2018 is approximately 6,000 vehicles.

[12] http://www.englandgolf.org/page.aspx?sitesectionid=93&sitesectiontitle=Infrastructure+of+the+English+Golf+Union&preview=1
[13] https://www.scottishgolf.org/who-we-are/
[14] http://www.golfunionwales.org/affiliated-golf-clubs
[15] https://www.golfnet.ie/

Remaining vehicle types

8.16 The remaining vehicle types within this category are: ride-on lawnmowers; children's' toys, fairground rides; and quad bikes[16]. In each case we were unable to find any reliable statistics on the annual sales for these vehicle types or the total size of the UK market.

8.17 DfT's Impact Assessment estimated that for each of these vehicle types the number of vehicles would be 'low'. Segways were also expected to have a 'low' number of vehicles and so we have assumed that this vehicle type is representative of the other vehicle types within this category. As such we assume that there are 6,000 vehicles for each of the remaining vehicle types.

Additional uplift

8.18 The vehicle types described above are believed to capture the vast majority of miscellaneous vehicles which may require compulsory insurance. However, in recognition that there may be other vehicles which have not been specifically identified, but may be required to purchase insurance as a result of the Vnuk judgement, we have made an additional increase to our exposure estimate.

8.19 In line with approach in the Other Business Vehicles category, we have increased our exposure estimate by 5%. The selection of 5% is subjective and we have performed sensitivity testing around this assumption in section 10.

Total exposure

8.20 The total exposure is shown in the table below:

Vehicle category	Estimated UK market
Mobility scooters	250,000
Electric bikes	150,000
Golf Buggies	27,500
Segways	6,000
Ride-on lawnmowers	6,000
Children's toys	6,000
Fairground rides	6,000
Quad bikes	6,000
Additional uplift (5%)	22,875
Total	**480,375**

Figure 8.1: Estimate of the number of 'miscellaneous' vehicles in the UK during the 2018 calendar year

[16] Quad bikes excludes agricultural quad bikes, also known as all-terrain vehicles ('ATVs'), which are included within the agricultural vehicles category which was considered in the Other Business vehicles section of our analysis.

Adjustments to the core model

8.21 Our estimate of exposure has been based on assessment of each individual vehicle type within this category. However, in order to use the core model in an efficient manner we now assume that there is a single risk profile which represents all of the vehicles. To construct this profile we have largely relied upon our meetings with First Senior and Bikmo as representatives of the two largest components within this category. However, we have also considered the other vehicle types, in particular when considering the possibility of large losses.

Adjustments to frequency

8.22 Both Bikmo and First Senior indicated that the vast majority of their claims were in respect of TPD rather than TPI claims:

> First Senior indicated that the overall claim frequency was approximately 4% for both TPD and TPI in aggregate. Of this, the TPI component should be small as First Senior would only expect around 10 TPI claims a year. Based on this information, and other details provided by First Senior on the size of the mobility scooter market and their share of it, this suggests that the aggregate 4% assumptions breaks down as 3.99% for TPD and 0.01% for TPI.

> Bikmo indicated a significantly lower overall claim frequency of approximately 0.08% for both TPD and TPI in aggregate. We understand that this statistic is based on their historical loss experience which has not included any TPI losses.

8.23 Weighting the total claim rates by the number of vehicles shown in table 8.1 gives a 2.53% overall claim frequency split 2.52% TPD and 0.01% for TPI.

Adjustments to severity – TPI

8.24 First Senior stated that the largest TPI claim they had experienced during their 20 year history in the industry was £56k. This arose as a result of a mobility scooter swerving onto a public road and causing another motorist to take evasive action which resulted in an accident and a TPI claim. The vast majority of the other TPI claims they had experiences are for far smaller amounts.

8.25 Information provided to DfT from other mobility scooter insurers as part of the wider consultation process suggested a slightly higher maximum loss of £250k.

8.26 Bikmo had not experienced any material TPI claims during their more limited trading history, with the claims that had experienced being in the low hundreds or low thousands. Bikmo also noted that they typically provided third party cover of £1m and there was a small possibility for significant third party losses to be at that level (but that the probability would be very low given the speed and weight of electric bikes).

8.27 In addition to the above, DfT has also made us aware of several large TPI claims that have recently emerged from quad bike accidents.

8.28 Given this information we have made the following adjustments to the core model distribution for TPI losses:

> In the core model, the vast majority of TPI losses were in the categories £2k to £17k and £17k to £34k. Given the lower speeds of the miscellaneous vehicles, we have assumed that these vehicles are likely to generate less significant TPI losses.

> We have therefore assumed for miscellaneous vehicles, the likelihood of a loss in the £0k to £2k category is equal to the probability of a loss in either the £0k to £2k or £2k to £17k categories from the core model.

> We have further assumed that the likelihood of a loss in the £2k to £17k category for miscellaneous vehicles is equal to the likelihood of a loss in the £17k to £34k category from the core model.

> We have continued this pattern (of shifting the likelihoods from the core model to the next lower claims category) until the final two claim categories. For these categories (£3.4m to £8.6m and £8.6m to £52m) we have assigned half of the likelihood from the core model category of £8.6m to £52m. We have done this to reflect the remote chance that substantial losses can be generated by miscellaneous vehicles.

8.29 The assumed distribution for TPI losses is shown in the table below, alongside the corresponding distribution in the core model for comparison:

	Claim category (size of loss, £k or £m as indicated)										
	0-2k	2k-17k	17k-34k	34k-86k	86k-172k	0.2m-0.4m	0.4m-0.9m	0.9m-1.7m	1.7m-3.4m	3.4m-8.6m	8.6m-52m
Average claim size (£k or £m)	0.4k	8k	22k	47k	109k	0.24m	0.57m	1.15m	2.31m	5.36m	13.99m
Likelihood: core model	6.83%	73.93%	12.90%	5.02%	0.77%	0.33%	0.12%	0.05%	0.03%	0.02%	0.01%
Likelihood: Miscellaneous Vehicles	80.77%	12.90%	5.02%	0.77%	0.33%	0.12%	0.05%	0.03%	0.02%	0.004%	0.004%
Difference (Miscellaneous - Core)	73.93%	-61.04%	-7.88%	-4.25%	-0.44%	-0.21%	-0.07%	-0.02%	0.00%	-0.019%	-0.004%

Figure 8.1: Estimate of the number of 'miscellaneous' vehicles in the UK during the 2018 calendar year

Adjustments to severity – TPD

8.30 First Senior have provided us with data that shows their average claim amount in recent years had been approximately £400, but noting that that this was:

> a mix of TPI, TPD and accidental damage claims

> did not include of any material TPI losses

8.31 If we make the assumption that the average loss for accidental damage is similar to the average loss for TPD, and further assume that the absence of any material TPI losses meant that the experience was not distorted, this suggests an average TPD loss of £400 is appropriate.

8.32 As such, we have adjusted the core model so that the TPD severity distribution is adjusted to give an average loss of £400.

Other adjustments

8.33 Given the small size of the market for these vehicle types it is likely that the assistance of a broker or other intermediary will be required to arrange suitable insurance. In line with the other vehicle categories we have assumed brokerage of 15%.

Amended and Comprehensive options

8.34 We highlight that under the amended option (considering more vehicle types but not private land) certain vehicle types within this category will still be affected as they are typically used on public roads and areas which the public has access to. To adjust for this:

> We have assumed that only mobility scooters and electric bikes are affected by the amended option. We understand that Segways and most quad bikes are only legally allowed to be used on private property as they do not meet the required safety standards.

> We have assumed that 100% of the use of mobility scooters and electric bikes is on public roads/spaces. The cost of insuring these vehicles is therefore identical under either the Amended or Comprehensive options.

Premium impact – Comprehensive option

8.35 Under the Comprehensive option, we estimate that the average premium for each vehicle within the Miscellaneous vehicle category is £16.93 per annum. Scaling up for the anticipated exposure in 2018 means that the total premium required to provide Road Traffic Act compliant insurance is £8.1m.

Premium impact – Amended option

8.36 Given the assumptions set out in paragraphs 8.22 and 8.35, the insurance cost for each mobility scooter and electric bike under the Amended option is also expected to be £16.93 per annum. Scaling up for the anticipated exposure in 2018 means that the total premium required to provide Road Traffic Act compliant insurance is £6.8m.

9 Derogation and the Motor Insurers' Bureau

Introduction

9.1 The MIB was established in order to compensate the victims of uninsured and untraced drivers. The MIB operates under two agreements with Her Majesty's Government, the 'Uninsured Drivers' Agreements' and the 'Untraced Drivers' Agreements'. Whilst the scope of the MIB has expanded over time, the activities listed above remain principle concerns for the organisation.

9.2 Every insurer underwriting compulsory motor insurance in the UK is obliged, by virtue of the Road Traffic Act 1988, to be a member of MIB and to contribute to its funding. Whilst the MIB's funds are obtained from insurers in the first instance, they are ultimately paid for by businesses and members of the public who pay higher motor insurance premiums as a result of the levy.

9.3 This section estimates the additional funds that the MIB would require if the Comprehensive option was selected and any of the new vehicle types (Motor Sport Vehicles, Other Business Vehicles, Miscellaneous Vehicles) were derogated. This would mean that the MIB meets the cost of any third party liabilities incurred by any newly in scope vehicles that are being used whilst uninsured. Under the assumption that these additional funds would ultimately be passed on via higher premiums to other policy holders, we have also estimated the average increase in premium.

9.4 Derogation does not eliminate a vehicle user's liability if they are responsible for an accident. As is currently the case with the existing vehicles that fall under the scope of the Road Traffic Act, the MIB will still seek to recover claims costs from the responsible party wherever possible.

Annual levy

9.5 The MIB, which operates on a not-for-profit basis, is funded by a levy paid by every insurer underwriting compulsory motor insurance in the UK. The total MIB levy is set on an annual basis based on "an actuarial estimation carried out by independent actuaries of the likely expenditure in the year on the settlement of claims and business running costs, net of expected investment returns"[17]. The MIB has confirmed that the levy is also net of assumed recoveries. The figure below shows how the levy has changed between 2011 and 2016.

[17] This definition is given in the MIB's 2015 annual report

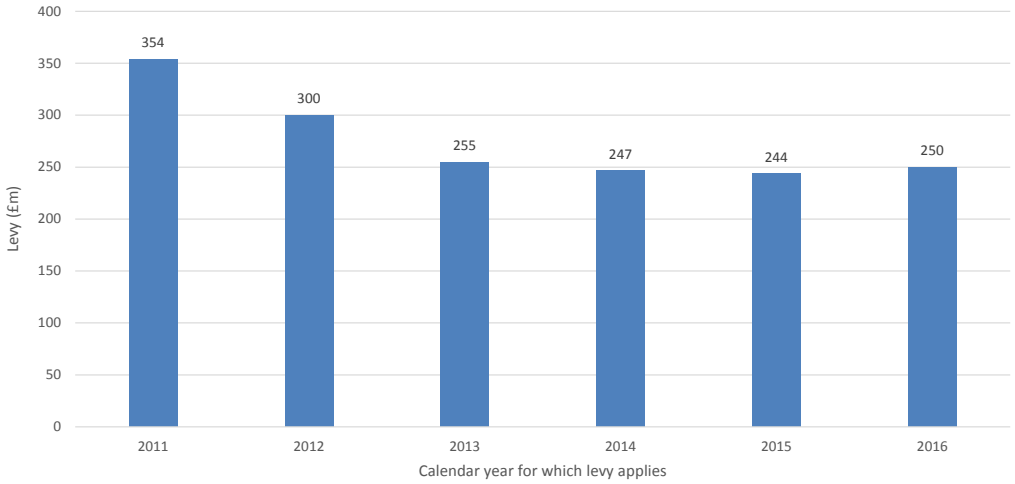


Figure 9.1: MIB levy between 2011 and 2016 (£m). The levy is net of recoveries.

9.6 We note that the basis for setting the annual levy is a forward looking projection of expenditure rather than a retrospective analysis of historical expenditure in past years. This process means that the levy will respond quickly to any changes in the claims environment. For example, the MIB noted that their 2016 levy included a loading for anticipated changes caused by the Deregulation Act 2015 which had only recently came into force on 30 June 2015.

9.7 Figure 9.1 shows that the levy for 2016 was £250m. In order to distribute this amongst the members of the MIB, the following process is used[18]:

> Each individual member is asked to supply their estimated gross written premium ('GWP') for the upcoming year, split into six categories of business where compulsory motor insurance can be written. Members provide further information which help the MIB to estimate the proportion of the GWP which relates to compulsory third party liability cover.

> For each category of business, the GWP estimate (adjusted to represent third party liabilities only) is multiplied by a specified rate which is provided by the MIB. This produces a measure of business known as the member's weighted covers. The specified rates are shown in the table below.

MIB vehicle category	Specified rate
Private Car (Comprehensive)	73%
Private Car (Non-comprehensive)	96%
Commercial	78%
Motorcycle	73%
Fleet	75%
Other	40%

Table 9.1: MIB specified rates used to calculate each member's weighted covers

> The MIB collates each members weighted covers, and pro-rates the levy using this measure.

[18] Our understanding is based on the MIB document 'Levy return form documents' dated 1 May 2015.

The concept of derogation

9.8 The Motor Insurance Directive allows a member state the option of removing the compulsory insurance requirement for certain categories of people or vehicle. This is known as derogation. The categories which can be derogated are:

- certain natural or legal persons
- public or private persons
- certain types of vehicle
- certain vehicles having a special plate

9.9 Any member state which chooses to derogate must ensure that these categories are dealt with in the same way as the people/vehicles for which the compulsory insurance obligation has not been satisfied. In the UK, this would mean the MIB meeting the cost of any third party liabilities incurred by any newly in scope vehicles that are being used whilst uninsured.

9.10 In the context of the United Kingdom, derogation would remove the requirement for the owner of the derogated vehicle type to purchase compulsory insurance so long as any subsequent third party losses are paid by the MIB in the first instance.

9.11 Derogation does not eliminate a vehicle user's liability if they are responsible for an accident. As is currently the case with the uninsured existing vehicles that fall under the scope of the Road Traffic Act, the MIB would still seek to recover claims costs from the responsible party wherever possible. It also does not prevent liability insurance being voluntarily purchased. Any amounts paid out by the MIB which cannot be recovered from the responsible party (or their insurers) will need to be funded from the levy.

Estimating the impact of the levy on existing consumers

9.12 In order to estimate the impact of derogating any of the new vehicle types we first assume that the process for calculating the levy and distributing it amongst insurers will not change. In particular, we assume that the vehicles which are currently subject to the Road Traffic Act continue to be the only ones which fund the MIB. These are the vehicles we considered in section 5 which discussed the modelling category Existing Vehicles.

9.13 The specified rates used by the MIB rely upon the vehicle categories shown in table 9.1. In order to map these categories to the Existing Vehicles category used by GAD in this modelling exercise, we have made the following assumptions:

Existing Vehicles – private motorcar

9.14 Within our Existing Vehicles category, there is a sub-category of private motorcars. This corresponds to the MIB's categories of Private Car (Comprehensive) and Private Car (Non-comprehensive), both of which attract different specified rates. Based on the ABI's data over the last five years, we estimate that 95% of policies are comprehensive and 5% and non-comprehensive. We have therefore assumed a specified rate of 74% (95% x 73% + 5% x 96%).

9.15 In paragraph 4.86 we estimated that the average private motorcar premium under the existing Road Traffic Act is £427 per vehicle year. In paragraph 4.18 we estimated that the size of the private motorcar market in 2018 would be 25m vehicle years. This gives an estimated GWP of £10,670m.

Existing Vehicles – private motorcycle

9.16 Within our Existing Vehicles category, there is a sub-category of private motorcycles. This directly corresponds to the MIB's Motorcycle category which attracts a specified rate of 73%.

9.17 In paragraph 5.20 we estimate that the average private motorcycle premium is £670. In paragraph 5.19 we estimated that the size of the market in 2018 would be 0.72m vehicles. This gives an estimated GWP of £483m.

Existing Vehicles – existing business vehicles

9.18 Within our Existing Vehicles category, there is a sub-category of existing business vehicles. This will me a mixture of the remaining MIB categories of Commercial, Fleet and Other. Whilst we do not have access to the MIB's definitions for each category, it is likely that the majority of exposure arises from the Commercial and Fleet categories which attract similar specified rates of 78% and 75% respectively. We have adopted a specified rate of 77% which is the average of the two.

9.19 In paragraph 5.48 we estimate that the average existing business vehicle premium is £611. In paragraph 5.42 we estimated that the size of the market in 2018 would be 3.85m vehicles. This gives an estimated GWP of £2,353m.

Existing Vehicles – summary

9.20 The table below summarises the specified rate and weighted covers for each of the vehicle sub-categories in GAD's Existing Vehicles category. The final column shows the percentage of the total weighted covers, which determines the proportion of derogated costs that will be funded by that vehicle type.

GAD vehicle category	Specified rate	GAD estimated 2018 premium (£m)	Weighted covers Amount (£)	Weighted covers % of total
Existing vehicles - private motorcars	74%	10,670	7,912	79%
Existing vehicles - private motorcycles	73%	483	352	4%
Existing vehicles - existing business vehicles	77%	2,353	1,800	18%
		Total	10,064	100%

Table 9.2: Summary of assumptions used to distribute the MIB's costs to existing vehicle types

Adjusting for MIB recoveries

9.21 As previously noted, the MIB will look to recover its outlay from the liable party wherever possible. Recovery performance is one consideration when calculating the levy. All other elements being equal, recoveries will reduce the funding required by the MIB, which we assume will mean lower premiums for policyholders.

9.22 To allow for this feature, we have first estimated the MIB's average recovery rate in the current environment, i.e. what proportion of the claims paid out by the MIB are eventually recovered from the responsible party. To do this we've analysed the information contained in the MIB's latest annual report (the 2015 Annual Report & Accounts). This shows that:

> In the 2015 calendar year, recoveries were £9.8m. The corresponding figure for the 2014 calendar year was £9.3m.

> In the 2015 calendar year, the total claims paid (less recoveries) was £179.1m. The corresponding figure for the 2014 calendar year was £196.5m.

9.23 Combining the two pieces of information, we estimate recovery rates of:

> 2015 recovery rate = 9.8 / (179.1 + 9.8) = 5.2%

> 2014 recovery rate = 9.3 / (196.5 + 9.3) = 4.5%

9.24 We have therefore assumed that a 5% recovery rate is reasonable based on the MIB's current responsibilities.

9.25 We have further assumed that this is an appropriate assumption to apply to the types of losses that could be derogated in the future. In doing so we acknowledge that there are arguments in favour of both an increase in the recovery rate (e.g. because it easier to identify people on slower moving vehicles) and a decrease (the socioeconomic status of mobility scooter owners is believed to be lower than for private vehicle owners, so there are fewer assets from which a recovery can be made). In the absence of any data to support either view, we believe that 5% is a reasonable assumption.

Potential for behaviour changes from existing vehicle owners

9.26 When estimating the derogation costs we have assumed that the behaviour of existing vehicle owners is unaffected. However, the additional insurance costs as a result of the new derogations may encourage more existing vehicle owners not to purchase compulsory insurance. If this behavioural change takes place, there would be two effects:

> The MIB's costs will be higher, as there will be more accidents from uninsured drivers.

> There will be fewer insurance policies purchased, so the cost per policy of funding the MIB will be higher (under our assumption that the MIB's costs are ultimately borne by policyholders).

Adjusting for MIB expenses

9.27 We met with MIB to discuss their expense experience and how it compared to commercial insurers. Whilst there are differences in the claims handling process (for example the MIB helps people involved in road accidents where the normal routes to compensation might not exist or be difficult to trace) the MIB considered their overall expenses to be similar to that of a commercial insurer. We have therefore assumed MIB's expenses are 15% of the expected loss costs, which is the same assumption used in the rest of our modelling.

9.28 We also highlight that the other elements of a commercial premium (cost of capital, brokerage, and IPT) are not applicable to claims settled by the MIB. We have therefore excluded these costs from our work

Summary of results

9.29 The table below summarises the costs (under the Comprehensive option) of derogating each of the new vehicle types and how these are distributed amongst existing policyholders. The final set of rows shows the total cost of derogating all the new vehicle types.

Derogated Vehicle Category	Estimated Losses + Expenses (£) Gross of recoveries	Net of recoveries	Allocation of costs (net of recoveries) to existing vehicle types Type	% of costs	Costs (£)	Policies	Cost per policy (£)
Motor Sport Vehicles	155,770,625	147,982,094	Private motorcars	79%	116,335,008	25,000,000	4.65
			Private motorcycles	4%	5,180,196	720,000	7.19
			Existing business vehicles	18%	26,466,890	3,850,000	6.87
			Total	**100%**	**147,982,094**	**29,570,000**	**5.00**
Other Business Vehicles	134,427,413	127,706,042	Private motorcars	79%	100,395,142	25,000,000	4.02
			Private motorcycles	4%	4,470,422	720,000	6.21
			Existing business vehicles	18%	22,840,478	3,850,000	5.93
			Total	**100%**	**127,706,042**	**29,570,000**	**4.32**
Miscellaneous Vehicles	5,849,552	5,557,075	Private motorcars	79%	4,368,652	25,000,000	0.17
			Private motorcycles	4%	194,529	720,000	0.27
			Existing business vehicles	18%	993,894	3,850,000	0.26
			Total	**100%**	**5,557,075**	**29,570,000**	**0.19**
Motor + Other Business + Miscellaneous Vehicles	296,047,590	281,245,211	Private motorcars	79%	221,098,802	25,000,000	8.84
			Private motorcycles	4%	9,845,147	720,000	13.67
			Existing business vehicles	18%	50,301,262	3,850,000	13.07
			Total	**100%**	**281,245,211**	**29,570,000**	**9.51**

Table 9.3: Summary of derogation costs under the Comprehensive Option

10 Assumptions and Uncertainty

Introduction

10.1 The Vnuk judgement is concerned with motor risks where existing insurance is limited or non-existent. In order to assess the costs associated with these new risks we have made a number of assumptions about the losses that may arise, and how the insurance industry may develop suitable products.

10.2 Where possible, we have based these assumptions on relevant evidence which we were able to obtain during the course of the project. This may be quantitative data provided by the market participants, qualitative data from industry experts, or broader research which has been provided to GAD. In the absence of these data sources, we have used our judgement to guide our assumptions.

10.3 This section describes how we have assessed: i) the quality of the evidence supporting the key assumptions underlying our model and ii) the materiality of each key assumption. Our assessment of materiality is based on sensitivity tests which consider the impact of making alternative assumptions. Appendix A contains the results of these assessments.

Assumption setting – Supporting evidence

10.4 For each assumption we selected what we consider to be a best estimate, i.e. a value which does not contain any margin for either prudence or optimism. Where possible, we have made these selections based on relevant evidence that we have been able to obtain.

10.5 Evidence to support an assumption can be found in several different areas:

- Direct evidence. This is data directly relating to the assumption being made. For example, in section 6 we make an assumption about the frequency of accidents in two-wheeled motor sport races. To support this we were able to obtain historical data on the number of accidents from historical two-wheeled motor sport races.
- Indirect evidence. This is data which does not directly relate to the assumption being made, but is connected to the topic under consideration and is helpful in making the assumption. Indirect data will require some form of transformation before it can be made relevant to the assumption being made. For example, in section 6 we make an assumption about the frequency of TPD claims for motor sport vehicles. This assumption has been guided by the relative frequencies of TPD and TPI claims for private motor cars.
- Expert guidance. In some instances we were able to speak to insurance professionals who have relevant experience for the assumption we are considering. The insurance professional may be able to provide guidance on what they would expect the assumption to be, or a qualitative assessment that helps us to select a value. For example, in section 5 we have assumed claim frequency will increase as a result of additional fraud on private land. The rationale for assuming an increase is based on our conversations with the IFB and other insurance professionals.

10.6 For each assumption we have considered the potential sources of data and judgementally assigned the total amount of evidence to be good, average or poor. The guidelines we have used to help make these assessments are shown in the table below.

Key	Evidence
Poor	Direct evidence - Does not exist or only limited volumes exist. The data quality is very poor. Indirect evidence - Does not exist or only limited volumes exits. The data quality is poor or relevance is low. Significant adjustments are required before it is relevant to the assumption being considered. Expert guidance - We were not able to talk to anyone with significant experience in the relevant field.
Acceptable	Direct evidence – Relevant data exists, and there is adequate volume and data quality to allow a meaningful analysis to take place. However, there are still areas for improvement, such as insufficiently granular data, or unanswered questions around the way in which data was collected. Indirect evidence – Indirect data exists, and there is adequate volume and data quality to allow a meaningful analysis to take place. Only moderate adjustments are required before the data is considered to be reasonable for the topic under consideration. Expert guidance – We were able to talk to someone with moderate experience in the relevant field and they provided some guidance on what the assumption should be.
Good	Direct evidence – A significant quantity of relevant data exists and is of high quality. The data source is well understood. There may also be several independent data sources giving similar information. Indirect evidence – A significant quantity of indirect data exists and is of high quality and relevance. Only limited adjustments are required in order to transform the data to a basis which is relevant to the assumption under consideration. Expert guidance – We were able to talk to an expert in the relevant field and they provided clear guidance on what the assumption should be.

Table 10.1: Guidance used to categorise the evidence of an assumption

Assumption setting – materiality

10.7 We also assess the materiality of an assumption by choosing reasonable high and reasonable low alternatives, and considering the impact on the overall costs. We highlight that the reasonable high and low selections are judgemental, and are often related to quality of the data (e.g. where little data exists the range of reasonable estimates is likely to be wider).

10.8 For each assumption we have assigned the materiality to be high, average or low based on the criteria shown in the table below.

Key	Materiality
High	Greater than 25%
Medium	5% - 25%
Low	Less than 5%

Table 10.2: Guidance used to categorise the materiality of an assumption

Appendix A: Sensitivity Test Results

A.1 The table below shows our selections for each key assumption underlying our estimated additional insurance costs of £1,831m for the Comprehensive option. It also shows the results when a reasonable low and a reasonable high assumption is selected, and the change in result compared to the one actually selected.

Assumption	Alternative assumptions	Reasonable low	Selected	Reasonable high	Evidence quality (good / acceptable / poor)	Materiality (low / medium / high)
Core model – upper limit for TPI claims (paragraph 4.44)	Assumption	£30m	£52m	£100m	Direct – There is a limited amount of public information on large, historic motor insurance claims. Indirect – GAD has experience with other bodily injury claims.	
	Result	£1,818m	£1,831m	£1,942		
	% change	- 1%	0%	+ 6%		
Core model – correlation between TPI and TPD losses (paragraph 4.67)	Assumption	0%	25%	50%	Indirect - A similar assumption is made in the Solvency II Standard Formula, but it needs to be adjusted before it can be used in this context.	
	Result	£1,829m	£1,831m	£1,833m		
	% change	0%	0%	0%		
Core model – return on capital (paragraph 4.80)	Assumption	3%	6%	12%	Indirect - A similar assumption is made in the Solvency II Standard Formula, but it is an average which applies across all classes of business. Indirect – GAD's experience with other classes of business and capital benchmarking exercises.	
	Result	£1,802m	£1,831m	£1,911m		
	% change	- 2%	0%	+ 4%		
Existing Vehicles – increased claim frequency for motorcycles (paragraph 5.11)	Assumption	+0%	+84%	+150%	relevant data which is included in a DfT report on road casualties.	
	Result	£1,802m	£1,831m	£1,851m		
	% change	-2%	0%	+ 1%		

Existing Vehicles – increased claim frequency due to extension to private land (paragraph 5.23)	Assumption Result % change	+0% £1,426m - 22%	+5% £1,831m 0%	+10% £2,264m + 24%	Indirect - We were not able to obtain any evidence and we have therefore used our judgement. This was based on our understanfing of the Road Traffic Act and court judgements regarding private/public land.	
Existing Vehicles – increased claim frequency due to fraud on private land (paragraph 5.35)	Assumption Result % change	+0% £1,047m - 43%	+10% £1,831m 0%	+25% £2,961m + 62%	Direct - First Senior and Bikmo have exposure to fraud claims but have received very few claims. IFB shared high level fraud statistics. Expert guidance - We met with the IFB who described why fraud may be an issue.	
Motor Sports Vehicles – upper limit for TPD claims (paragraph 6.39)	Assumption Result % change	£50m £1,804m - 2%	£125m £1,831m 0%	£200m £1,861m + 2%	Expert guidance - We have set the upper limit by considering a realistic disaster scenario based on the advice of industry experts.	
Other Business Vehicles – additional exposure uplift (paragraph 7.16)	Assumption Result % change	+0% £1,822m - 1%	+5% £1,831m 0%	+10% £1,841m + 1%	Direct - We were able to find direct evidence to support assumptions for listed vehicle types, reducing the uplift uncertainty. Expert guidance – The vehicle types considered are based on DfT's consultation, which reflects industry input.	
Miscellaneous Vehicles – additional exposure uplift (paragraph 8.19)	Assumption Result % change	+0% £1,831m 0%	+5% £1,831m 0%	+10% £1,832m 0%	Direct – We were able to find direct evidence to support assumptions for listed vehicle types, reducing the uplift uncertainty. Expert guidance – The vehicle types considered are based on DfTs consultation, which had industry input.	

Core model - Ogden discount rate*	Assumption		n/a	+2.5%	-0.75%	Direct – The current Ogden rate is observable. Expert guidance – The Lord Chancellor has announced a consultation which may result in a different methodology being used to set the rate in the future. However, any changes are unlikely to come into effect before the start of the 2018 calendar year.
	Result		n/a	£1,831m	£2,318m	
	% change		n/a	0%	27%	

*** Additional note on the Ogden discount rate**

Background

In the UK, certain personal injury claims can be settled by a lump sum payment to compensate the claimant for the injury they have sustained. An element of the lump sum may represent compensation for costs which will be incurred in the future, for example ongoing medical treatment or loss of earnings. In order to calculate the lump sum that should be paid now in order to meet costs in the future, two key assumptions need to be made:

- The Ogden discount rate, which reflects the fact that an investment return can be earned on the lump sum before the future payments need to be made.
- The life expectancy that the claimant would have expected, which reflects how long future payments need to be made. The age and gender of the claimant will drive the assumption.

Where a lump sum is determined by the courts, their calculations are typically based on:

- A discount rate which is a rate prescribed by the Lord Chancellor under the Damages Act 1996.
- The life expectancies set by the Office of National statistics.

To help with the courts' calculations, a set of tables are produced which incorporate both the discount rate and mortality assumptions. The tables are informally known as the Ogden tables or Ogden rates, and are produced by the Government Actuary's Department.

Between 2001 and 2017 the Ogden discount rate was 2.5%. Our model is based on data during this period and will therefore reflect an Ogden discount rate of 2.5%.

Recent changes

In February 2017 the Lord Chancellor announced that the discount rate was being reduced from +2.5% to -0.75% with immediate effect. A lower Ogden discount rate means that smaller investment returns are assumed to be generated by the claimant, and a larger the lump sum settlement is required at the date of the claim. Because the Ogden rate has been significantly reduced, this materially increases the assumed cost of a settlement, which in turn increases our premium estimates.

In order to assess the impact of the change in the Ogden discount rate, we have carried out the following sensitivity test:

- We have assumed that only simulated TPI claims above £175k will be affected by the change (this is approximately the mid-point for claims we categorised as 'high' in paragraph 6.30). Claims settling for less than £175k are less likely to involve death, reduced life expectancy, long term care or curtailed careers (all of which require a consideration of multiple future payments which would be affected by changes to the Ogden discount rate).
- Before the change in discount rate, the Ogden multiplier used to compensate the estate of a 45 year old male following death was 24.70. After the change the factor has increased to 48.34, an increase of 96%. The Ogden multiplier used to compensate a 45 year old male for just the loss of earnings increased from 18.80 to 26.01, an increase of 38%. This gives an indication of the range of increases that will be experienced, with the increase for any individual claim depending on the exact nature of the injuries. We have assumed that an increase of 65%, approximately the average of the two increases noted, will apply to all simulated claims above £175k.
- We have therefore assumed that each simulated TPI claim above £175k will be uplifted by a factor of 65%

Under these assumptions, our estimate of the additional premium costs associated with the Comprehensive option is £2,318m. This is an increase of 27% over our estimate of £1,831m which is based on data which reflects the old Ogden discount rate of +2.5%.

Finally, we highlight that this is an estimate of the additional costs associated with the Comprehensive option. This estimate does not include the amount by which existing motor insurance premiums will increase as a result of the changes in the Ogden discount rate.

Appendix B: Glossary

Abbreviation	Term	Description
ABI	Association of British Insurers	A body which represents over 250 insurance companies in the UK. The ABI's remit is to promote best practice, transparency and high standards within the insurance industry and works with regulators and policymakers to achieve these goals.
ACU	Auto-Cycle Union	One of the eleven governing bodies for UK motor racing. The ACU represents motorcycle or 'two-wheeled' racing in Britain.
AEA	Agricultural Engineers Association	A trade association representing UK manufacturers and importers of agricultural machinery and outdoor equipment.
Bikmo	Bikmo Cycling Insurance	A provider of specialist insurance products for cyclists in the UK, including electric power assisted cycles.
BITA	British Industrial Truck Association	A trade association for forklift truck manufacturers and suppliers in the UK.
CEA	Construction Equipment Association	A trade association that represents the UK construction equipment sector.
CoV	Coefficient of variance	A standardised measure of 'spread' which is comparable across different distributions. It is defined as the standard deviation divided by the mean of a distribution.
DfT	Department for Transport	A ministerial department reporting to the Government of the United Kingdom. It provides policy guidance, strategic direction and funding on a range of transport issues.
EU	The European Union	A group of 28 European countries, or member states, joined in political and economic union.
FRC	Financial Reporting Council	A body which sets and enforces standards for a number of professions in the UK, including the actuarial profession.
GAD	Government Actuary's Department	A non-ministerial department reporting to the Government of the United Kingdom. It provides actuarial analysis to a range of government and public sector bodies to help support effective decision making.
GWP	Gross Written Premium	A measure of the volume of business underwritten by an insurer. GWP is the total amount charged to the policyholder, and includes loadings for profit, brokerage and tax.
IFB	The Insurance Fraud Bureau	A not-for-profit company established to lead the insurance industry's collective fight against insurance fraud.
IPT	Insurance Premium Tax	A tax imposed by the Government of the United Kingdom on most general insurance premiums. Motor insurance is subject to IPT.
JLT	Jardine Lloyd Thompson	A large brokering company that provides assistance to organisations looking to purchase insurance.
MIB	Motor Insurers' Bureau	An organisation set up to provides compensation to victims of uninsured and untraced drivers. It is funded by a levy on UK motor insurers.
MSA	The Motor Sports Association	One of the eleven governing bodies for UK motor racing. The MSA represents 'four-wheeled' motor sport in the UK which includes rallying, karting and circuit racing.

TPD	Third party property damage	Liability to compensate a third party for damage to their property as a result of negligence by the driver of a motor vehicle.
TPI	Third party bodily injuries	Liability to compensate a third party, or their estate, for bodily injury or death as a result of negligence by the driver of a motor vehicle.
TPWP	Third Party Working Party	A research group of the Institute and Faculty of Actuaries, the professional body representing actuaries in the United Kingdom.

Effect of introducing a cap on third party bodily injury claims

December 2017

Government Actuary's Department

MEMO

TO: Department for Transport [redacted]

FROM: **Matt Kirkpatrick; Ian Rogers**

REF: **Vnuk Impact Analysis** **DATE:** **21 December 2017**

SUBJECT: Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims

1 Introduction

1.1 The Department for Transport ('DfT') has previously commissioned the Government Actuary's Department ('GAD') to quantify the impact of a 2014 judgement by the European Court of Justice regarding compulsory motor insurance (the 'Vnuk judgement'). GAD were asked to estimate the increase in insurance premiums that may arise if the scope of compulsory motor insurance in the United Kingdom was extended in line with Vnuk judgement. This work was documented in the report entitled "Vnuk Impact Analysis" and dated 29 August 2017.

1.2 GAD considered two potential courses of action in this report. The first, which we refer to as the 'Comprehensive option' considered extending compulsory insurance to cover additional types of vehicle and also the use of vehicles whilst on private land. The second, which we refer to as the 'Amended option' only considers modifying legislation to include the additional types of vehicle to the extent that they are used on a road or other public place.

1.3 In order to calculate the costs associated with these options, GAD built a model (the 'original Vnuk model') which simulated the number of claims that might arise in the future, and the total size of insurance losses associated with each claim.

1.4 Our report estimated that the additional premium costs associated with the Comprehensive option would be £1,831m, but also noted that this figure was subject to significant uncertainty. This is because the Vnuk judgement is concerned with motor risks where existing insurance is limited or non-existent, and as a result relevant information was often unavailable.

1.5 To help quantify this uncertainty we performed a number of sensitivity tests and these indicated that the additional premium costs could be between £1,000m and £3,000m.

1.6 The additional premium costs associated with the Amended option were estimated to be much smaller at £7m. In both cases the premium estimates relate to the 12 month period starting 1 January 2018.

1.7 DfT has now commissioned GAD to estimate the impact on our analysis of the Comprehensive option if compulsory motor insurance was further modified to remove the requirement to provide unlimited liability for third party bodily injury claims ('TPI' claims), and instead replace it with a defined upper limit.

1.8 In order to avoid unnecessary duplication between our original report and this memo, we have not reproduced descriptions of elements of our work where these have not been adjusted. This includes descriptions of the general pricing methodology and certain key assumptions. This allows us to focus on the key changes which have been made.

1.9 As a result of this approach, both the original report and this memo should be considered as components of a larger, aggregated report. Both the original report and this report must be considered together in their entirety, as individual sections of either report, if considered in isolation, may be misleading, and conclusions reached by review of some sections on their own may be incorrect. The two reports taken in aggregate provide all the detail that is needed.

1.10 We draw your attention to the limitations and reliance restrictions which were described in our original report and which also apply to this document. In particular, we highlight paragraphs 2.15 to 2.20 of our original report which noted the following:

- The report has been prepared for the exclusive use of DfT. Other than DfT no person or third party is entitled to place any reliance on the contents of this report.
- The report must not be reproduced, distributed or communicated in part without GAD's prior written permission.
- Our premium calculations are based on available data and research between January 2017 and June 2017.

1.11 This work has been carried out in accordance with the applicable Technical Actuarial Standard: TAS 100 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.

2 Background

2.1 The European Union ('EU') has adopted a number of items of legislation regarding motor insurance, the most recent of which is Directive 2009/103/EC (the 'Motor Insurance Directive' or 'MID'). Individual Member States of the European Union are responsible for incorporating this Directive into their own national law.

2.2 In Great Britain, the Road Traffic Act (1998) is the domestic legislation which incorporates the Motor Insurance Directive. Separate legislation is in place for Northern Ireland, however we understand that the key features are similar and as such we do not distinguish between Northern Ireland and Great Britain.

2.3 At present, the Road Traffic Act requires compulsory insurance to provide unlimited cover for third party bodily injury claims. In contrast, the Motor Insurance Directive only requires a minimum amount of cover of €1.22m per victim and €6.07m per claim.

2.4 We have investigated the impact on our Vnuk analysis of removing the requirement for compulsory insurance to provide unlimited liability for third party bodily injury claims, and instead replace it with a defined upper limit. To do this, we have considered three scenarios:

- The first scenario is the minimum amount as set out in the Motor Insurance Directive (the 'MID minimum' scenario). In paragraphs 4.4 to 4.6 of this memo we describe our understanding of how the two caps described in the Motor Insurance Directive interact with each other. In paragraphs 4.7 to 4.11 we describe how the caps, which are defined in Euro amounts, can be converted to Sterling amounts. This gives a cap of £1.1m per claimant and £5.3m per claim.

- The second scenario is designed to mimic the cap that is in place for employers' liability insurance in the United Kingdom, which is another type of compulsory liability insurance. In this scenario, there is a cap of £5m per claimant and £10m per claim. This is referred to as the '£5m / £10m' scenario. The £5m per claimant cap is motivated by Employers' Liability in the UK, and the £10m per claim cap is motivated by analysis we have performed which shows that the vast majority of accidents involve 2 or fewer claimants (therefore in most cases claimants will not be further penalised by the per claim cap). The interaction between the claimant cap and the claim cap is the same as the MID minimum scenario.

- The third scenario is designed to reduce the number of affected claimants to approximately 10 per year. To do this, we have estimated that the caps need to be raised to £25m per claimant and £50m per claim. This is referred to as the '£25m / £50m' scenario. This has been selected to limit the number of affected claimants, whilst maintaining the 1:2 ratio between the per claimant and per claim cap. Again, we assume that the interaction between the claimant cap and the claim cap is the same as the MID minimum scenario.

2.5 In each scenario we assume that all commercial insurance products would be adjusted so that they only offer liability cover which is equal to the minimum amount being considered. We do not make any allowance for insurers offering enhanced products that offer liability cover greater than the minimum amount, as we assume that demand for such products would be limited.

2.6 The original Vnuk model only considers the total third party bodily injury losses which arise from an accident – it does not consider the number of individual claimants and what their individual claims may be. In order to better understand the effect of the MID minimum and interim position scenarios, we have adjusted the model to take into account individual claimants. These adjustments are described in paragraphs 4.12 to 4.21.

2.7 For completeness, we note that the following aspects were outside the scope of our work and have not been considered:

- We have only calculated the impact on the Comprehensive option. The Amended option, which resulted in much smaller additional premium costs, has not been considered.

- The Motor Insurance Directive only requires a minimum amount of cover of €1.22m per claim in respect of third party property damage losses (unlike personal injury claims, there is no separate per claimant amount). The Road Traffic Act requires a minimum amount of cover of £1.2m per third party property damage claim. We have not considered the effect of any changes to the Road Traffic Act in relation to the third party property damage, but note that the similarities between the Motor Insurance Directive and Road Traffic Act mean that there is limited scope for any changes to have a significant impact.

3 Summary of Results

Change in premium costs

3.1 Exhibit 1 summarises the change in premium costs associated with the three alternative scenarios considered in this memo. The premium costs from our original analysis are also shown.

Vehicle Category	Change in premium costs for the UK (£m)			
	Comprehensive Option MID minimum scenario	Comprehensive Option £5m / £10m scenario	Comprehensive Option £25m / £50m scenario	Comprehensive Option Unlimited TPI liability
Existing - Motorcars	-902	-167	809	1,227
Existing - Motorcycles	-34	3	48	65
Existing - Business Vehicles	-312	-213	-82	105
Motor Sports	178	184	197	229
Other Business	145	155	184	198
Miscellaneous	7	8	8	8
Total	**-917**	**-30**	**1,164**	**1,831**

Exhibit 1: The change in premium associated with each scenario. Figures are in £m and represent costs for the 2018 calendar year. The captions £5m/£10m and £25m/£50m refer to the per claimant and per claim caps respectively.

3.2 The additional premium costs estimated in our original report (£1,831m) are shown in the final column of the exhibit. The costs associated with the alternative scenarios considered in this memo are shown in the first three columns, and range from a saving of £917m (the MID minimum scenario) to a cost of £1,164m (the £25m / £50m scenario).

3.3 The costs associated with the alternative scenarios are lower for two principle reasons.

> Introducing a cap reduces the amount than an insurer would expect to pay during the course of a calendar year. This is because a certain number of 'large' claims are expected to occur, and the cost of these would be reduced if a liability cap was in place.

> Insurers are required to hold capital to guard against particularly poor claims experience, typically the worst result which would be experienced in 200 simulations of the year. Introducing a cap reduces this worst case scenario, and the capital that an insurer is required to hold.

Number of capped claimants

3.4 Exhibit 2 summarises the number of claimants who will have their compensation capped as a result of removing the requirement to provide unlimited liability cover for third party bodily injury claims.

Vehicle Category	Number of claimants who have their compensation capped			
	Comprehensive Option MID minimum scenario	Comprehensive Option £5m / £10m scenario	Comprehensive Option £25m / £50m scenario	Comprehensive Option Unlimited TPI liability
Existing - Motorcars	270	60	10	0
Existing - Motorcycles	14	3	1	0
Existing - Business Vehicles	38	8	1	0
Motor Sports	2	1	0	0
Other Business	1	1	0	0
Miscellaneous	0	0	0	0
Total	**326**	**73**	**12**	**0**

Exhibit 2: The number of claimants who have their compensation capped. Figures are for the 2018 calendar year. The captions £5m/£10m and £25m/£50m refer to the per claimant and per claim caps respectively.

3.5 The number of capped claimants from our original report is zero as in this scenario insurers must provide unlimited cover for third party bodily injury claims. Each of the alternative scenarios considered in this memo do generate capped claimants, ranging from 326 (under the MID minimum scenario) to 12 (under the £25m / £50m scenario).

3.6 Additional commentary on the three alternative scenarios is given in sections 5, 6 and 7.

4 Methodology

4.1 This section describes the additional methodologies which we have used to extend the original Vnuk model in order to assess the impact of the alternative scenarios.

4.2 We note that the original Vnuk model was designed to give a broad overview of the potential costs of the Vnuk judgement, and was not intended to be used to analyse more specific aspects of the motor insurance market. As such:

- The structure and methodologies of the original model may not correspond to how a new model would be designed given the new scope set out in this memo.
- The number of simulations generated by the original Vnuk model was chosen to balance two objectives i) minimising the variability in our estimate of the total premium, and ii) making the time taken to run the model reasonable. This new analysis introduces a greater focus on specific parts of the model, and if these were considered in isolation a greater number of simulations may have been selected.

4.3 Where such limitations have arisen, we have highlighted them in this memo.

Interaction between the per claimant cap and the per claim cap

4.4 The Motor Insurance Directive sets out two caps: the 'per claimant' cap (€1.22m per claimant) and the 'per claim' cap (€6.07m per claim). Our understanding of how these limits work in practice is as follows:

- The per claimant cap is applied in the first instance, i.e. each individual claimant has their claim capped at €1.22m.
- The reduced individual claims are then aggregated and compared to the per claim cap.
- If the sum of the reduced individual claims exceed the per claim cap, each claim is scaled down by the same proportion so that they equal the per claim cap.

4.5 For example, consider an event which leads to six claimants, one of whom requires compensation of €10m and five of whom require compensation of €1m. The exhibit below shows how the per claimant and per claim caps would be applied if the MID minimum cover were in place.

	Claim 1	Claim 2	Claim 3	Claim 4	Claim 5	Claim 6	Total
Individual Losses	10	1	1	1	1	1	**15**
Apply per claimant cap	1.22	1	1	1	1	1	**6.22**
Apply per claim cap	1.19	0.98	0.98	0.98	0.98	0.98	**6.07**

Exhibit 3: Example illustrating our understanding of the interaction between the per claimant cap and per claim cap (€m)

4.6 We have discussed this interaction with DfT who have, in turn, asked the Council of Bureaux to confirm whether or not our understanding is correct. DfT has subsequently received legal advice from the Council of Bureaux which has been shared with GAD. Our understanding of this legal advice is that our proposed methodology is suitable, but that a number of areas have been identified as requiring further investigation.

Converting the MID minimum caps from Euros to Sterling

4.7 The caps set out in the Motor Insurance Directive are defined in Euro amounts, whereas the original Vnuk model is designed to work using Sterling amounts.

4.8 In order to assess the MID minimum scenario we have converted the caps using exchange rates taken from the Office for Budget Responsibility's ('OBR') latest economic and fiscal outlook as at March 2017. Having discussed this approach with DfT, we have adopted the OBR's average forecast from the start of the 2017/18 financial year through to the 2021/22 financial year.

4.9 The average exchange rate during this period is £1 = €1.15 (or equivalently €1 = £0.87). Applying this exchange rate gives Sterling caps of £1.1m per claimant and £5.3m per claim.

4.10 We note that similar exchange rate challenges are faced elsewhere in central government and wider government organisations. For example, the Financial Services Compensation Scheme ('FSCS') faces a similar issue when setting the liability cap for UK deposits. The underlying European legislation sets a cap of EUR 100,000 which the FSCS converts to GBP 85,000.

4.11 The FSCS released a document earlier this year that commented on their process for setting the exchange rate. This document discusses only making changes following a "structural shift" to exchange rates and noting the "importance of a stable limit for consumer confidence".

Modelling the number of injured parties in an accident

4.12 The original Vnuk model only considers the total third party bodily injury losses which arise from an accident – it does not consider the number of individual claimants and what their individual claims may be. To address this, we have adjusted the model so that after simulating the total amount of third party bodily injury losses arising from an event, a separate calculation is performed to estimate the number of claimants and the size of each individual claim.

4.13 We highlight that:

> The two processes are independent of one another, so that there is no connection between the size of the total claims and the number of claimants.

> The total amount of third party bodily injury claims is assumed to be evenly distributed amongst the number of claimants.

4.14 These approaches have been taken due to the design of the original Vnuk model, and are examples of the limitations described in paragraph 4.3.

4.15 In order to model the number of claimants from an event, we have used data from the DfT report 'Reported road casualties in Great Britain: 2016 annual report'. In particular, we have used the data contained in the exhibit 'RAS10004 - Reported accidents by severity, number of casualties involved, built-up and non built-up roads and road class, Great Britain, 2016'[1].

4.16 This exhibit shows the number of casualties involved in motor accidents in Great Britain during the 2016 calendar year. The number of accidents are first broken down into three broad categories: fatal, serious and slight. For each category, the number of accidents are then further broken down by the number of people injured in the accident from '1' to '4+' or '5+' depending on the category.

4.17 In order to incorporate the data in our model we fit a standard statistical distribution, known as the Geometric distribution, to the DfT data. Using a fitted geometric distribution overcomes two limitations in the data source:

> Some of the DfT data is grouped into a single category (either "4+" or "5+" injured parties). The Geometric Distribution allows us to estimate how the results would look if they were split out into more granular categories.

> The DfT data only covers a single year period. It is common to assume that such observations are examples of an underlying phenomenon which is more accurately modelled by a standard statistical distribution, rather than relying on the results from the more limited observation.

4.18 In order to help verify our modelling approach, we compared the fitted Geometric Distribution from the DfT data to the results from a separate study on car occupancy which was undertaken by the Scottish Government. This data source shows the number of people in a car based on a sample of journeys across Scotland during 2009/2010, and we have fitted a separate Geometric distribution to this data. The results are shown in the exhibit below.

[1] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/647864/ras10004.ods

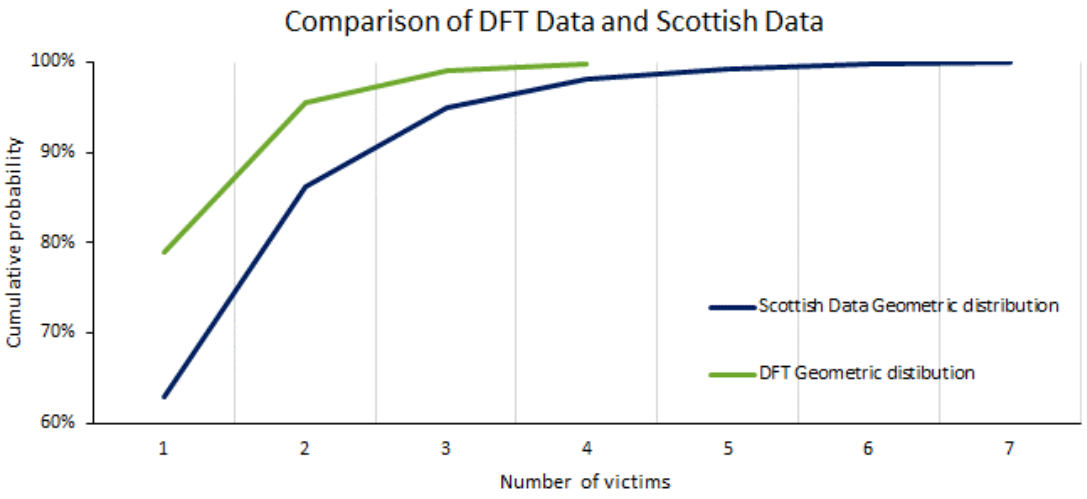


Exhibit 4: Comparison of the Geometric distributions fitted to the Scottish data and the 2016 DfT data.

4.19 The exhibit shows that:

> The fitted distributions from the two data sources give broadly similar results. This gives comfort that the DfT data replicates the experience seen in other studies.

> The DfT data assumes that a greater proportion of accidents only have 1 victim. Using the DfT data means that a lower liability cap will tend to be assumed as one of the inputs into the cap is the number of victims. As a result, using the DfT data will lower our estimate of costs when the cap is applied.

4.20 We consider the DfT data to be more appropriate than the Scottish data as:

> It collates data from all constituent countries within Great Britain, not just Scotland.

> It specifically considers the number of people injured in an accident, not the occupants of a car.

> It provides a breakdown of fatal, serious or slight accidents. This breakdown allows us to focus our analysis on the fatal and serious accidents. These are the types of accident most likely to be effected by the cap.

> It is more recent as the Scottish data is from 2009/2010.

4.21 We have also obtained DfT data from a similar study of the 2015 calendar year. Fitting a Geometric distribution to the 2015 data gives very similar results to the 2016 exercise, with virtually no changes in the proportion of accidents in each of the various categories under consideration. This gives further comfort that the 2016 data is appropriate for use in our model.

5 MID Minimum Scenario

5.1 Exhibit 5 summarises the results of the model under the MID minimum scenario. We highlight that in this analysis we are applying the lowest level of cap allowed by the Motor Insurance Directive.

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option MID minimum scenario	Saving
Existing - Motorcars	1,227	-902	-2,129
Existing - Motorcycles	65	-34	-99
Existing - Business Vehicles	105	-312	-418
Motor Sports	229	178	-50
Other Business	198	145	-53
Miscellaneous	8	7	-1
Total	**1,831**	**-917**	**-2,749**

Exhibit 5: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to the minimum set out in the MID.

5.2 The exhibit shows that:

- For private motorcars only, the cost of extending the compulsory insurance requirement in line with the Comprehensive Option would reduce materially (by £2,129m) if the liability cap was put in place. This is shown in the first row of the table. This is because i) the expected value of claims reduces ii) the capital an insurer would be required to hold would also be reduced, as this is based on a consideration of the most adverse claims that could arise, and these are the types of claim that are most affected by the cap.
- The subsequent rows show similar information for the other vehicle categories which we model (Motorcycles, Business Vehicles, Motor Sports, Other Business and Miscellaneous).
- The final row shows that if the unlimited liability cap is kept, the cost of implementing the Comprehensive Vnuk Option would be £1,831m. However if the Comprehensive Vnuk Option is implemented alongside a reduction in the liability cap to the minimum amount allowed under the MID, there is actually a cost saving of £917m. This is because of the substantial reductions in premiums for existing coverage, in particular from the large number of private motorcars.

5.3 Exhibit 6 shows the average change in premium under the two scenarios discussed above. These changes are calculated by taking the overall costs and dividing by our estimate of the number of vehicles in each category.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option MID minimum scenario	Difference
Existing - Motorcars	49.07	-36.07	-85.15
Existing - Motorcycles	89.76	-47.09	-136.85
Existing - Business Vehicles	27.38	-81.09	-108.47
Motor Sports	457.70	356.72	-100.98
Other Business	159.49	116.90	-42.59
Miscellaneous	16.93	15.46	-1.47

Exhibit 6: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to the minimum set out in the MID.

5.4 As in our original analysis, we note that for motor sports the premium is given for 1 'ride'. A participant may have multiple rides in a year in which case the premium will scale in a linear fashion.

5.5 Exhibit 7 shows the number of claimants that would be affected by the cap, and the average reduction for each claimant.

Vehicle Category	Capped claimants	
	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars	270	3,522,629
Existing - Motorcycles	14	3,551,790
Existing - Business Vehicles	38	3,543,152
Motor Sports	2	7,085,240
Other Business	1	12,010,193
Miscellaneous	0	2,988,613
Total	**326**	**3,591,411**

Exhibit 7: Number of capped claimants, and the average reduction in their claim

5.6 This exhibit shows that:

> Across all modelling categories, we expect 326 claimants to have a capped claim during the 2018 calendar year.

> For most of the modelling categories, the average reduction per claimant is approximately £3.5m. The exceptions to this are:

- Motor Sports vehicles, where we amend the core model to allow much larger claims to arise, due to the additional dangers which are inherent in motor sport activities.
- Miscellaneous vehicles, where the opposite argument applies and we assume it is less likely that very large losses can arise.
- The results for Other Business vehicles is due to the way in which we allow for the interaction with existing public liability and employers' liability coverage. The construction of the original model means that for this exercise we assume that the first £10m of any claim is covered by another policy, and only the remainder is then treated as a motor insurance claim. The distribution of claims above £10m is different to the distribution of all claims, and means that larger claims tend to be left for motor insurance coverage.

6 £5m / £10m Scenario

6.1 Exhibit 8 summarises the results of the model under the £5m / £10m scenario.

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option £5m / £10m scenario	Saving
Existing - Motorcars	1,227	-167	-1,394
Existing - Motorcycles	65	3	-61
Existing - Business Vehicles	105	-213	-318
Motor Sports	229	184	-45
Other Business	198	155	-42
Miscellaneous	8	8	0
Total	**1,831**	**-30**	**-1,861**

Exhibit 8: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £5m per claimant / £10m per claim.

6.2 The format of this exhibit is identical to exhibit 5 which has previously been described. We highlight that:

- For private motorcars only, the cost of extending the compulsory insurance requirement in line with the Comprehensive Option would reduce materially (by £1,394m) if the £5m / £10m liability cap was put in place. This is shown in the first row of the table. Whilst this is a material reduction, this is less than that observed if the MID minimum scenario was adopted (this was a reduction of £2,129m).
- The subsequent rows show the relative savings for the other modelling categories. These are always less than the corresponding savings under the MID minimum scenario.
- The final row shows that if the unlimited liability cap is kept, the cost of implementing the Comprehensive Vnuk Option would be £1,831m. However if the Comprehensive Vnuk Option is implemented alongside a reduction in the liability cap in line with the interim position, there is virtually no cost (actually a small saving of £30m is estimated). This is because of the substantial reductions in premiums for existing coverage, in particular from the large number of private motorcars.

6.3 Exhibit 9 shows the average change in premium under the two scenarios discussed above. These changes are calculated by taking the overall costs and dividing by our estimate of the number of vehicles in each category.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option £5m / £10m scenario	Difference
Existing - Motorcars	49.07	-6.70	-55.77
Existing - Motorcycles	89.76	4.65	-85.11
Existing - Business Vehicles	27.38	-55.25	-82.63
Motor Sports	457.70	368.62	-89.08
Other Business	159.49	125.22	-34.26
Miscellaneous	16.93	16.12	-0.81

Exhibit 9: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £5m per claimant / £10m per claim.

6.4 As in our original analysis, we note that for motor sports the premium is given for 1 'ride'. A participant may have multiple rides in a year in which case the premium will scale in a linear fashion.

6.5 Exhibit 10 shows the number of claimants that would be affected by the cap, and the average reduction for each claimant.

Vehicle Category	Capped claimants	
	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars	60	8,328,066
Existing - Motorcycles	3	8,340,710
Existing - Business Vehicles	8	8,320,275
Motor Sports	1	22,537,673
Other Business	1	10,338,665
Miscellaneous	0	12,797,693
Total	**73**	**8,334,311**

Exhibit 10: Number of capped claimants, and the average reduction in their claim

6.6 This exhibit shows that:

- Across all modelling categories, we expect 73 claimants to have a capped claim during the 2018 calendar year. This compares to 326 claimants under the MID minimum scenario.
- For most of the modelling categories, the average reduction per claimant is between £8m and £8.5m. This compares to £3.5m under the MID minimum. This is a direct result of shifting the per claimant liability cap from approximately £1m to £5m:
  - When the cap was £1m, there were a lot more claims affected by the cap, but the vast majority of these (over 90%) were between £1 and £9m. Only 10% would be in our highest category of £9m to £51.5m.
  - When the cap is £5m, there are far fewer claims affected by the cap, but the proportion that are in the highest category is significantly higher at 33%. This results in the average claim being far higher.
- The exceptions to this are Motor Sports vehicles, Miscellaneous vehicles, and Other Business vehicles. The reasons for this are similar to those discussed in the paragraph 5.6, and we have not investigate further due to the relative immateriality of these modelling categories.

7 £25m / £50m Scenario

7.1 Exhibit 11 summarises the results of the model under the £25m / £50m scenario.

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option £25m / £50m scenario	Difference
Existing - Motorcars	1,227	809	-417
Existing - Motorcycles	65	48	-17
Existing - Business Vehicles	105	-82	-187
Motor Sports	229	197	-32
Other Business	198	184	-13
Miscellaneous	8	8	0
Total	**1,831**	**1,164**	**-667**

Exhibit 11: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £25m per claimant / £50m per claim.

7.2 We highlight that:

- For private motorcars only, the cost of extending the compulsory insurance requirement in line with the Comprehensive Option would reduce (by £417m) if the £25m / £50m liability cap was put in place. This is shown in the first row of the table. Whilst still a notable saving, it is considerably less than the saving under the other scenarios.
- The interim rows show the relative savings for the other modelling categories. These are always less than the corresponding savings under the other scenarios.
- The final row shows that if the unlimited liability cap is kept, the cost of implementing the Comprehensive Vnuk Option would be £1,831m. However if the Comprehensive Vnuk Option is implemented alongside a reduction in the liability cap in line with the £25m / £50m scenario, this cost is reduced to £1,164m.

7.3 Exhibit 12 shows the average change in premium under the two scenarios discussed above. These changes are calculated by taking the overall costs and dividing by our estimate of the number of vehicles in each category.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option £25m / £50m scenario	Difference
Existing - Motorcars	49.07	32.37	-16.70
Existing - Motorcycles	89.76	66.12	-23.64
Existing - Business Vehicles	27.38	-21.18	-48.56
Motor Sports	457.70	393.85	-63.85
Other Business	159.49	148.71	-10.78
Miscellaneous	16.93	16.33	-0.60

Exhibit 12: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £25m per claimant / £50m per claim.

7.4 As in our original analysis, we note that for motor sports the premium is given for 1 'ride'. A participant may have multiple rides in a year in which case the premium will scale in a linear fashion.

7.5 Exhibit 13 shows the number of claimants that would be affected by the cap, and the average reduction for each claimant.

Vehicle Category	Capped claimants	
	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars	10	8,460,956
Existing - Motorcycles	1	8,401,412
Existing - Business Vehicles	1	8,332,486
Motor Sports	0	39,773,362
Other Business	0	3,168,736
Miscellaneous	0	13,572,485
Total	**12**	**8,786,410**

Exhibit 13: Number of capped claimants, and the average reduction in their claim

7.6 This exhibit shows that:

> Across all modelling categories, we expect 12 claimants to have a capped claim during the 2018 calendar year. This compares to 326 claimants under the MID minimum scenario and 73 under the £5m / £10m scenario.

> For most* of the modelling categories, the average reduction per claimant is between £8m and £8.5m. This compares to £3.5m under the MID minimum scenario and is the same as the £5m / £10m scenario (which was also £8m to £8.5m). The reason that the reduction has not increased significantly (compared to the £2.5m / £5m scenario) is that for most categories our model assumes that claims cannot be larger than approximately £50m. As such, applying a very large cap (such as the £25m considered here) limits the potential for large uncapped claims.

* The exceptions to this are Motor Sports vehicles, Miscellaneous vehicles, and Other Business vehicles. The reasons for this are similar to those discussed in the paragraph 5.6, and we have not investigated further due to the relative immateriality of these modelling categories.

8 Appendix – Detailed exhibits

8.1 This section replicates the key exhibits provided within this memo, but with additional detail for the existing motorcars, motorcycles and business vehicles categories.

8.2 Given this extra detail, we reiterate our comments from paragraph 4.2 which noted that the number of simulations were based on the objectives of the original Vnuk report. Given the new analysis introduces a greater focus on specific parts of the model, a larger number of simulations may have been selected. A larger number of simulations would increase the time taken to run the model, but would reduce the variability in the simulated results.

Vehicle Category	Change in premium costs for the UK (£m)			
	Comprehensive Option and MID minimum TPI Liability	Comprehensive Option and £5m / £10m TPI Liability	Comprehensive Option and £25m / £50m TPI Liability	Comprehensive Option Unlimited TPI Liability
Existing - Motorcars - Without Vnuk changes	-1,931	-1,287	-462	0
Existing - Motorcars - Extension to private land	451	481	520	484
Existing - Motorcars - Additional fraud	578	639	751	743
Existing - Motorcycles - Without Vnuk changes	-85	-52	-13	0
Existing - Motorcycles - Extension to private land	19	20	23	23
Existing - Motorcycles - Additional fraud	32	36	38	41
Existing - Business Vehicles - Without Vnuk changes	-414	-318	-193	0
Existing - Business Vehicles - Extension to private land	102	105	111	105
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a	0
Motor Sports	178	184	197	229
Other Business	145	155	184	198
Miscellaneous	7	8	8	8
Total	-917	-30	1,164	1,831

Exhibit 1a: The change in premium associated with each scenario. Figures are in £m and represent costs for the 2018 calendar year. The captions £5m/£10m and £25m/£50m refer to the per claimant and per claim caps respectively.

Vehicle Category	Number of claimants who have their compensation capped		
	Comprehensive Option MID minimum scenario	Comprehensive Option £5m / £10m scenario	Comprehensive Option £25m / £50m scenario
Existing - Motorcars - Without Vnuk changes	233	53	8
Existing - Motorcars - Extension to private land	12	2	1
Existing - Motorcars - Additional fraud	24	5	1
Existing - Motorcycles - Without Vnuk changes	12	3	0
Existing - Motorcycles - Extension to private land	1	0	0
Existing - Motorcycles - Additional fraud	1	0	0
Existing - Business Vehicles - Without Vnuk changes	36	8	1
Existing - Business Vehicles - Extension to private land	2	0	0
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	2	1	0
Other Business	1	1	0
Miscellaneous	0	0	0
Total	326	73	12

Exhibit 2a: The number of claimants who have their compensation capped. Figures are for the 2018 calendar year. The captions £5m/£10m and £25m/£50m refer to the per claimant and per claim caps respectively.

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option and MID minimum scenario	Difference
Existing - Motorcars - Without Vnuk changes	0	-1,931	-1,931
Existing - Motorcars - Extension to private land	484	451	-33
Existing - Motorcars - Additional fraud	743	578	-165
Existing - Motorcycles - Without Vnuk changes	0	-85	-85
Existing - Motorcycles - Extension to private land	23	19	-4
Existing - Motorcycles - Additional fraud	41	32	-9
Existing - Business Vehicles - Without Vnuk changes	0	-414	-414
Existing - Business Vehicles - Extension to private land	105	102	-3
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	229	178	-50
Other Business	198	145	-53
Miscellaneous	8	7	-1
Total	1,831	-917	-2,749

Exhibit 5a: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to the minimum set out in the MID.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option MID minimum scenario	Difference
Existing - Motorcars - Without Vnuk changes	0.00	-77.22	-77.22
Existing - Motorcars - Extension to private land	19.36	18.03	-1.33
Existing - Motorcars - Additional fraud	29.71	23.11	-6.60
Existing - Motorcycles - Without Vnuk changes	0.00	-118.05	-118.05
Existing - Motorcycles - Extension to private land	32.24	26.62	-5.62
Existing - Motorcycles - Additional fraud	57.52	44.34	-13.18
Existing - Business Vehicles - Without Vnuk changes	0.00	-107.63	-107.63
Existing - Business Vehicles - Extension to private land	27.38	26.55	-0.83
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	457.70	356.72	-100.98
Other Business	159.49	116.90	-42.59
Miscellaneous	16.93	15.46	-1.47

Exhibit 6a: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to the minimum set out in the MID.

Vehicle Category	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars - Without Vnuk changes	233	3,537,601
Existing - Motorcars - Extension to private land	12	3,537,694
Existing - Motorcars - Additional fraud	24	3,492,592
Existing - Motorcycles - Without Vnuk changes	12	3,551,349
Existing - Motorcycles - Extension to private land	1	3,528,656
Existing - Motorcycles - Additional fraud	1	3,575,364
Existing - Business Vehicles - Without Vnuk changes	36	3,542,998
Existing - Business Vehicles - Extension to private land	2	3,543,306
Existing - Business Vehicles - Additional fraud	n/a	n/a
Motor Sports	2	7,085,240
Other Business	1	12,010,193
Miscellaneous	0	2,988,613
Total	326	3,591,411

Exhibit 7a: Number of capped claimants, and the average reduction in their claim

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option Interim position TPI Liability	Difference
Existing - Motorcars - Without Vnuk changes	0	-1,287	-1,287
Existing - Motorcars - Extension to private land	484	481	-3
Existing - Motorcars - Additional fraud	743	639	-104
Existing - Motorcycles - Without Vnuk changes	0	-52	-52
Existing - Motorcycles - Extension to private land	23	20	-3
Existing - Motorcycles - Additional fraud	41	36	-6
Existing - Business Vehicles - Without Vnuk changes	0	-318	-318
Existing - Business Vehicles - Extension to private land	105	105	0
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	229	184	-45
Other Business	198	155	-42
Miscellaneous	8	8	0
Total	1,831	-30	-1,861

Exhibit 8a: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £5m per claimant / £10m per claim.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option and £5m / £10m scenario	Difference
Existing - Motorcars - Without Vnuk changes	0.00	-51.50	-51.50
Existing - Motorcars - Extension to private land	19.36	19.25	-0.11
Existing - Motorcars - Additional fraud	29.71	25.55	-4.16
Existing - Motorcycles - Without Vnuk changes	0.00	-72.48	-72.48
Existing - Motorcycles - Extension to private land	32.24	27.68	-4.56
Existing - Motorcycles - Additional fraud	57.52	49.45	-8.07
Existing - Business Vehicles - Without Vnuk changes	0.00	-82.53	-82.53
Existing - Business Vehicles - Extension to private land	27.38	27.28	-0.10
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	457.70	368.62	-89.08
Other Business	159.49	125.22	-34.26
Miscellaneous	16.93	16.12	-0.81

Exhibit 9a: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £5m per claimant / £10m per claim.

Vehicle Category	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars - Without Vnuk changes	53	8,160,485
Existing - Motorcars - Extension to private land	2	8,380,604
Existing - Motorcars - Additional fraud	5	8,443,110
Existing - Motorcycles - Without Vnuk changes	3	8,298,602
Existing - Motorcycles - Extension to private land	0	8,327,055
Existing - Motorcycles - Additional fraud	0	8,396,474
Existing - Business Vehicles - Without Vnuk changes	8	8,249,257
Existing - Business Vehicles - Extension to private land	0	8,391,293
Existing - Business Vehicles - Additional fraud	n/a	n/a
Motor Sports	1	22,537,673
Other Business	1	10,338,665
Miscellaneous	0	12,797,693
Total	73	8,334,311

Exhibit 10a: Number of capped claimants, and the average reduction in their claim

Vehicle Category	Change in premium costs for the UK (£m)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option and £25m / £50m TPI Liability	Difference
Existing - Motorcars - Without Vnuk changes	0	-462	-462
Existing - Motorcars - Extension to private land	484	520	36
Existing - Motorcars - Additional fraud	743	751	8
Existing - Motorcycles - Without Vnuk changes	0	-13	-13
Existing - Motorcycles - Extension to private land	23	23	0
Existing - Motorcycles - Additional fraud	41	38	-3
Existing - Business Vehicles - Without Vnuk changes	0	-193	-193
Existing - Business Vehicles - Extension to private land	105	111	6
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	229	197	-32
Other Business	198	184	-13
Miscellaneous	8	8	0
Total	1,831	1,164	-667

Exhibit 11a: The overall change in motor insurance premiums if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £25m per claimant / £50m per claim.

Vehicle Category	Average additional premium per policy (£)		
	Comprehensive Option Unlimited TPI Liability	Comprehensive Option and £25m / £50m TPI Liability	Difference
Existing - Motorcars - Without Vnuk changes	0.00	-18.47	-18.47
Existing - Motorcars - Extension to private land	19.36	20.80	1.44
Existing - Motorcars - Additional fraud	29.71	30.05	0.34
Existing - Motorcycles - Without Vnuk changes	0.00	-18.64	-18.64
Existing - Motorcycles - Extension to private land	32.24	31.97	-0.27
Existing - Motorcycles - Additional fraud	57.52	52.79	-4.73
Existing - Business Vehicles - Without Vnuk changes	0.00	-50.06	-50.06
Existing - Business Vehicles - Extension to private land	27.38	28.89	1.51
Existing - Business Vehicles - Additional fraud	n/a	n/a	n/a
Motor Sports	457.70	393.85	-63.85
Other Business	159.49	148.71	-10.78
Miscellaneous	16.93	16.33	-0.60

Exhibit 12a: The average change in motor insurance premium if i) the Comprehensive Vnuk option is implemented with no change in the TPI liability cap and ii) the Comprehensive Vnuk option is implemented but TPI liability is reduced to £25m per claimant / £50m per claim.

Vehicle Category	Number of capped claimants	Average reduction per capped claimant (£)
Existing - Motorcars - Without Vnuk changes	8	8,367,575
Existing - Motorcars - Extension to private land	1	8,376,212
Existing - Motorcars - Additional fraud	1	8,639,083
Existing - Motorcycles - Without Vnuk changes	0	8,398,545
Existing - Motorcycles - Extension to private land	0	8,446,372
Existing - Motorcycles - Additional fraud	0	8,359,318
Existing - Business Vehicles - Without Vnuk changes	1	8,334,180
Existing - Business Vehicles - Extension to private land	0	8,330,792
Existing - Business Vehicles - Additional fraud	n/a	n/a
Motor Sports	0	39,773,362
Other Business	0	3,168,736
Miscellaneous	0	13,572,485
Total	12	8,786,410

Exhibit 13a: Number of capped claimants, and the average reduction in their claim

Effect of Increasing Motor Sports exposure / Personal Injury Discount Rate

March 2019

Government Actuary's Department

MEMO

TO: Department for Transport [redacted]

FROM: **Matt Kirkpatrick; Ian Rogers**

REF: **Vnuk Additional Analysis** **DATE:** **29 March 2019**

SUBJECT: Vnuk Additional Analysis – Effect of increasing Motor Sports exposure

1 Background

In order to provide context for the work described in this memo, a brief overview of the Vnuk analysis performed by the Government Actuary's Department ('GAD') is set out below:

The original report

1.1 The Department for Transport ('DfT') has previously commissioned GAD to quantify the impact of a 2014 judgement by the European Court of Justice regarding compulsory motor insurance (the 'Vnuk judgement'). GAD were asked to estimate the increase in insurance premiums that may arise if the scope of compulsory motor insurance in the United Kingdom was extended in line with the Vnuk judgement. This work was documented in the report entitled "Vnuk Impact Analysis" and dated 29 August 2017. Throughout this memo we refer to this work as our 'original report' and 'original analysis'.

1.2 GAD considered two potential courses of action in that report. The first, which we refer to as the 'Comprehensive Option' considered extending compulsory insurance to cover additional types of vehicle and also the use of vehicles whilst on private land. The second, which we refer to as the 'Amended Option' only considers modifying legislation to include the additional types of vehicle to the extent that they are used on a road or other public place.

1.3 In order to calculate the costs associated with these options, GAD built a model (the 'original Vnuk model') which simulated the number of claims that might arise in the future, and the total size of insurance losses associated with each claim.

1.4 Our report estimated that the additional premium costs associated with the Comprehensive Option would be £1,831m, but also noted that this figure was subject to significant uncertainty. This is because the Vnuk judgement is concerned with motor risks where existing insurance is limited or non-existent, and as a result relevant information was often unavailable.

1.5 To help quantify this uncertainty we performed a number of sensitivity tests and these indicated that the additional premium costs could be between £1,000m and £3,000m.

1.6 The additional premium costs associated with the Amended Option were estimated to be much smaller at £7m. In both cases the premium estimates relate to the 12 month period starting 1 January 2018.

Considering the impact of a cap on third party bodily injury claims

1.7 DfT subsequently requested that GAD investigate the impact on the Comprehensive Option if compulsory motor insurance was further modified to remove the requirement to provide unlimited liability for third party bodily injury claims ('TPI' claims), and instead replace it with a defined upper limit. This work was documented in the memo entitled "Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims" and dated 21 December 2017. Throughout this memo we refer to this as the 'second phase' memo and analysis.

1.8 To do this, we considered three ways that TPI claims could be capped[1]:

- In line with the minimum amount as set out in the Motor Insurance Directive (the 'MID minimum' scenario). Based on exchange rates at the time of our work, this gave a cap of £1.1m per claimant and £5.3m per claim.
- Mirroring the cap that is in place for employers' liability insurance in the United Kingdom, which is another type of compulsory liability insurance. In this scenario, there is a cap of £5m per claimant and £10m per claim. This is referred to as the '£5m / £10m' scenario.
- Looking to reduce the number of affected claimants to approximately 10 per year. To do this, we estimated that the caps need to be raised to £25m per claimant and £50m per claim. This is referred to as the '£25m / £50m' scenario.

Allowing for unlicensed motor sport activity

1.9 DfT has commissioned GAD to provide a further update of our work in order to reflect new research on the size of unlicensed Motor Sports activity that takes place within the UK. Based on research and analysis conducted by DfT, we have increased the Motor Sports exposure from 500,000 rides to 1,000,000 rides.

1.10 In order to better understand the impact of this change, DfT has also requested that GAD:

- Update the analysis showing the effect of introducing the three TPI caps; and
- Repeat a sensitivity test from our original analysis which considers the effect of changes to the Personal Injury Discount Rate.

1.11 Throughout this memo we refer to this as the 'third phase' of our analysis.

Format of this memo

1.12 In order to avoid unnecessary duplication between: our original report; the second phase memo looking at a cap on third party bodily injury claims; and this memo, we have not repeated the text describing our methodology and assumptions where these have not been adjusted. This allows us to focus on the key changes which have been made.

1.13 As a result of this approach, both the original report, our second phase memo, and this memo should be considered as components of a larger, aggregated report. All reports and memos should be considered in their entirety, as individual sections from these documents, if considered in isolation, may be misleading, and conclusions reached by review of some sections on their own may be incorrect. The three documents taken in aggregate provide all the detail that is needed.

1.14 We draw your attention to the limitations and reliance restrictions which were described in our original report and which also apply to this document. In particular, we highlight paragraphs 2.15 to 2.20 of our original report which noted the following:

- The report has been prepared for the exclusive use of DfT. Other than DfT no person or third party is entitled to place any reliance on the contents of this report.
- The report must not be reproduced, distributed or communicated in whole or in part without GAD's prior written permission.
- Calculations are based on data and research available between January and June 2017.

1.15 This work has been carried out in accordance with the applicable Technical Actuarial Standard: TAS 100 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.

[1] Whilst the words 'cap' and 'capped' are used throughout our work, we note that these would be minimum amounts of cover that insurers would be required to meet with their policies. Insurers would still be free to offer additional cover above this minimum amount, if they wished to do so.

2 Adjustments to the existing Vnuk model

2.1 The methodology and assumptions underlying our work is fully described in the original report accompanying our initial work, noting that the Motor Sports component of the model (the focus of our update in the third phase of our work) was covered in section 6 of that report. The following paragraphs provide a summary of the aspects of this methodology which are relevant to this update.

Estimate of exposure from our original analysis

2.2 In order to estimate exposure we initially looked at the number of authorised Motor Sports events that take place every year:

> Our understanding of the Road Traffic Act Off Road Event Regulations (1992) is that organisers of any racing event in 'public places other than a road' are required to seek authorisation by one of eleven governing bodies of the sport.

> Of the eleven governing bodies there are two which authorise the vast majority of events: The Auto-Cycle Union ('ACU') which represents motorcycle or 'two-wheeled' racing in Britain and issues permits for approximately 3,500 events each year; and the Motor Sports Association ('MSA') which is the governing body for 'four-wheeled' motor sport in the UK and issues permits for approximately 5,000 events each year.

> The MSA have estimated that the MSA and ACU represent 80-85% of the total events in the UK. We adopted that the mid-point of this range (82.5%) in order to estimate that the total number of events in 2018 is 10,300, being calculated as (3,500 + 5,000) / 82.5%, and rounded to the nearest hundred.

2.3 When either the ACU or MSA issue a permit, this allows a racing event to take place. A particular racing event will involve a number of separate races, and any individual race will involve a number of participants. Because the number of races and participants varies by the type of Motor Sports activity being considered, the number of events is not the most appropriate measure of exposure.

2.4 Instead we have used the number of 'rides' as our exposure measure. A 'ride' represents a single participant taking place in a single race.

> Based on analysis of historical ACU data, we estimated the average number of rides per ACU event is 88. As such, our exposure measure for ACU licensed events is 310,000 (3,500 events x 88 rides, rounded to the nearest ten thousand).

> Based on analysis of historical MSA data, we estimated the average number of rides per MSA event is 28. As such, our exposure measure for MSA licensed events is 140,000 (5,000 events x 28 rides, rounded to the nearest ten thousand).

> The majority of the remaining governing bodies are concerned with sports which appear to be similar to four-wheeled racing. As such we have assumed that the MSA average of 28 rides per event is appropriate. This gives 50,000 rides for the other governing bodies (1,800 events x 28 rides, rounded to the nearest ten thousand).

2.5 Our total exposure estimate for the 2018 calendar year is therefore 500,000 rides. This is calculated as 310,000 (from the ACU) plus 140,000 (from the MSA) plus 50,000 (from other bodies).

Rationale for increasing Motor Sport exposure

2.6 DfT has subsequently carried out research that indicates that unlicensed motor sports events, a feature not captured in GAD's original analysis, are a source of significant source of additional exposure. DfT has estimated that is reasonable to assume that there are 500,000 additional rides in the 2018 calendar year from unlicensed events.

2.7 GAD has not reviewed DfT's methodology for estimating the number of unlicensed rides. We understand that this figure is based on an analysis of data provided by a motor sports consortium that owns and operates a number of race circuits across UK. As well as hosting licensed events (which, along with associated practice and qualifying laps, are covered within GAD's original model), these race circuits offer non-licensed use of their facilities for activities such as:

- Track days (where participants use their own vehicles);
- Retail and corporate driving activities (where participants use vehicles provided by the venue or operator);
- Testing (where participants use their own race prepared vehicles); and
- Manufacturer days (where participants use vehicles provided by the manufacturer, e.g. for a new car launch event where journalists drive the cars on track).

2.8 On the instruction of DfT, we have updated the Motor Sports section of our model to allow for an additional exposure of 500,000 rides. This takes our total Motor Sports exposure to 1,000,000 rides.

2.9 We have not made any adjustments to the frequency and severity assumptions for the claims arising from the unlicensed Motor Sport exposure. This is equivalent to assuming that they are equal to the assumptions used for the existing Motor Sports exposures. There may be an argument that the risk profile of the additional exposure is different from the existing exposure, which in turn could lead to material changes to our estimate of premium costs for Motor Sports.

Sensitivity test for the Personal Injury ('Ogden') Discount Rate

2.10 In our original analysis we noted that the data underlying our model corresponded to a period of time when the Personal Injury Discount Rate (a key component for calculating the size of many of the larger compensation awards) was +2.5% p.a.[2]. However, as at the date of our original analysis the Personal Injury Discount Rate had recently been revised to -0.75% p.a. which significantly increased the size of the most severe claims. In our original report we performed a sensitivity test to assess the potential impact of this change on our work.

2.11 Since the time of our original analysis:

- The Ministry of Justice has carried out a consultation to assess how the Personal Injury Discount Rate should be set in the future.
- The consultation has concluded and a government response has been published.
- A Civil Liability Bill has been introduced in the House of Lords, which details the proposed changes to the way the personal injury discount rate will be set in England and Wales. At the time of writing, this Bill is being debated and has not yet become law.

2.12 We highlight that GAD has been involved in the Ministry of Justice's consultation, and as the Bill currently stands, the Government actuary has a formal role in advising how the rate is set. Because of GAD's wider involvement in this area, we have not provided any advice to DfT on what an appropriate discount rate assumption would be for this work.

2.13 Noting the developments described above, DfT have asked that we perform a new sensitivity test to assess the impact on our work if the personal injury discount rate is +1.0% p.a. The decision to consider a rate of +1.0% p.a. has been made by DfT based on publicly available information and no advice has been received from GAD.

[2] Noting that the Personal Injury Discount Rate is defined as a margin above or below the Retail Prices Index.

2.14 In order to assess the impact of the a potential in the discount rate from +2.5% p.a. to +1.0% p.a., we have carried out the following sensitivity test which is a repeat of that from our original analysis:

> We have assumed that only simulated TPI claims above £175k will be affected by the change (this is approximately the mid-point for claims we categorised as 'high' in our original report). Claims settling for less than £175k are less likely to involve death, reduced life expectancy, long term care or curtailed careers (all of which require a consideration of multiple future payments which would be affected by changes to the discount rate).

> The choice of £175k as the threshold for a claim being affected by the personal injury discount rate is judgemental. A higher choice would reduce the impact of a change in discount rate, whilst a lower choice would increase the impact. Given the overall scope of the analysis requested by DfT we believe this approach is reasonable, but note that a more detailed analysis could be carried out to verify the threshold. This would need to recognise that for some large claims only a proportion of the settlement would relate to long term costs that would be affected by the discount rate.

> We have considered the Ogden multiplier used to compensate the estate of a 45 year old male following death, and the Ogden multiplier used to compensate a 45 year old male for loss of earnings. On average, the two Ogden multipliers described above increase by 25% if the discount rate falls from +2.5% p.a. to +1.0% p.a.[3]

> Whilst the increase for any individual claim will depend on the exact nature of the injuries and the characteristics of the injured party, the above analysis gives an indication of the type of increases that may be experienced.

> We have therefore assumed that each simulated TPI claim above £175k will be uplifted by a factor of 25%.

[3] The Ogden multipliers are given in the following document: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/599837/Actuarial_tables_for_use_in_personal_injury_and_fatal_accident_cases_7th_edition_Supplementary_Tables.pdf

3 Implementing the updated methodology

3.1 The Vnuk model was designed to satisfy the scope of GAD's original engagement. This can be summarised as providing a broad overview of the potential costs of the Vnuk judgement in the United Kingdom by considering all of the vehicle types that may be affected. The model was not intended to be used to provide an in-depth analysis of specific aspects of the motor insurance market.

3.2 Whilst the Vnuk model was not designed with this more focussed analysis in mind, we believe it is capable of satisfying the additional DfT requests which make up the second and third phases of our work. However, when using the model for purposes other than that which it was designed for, it is important to note that:

- The structure and methodologies used in the model may not correspond to how a new model would be built given the additional questions asked by DfT. With this new scope in mind, we may have chosen to build the model in a different way, which includes the software and coding language used to construct the model.

- The number of simulations generated by the original Vnuk model was chosen to balance two objectives i) minimising the variability in our estimate of the total premium, and ii) making the time taken to run the model reasonable. The analysis conducted in phases two and three require a greater focus on specific parts of the model, and if these were considered in isolation it is likely that a greater number of simulations may have been selected.

3.3 In order to maximise the utility of the model for the task in hand, we have taken additional steps which are described below.

Calculating the impact of the additional motor exposure

3.4 Our original report describes how for the main component of the Vnuk model (Personal Motorcar) we assumed that an individual insurer would write policies covering 1,000,000 units of exposure. This assumption was based on an analysis of Personal Motor market shares in the UK and affected the size of the capital loading within the premium estimate.

3.5 A fundamental design feature of the Vnuk model was that the Personal Motorcar component would be used as the template for assessing the other vehicle types, with adjustments only made to the frequency and severity distributions. This meant that the assumption that an individual insurer would write 1,000,000 units of exposure was carried over to all other components of the model.

3.6 For those components where total exposure was greater than 1,000,000 units, this assumption had a natural interpretation – it meant that the market would be divided amongst a number of similar sized insurers. However, for the Motor Sports component of the model, where exposure was only 500,000 units, maintaining the assumption had a different interpretation. It meant that there was single insurer writing this niche product, supplementing its UK exposures with similar risk from other jurisdictions so that it wrote 1,000,000 units of exposure in total. With this assumption in place, the premium for UK policies was a linear proportion of the 1,000,000 policies assumed to be written.

3.7 As a result of this approach, increasing the Motor Sports exposure to 1,000,000 units is simply a case of doubling the costs from our original analysis. Because the other components of the model operate independently of the Motor Sports component, we have not repeated these calculations.

Calculating the impact of the TPI caps

3.8 The Vnuk model uses a stochastic modelling approach rather than a deterministic one, which means that the model simulates different claim frequency and severity assumptions each time it is run. The number of simulations was chosen so that the overall result from the original analysis would only be subject to a small amount of variation. However, as described in paragraphs 3.1 and 3.2 above, when smaller components of the model are focussed upon in isolation, the modelled result is subject to a more material variation each time the model is run.

3.9 When considering the impact of the TPI caps, the structure of the model is such that we are able to make an adjustment that eliminates the variation in our results that would otherwise arise from simply running the model multiple times (e.g. both with and without the TPI caps). We do this by controlling the part of the model that generates the number of claims, the size of each individual claim and how TPI and third party property damage ('TPD') claims are correlated. Rather than letting these values vary each time we run the model, we force them to be the same each time.

3.10 Having made this change, we perform four runs of the model: once without a cap, and then with the three different caps described in paragraph 1.8. The differences between these runs are then considered to be the impact of introducing the caps.

Performing the sensitivity test on the Personal Injury Discount Rate (Ogden rate)

3.11 A similar approach can be used to eliminate the variation in results due to different simulations when performing the sensitivity test on the Personal Injury Discount Rate. This is achieved by fixing the seeds of the random number generating function for all components of the model, not just the Motor Sports components. The entire model is then run with and without the change to the Personal Injury Discount Rate. The difference between these runs is then considered to be the impact of changing the Personal Injury Discount Rate.

4 Summary of Results

Change in premium costs – Increasing Motor Sports exposure

4.1 Exhibit 1 summarises the change in premium costs associated with increasing the Motor Sports exposure from 500,000 rides to 1,000,000 rides. The premium costs from our original analysis are also shown.

Vehicle Category	Change in premium costs for the UK (£m)	
	No Motor Sports adj. Comprehensive Option Unlimited TPI Liability	With Motor Sports adj. Comprehensive Option Unlimited TPI Liability
Existing - Motorcars	1,227	1,227
Existing - Motorcycles	65	65
Existing - Business Vehicles	105	105
Motor Sports	229	458
Other Business	198	198
Miscellaneous	8	8
Total	**1,831**	**2,060**

Exhibit 1: The change in premium associated with increasing the Motor Sports exposure from 0.5m rides to 1.0m rides. Figures are in £m and represent costs for the 2018 calendar year.

4.2 The first column of results, giving a total increase in premium of £1,831m, matches the figures provided in our phase 1 report.

4.3 In the second column of results, the only change is to the Motor Sports component where costs increase from £229m to £458m (these figures are highlighted in the exhibit). This is exactly twice the original amount due to the reasons described in paragraph 3.4 to 3.7. As a result, the total change in premium increases to £2,060m.

Change in premium costs – Introducing a cap on TPI liability

4.4 Having shown the effect of increasing Motor Sports exposure, exhibit 2 shows the additional effect of introducing each of the three TPI liability caps.

Vehicle Category	Change in premium costs for the UK (£m)			
	With Motor Sports adj. Comprehensive Option Unlimited TPI Liability	With Motor Sports adj. Comprehensive Option MID minimum scenario	With Motor Sports adj. Comprehensive Option £5m / £10m scenario	With Motor Sports adj. Comprehensive Option £25m / £50m scenario
Existing - Motorcars	1,227	-902	-167	809
Existing - Motorcycles	65	-34	3	48
Existing - Business Vehicles	105	-312	-213	-82
Motor Sports	458	358	371	395
Other Business	198	145	155	184
Miscellaneous	8	7	8	8
Total	**2,060**	**-737**	**157**	**1,363**

Exhibit 2: The change in premium associated with increasing the Motor Sports exposure from 0.5m rides to 1.0m rides (second column) and then additionally introducing a cap on TPI claims (columns three, four and five).

4.5 The only change compared to the results from our second phase memo is to the Motor Sports component where costs are lowest (£358m) when the MID Minimum cap is imposed, with costs rising (to £371m and then £395m) as the cap is increased in the other scenarios.

4.6 The costs associated with the other components (Motorcars, Motorcycles etc.) are equal the figures given in our phase 2 memo.

Change in premium costs – Sensitivity tests for the Personal Injury Discount Rates

4.7 Exhibit 3 shows the effect on premium costs if the Personal Injury Discount Rate is changed from +2.5% to +1.0%.

	Change in premium costs for the UK (£m)	
TPI Cap	**No adjustment to Personal Injury Discount Rate (+2.5%)**	**Adjusted Personal Injury Discount Rate (+1.0%)**
Unlimited TPI Liability	2,060	2,305
MID minimum scenario	-737	-1,320
£5m / £10m scenario	157	-223
£25m / £50m scenario	1,363	1,243

Exhibit 3: The change in premium associated with changing the Personal Injury Discount Rate from +2.5% to +1.0%

4.8 The figures in the first column of results correspond to those shown in the 'Total' row of exhibit 2, i.e. they are the costs of implementing the Comprehensive Option, based on data where the Personal Injury Discount Rate was +2.5%, with the additional Motor Sports exposure included, and with TPI claims at first uncapped, and then subject to the three caps we consider in this work.

4.9 The second column of results show how these figures would change if the Personal Injury Discount Rate were reduced to +1.0%.

4.10 Comparing the two sets of figures we note that:

- Under our assumed methodology, the only effect of reducing the Personal Injury Discount Rate is to increase the cost of the most serious claims. If a lower discount rate is assumed, this means that more money is required in order to meet the future liability payments required to compensate those severely injured in a motor accident.
- The first row of results (Unlimited TPI Liability) moves as you would initially expect - reducing the discount rate increases the cost of the more serious claims, and therefore the increases the cost of implementing the Comprehensive Option with no cap on TPI claims.
- The next row of results (MID minimum scenario) shows that a saving of £737m is associated with introducing the Comprehensive Option, capping TPI claims using the MID minimum scenario, and with a Personal Injury Discount Rate of +2.5%. This saving increases to £1,320m if the discount rate were +1.0%.
    - These figures represent the change in premium costs compared to the current motor insurance requirements.
    - Premium costs are reducing because the costs associated with the Comprehensive Option changes (covering private land and more vehicle types) are more than offset by allowing for a cap on TPI claims.
    - If the discount rate was lowered, the introduction of a cap generates even greater savings. This is because the most severe claims are assumed to cost more, and the cap has more of an impact. This explains why the change in premium improves from a saving of £737m to a saving of £1,320m.
- The final two rows show a similar but less pronounced effect when higher TPI caps are introduced.

External Peer review by Grant Thornton UK LLP

July 2019

Grant Thornton
An instinct for growth™

Department for Transport

Peer review of the Government Actuary Department's Report on the Vnuk Impact Analysis

Final Report

10 July 2019

Grant Thornton UK LLP
30 Finsbury Square
London EC2P 2YU

T +44 (0)20 7383 5100
F +44 (0)20 7184 4301
www.grant-thornton.co.uk

[redacted]
Department for Transport
33 Horseferry Road
London
SW1P 4DR

10 July 2019

Dear [redacted],

Peer review of the Government Actuary Department's Report on the Vnuk Impact Analysis

We have pleasure in enclosing our final report summarising the findings of our peer review of the Government Actuary's Department's Report on the Vnuk Impact Analysis, as requested by the Department for Transport. This report describes our approach to this peer review and summarises our findings and recommendations.

Please let us know if you have any comments or questions on this report.

Yours sincerely

Simon Sheaf FIA FSAI
Partner, Head of General Insurance Actuarial and Risk
For and on behalf of Grant Thornton UK LLP

Contents

1 Executive Summary

1.1 Purpose and Scope

1.1.1 The Department for Transport ("DfT", "you") has asked Grant Thornton UK LLP ("Grant Thornton", "we", "us") to undertake a Peer Review of the Government Actuary's Department's ("GAD's") Report on the Vnuk Impact Analysis. In particular, we were asked to review the following documents:

- Report issued by the GAD entitled Vnuk Impact Analysis, dated 29 August 2017
- Memorandum issued by the GAD entitled Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims, dated 21 December 2017
- Memorandum issued by the GAD entitled Vnuk Additional Analysis – Effect of increasing Motor Sports exposure, dated 29 March 2019
- Email and memorandum issued by the GAD in response to our initial draft peer review comments which were dated 18 June 2019

1.1.2 The purpose of the GAD's analysis in the documents listed in paragraph 2.1.1 above is to provide an estimate of the potential additional insurance premiums that will be paid by private individuals and businesses as a result, of extending the scope of compulsory motor insurance in the United Kingdom. These considerations are a result of a judgement in the European Court of Justice in 2014 (the 'Vnuk judgement').

1.1.3 We understand that as a result of the Vnuk judgement, the UK's current interpretation of the Motor Insurance Directive may no longer be correct. In particular more vehicles may be required to purchase a compulsory third party liability insurance policy and compulsory insurance may need to be extended to private land.

1.1.4 DfT requested the GAD to consider two potential courses of action. The first was to modify domestic legislation to comply with the new interpretation of the Motor Insurance Directive. This would mean extending compulsory insurance to cover additional types of vehicle and also the use of vehicles whilst on private land. The second was to only consider modifying legislation to include the additional types of vehicle to the extent that they are used on a road or other public place.

1.1.5 The purpose of our peer review is to provide assurance to the DfT on the GAD's analysis and its estimate of the potential cost of extending the scope of compulsory motor insurance in the United Kingdom for each of the potential courses of action discussed in paragraph 2.1.4 above.

1.2 Methodology

1.2.1 Our approach to this Peer Review consisted of three elements, these are described in the following paragraphs.

1.2.2 **Document Review –** We reviewed the GAD's Report on the Vnuk Impact Analysis dated 29 August 2017 and the GAD's subsequent addendums to the report dated 21 December 2017 and 29 March 2019 (referred to together as the "GAD Report").

1.2.3 **Discussions with the author of the GAD Report –** Discussions were held with the author of the GAD Report.

1.2.4 After undertaking the above, we produced an initial set of draft comments on our peer review. These were dated 18 June 2019.

1.2.5 The GAD subsequently provided us with responses to the more material of our comments. In some cases, this included additional analyses that it undertook.

1.2.6 **Review of the GAD's responses to our comments –** We also reviewed the GAD's responses to our initial draft peer review comments.

1.3 Overall Conclusions

1.3.1 Broadly, we are of the opinion that the GAD's methodology and assumptions as described in the GAD Report are reasonable and fit for purpose given the data and information available.

1.3.2 There are a number of assumptions within the GAD report that are difficult to validate or challenge as these relate to events that have not taken place e.g. changes in the behaviour of policyholders and claimants following the proposed legislative changes, or where there is insufficient historical data or evidence. We note from the GAD Report that it has performed a sensitivity analysis in respect of many of the key assumptions underlying its analysis. We have reviewed the GAD's sensitivity analysis and are comfortable that the sensitivity of the GAD's estimates to these assumptions are not unreasonable. We are also comfortable that the sensitivity tests performed considered a reasonably wide range surrounding each assumption and are a reasonable representation of the uncertainty underlying these assumptions.

1.3.3 Where sufficient information was not available in respect of the sensitivity of the GAD's estimate to an assumption, we have discussed options with the GAD for improving the information available including where possible performing additional sensitivity testing. Following from this, we have not identified any issues that made the conclusions set out in the GAD Report appear unreasonable.

1.3.4 We identified a number of areas within the GAD Report that we believe would benefit from further refinement. Although the areas we identified are likely to have an impact on the modelling results, we do not believe any of these areas, either individually or collectively, will impact the estimates in respect of the impact of the proposed legislative changes set out in the GAD Report when measured to the nearest £1 billion. In other words, we do not believe that any of these areas are likely to reduce the GAD's estimate of the impact of the proposed legislative changes to less than £1.5 billion, or to increase it to more than £2.5 billion.

2 Purpose and Scope

2.1 Purpose and Scope

2.1.1 The Department for Transport (“DfT”, “you”) has asked Grant Thornton UK LLP ("Grant Thornton", "we", "us") to undertake a Peer Review of the Government Actuary’s Department’s (“GAD’s”) Report on the Vnuk Impact Analysis. In particular, we were asked to review the following documents:

- Report issued by the GAD entitled Vnuk Impact Analysis, dated 29 August 2017
- Memorandum issued by the GAD entitled Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims, dated 21 December 2017
- Memorandum issued by the GAD entitled Vnuk Additional Analysis – Effect of increasing Motor Sports exposure, dated 29 March 2019
- Email and memorandum issued by the GAD in response to our initial draft peer review comments which were dated 18 June 2019

2.1.2 The purpose of the GAD’s analysis in the documents listed in paragraph 2.1.1 above is to provide an estimate of the potential additional insurance premiums that will be paid by private individuals and businesses as a result, of extending the scope of compulsory motor insurance in the United Kingdom. These considerations are a result of a judgement in the European Court of Justice in 2014 (the ‘Vnuk judgement’).

2.1.3 We understand that as a result of the Vnuk judgement, the UK’s current interpretation of the Motor Insurance Directive may no longer be correct. In particular more vehicles may be required to purchase a compulsory third party liability insurance policy and compulsory insurance may need to be extended to private land.

2.1.4 DfT requested the GAD to consider two potential courses of action. The first was to modify domestic legislation to comply with the new interpretation of the Motor Insurance Directive. This would mean extending compulsory insurance to cover additional types of vehicle and also the use of vehicles whilst on private land. The second was to only consider modifying legislation to include the additional types of vehicle to the extent that they are used on a road or other public place.

2.1.5 The purpose of our peer review is to provide assurance to the DfT on the GAD’s analysis and its estimate of the potential cost of extending the scope of compulsory motor insurance in the United Kingdom for each of the potential courses of action discussed in paragraph 2.1.4 above.

2.1.6 This report describes our approach to this peer review and summarises our findings and recommendations.

2.2 Professional guidance

2.2.1 This report has been prepared in accordance with the requirements of the Technical Actuarial Standards ("TASs") issued by the Financial Reporting Council (“FRC”). In particular, this report has been prepared in accordance with TAS 100: Principles of Technical Actuarial Work and TAS 200: Insurance. We have complied with these Technical Actuarial Standards as far as reasonable given the scope of our work.

2.2.2 In addition, this report has been internally peer reviewed in line with the requirements of APS X2: Review of Actuarial Work, issued by the Institute and Faculty of Actuaries.

3 Distribution and Use

3.1.1 This report has been commissioned by, and is addressed to, DfT. The report is intended solely for the internal use of DfT for the purpose described in this report. It is not intended, nor is it necessarily suitable, for any other purpose. We assume no responsibility nor accept any liability for any use of this report for any other purpose.

3.1.2 Draft and final versions of this report may be distributed to the GAD but solely on the understanding that Grant Thornton UK LLP assumes no responsibility nor accepts any liability to the GAD in respect to this report.

3.1.3 No further distribution of draft versions of this report may be made, in part or in whole, without our prior written consent.

3.1.4 Copies of the final version of this report may be made available publicly and may be provided to any person requesting it. However, Grant Thornton does not accept any liability to any party other than DfT who chooses to act on the basis of this report.

3.1.5 This report was not prepared for the use of any third party. Any third party that chooses to rely on this report does so entirely at its own risk. We assume no responsibility nor accept any liability to any third party that chooses to rely on this report, including the GAD.

3.1.6 Prior to the final version of this report being made available publicly, no reference to Grant Thornton UK LLP in relation to this report, in any reports, accounts or other published documents or statements issued by DfT or GAD is permitted without our prior written consent.

3.1.7 This report was prepared for the management of DfT and assumes a high level of knowledge relating to the UK motor insurance industry, the information provided for this report and external factors affecting UK motor insurance industry. Any third party reading this report may not have the background information necessary for a full understanding of the report.

3.1.8 In addition, this report has been prepared for use by persons technically competent in insurance matters. Judgements as to the conclusions drawn in this report should be made only after studying the report in its entirety. We assume that users of this report will seek explanation and/or simplification of any part of this report which is not clear. We remain available to answer any reasonable questions which may arise regarding this report.

4 Reliances and Limitations

4.1.1 In developing this report, we have relied, without audit or independent verification, on quantitative and qualitative information provided by DfT and GAD. The accuracy of our results is dependent upon the accuracy and completeness of this information; therefore, any material errors discovered in this information should be reported to us and this report amended accordingly, if warranted.

4.1.2 We have assumed that UK motor insurance business will proceed as it has in the past. Beyond the assumption that the scope of compulsory motor insurance in the United Kingdom may be extended in line with the Vnuk judgement, we have not anticipated any extraordinary changes to the legal, social or economic environment that might affect the cost, frequency or future credit risk events or operational risk events.

4.1.3 There is a limitation upon the accuracy of our estimates in that there is an inherent uncertainty in any estimate of future liabilities. This is due to the fact that claims will be subject to the outcome of events yet to occur, such as judicial decisions, legislative actions, claim consciousness amongst potential claimants, claims management, claim settlement practices, changes in inflation, and economic decisions. As a result, it should be recognised that future claim emergence will likely deviate, perhaps materially, from any estimate of these liabilities.

4.1.4 Our specific assumptions and other reliances and limitations are documented in the various sections of this report. These sections are an integral part of this report. This report should be read in its entirety, as parts considered in isolation may be misleading.

5 Approach

5.1 Information received

5.1.1 The DfT provided us with the following documentation for our analysis:

- Report issued by the GAD entitled *Vnuk Impact Analysis*, dated 29 August 2017
- Memorandum issued by the GAD entitled *Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims*, dated 21 December 2017
- Memorandum issued by the GAD entitled *Vnuk Additional Analysis – Effect of increasing Motor Sports exposure*, dated 29 March 2019

5.1.2 The GAD provided us with the following documentation for our analysis:

- Email and memorandum issued by the GAD in response to our initial draft peer review comments which were dated 18 June 2019.

5.1.3 This report reflects the versions of the memorandum received from the GAD in response to our initial draft peer review comments that were issued prior to 3 July 2019. However, it should be noted that this report has not been updated to reflect any subsequent versions of the memorandum. In particular, the GAD issued a further version on 3 July 2019. We understand that this included feedback on those of our comments that were not covered in previous versions of the memorandum. However, we agreed with the DfT that there was insufficient time for us to reflect the 3 July version of the memorandum in this report.

5.2 Methodology

5.2.1 Our approach to this Peer Review consisted of three elements, these are described in the following paragraphs.

5.2.2 **Document Review –** We reviewed the GAD's Report on the Vnuk Impact Analysis dated 29 August 2017 and the GAD's subsequent addendums to the report dated 21 December 2017 and 29 March 2019 (referred to together as the "GAD Report").

5.2.3 **Discussions with the author of the GAD Report –** Discussions were held with the author of the GAD Report. The aim of these discussions was to discuss the data that was available to the GAD for their analysis, the GAD's methodology and key assumptions and the GAD's rationale for these.

5.2.4 After undertaking the above, we produced an initial set of draft comments on our peer review. These were dated 18 June 2019.

5.2.5 The GAD subsequently provided us with responses to the more material of our comments. In some cases, this included additional analyses that it undertook.

5.2.6 **Review of the GAD's responses to our comments –** We also reviewed the GAD's responses to our initial draft peer review comments.

5.2.7 Following this review, we removed some comments, altered the raking of some others and amended other comments. The findings detailed in Section 6 of this report are those following these updates.

6 Findings

Overall Conclusions

6.1.1 Broadly, we are of the opinion that the GAD's methodology and assumptions as described in the GAD Report are reasonable and fit for purpose given the data and information available.

6.1.2 There are a number of assumptions within the GAD report that are difficult to validate or challenge as these relate to events that have not taken place e.g. changes in the behaviour of policyholders and claimants following the proposed legislative changes, or where there is insufficient historical data or evidence. We note from the GAD Report that it has performed a sensitivity analysis in respect of many of the key assumptions underlying its analysis. We have reviewed the GAD's sensitivity analysis and are comfortable that the sensitivity of the GAD's estimates to these assumptions are not unreasonable. We are also comfortable that the sensitivity tests performed considered a reasonably wide range surrounding each assumption and are a reasonable representation of the uncertainty underlying these assumptions.

6.1.3 Where sufficient information was not available in respect of the sensitivity of the GAD's estimate to an assumption, we have discussed options with the GAD for improving the information available including where possible performing additional sensitivity testing. Following from this, we have not identified any issues that made the conclusions set out in the GAD Report appear unreasonable.

6.1.4 We identified a number of areas within the GAD Report that we believe would benefit from further refinement. Although the areas we identified are likely to have an impact on the modelling results, we do not believe any of these areas, either individually or collectively, will impact the estimates in respect of the impact of the proposed legislative changes set out in the GAD Report when measured to the nearest £1 billion. In other words, we do not believe that any of these areas are likely to reduce the GAD's estimate of the impact of the proposed legislative changes to less than £1.5 billion, or to increase it to more than £2.5 billion.

6.1.5 We have categorised our findings as following:

- **High –** High likelihood that the issue identified will have a noticeable impact on the GAD's modelling results or where we strongly recommended that the identified issue be investigated in greater detail
- **Medium –** Non-negligible likelihood that the issue identified will have a noticeable impact on the GAD's modelling results or where we recommended that the identified issue be investigated in greater detail
- **Low –** Low likelihood that the issue identified will have a noticeable impact on the GAD's modelling results or where addressing the issue is unlikely to impact on the GAD's analysis

6.1.6 The DfT and the GAD agreed that findings categorised as High in our initial draft peer review comments and first draft report would be prioritised and the GAD has provided us with a memorandum containing further analyses and sensitivity testing with respect to these findings. Where we were satisfied that the further work carried out by the GAD provided adequate mitigation against a finding we raised originally, we have removed that finding or re categorised it to either Medium or Low as appropriate.

6.1.7 As discussed in paragraph 5.1.3, this report reflects the versions of the GAD's memorandum that were issued prior to 3 July 2019. However, this report has not been updated to reflect any subsequent versions of the memorandum.

6.1.8 The DfT have informed us that it will continue to work with the GAD to remediate findings categorised as Medium or Low in this report and. However, we agreed with the DfT that there was insufficient time for this further work to be included within the scope of our peer review.

6.1.9 Consequently, although we have been provided with intermediate results from GAD's further analysis in respect findings rated as Medium and Low in a subsequent version of the GAD's memorandum that was received on 3 July 2019, we have not reflected these in this report.

6.1.10 We are comfortable with the GAD's approach to the review of our comments (as outlined in paragraphs 6.1.6 and 6.1.9), as the approach prioritises the areas we believe may have the highest potential impact on the GAD modelling results.

Findings categorised as High

Report on Vnuk Impact Analysis – dated 29 August 2017

6.1.11 Below is a summary of our findings that have been rated as High in respect of the Report issued by the GAD entitled Vnuk Impact Analysis – dated 29 August 2017 (and the corresponding paragraph reference within the GAD's report).

6.1.12 Paragraph 4.39 and table 4.4 – We note that a 7% adjustment rate has been assumed to adjust the historical average claim sizes for inflation and other trends observed in the underlying claims data, to 2018 terms and that the adjusted average claim sizes are displayed in table 4.4. However, the figures in table 4.4 show a strong decreasing trend by accident year across all claim sizes, whilst the unadjusted data displays an increasing trend. Given that the purpose of the adjustment is to remove any trends in the data, we would expect the adjusted data to appear reasonably random. The trend visible in the adjusted data indicates that the 7% adjustment rate assumed is higher than the actual trend. In response to this observation, the GAD has performed a sensitivity test on this assumption by reducing the adjustment rate to 5%. We understand from the GAD that a 5% adjustment rate was selected for this sensitivity test as the observed downward trend was eliminated at this adjustment rate. The sensitivity test resulted in a £130m reduction in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

6.1.13 Paragraphs 4.43 and 4.44 – The GAD's report states that, according to publicly available records, the largest ever recorded UK motor insurance loss is £23m. However, we are aware of the Selby rail crash (where a train crash was caused by the actions of a car driver), which we understand was considerably larger than £23m (even before it is restated to 2018 values). We are of the opinion that the value of the largest possible loss assumed for private motor, £30m, is not sufficiently extreme as this value can be exceeded for example as a result of a significant motorway pile up, collision with a large passenger transport vehicle, a crash involving, for example, the team bus of a Premier League football club or a similar event to the Selby rail crash. Furthermore, this assumption is also not consistent with that assumed for motorsport losses (paragraph 6.39), where the largest possible loss has been assumed to be £125m. In response to this observation, the GAD has performed a sensitivity test on this assumption by increasing the largest possible loss assumption for private motor to £129m. The sensitivity test resulted in a £229m increase, in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

6.1.14 Paragraph 4.58 and table 4.7 b) – We note that a 7% adjustment rate has been assumed to adjust the historical average claim sizes for inflation and other trends observed in the underlying claims data, to 2018 terms and that the adjusted average claim sizes are displayed in table 4.7 b). The figures in table 4.7 b) show a decreasing trend by accident year across all claim sizes, whilst the opposite trend is visible in the

unadjusted data. Given that the purpose of the adjustment is to remove any trends in the data, we would expect the adjusted data to appear reasonably random. The trend visible in the adjusted data indicates that the 7% adjustment rate assumed is higher than the actual trend. In response to this observation, the GAD has performed a sensitivity test on this assumption by reducing the adjustment rate to 5%. We understand from the GAD that a 5% adjustment rate was selected for this sensitivity test as the observed downward trend was eliminated at this adjustment rate. The sensitivity test resulted in a £130m reduction in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

6.1.15 Paragraph 4.84 – The GAD has assumed a 10% rate in respect of brokerage costs on private motor car business. Given that the vast majority of private motor car business in the UK is currently sold over the internet or through insurance aggregators, the 10% rate assumed by the GAD appears conservative. In response to this observation, the GAD has performed a sensitivity test on this assumption by reducing the assumed brokerage rate to 5%. The sensitivity test resulted in an £81m reduction in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

6.1.16 Paragraph 5.23, fourth and fifth bullets – We agree with the GAD's analysis that the increase in the frequency of TPD and TPI claims from extending compulsory insurance covering to include public land will be limited. However, we note that vehicles will typically travel at materially lower speeds on private land owing to smaller and/or poorer roads. Given this, in our opinion, we believe the 5% increase in the frequency is potentially pessimistic. We would also expect a lower claim severity owing to the lower vehicle speeds. The exception to this is, of course, vehicles participating in motor sports. In response to this observation, the GAD has performed a sensitivity test on this assumption by reducing the assumed increase in the frequency to 2.5%. The sensitivity test resulted in a £224m reduction in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

Vnuk Impact Analysis – Effect of increasing Motor Sports exposure dated 29 March 2019

6.1.17 Below is a summary of our findings that have been rated as High in respect of the Memorandum issued by the GAD entitled Vnuk Additional Analysis – Effect of increasing Motor Sports exposure, dated 29 March 2019 (and the corresponding paragraph reference within the GAD's memorandum).

6.1.18 Paragraph 2.14, third bullet – The GAD estimates the increase in the claim cost due to a change in the Ogden discount rate based on a single reference point, in particular, a 45 year old male. We note that there will significant variability in the impact of the Ogden discount rate change depending on the age of the claimant. The impact is likely to be significantly higher than the 25% estimated in the GAD's analysis for younger claimants (and this is in addition to the fact that claim sizes are typically larger for younger claimants) and lower for older claimants. Given this, we are of the opinion that the GAD's methodology with respect to the Ogden discount rate change may be overly simplistic and that it is likely to underestimate the variability of the claims experience.

6.1.19 In response to this observation, the GAD performed a sensitivity test on this assumption by recalculating the GAD's estimates under a second reference point, namely, a 35 year old female. We have reviewed the results of this sensitivity test and, whilst we agree that this sensitivity test provides a level of comfort, we

believe that it would be informative to also consider other reference points, including some that are more extreme.

Findings categorised as Medium

Report on Vnuk Impact Analysis – dated 29 August 2017

6.1.20 Below is a summary of our findings that have been rated as Medium in respect of the Report issued by the entitled Vnuk Impact Analysis – dated 29 August 2017 (and the corresponding paragraph reference within the GAD's report).

6.1.21 Paragraph 1.14 – The report assumes that, in the scenario that the Motor Insurer's Bureau ("MIB") pays for claims arising on derogated vehicles, the increase in MIB levies will be lower than the increase in insurance premiums would have been should these vehicles not have been derogated. The report notes that the MIB is not subject to Insurance Premium Tax ("IPT") which reduces the impact to policyholders. However, we note that insurers will recover the MIB levies by increasing the premiums charged to their policyholders and we would expect any such increase in premiums to be subject to IPT. In response to this observation, the GAD has explained to us that it has not been able to conclude, within the timeframe available, on whether levies imposed by the MIB on insurers could be passed on to consumers without the imposition of IPT. However, the GAD has sensitivity tested the impact of IPT being added to MIB levies. The sensitivity tests showed that the impact would be a 12% increase in the GAD's estimate of the additional MIB levy that is required in respect of the derogated vehicles. This increase is not very significant in comparison to the total estimated increase in costs in respect of the Comprehensive option.

6.1.22 Paragraph 3.11 – We note that the GAD's analysis is based on a Monte Carlo simulation model and that the number of simulations considered in the model was 10,000. The report however does not explain the level of uncertainty that remains due to simulation error (seed error). We suggest that this error be quantified and explained in the report.

6.1.23 Paragraph 4.11 – We note that there have now been more recent publications by the Third Party Working Party since the information considered in the GAD report. We suggest that the GAD reviews the new information to ensure that verify whether the conclusions in the GAD report will materially change should the analysis be updated to consider this additional information, and, if necessary, updates its analysis.

6.1.24 Paragraph 4.14 – Similar to the above, we note that more recent data is available from the ABI on the motor insurance market in comparison to the data considered in the GAD report. We suggest that the GAD report be updated to consider this latest available data, or alternatively, that the new data be reviewed to verify whether it materially change the GAD's conclusions and, if necessary, the analysis is updated.

6.1.25 Paragraphs 4.59 and 4.60 – Paragraph 4.59 states that the variability parameters in the TPD severity distribution have been selected such that there is a 1 in 200 chance of there being a TPD liability of approximately £100,000. This however is inconsistent with paragraph 4.60 which states that there is a 1 in 200 chance of TPD claims being £90,000 or larger.

6.1.26 Paragraph 4.80 – We note that a 6% return on capital assumption has been selected for the purposes of calculating the cost of capital. However, it is not clear whether the analysis considered the actual return on capital achieved by motor insurers in selecting this assumption. We note that the return on capital can be calculated from publicly available sources of information such as published accounts and Solvency and Financial Condition Reports. We recommend that, if this has not been done already, the return on capital assumption be reviewed in further detail based on this information.

6.1.27 Paragraph 4.88 – It is not clear what analysis GAD undertook to confirm that a difference of between £70 and £170 was reasonable for the difference between Comprehensive and Third Party Liability premiums.

6.1.28 Paragraphs 5.13 and 5.15 – The GAD report assumes that the severity of TPD claims for motorcycles is the same as that of motorcars. We note however that motorcycles are lighter vehicles in comparison to motorcars and are therefore likely to cause less damage following a collision. We suggest that the TPD average severity assumption for motorcycles be revised to be lower than that of motorcars.

6.1.29 Paragraph 5.48 – We note that the expected premium per policy before adjustment is £611 which increases to £639 following the fraud loading. We also note that the fraud loading is a 6% increase in the expected claim frequency. Given this, we would expect the expected premium following the loading to be £648 (£611 x 1.06). We would like to understand why the GAD's model gives a different result.

6.1.30 Paragraph 6.42 – The GAD assumes that the severity distribution for TPD is appropriate for use in the motorsport model without adjustment. However, we note that vehicles used in a significant proportion of motorsports are substantially more costly than private vehicles. In addition, given the higher speeds involved in motorsports, the level of damage as a result of collisions is also likely to be higher. The GAD notes that the 99.5th percentile of the TPD claims distribution used for motorsports is £90,000. In comparison, following a collision between vehicles, the third party damage in a Formula One or other similar high profile motorsport event can exceed several million pounds. In response to this observation, the GAD has performed a sensitivity test on this assumption by adjusting the GAD's model to assume that all claims that exceed £90,000 are for a value of £1m. We believe that the methodology applied by the GAD in this sensitivity test is reasonable. The sensitivity test resulted in a £25m increase in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to impact the GAD's estimate of the impact of the proposed legislative changes to the extent that the conclusion set out in paragraph 6.1.4 of this report is invalidated.

6.1.31 Paragraph 9.28 – As mentioned for paragraph 1.14 of the GAD's report, we note that insurers will recover the MIB levies by increasing the premiums charged to policyholders and that this increase in premium and we would expect any such increase in premiums to be subject to IPT. Given this, we believe that the impact on policyholders due to IPT is unlikely to be avoided under this scenario. In response to this observation, the GAD has explained to us that it has not been able to conclude, within the timeframe available, on whether levies imposed by the MIB on insurers could be passed on to consumers without the imposition of IPT. However, the GAD has sensitivity tested the impact of IPT being added to MIB levies. The sensitivity tests showed that the impact would be a 12% increase in the GAD's estimate of the additional MIB levy that is required in respect of the derogated vehicles. This increase is not very significant in comparison to the total estimated increase in costs in respect of the Comprehensive option.

Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims dated 21 December 2017

6.1.32 Below is a summary of our findings that have been rated as High in respect of the Memorandum issued by the GAD entitled Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims dated 21 December 2017 (and the corresponding paragraph reference within the GAD's memorandum).

6.1.33 Paragraph 2.4, second and third bullets – The GAD's analysis assume that a 1:2 ratio will be applied in respect of the caps applied to individual claimants and the total value of the claim. In comparison, the equivalent ratio under the Motor Insurance Directive is approximately 1:5. Given this difference, the ratio in the GAD's assumption penalises severe claim incidents to a greater extent. For example, given a severe event where there are more than two claimant with each suffering a significant loss, we note that on average,

each claimants is likely to receive lower compensation in comparison to other events involving lower levels of damage or fewer claimants. Given this, we are of the opinion that adopting a 1:2 ratio is likely to unfairly penalise individuals that are involved in the most significant accidents. We appreciate that the 1:2 ratio was designed to mimic the cap on Employers' Liability insurance but we note that Employers' Liability incidents are less likely to involve multiple claimants.

Findings categorised as Low

Report on Vnuk Impact Analysis – dated 29 August 2017

6.1.34 Below is a summary of our findings that have been rated as Low in respect of the Report issued by the entitled Vnuk Impact Analysis – dated 29 August 2017 (and the corresponding paragraph reference within the GAD's report).

6.1.35 Paragraph 1.10, Motor Sports – It is assumed that motor sport event organisers will no longer need to purchase public liability insurance under the Comprehensive Option as the motor insurance will provide this cover. Whilst the motor insurance will provide cover in the event that the driver is found to be at fault, however, we note that event organisers will still be exposed to potential liability from events that are found to be the fault of the event organisers and not the driver(s). We believe that under the Comprehensive Option, event organisers will still need to purchase public liability insurance, albeit that they will need less coverage than currently and the cost will therefore be lower. The impact on Motor Sports therefore is likely to be understated as the premium offset for event organisers is potentially overstated in the GAD report.

6.1.36 Paragraph 1.17 – We note that the quality of the supporting evidence for various assumptions has been categorised as being either poor, acceptable or good. However, the report does not explain the criteria or the assessment that has been applied in this categorisation. We suggest that an explanation be provided for this in the report.

6.1.37 Paragraphs 4.83 and 4.84 – The GAD's report does not explain how the 15% and 10% assumptions in respect of expenses and brokerage have been selected. In response to this observation, the GAD has informed us that these assumptions were based on historical experience within the private sector and the GAD's experience from working with government insurance arrangements. We recommend that the GAD Report be updated to include this explanation.

6.1.38 Paragraph 5.2 – The GAD report assumes that liabilities arising from commercial vehicles on private land are not currently covered under motor insurance policies, however, they would be if the private land was deemed to be accessible to the public. In the event that these claims are currently covered under existing insurance policies, there is a risk that the impact from these exposures has been double counted in the GAD's analysis.

6.1.39 Paragraph 5.47 – The GAD report states that the Insurance Fraud Bureau ("IFB") did not indicate that commercial vehicle fraud was a particular concern for the insurance industry. The GAD therefore has made no allowance for fraud on commercial vehicles. However, from what we can tell, the IFB's comments did not exclude the existence of insurance fraud on commercial vehicles. We recommend therefore that some allowance be made for fraud on commercial vehicles, although we expect this allowance to be less than that required on private motorcars and motorcycles.

6.1.40 Paragraph 6.50 – This paragraph does not appear to address the heading for this section, in particular, it does not discuss the "Overall premium impact". We believe that an incorrect paragraph may have been included here.

6.1.41 Paragraphs 7.16 and 7.17 –The GAD remarks that there may be some vehicles within the Other Business Vehicles category that already purchase insurance and therefore there may be some amount of double count with the Existing Vehicles model. However, the analysis does not appear to allow for a corresponding decrease in its exposure estimate as a result of the vehicles discussed in paragraph 7.16.

6.1.42 Paragraphs 7.19 and 7.23 – We note that the GAD's Report states that its analysis allows for an overlap between a Vnuk compliant motor insurance policy under the Comprehensive Option and existing employer's liability policies. However, the Report does not appear to discuss the overlap with existing public liability policies. In response to this observation, the GAD has explained to us that the methodology applied does not distinguish between claims arising from employees or members of the public. We note that this approach implicitly assumes that the same coverage will be available to claimants under employer's liability and public liability policies. Whilst there is in reality potentially some difference between the coverage available under employer's liability and public liability policies, we do not believe that the GAD's methodology is unreasonable as the difference is unlikely to have a material impact on the GAD's estimates. However, we recommend that the GAD's Report be updated to explains more clearly what the analysis represents.

6.1.43 Paragraph 7.26 – In our opinion, we believe that it is highly likely that the vehicles considered in this paragraph also operate at lower average speeds in comparison to private motorcars which further minimises the claims risk.

6.1.44 Paragraphs 8.16 and 8.17 – We believe that the GAD's assumption that there are 6,000 vehicles within some of the vehicle categories discussed in paragraph 8.16, in particular ride-on lawnmowers and children's toys, may be too low. In response to this observation, the GAD has performed a sensitivity test on this assumption by increasing the estimated total annual exposure (measured in vehicle years) from the Miscellaneous Vehicles category from 480,000 to 1,000,000. The sensitivity test resulted in a £9m increase in the GAD's estimate of the impact of the proposed legislative changes. Given this, we are comfortable that the uncertainty in this assumption is unlikely to materially impact the GAD's estimate of the impact of the proposed legislative changes.

6.1.45 Paragraph 8.33 – Given the highly specialised nature of the market for the vehicles considered in the Miscellaneous Vehicles category, we are of the opinion that the sales and distribution of the insurance coverage for these vehicles may be closely tied that of the vehicles themselves and as a result, a broker or intermediary is unlikely to be involved. However, in this situation, the insurer is likely to pay commission to the retailer and, on this basis, we do not believe the GAD's commission assumption of 15% to be unreasonable even if we disagree with the argument used in the report to justify it.

6.1.46 Paragraph 9.12 – We note that the GAD's analysis assumes that only the vehicles that are currently subject to the Road Traffic Act estimates will continue to fund the MIB. However, we note that should any additional vehicles be required to purchase compulsory insurance in the future, these vehicles should also be subject to the MIB levy. Although this could affect the population of vehicles that have to contribute to the MIB levy, this will not affect the total increase in costs arising from the proposed legislation changes; rather it will affect how these costs are spread across policies. As a result, this will not affect the GAD's estimate of the impact of the proposed legislative changes.

6.1.47 Paragraph 10.6 and Table 10.1 – Table 10.1 in the GAD report shows the traffic light rating system that the GAD has applied to rank the quality of various sources of data and evidence in this analysis. We note however that under this traffic light rating system, it is possible for the same rating to be applied to items where there is direct evidence and where the only available evidence has been in the form of expert guidance, despite the former being preferable. We recommend that the traffic light system be enhanced to

consider two dimensions, the first one being whether the evidence is direct, indirect or based on expert guidance and the second dimension representing the quality of the evidence.

6.1.48 Paragraph 10.8 and Table 10.2 – Table 10.2 of the GAD report summarises the materiality criteria that the GAD has applied in its analysis. The criteria are expressed in percentage terms but Section 10 does not explain how these percentages are measured or which variable they relate to. However, this is made clear in Section 1 of the report. We would, therefore, suggest that this explanation be repeated in Section 10.

Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims dated 21 December 2017

6.1.49 Below is a summary of our findings that have been rated as Low in respect of the Memorandum Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims dated 21 December 2017 (and the corresponding paragraph reference within the GAD's memorandum).

6.1.50 Paragraph 4.13, first bullet –The GAD report states that under their modelling methodology, there is no connection between the size of the total claims and the number of claimants. However, this assumption is demonstrably untrue given that a claim involving multiple claimants is more likely to be large than a claim involving only a single claimant.

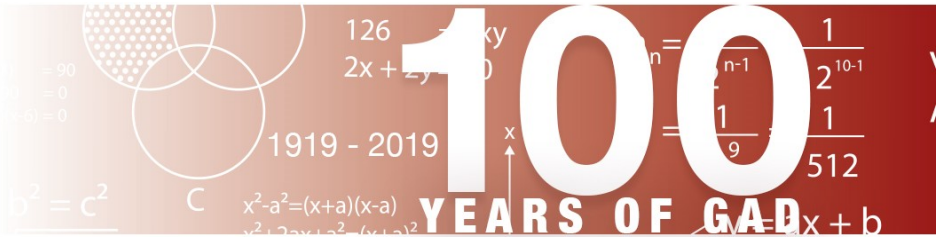
6.1.51 Paragraphs 4.19, 4.20 and Exhibit 4 – The "Scottish Data" considered in this paragraph only considers the number of passengers per vehicle. In comparison, the "DfT Data" comprises of the number of claimants per motor accident. We note that, in many cases, motor accidents will include more than one vehicle. In addition, we also note that not all occupants in a vehicle are necessarily injured in an accident. We think that it would be helpful for the report to set out these limitations.

6.1.52 Paragraph 7.6, second bullet, third sentence – We believe that there is an error in this paragraph. The paragraph refers to the £2.5m / £5m scenario; however we believe this should refer to the £5m / £10m scenario.

GAD's response to the external peer review

July 2019

Government Actuary's Department



MEMO

TO: Department for Transport [redacted]

COPIED TO: [redacted] **Simon Sheaf (Grant Thornton)**

FROM: **Matt Kirkpatrick**

REF: **Vnuk – Grant Thornton peer review** **DATE:** **16 July 2019**

SUBJECT: Grant Thornton peer review – Responses to peer review points

1 Introduction

1.1 The Department for Transport ('DfT') has previously commissioned GAD to quantify the impact of a 2014 judgement by the European Court of Justice regarding compulsory motor insurance (the 'Vnuk judgement'). GAD were asked to estimate the increase in insurance premiums that may arise if the scope of compulsory motor insurance in the United Kingdom was extended in line with the Vnuk judgement. This work was documented in the report entitled "Vnuk Impact Analysis" and dated 29 August 2017.

1.2 Two further phases of work were subsequently commissioned by DfT:

- To investigate the impact if compulsory motor insurance was further modified to remove the requirement to provide unlimited liability for third party bodily injury claims. This work was documented in GAD's memo entitled "Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims" and dated 21 December 2017.

- To investigate the impact of allowing for unlicensed motor sport activity. This work was documented in GAD's memo entitled "Vnuk Additional Analysis – Effect of increasing Motor Sports exposure" and dated 29 March 2019.

1.3 DfT has arranged for all three documents to be peer reviewed by Grant Thornton UK LLP ('GT'). As an initial phase of their work, GT summarised their evaluation of the documents by providing a list of 39 review points. These were supplied via email on 4 June 2019.

1.4 DfT, GT and GAD met on 7 June 2019 to discuss these review points and it was agreed that GT would classify these as either 'high', 'medium' or 'low'. A high ranked issue is one where GT judged there would be a noticeable impact on the GAD modelling results or where GT recommended that the identified issue be addressed as a high priority.

1.5 The classified review points were subsequently received on 11 June 2019. 16 of the review points were categorised as high, 10 a medium and 13 as low. This categorisation has been reviewed by both GAD and DfT and were discussed in a meeting on 13 June 2019.

1.6 In order to assist GT in concluding their peer review, it was agreed that GAD would provide formal responses to all of the high ranked review points, and one of the medium ranked review points which DfT identified as an area of particular interest.

1.7 It was further agreed that GAD would provide high-level responses to the remaining 9 medium ranked review points, and all of the 13 low ranked review points. Whilst these did not factor into GT's final peer review report, they provide DfT with a complete list of responses to all of the review points.

1.8 The purpose of this document is as follows:

- Section 2 - Sets out GAD's proposed responses to all of the high review points and one of the medium review points. In some instances, we have suggested that further work should be carried out by GAD in order to quantify the impact of alternative assumptions or methodologies. These responses were discussed with DfT before being issued to GT. GT considered these responses whilst their peer review was being undertaken.
- Section 3 - Provides GAD's formal responses to the review points. These responses were provided to GT and were considered as part of their final peer review report.
- Section 4 - Provides GAD's high-level responses to the remaining medium and low review points. These were not considered by GT as part of their final peer review report.

1.9 As a reminder, the increases in insurance premiums that are quoted in our reports (including this one) are in 2018 monetary terms. This aligns with the original scope of our work.

Format of this memo

1.10 In order to avoid unnecessary duplication between this document and our previous memos/reports, we have not repeated the text describing our methodology and assumptions where these have not been adjusted. This allows us to focus on the key changes which have been made.

1.11 As a result of this approach, both the original report, our second phase memo, our third phase memo, and this memo should be considered as components of a larger, aggregated report. All reports and memos should be considered in their entirety, as individual sections from these documents, if considered in isolation, may be misleading, and conclusions reached by review of some sections on their own may be incorrect. The three documents taken in aggregate provide all the detail that is needed.

1.12 We draw your attention to the limitations and reliance restrictions which were described in our original report and which also apply to this document. In particular, we highlight paragraphs 2.15 to 2.20 of our original report which noted the following:

- The report has been prepared for the exclusive use of DfT. Other than DfT no person or third party is entitled to place any reliance on the contents of this report.
- The report must not be reproduced, distributed or communicated in whole or in part without GAD's prior written permission. This permission has been granted in the context of Grant Thornton who are performing a peer review of our work.
- Calculations are based on data and research available between January and June 2017.

1.13 This work has been carried out in accordance with the applicable Technical Actuarial Standard: TAS 100 issued by the Financial Reporting Council ('FRC'). The FRC sets technical standards for actuarial work in the UK.

2 Review points and GAD's proposed responses

Ref	Grant Thornton review comments	GAD response & proposed actions
High 1	Paragraph 1.14 – The report assumes that, in the scenario that the MIB pays for claims arising on derogated vehicles, the increase in MIB levies will be lower than the increase in insurance premiums would have been should these vehicles not have been derogated. The report notes that the MIB is not subject to Insurance Premium Tax ("IPT") which reduces the impact to policyholders. However, we note that insurers will recover the MIB levies by increasing the premiums charged to their policyholders and that this increase in premium will be subject to IPT. Given this, we believe that the impact on policyholders due to IPT is unlikely to be avoided under this scenario. In addition, there is a possibility that the insurer may also apply a profit loading on top of the charge to policyholders for the MIB levy. The GAD's estimate of the increase in the policyholder's average premium under this scenario is therefore potentially underestimated as a result.	In respect of IPT, it was agreed that further research was required: **Action - DfT has agreed to look into the mechanics of how the MIB levies are passed on by insurers to consumers. In particular:** • **Whether or not the current arrangement attracts IPT** • **Whether it is possible to make future changes that would avoid IPT, if it is currently accrued** **Action – Depending on the outcome of the above, GAD can recalculate the effect on the derogation costs if IPT is added (this would be a recalculation of table 9.3)** In respect of insurers adding profit on top of the levy, GAD would argue that this possibility is remote due to the competitive nature of the motor insurance market in the UK. This would mean that any additional profit not related to legitimate risk-taking activity would be quickly eroded by competitive behaviour. **Action – Whilst GAD would push back against this point, the effect can be quantified by re-calculating table 9.3 and making an allowance for additional profit.**
High 2	Paragraph 4.32 and figure 4.3 – We note that a Negative Binomial distribution has been selected to model the frequency. The analysis however does not appear consider the closeness of the fitted distribution to the observed data (e.g. by calculating the R square statistic of p-value), or compare the closeness of the fit under the Negative Binomial Distribution and other potential distributions e.g. Poisson, Binomial. We recommend that these additional criteria and comparisons also be considered in the selection of the probability distribution	Other distributions were considered during the initial modelling phases, and goodness of fit was one of the key considerations in choosing (paragraphs 4.30 and 4.31 briefly discuss this issue) **Action – GAD to provide a brief summary that provides more detail, and perform a sensitivity test using an alternative distribution.**

High 3	Paragraph 4.39 and table 4.4 – We note that a 7% inflation rate has been assumed to adjust the historical average claim sizes to 2018 terms and that the adjusted average claim sizes are displayed in table 4.4. The figures in table 4.4. however, show a strong decreasing trend by accident year across all claim sizes, whilst the unadjusted data displays an increasing trend. Given that the purpose of the adjustment is to remove any trends in the data due to claims inflation, we would expect the adjusted data to appear reasonably random. The trend visible in the adjusted data indicates that the 7% inflation rate assumed is higher than the actual inflation. We suggest that the inflation rate assumption be reviewed for appropriateness.	The TPWP had access to more granular data than was released in their public reports – this allowed a more in-depth analysis to take place to justify the adjustment (which is meant to represent inflation and underlying trends). Because of this information asymmetry, we have relied on the TPWP adjustment rather than making our own. **Action – GAD to provide references to the original TPWP papers to evidence this approach, and any comments of the underlying trends.**
High 4	Paragraphs 4.43 and 4.44 – The GAD report states that, according to publicly available records, the largest ever recorded motor insurance loss is £23m. However, we are aware of the Selby rail crash (where a train crash was caused by the actions of a car driver), which we understand was considerably larger than £23m (even before it is restated to 2018 values). We are of the opinion that the value of the largest possible loss assumed for private motor, £30m, is not sufficiently extreme as this value can be exceeded for example as a result of a significant motorway pile up, collision with a large passenger transport vehicle, a crash involving, for example, the team bus of a Premier League football club or a similar event to the Selby rail crash. Furthermore, this assumption is also not consistent with that assumed for motorsport losses (paragraph 6.39), where the largest possible loss has been assumed to be £125m. We recommend that the GAD considers increasing its assumption for the largest possible private motor loss.	The referenced loss appears to be in the region of £50m (before inflation) but this figure contains elements of third party property damage and business interruption. It is not immediately clear how this figure breaks down into its component parts. Nevertheless, the broader challenge around the largest possible losses is well made, and can be explored with a sensitivity test. **Action – GAD to perform a sensitivity test to explore the effect of a higher maximum loss.**
High 5	Paragraph 4.55 and figure 4.5 – We note that a decreasing trend is observed in the TPD claims frequency. We would like to understand whether the claims frequency data shown in figure 4.5 a) has been adjusted to allow for delays in claims reporting (i.e. IBNR claim counts). If the data is based on unadjusted reported claim counts, it is likely that the observed trend is, at least in part, due to delays in claims reporting.	The data has been adjusted for IBNR. **Action – GAD to provide references to the original TPWP papers to evidence this.**
High 6	Paragraph 4.55 and figure 4.6 – We note that a Negative Binomial distribution has been selected to model the frequency. The analysis however does not appear consider the closeness of the fitted distribution to the observed data (e.g. by calculating the R square statistic of p-value), or compare the closeness of the fit under the Negative Binomial Distribution and other potential distributions e.g. Poisson, Binomial. We recommend that these additional criteria and comparisons also be considered in the selection of the probability distribution.	See response to High 2

High 7	Paragraph 4.58 and table 4.7 b) – We note that a 7% inflation rate has been assumed to adjust the historical average claim sizes to 2018 terms and that the adjusted average claim sizes are displayed in table 4.7 b). The figures in table 4.7 b) show a decreasing trend by accident year across all claim sizes, whilst the opposite trend is visible in the unadjusted data. Given that the purpose of the adjustment is to remove any trends in the data due to claims inflation, we would expect the adjusted data to appear reasonably random. The trend visible in the adjusted data indicates that the 7% inflation rate assumed is higher than the actual inflation. We suggest that the selected inflation rate assumption be reviewed for appropriateness.	See response to High 3
High 8	Paragraphs 4.83 and 4.84 – The GAD's report does not explain how the 15% and 10% assumptions in respect of expenses and brokerage have been selected. We note that this information can be obtained from publicly available sources of information such as published accounts and Solvency and Financial Condition Reports. We recommend that these assumptions be reviewed in further detail based on this information.	Both assumptions were based on historical experience within the private sector and involvement with government insurance arrangements. **Action – GAD to sensitivity test alternative assumptions**
High 9	Paragraph 4.84 – The GAD has assumed a 10% rate in respect of brokerage costs on private motor car business. Given that the vast majority of private motor car business in the UK is currently sold over the internet or through insurance aggregators, the 10% rate assumed by the GAD appears conservative. We recommend that the GAD reviews this assumption.	This was discussed with DfT during the original review – whilst GAD has experience with commercial lines, we do not have insight into the brokerage costs associated with aggregator business. Furthermore, given the commercial nature of this assumption, publicly available sources of information do not appear to exist. **Action – GAD to sensitivity test a lower assumption of 5%**
High 10	Paragraph 6.42 – The GAD assumes that the severity distribution for TPD is appropriate for use in the motorsport model without adjustment. However, we note that vehicles used in a significant proportion of motor sports are substantially more costly than private vehicles. In addition, given the higher speeds involved in motorsports, the level of damage as a result of collisions is also likely to be higher. The GAD notes that the 99.5th percentile of the TPD claims distribution used for motorsports is £90,000. In comparison, following a collision, the damage to individual vehicles in a formula one or other similar high profile motorsport event can exceed several million pounds. Given this, we are of the opinion that the severity distribution selected by the GAD is potentially understated. We recommend that the severity assumption be increased to allow for the higher speeds involved and greater vehicle values in motorsports	UK motorsport activity will encompass a wide range of vehicle types and specifications, with the top end encompassing high specification vehicles. A more sophisticated modelling approach would look to subdivide motorsport activity into broadly similar components, but this approach was not commensurate with original scope of our work. The selected distribution looked to reflect all motor sport activity in a single distribution. **Action – GAD to sensitivity test a higher top end assumption for TPD damage**

High 11	Paragraphs 7.19 and 7.23 – We note that the GAD's analysis allows for an overlap between a Vnuk compliant motor insurance policy under the Comprehensive Option and existing employers' liability policies. However, the analysis does not appear to allow for any overlap with existing public liability policies. In our opinion, the overlap with public liability policies is likely to be material as not all claims will be from employees. We recommend therefore that the GAD's analysis and selected assumptions be extended to also allow for the overlap with public liability policies.	The methodology adjusts the TPI simulations to reduce all simulated claims by a maximum of £10m. In does not look to distinguish between claims that would arise from employees and claims that would come from members of the public. The methodology therefore implicitly assumed that public liability coverage is in place and is commensurate with EL coverage.
High 12	Paragraphs 8.16 and 8.17 – We believe that the GAD's assumption that there are 6,000 vehicles within some of the vehicle categories discussed in paragraph 8.16, in particular ride-on lawnmowers and children's toys, may be too low. We recommend that the assumption for these vehicle categories be reviewed.	Information in this area is scarce, but the impact can be easily assessed. **Action – GAD to sensitivity test for higher vehicle numbers**
High 13	Paragraph 9.12 – We note that the GAD's analysis assumes that only the vehicles that are currently subject to the Road Traffic Act estimates will continue to fund the MIB. However, we note that should any additional vehicles be required to purchase compulsory insurance in the future, these vehicles should also be subject to the MIB levy. We recommend therefore that this assumption be reviewed to ensure that any additional vehicles that may become subject to compulsory insurance are allowed for in this analysis.	In theory this is correct – if some of the new vehicle types are derogated but not others, it is likely that they will be asked to contribute towards the MIB. The burden of those costs on the new vehicle types is uncertain. If all of the new vehicle types are derogated the original analysis will be unaffected. **Action – GAD to calculate the potential impact of a wider base of non-derogated vehicle types**
High 14	Paragraph 9.27 – We note that the GAD has estimated the MIB's expense experience from discussions with the MIB. However, we understand that the MIB discloses this information in its annual report and accounts. We recommend therefore that the GAD's expense assumption be reviewed and compared the MIB's historical expense experience as reported in its accounts.	The accounts available at the time of the original analysis did not split out claim expenses from general expenses (which include an element of fixed costs that won't scale with additional derogations). The wider point around expenses is covered in High 8 and we don't propose any further actions

High 15	Paragraph 9.28 – As mentioned for paragraph 1.14, we note that insurers will recover the MIB levies by increasing the premiums charged to policyholders and that this increase in premium will be subject to IPT. Given this, we believe that the impact on policyholders due to IPT is unlikely to be avoided under this scenario. In addition, there is a possibility that the insurer may also apply a profit loading on top of the charge to policyholders for the MIB levy. The GAD's estimate of the increase in the policyholder's average premium under this scenario is therefore potentially underestimated as a result.	See High 1
High 16	Paragraph 2.14, third bullet (third memo - "Effect of increasing Motor Sports exposure")– The GAD estimates the increase in the claim cost due to a change in the Ogden discount rate based on a single reference point, in particular, a 45 year old male. We note that there will significant variability in the impact of the Ogden discount rate change depending on the age of the claimant. The impact is likely to be significantly higher than the 25% estimated in the GAD's analysis for younger claimants (and this is in addition to the fact that claim sizes are typically larger for younger claimants) and lower for older claimants. Given this, we are of the opinion that the GAD's methodology with respect to the Ogden discount rate change may be overly simplistic and that it is likely to underestimate the variability of the claims experience. Also, we believe that it would be helpful for the GAD's report to explain the uncertainty underlying the assumed 25% increase.	This approach is a simplification in line with the scope agreed with DfT. A more sophisticated approach would look to identify the age and gender distribution of accidents and make a suitable adjustment for this. In lieu of this information, a sensitivity test can be performed **Action – GAD to perform sensitivity tests to assess the impact of using different reference points.**
Medium 8	Paragraph 5.23, fourth and fifth bullets – We agree with the GAD's analysis that the increase in the frequency of TPD and TPI claims from extending compulsory insurance covering to include public land will be limited. However, we note that vehicles will typically travel at materially lower speeds on private land owing to smaller and/or poorer roads. Given this, in our opinion, we believe the 5% increase in the frequency to be too high. We would also expect a lower claim severity owing to the lower vehicle speeds. The exception to this is, of course, vehicles participating in motor sports. Nevertheless, we recommend that the frequency and claim severity assumptions be reviewed to reflect the fact that average vehicle speeds on private land are expected to be lower.	This is a subjective area and GAD acknowledges the lack of relevant evidence means that different judgements can be made. The impact can of alternative assumptions can be assessed with a sensitivity test **Action – GAD to perform a sensitivity test to assess the impact of using a lower uplift.**

3 GAD's formal responses

Introductory notes

3.1 This section builds on the proposed responses set out in Section 2 by providing additional commentary addressing GT's review points.

3.2 In some instances, GAD has carried out additional sensitivity tests in order to quantify the impact of alternative assumptions or methodologies. In doing so we note that:

- Unless otherwise noted, we have used the version of the model underlying our original analysis. This is because the majority of GT's review points relate to this original report.
- Only the components of the model which are affected by the sensitivity test have been re-simulated. For example, if a sensitivity test is solely concerned with the TPI losses, we will not have updated the TPD simulations.
- We have provided a summary table comparing the additional premium costs before and after the sensitivity test. Again, in most instances the 'before' position is taken from our original analysis (£1,831m).

3.3 The performance of a sensitivity test does not mean that GAD agrees that the alternative being considered is more appropriate than the original approach. In most instances the most appropriate selection is judgemental and further research would be required to justify one approach over the other.

High 1

3.4 It has not been possible within the time frame of this review to definitively conclude on whether levies imposed by the MIB on insurers could be passed on to consumers without the imposition of IPT. At the time of writing this remains an open question.

3.5 The table below shows the impact if IPT is charged, with a comparison to the original analysis in the final column.

Derogated Vehicle Category	Estimated Losses + Expenses (£)			Allocation of costs (net of recoveries) to existing vehicle types					Orignal
	Gross of recoveries	Net of recoveries	With IPT @ 12%	Type	% of costs	Costs (£)	Policies	Cost per policy (£)	analysis
Motor Sport Vehicles	155,770,625	147,982,094	165,739,945	Private motorcars	79%	130,295,209	25,000,000	5.21	4.65
				Private motorcycles	4%	5,801,820	720,000	8.06	7.19
				Existing business vehicles	18%	29,642,917	3,850,000	7.70	6.87
				Total	**100%**	**165,739,945**	**29,570,000**	**5.61**	**5.00**
Other Business Vehicles	134,427,413	127,706,042	143,030,767	Private motorcars	79%	112,442,559	25,000,000	4.50	4.02
				Private motorcycles	4%	5,006,872	720,000	6.95	6.21
				Existing business vehicles	18%	25,581,335	3,850,000	6.64	5.93
				Total	**100%**	**143,030,767**	**29,570,000**	**4.84**	**4.32**
Miscellaneous Vehicles	5,849,552	5,557,075	6,223,924	Private motorcars	79%	4,892,891	25,000,000	0.20	0.17
				Private motorcycles	4%	217,872	720,000	0.30	0.27
				Existing business vehicles	18%	1,113,161	3,850,000	0.29	0.26
				Total	**100%**	**6,223,924**	**29,570,000**	**0.21**	**0.19**
Motor + Other Business + Miscellaneous Vehicles	296,047,590	281,245,211	314,994,636	Private motorcars	79%	247,630,659	25,000,000	9.91	8.84
				Private motorcycles	4%	11,026,564	720,000	15.31	13.67
				Existing business vehicles	18%	56,337,413	3,850,000	14.63	13.07
				Total	**100%**	**314,994,636**	**29,570,000**	**10.65**	**9.51**

Table: Effect if IPT is charged on MIB levies. Amounts are in £, 2018 monetary terms

High 2

3.6 For this review point, we have re-parameterised the model to use the Poisson distribution (instead of the Negative Binomial distribution to model claim frequency for TPI claims. Whilst we do not advocate using this particular distribution, the test is intended to indicate the potential magnitude of change if an alternate distribution was selected.

3.7 As shown in the table below, the impact is to increase premium by £95m (£1,926m - £1,831m)

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original Report**	**Poisson Distribution**
Existing - Motorcars - Extension to private land	484	511
Existing - Motorcars - Additional fraud	743	776
Existing - Motorcycles - Extension to private land	23	22
Existing - Motorcycles - Additional fraud	41	38
Existing - Business Vehicles - Extension to private land	105	145
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	228
Other Business	198	198
Miscellaneous	8	8
Total	1,831	1,926

Table: Additional premiums associated with using the Poisson distribution to model TPI claim numbers. Amounts are in £m, 2018 monetary terms

High 3

3.8 The GAD work used the two most recent TPWP reports at the time the analysis was carried out. These were the January 2015 report and the September 2016 report.

3.9 The September 2016 report can be found here:

https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=2ahUKEwjW--i0vITjAhVyQxUIHd-JAKgQFjABegQIAxAC&url=https%3A%2F%2Fwww.actuaries.org.uk%2Fdocuments%2Fa5-update-third-party-working-party-latest-trends-personal-motor-bodily-injury-and-property-damage&usg=AOvVaw1BkPHEDT8u-TcyZnj5kWrD

3.10 With reference to the September 2016 report:

- Slide 34 states the 7% p.a. adjustment factor has been used, but does not give any further details supporting its selection. In our subsequent meeting with TPWP representatives we were told that this was based on an analysis of the more granular data they received (which is not released to the public) and includes an adjustment for their view on underlying trends.
- Slide 5 provides some insight into the underlying data received by the TPWP. This was also discussed in our meeting with TPWP representatives where they noted i) granularity of data varied from respondent to respondent ii) the information made publicly available was aggregated to a higher level before publication to avoid it being used for commercial purposes.
- Some of the analysis provided by the TPWP provides insight into trends over more recent years. For example, slide 7 suggests there is some evidence of improvements in TPI claims experience for 2013-2015, potentially explaining why average costs are lower in this year.

3.11 The GT review comment suggests reviewing the adjustment to reduce the downward trend observed when a factor of 7% is used. The table below shows the impact of using a 5% factor for all modules except Motor Sports where we have taken a substantially different approach to modelling TPI severity. A 5% adjustment largely eliminates the downward trend.

3.12 As shown in the table below, the impact is reducing the premium impact by £130m (£1,831m to £1,701m).

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original report**	**+5% adjustment**
Existing - Motorcars - Extension to private land	484	481
Existing - Motorcars - Additional fraud	743	637
Existing - Motorcycles - Extension to private land	23	22
Existing - Motorcycles - Additional fraud	41	32
Existing - Business Vehicles - Extension to private land	105	102
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	229
Other Business	198	190
Miscellaneous	8	8
Total	1,831	1,701

Table: Change in additional premiums when the 7% p.a. adjustment factor is replaced with a 5% p.a. adjustment (for all modules except Motor Sports). Amounts are in £m, 2018 monetary terms

High 4

3.13 GAD's proposed response to this review point was to perform a further sensitivity test that increases the maximum possible simulated TPI losses for the existing motorcar components of the model. For these components we have increased the maximum possible loss from £30m to £75m in 2010 monetary terms. This is then adjusted to £129m in 2018 terms using the 7% p.a. inflation and trending factor that was adopted in our original work. There are a number of uncertainties surrounding the £50m large loss highlighted by GT, and the appropriate factor for inflating this to 2018 terms, but we believe the figure we have adopted (£129m in 2018 terms) is broadly commensurate with the loss highlighted by GT.

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original Report**	**Sensitivty Test**
Existing - Motorcars - Extension to private land	484	569
Existing - Motorcars - Additional fraud	743	886
Existing - Motorcycles - Extension to private land	23	23
Existing - Motorcycles - Additional fraud	41	41
Existing - Business Vehicles - Extension to private land	105	105
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	229
Other Business	198	198
Miscellaneous	8	8
Total	1,831	2,060

Table: Additional premiums when the maximum simulated loss is increased to £129m (existing motorcars only). Amounts are in £m, 2018 monetary terms

3.14 As shown in the table above the impact of the change is to increase costs by £229m (£2,060m - £1,831m)

3.15 Whilst we have carried out this sensitivity test, we refer back to our original response in section 2 which highlights some reasons why a higher figure may not be appropriate.

3.16 We also note that this sensitivity test is a more targeted version of the first sensitivity test in our original report. This looked at the impact of a smaller increase in the maximum TPI loss, but applied it to all motor classes other than Motorsports.

High 5

3.17 The underlying data from the TPWP has been adjusted for IBNR – see slide 11 of the September 2016 report which provides further details on the projections that have been carried out.

High 6

3.18 GAD's proposed response to this review point was to perform a sensitivity test that investigates the impact of using the Poisson distribution to model TPD claim numbers.

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original Report**	**Poisson Distribution**
Existing - Motorcars - Extension to private land	484	510
Existing - Motorcars - Additional fraud	743	748
Existing - Motorcycles - Extension to private land	23	23
Existing - Motorcycles - Additional fraud	41	41
Existing - Business Vehicles - Extension to private land	105	117
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	229
Other Business	198	199
Miscellaneous	8	8
Total	1,831	1,875

Table: Additional premiums associated with replacing the Negative Binomial distribution with a Poisson distribution when simulating the number of TPD claims. Amounts are in £m, 2018 monetary terms

3.19 As shown in the table above the impact of the change is to increase costs by £44m (£1,875m - £1,831m).

3.20 Whilst we have carried out this sensitivity test, we refer back to our original response in section 4 which highlights why the negative binomial distribution may be a better fit for the distribution of claims frequency.

High 7

3.21 See the response to High 3 which explores the impact of using of a different adjustment factor for TPI. TPI is the more material component of overall costs, so we have not repeated the analysis for TPD claims.

High 8

3.22 In response to this review point we have tested the impact of either increasing or decreasing both expenses and brokerage by 5% each. Because both of these items are applied as percentage of the expected costs (i.e. after the stochastic simulations have taken place), the result is symmetric at +/- £125m. A breakdown by vehicle category is shown in the tables below:

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original**	**-5% to Assumptions**
Existing - Motorcars - Extension to private land	484	447
Existing - Motorcars - Additional fraud	743	692
Existing - Motorcycles - Extension to private land	23	22
Existing - Motorcycles - Additional fraud	41	39
Existing - Business Vehicles - Extension to private land	105	98
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	215
Other Business	198	186
Miscellaneous	8	8
Total	1,831	1,706

Table: Additional premiums associated with reducing both brokerage and expenses by 5%. Amounts are in £m, 2018 monetary terms

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original**	**+5% to Assumptions**
Existing - Motorcars - Extension to private land	484	521
Existing - Motorcars - Additional fraud	743	794
Existing - Motorcycles - Extension to private land	23	25
Existing - Motorcycles - Additional fraud	41	44
Existing - Business Vehicles - Extension to private land	105	113
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	242
Other Business	198	209
Miscellaneous	8	9
Total	1,831	1,956

Table: Additional premiums associated with increasing both brokerage and expenses by 5%. Amounts are in £m, 2018 monetary terms

High 9

3.23 This review point is essentially a subset of 'high 8'. Rather than testing both expenses and brokerage, this sensitivity test looks solely at the brokerage component and the impact of decreasing it by 5%. As shown in the table below, the result is a £81m reduction in costs.

	Additional premium costs for the UK (£m)	
Vehicle Category	Original	Setting Brokerage to 5% for Private Cars
Existing - Motorcars - Extension to private land	484	466
Existing - Motorcars - Additional fraud	743	717
Existing - Motorcycles - Extension to private land	23	22
Existing - Motorcycles - Additional fraud	41	39
Existing - Business Vehicles - Extension to private land	105	98
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	215
Other Business	198	186
Miscellaneous	8	8
Total	1831	1,750

Table: Additional premiums associated with decreasing brokerage to 5% for existing motorcars only. Amounts are in £m, 2018 monetary terms

High 10

3.24 For this review point we have re-run the Motor Sport component of the model to generate larger TPD losses in extreme circumstances. The severity model for TPD losses uses a Lognormal distribution based on a mean of £3.3k and a 99.5th percentile of £90k. It is not possible to re-parameterise the Lognormal distribution to retain the mean but push the 99.5th percentile to significantly higher values. This reflects a limitation in the model – it is effectively looking to capture the losses that might arise from relatively inexpensive recreational vehicles, whilst simultaneously considering expensive, high performance vehicles. A more sophisticated approach would consider the two vehicle types separately.

3.25 To overcome this limitation, we have added an additional logic step to the model that replaces any simulation above £90k with a simulation of £1m. Whilst this results in a discontinuous distribution, it does have the desired effect of artificially extending the tail of the Lognormal distribution and increasing the capital requirement of an insurer writing this business.

3.26 The table below shows that the impact is minimal – increasing total costs by £25m (£1856m - £1,831m)

	Additional premium costs for the UK (£m)	
Vehicle Category	Original Report	Sensitivity Test
Existing - Motorcars - Extension to private land	484	484
Existing - Motorcars - Additional fraud	743	743
Existing - Motorcycles - Extension to private land	23	23
Existing - Motorcycles - Additional fraud	41	41
Existing - Business Vehicles - Extension to private land	105	105
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	254
Other Business	198	198
Miscellaneous	8	8
Total	1,831	1,856

Table: Additional premiums associated with Motor Sport vehicle if the upper end of the distribution is amended. Amounts are in £m, 2018 monetary terms

High 11

3.27 No further comments beyond our initial response which was as follows:

- The methodology adjusts the TPI simulations to reduce all simulated claims by a maximum of £10m. In does not look to distinguish between claims that would arise from employees and claims that would come from members of the public.
- The methodology therefore implicitly assumed that public liability coverage is in place and is commensurate with EL coverage.

High 12

3.28 For this review point we have performed a sensitivity test, we have increased the total exposure on the miscellaneous category from 480,000 to 1,000,000. As shown in the tabel below, the effect is to increase cost by £9m (£1,840m - £1,831m).

	Additional premium costs for the UK (£m)	
Vehicle Category	**Original**	**After increasing Misc. exsposure**
Existing - Motorcars - Extension to private land	484	484
Existing - Motorcars - Additional fraud	743	743
Existing - Motorcycles - Extension to private land	23	23
Existing - Motorcycles - Additional fraud	41	41
Existing - Business Vehicles - Extension to private land	105	105
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	229
Other Business	198	198
Miscellaneous	8	17
Total	1831	1,840

Table: Additional premiums associated with increasing exposure for Miscellaneous vehicles. Amounts are in £m, 2018 monetary terms

High 13

3.29 In response to this review point we have considered the impact of derogated costs if the new category of 'Other Business Vehicles' is not derogated. This has two impacts:

- The expected value of derogated costs decreases
- The number of policyholders available to pay derogated costs increases

3.30 We have assumed that the 'specified rate' for Other Business Vehicles is an average of the specified rate for the existing vehicle types (75%). This is a weighting that is applied to the premium income to calculate that vehicle category's share of derogated costs.

GAD vehicle category	Specified rate	GAD estimated 2018 premium (£m)	Weighted covers Amount (£m)	% of total
Existing vehicles - private motorcars	74%	10,670	7,912	77%
Existing vehicles - private motorcycles	73%	483	352	3%
Existing vehicles - existing business vehicles	77%	2,353	1,800	18%
New vehicles - Other business vehicles	75%	198	147	1%
		Total	10,212	100%

Table: Updated version of Table 9.2 in our original report. This calculates the share of derogated costs for the vehicle categories that are not derogated. Amounts are in £m, 2018 monetary terms

3.31 This enables the derogated costs to be distributed amongst the non-derogated categories. The results are shown in the table below, along with a comparison to the original analysis.

Derogated Vehicle Category	Estimated Losses + Expenses (£) Gross of recoveries	Net of recoveries	Allocation of costs (net of recoveries) to existing vehicle types Type	% of costs	Costs (£)	Policies	Cost per policy (£)	Original Analysis
Motor Sport Vehicles	155,770,625	147,982,094	Private motorcars	77%	114,656,734	25,000,000	4.59	4.65
			Private motorcycles	3%	5,105,466	720,000	7.09	7.19
			Existing business vehicles	18%	26,085,073	3,850,000	6.78	6.87
			New vehicles - Other business vehicles	1%	2,134,822	1,239,000	1.72	0.00
			Total	**100%**	**147,982,094**	**30,809,000**	**4.80**	**5.00**
Other Business Vehicles	0	0	Private motorcars	77%	0	25,000,000	0.00	4.02
			Private motorcycles	3%	0	720,000	0.00	6.21
			Existing business vehicles	18%	0	3,850,000	0.00	5.93
			New vehicles - Other business vehicles	1%	0	1,239,000	0.00	0.00
			Total	**100%**	**0**	**30,809,000**	**0.00**	**4.32**
Miscellaneous Vehicles	5,849,552	5,557,075	Private motorcars	77%	4,305,629	25,000,000	0.17	0.17
			Private motorcycles	3%	191,722	720,000	0.27	0.27
			Existing business vehicles	18%	979,556	3,850,000	0.25	0.26
			New vehicles - Other business vehicles	1%	80,168	1,239,000	0.06	0.00
			Total	**100%**	**5,557,075**	**30,809,000**	**0.18**	**0.19**
Motor + Other Business + Miscellaneous Vehicles	161,620,178	153,539,169	Private motorcars	77%	118,962,363	25,000,000	4.76	8.84
			Private motorcycles	3%	5,297,188	720,000	7.36	13.67
			Existing business vehicles	18%	27,064,629	3,850,000	7.03	13.07
			New vehicles - Other business vehicles	1%	2,214,989	1,239,000	1.79	0.00
			Total	**100%**	**153,539,169**	**30,809,000**	**4.98**	**9.51**

Table: Updated version of Table 9.3 in our original report. This calculates the derogated costs for the vehicle categories that are not derogated. There is also a comparison to the original analysis. Amounts are in £, 2018 monetary terms.

High 14

3.32 The wider point is covered by High 8 and no further investigation has taken place.

High 15

3.33 See response to High 1.

High 16

3.34 Unlike the previous High review points, this one refers to the third phase of our analysis (the memo entitled "Effect of increasing Motor Sports exposure").

3.35 Whilst this report focussed on the ramifications of increasing the exposure base for Motor Sport activity, it also included a sensitivity test that looked to assess the potential impact of a change in the Personal Injury Discount Rate from +2.5% to +1.0% p.a. This change considered all components of the model, not just Motor Sports.

3.36 This sensitivity test was based on a number of assumptions, but the three main ones were:

- That the new Personal Injury Discount Rate would be +1.0% p.a.
- Only TPI claims above £175k will be affected by a change in the rate.
- That the overall effect of the change could be approximated by considering the impact on a male claimant aged 45 years old.

3.37 In combination, this meant that any claim above £175k would be uplifted by a factor of 25%. This rule was applied to all components within the model.

3.38 GT's review point concerns the third of these assumptions – whether an appropriate reference point for the uplift factor is a 45 year old male.

3.39 GAD acknowledges that the chosen approach is simplistic. A more sophisticated methodology would involve researching the age and gender profile of motor sports accidents, subdividing the results by the seriousness of the accident, and making further adjustments to the model to represent these distributions. However, the time costs involved in carrying out such research and making the necessary adjustments to the model would not have been appropriate given the scope agreed with DfT.

3.40 In response to GT's review point we have investigated the impact of choosing a different reference point of a 35 year old female. In doing so we note that no research has been carried out to support this shift, so adopting this reference point should not be interpreted as implying that it is more appropriate than the original selection.

3.41 With this new reference point, the uplift factor increases from 25% to 35%. Again, this uplift factor was applied to all components of the model, not just Motor Sports.

3.42 The table below is an updated version of Exhibit 3 from the memo under discussion, but shortened to only show the impact of the PIDR change on the unlimited TPI liability scenario. As shown in the table:

- The central figure in our memo was £2,060m. This is the extra premium associated with the Comprehensive option once you allow for the additional Motor Sports exposure. It is based on a PIDR of +2.5%.
- The first comparison is to a figure of £2,305m. This is the impact of moving to a PIDR of +1.0% but based on a reference case of a 45-year-old male.
- The final comparison is to a figure of £2,405m. This is the impact of moving to a PIDR of +1.0% but based on a reference case of a 35-year-old female.

	Change in premium costs for the UK (£m)		
TPI Cap	No adjustment to Personal Injury Discount Rate (+2.5%)	Adjusted Personal Injury Discount Rate (+1.0%, 45 yr old male)	Adjusted Personal Injury Discount Rate (+1.0%, 35 yr old female)
Unlimited TPI Liability	2,060	2,305	2,405

Table: Updated version of Exhibit 3 in our memo "Effect of increasing Motor Sport exposure". This shows the impact of using a different reference point to calculate the uplift factor for if the PIDR was changed to +1.0%. All components of the model were affected by this change, not just Motor Sports. Amounts are in £m, 2018 monetary terms

Medium 8

3.43 This review point concerned the additional claim frequency that would occur if coverage was extended to private land, but without changing the additional effects of increased fraud.

3.44 The uplift to frequency has been decreased from 5% to 2.5% as a result. The impact is shown in the table below where total costs decrease by £224m (£1,831m – £1,607m)

	Additional premium costs for the UK (£m)	
Vehicle Category	**Sensitivity Test**	**Original**
Existing - Motorcars - Extension to private land	296	484
Existing - Motorcars - Additional fraud	706	743
Existing - Motorcycles - Extension to private land	23	23
Existing - Motorcycles - Additional fraud	41	41
Existing - Business Vehicles - Extension to private land	105	105
Existing - Business Vehicles - Additional fraud	0	0
Motor Sports	229	229
Other Business	198	198
Miscellaneous	8	8
Total	1,607	1,831

Table: Impact on additional premiums if the claim frequency adjustment for private land was reduced from 5% to 2.5%. Amounts are in £m, 2018 monetary terms

4 Medium and Low review points - GAD's high level responses

The table below lists the medium ranked review points raised by GT. With the exception of Medium 8, GAD has provided high-level responses.

Ref	Grant Thornton review comments	GAD high level response
Medium 1	Paragraph 3.11 – We note that the GAD's analysis is based on a Monte Carlo simulation model and that the number of simulations considered in the model was 10,000. The report however does not explain the level of uncertainty that remains due to simulation error (seed error). We suggest that this error be quantified and explained in the report.	This is partially addressed in GAD's second report ("Vnuk Impact Analysis – Effect of introducing a cap on third party bodily injury claims") paragraphs 4.2 and 8.2, with similar points made again in GAD's third report. As noted in those documents, the number of simulations generated by the original Vnuk model was chosen to balance two objectives i) minimising the variability in our estimate of the total premium, and ii) making the time taken to run the model reasonable. In the context of the original model, we considered that 10,000 simulations was a reasonable selection given these criteria. Whilst we have not formally tested the impact of simulation error, anecdotal experience running the model suggests the overall result is impacted by less than 1% as a result of simulation error. A formal test can be carried out if requested. In later phases of the project, GAD was asked to perform analysis that concentrated on specific parts of the model. Because of the more limited scope, the number of simulations is likely to have a greater impact, especially where the analysis concentrated on more remote outcomes. In many cases we were able to control simulation error by maintaining the same 'seed' or starting point for the random number generator underlying our work.
Medium 2	Paragraph 4.11 – We note that there have now been more recent publications by the Third Party Working Party since the information considered in the GAD report. We suggest that the GAD reviews the new information to ensure that verify whether the conclusions in the GAD report will materially change should the analysis be updated to consider this additional information, and, if necessary, updates its analysis.	The TPWP papers were being produced twice a year at the time of our original review, so it is likely that a number of updates have been released since our work was carried out. Assuming that the format of the reports is similar to those previously released, it would be possible to update the analysis to reflect the latest information. However, we note that their main use in our work is to establish distributions for claim frequency and severity based on an analysis of a number of years of historical data. The addition of one or two extra years' experience is therefore diluted. A residual risk is that new trends have been identified that were not previously allowed for.

Medium 3	Paragraph 4.14 – Similar to the above, we note that more recent data is available from the ABI on the motor insurance market in comparison to the data considered in the GAD report. We suggest that the GAD report be updated to consider this latest available data, or alternatively, that the new data be reviewed to verify whether it materially change the GAD's conclusions and, if necessary, the analysis is updated.	As per Medium 2, given the length of time since our original analysis, it is likely that new data has been released by the ABI, and this could be incorporated into our work. Because we rely on a number of years of historical data, the effect of new data is diluted.
Medium 4	Paragraphs 4.59 and 4.60 – Paragraph 4.59 states that the variability parameters in the TPD severity distribution have been selected such that there is a 1 in 200 chance of there being a TPD liability of approximately £100,000. This however is inconsistent with paragraph 4.60 which states that there is a 1 in 200 chance of TPD claims being £90,000 or larger.	This is a drafting issue – we agree that the wording could be tighter, but the two are not inconsistent. Paragraph 4.59 states that there is a 1 in 200 chance of "approximately £100,000" whereas as paragraph 4.60 states that there is 1 in 200 chance of £90,000. Paragraph 4.60 contains the more accurate wording.
Medium 5	Paragraph 4.80 – We note that a 6% return on capital assumption has been selected for the purposes of calculating the cost of capital. However, it is not clear whether the analysis considered the actual return on capital achieved by motor insurers in selecting this assumption. We note that the return on capital can be calculated from publicly available sources of information such as published accounts and Solvency and Financial Condition Reports. We recommend that, if is has not been done already, the return on capital assumption be reviewed in further detail based on this information.	The 6% return on capital is the default assumption from the Solvency II Standard Formula, it is not a specific return for Motor Insurance business. In our judgement, it does not appear unreasonable given GAD's wider experiences with other classes of insurance business. We agree that a more detailed analysis could be carried out by looking at accounts for several motor insurers over a number of years to determine a more specific return on capital. However, in the context of the overall modelling project we do not believe that this level of analysis would be justified. We also draw your attention to sensitivity test 3 from our original report that considers alternative returns on capital. As a result of this test we judged this assumption to be of low materiality.

Medium 6	Paragraph 4.88 – What analysis did to GAD undertake to confirm that a difference of between £70 and £170 was reasonable for the difference between Comprehensive and Third Party Liability premiums?	The purpose of paragraph 4.88 is to provide a high-level sense check on the modelled results based on publicly available data. This is complicated by the fact that the publicly available data used for this sense check was concerned with comprehensive insurance, whereas the GAD model only considered third party liability. This is a significant source of difference and resulted in the conclusion that the two sets of data did "not appear unreasonable" when compared to one another. We agree that further research could theoretically be conducted to help strengthen this conclusion. For example, it may be possible to carry out an analysis that splits out the third party liability component from a typical comprehensive motor insurance premium. This would help to confirm the reasonableness of the gap. However, public data of this nature may not exist, and we would also question whether the time required for such analysis would be proportionate in the nature of the overall engagement.
Medium 7	Paragraphs 5.13 and 5.15 – The GAD report assumes that the severity of Third Party Damage (TPD) claims for motorcycles is the same as that of motorcars. We note however that motorcycles are lighter vehicles in comparison to motorcars and are therefore likely to cause less damage following a collision. We suggest that the TPD severity assumption for motorcycles be revised to be lower than that of motorcars.	Whilst good data was available to support the approach for motorcycle TPI severity, the report notes that we were unable to find any data to help parameterise TPD severity. GT makes a qualitative argument as to why the distribution may be lower - whilst this could be the case, other qualitative arguments could also be put forward to support other changes to the distributions (e.g. perhaps smaller bumps and scrapes are less likely for motorcycles, shifting the distribution towards more expensive claims). Without relevant data the assumption can only be set by making judgements based on the balance of such views. Alternative judgements can be explored with sensitivity tests – in this case given the relative size of motorcycle TPD losses, it is unlikely that adjustments will make a significant difference.

Medium 8	Paragraph 5.23, fourth and fifth bullets – We agree with the GAD's analysis that the increase in the frequency of TPD and TPI claims from extending compulsory insurance covering to include public land will be limited. However, we note that vehicles will typically travel at materially lower speeds on private land owing to smaller and/or poorer roads. Given this, in our opinion, we believe the 5% increase in the frequency to be too high. We would also expect a lower claim severity owing to the lower vehicle speeds. The exception to this is, of course, vehicles participating in motor sports. Nevertheless, we recommend that the frequency and claim severity assumptions be reviewed to reflect the fact that average vehicle speeds on private land are expected to be lower.	At DfT's request, a formal response to this review point is included in Section 3 of this report.
Medium 9	Paragraph 5.48 – We note that the expected premium per policy before adjustment is £611 which increases to £639 following the fraud loading. We also note that the fraud loading is a 6% increase in the expected claim frequency. Given this, we would expect the expected premium following the loading to be £648 (£611 x 1.06). We would like to understand why the GAD's model gives a different result.	Paragraph 5.48 is concerned with existing business vehicles only. As set out in paragraph 5.44, we take the view that extending coverage to private land only affects the TPD component of the premium, not the TPI component. We therefore would not expect the entire premium to scale up by the 6% adjustment factor. As a more general point, we note that the stochastic nature of the model means that some simulation variation can be introduced when analysing transformations such as this. For the original model we believe that in aggregate this effect is minor, but for specific components (especially where the transformations are concerned with the more extreme losses) more notable simulation variance may be introduced.
Medium 10	Paragraph 2.4, second and third bullets (second report, "Effect of introducing a cap on third party bodily injury claims") – The GAD's analysis assume that a 1:2 ratio will be applied in respect of the caps applied to individual claimants and the total value of the claim. In comparison, the equivalent ratio under the Motor Insurance Directive is approximately 1:5. Given this difference, the ratio in the GAD's assumption penalises severe claim incidents to a greater extent. For example, given a severe event where there are more than two claimant with each suffering a significant loss, we note that on average, each claimants is likely to receive lower compensation in comparison to other events involving lower levels of damage or fewer claimants. Given this, we are of the opinion that adopting a 1:2 ratio is likely to unfairly penalise individuals that are involved in the most significant accidents. We appreciate that the 1:2 ratio was designed to mimic the cap on Employers' Liability insurance but we note that Employers' Liability incidents are less likely to involve multiple claimants.	This scenario was proposed by GAD and agreed with DfT to help explore potential policy options. We agree that other scenarios could be investigated, and the model can be used to provide further quantitative support.

The table below lists the low ranked review points raised by GT alongside GAD's high-level responses.

Ref	Grant Thornton review comments	GAD response & proposed actions
Low 1	Paragraph 1.10, Motor Sports – It is assumed that motor sport event organisers will no longer need to purchase public liability insurance under the Comprehensive Option as the motor insurance will provide this cover. Whilst the motor insurance will provide cover in the event that the driver is found to be at fault, however, we note that event organisers will still be exposed to potential liability from events that are found to be the fault of the event organisers and not the driver(s). We believe that under the Comprehensive Option, event organisers will still need to purchase public liability insurance, albeit that they will need less coverage than currently and the cost will therefore be lower. The impact on Motor Sports therefore is likely to be understated as the premium offset for event organisers is potentially overstated in the GAD report	If data could be made available, this could be explored by analysing the split of organisers' liability claims between accidents where the driver was at fault, and other public liability claims. Whilst we agree in principle that this is a more accurate reflection of reality, it seems likely that a significant majority of the premium will be associated with accidents involving the driver. We agree that impact is therefore likely to be small. A sensitivity test could be carried out to help quantify the effect.
Low 2	Paragraph 1.17 – We note that the quality of the supporting evidence for various assumptions has been categorised as being either poor, acceptable or good. However, the report does not explain the criteria or the assessment that has been applied in this categorisation. We suggest that an explanation be provided for this in the report	The report already provides further detail on the categorisation in section 10, in particular paragraphs 10.4 to 10.6.
Low 3	Paragraph 5.2 – The GAD report assumes that liabilities arising from commercial vehicles on private land are not currently covered under motor insurance policies, however, they would be if the private land was deemed to be accessible to the public. In the event that these claims are currently covered under existing insurance policies, there is a risk that the impact from these exposures has been double counted in the GAD's analysis.	The language used in paragraph 5.2 could be tightened to say that this modelling category is only concerned with cover that is already provided by existing motor insurance policies, i.e. in line with the Road Traffic Act. The analysis itself is unaffected.

Low 4	Paragraph 5.47 – The GAD report states that the IFB did not indicate that commercial vehicle fraud was a particular concern for the insurance industry. The GAD therefore has made no additional allowance for fraud on commercial vehicles. However, from what we can tell, the IFB's comments did not exclude the existence of insurance fraud on commercial vehicles. We recommend therefore some allowance be made for additional fraud on commercial vehicles, although we expect this allowance to be less than that allowed for on private motorcars and motorcycles.	We agree that the IFB has not stated that there would be no additional fraud from commercial vehicles. However; • The majority of their commentary is concerned with private vehicles. • Some aspects of fraud that they are concerned with are only applicable to private vehicles, as they require large volumes to work effectively. As such, and in the wider context of the engagement, we continue to be of the view that the total adjustments we have made for fraud are not unreasonable. If a fraud uplift were to be applied to commercial vehicles, it would increase the number of claims, leading to an increase in the overall costs. However, this increase is likely to be small given that commercial vehicles are a relatively small part of the overall Vnuk premiums. This could be explored through a sensitivity test.
Low 5	Paragraph 6.50 – This paragraph does not appear to address the heading for this section, in particular, it does not discuss the "Overall premium impact". We believe that an incorrect paragraph may have been included here.	This is a drafting issue – paragraph 6.50 is a copy of paragraph 6.8 – it should be a statement of the overall premium impact in the same format as the other sections. The analysis itself is unaffected.
Low 6	Paragraphs 7.16 and 7.17 –The GAD remarks that there may be some vehicles within the Other Business Vehicles category that already purchase insurance and therefore there may be some amount of double count with the Existing Vehicles model. However, the analysis does not appear to allow for a corresponding decrease in its exposure estimate as a result of the vehicles discussed in paragraph 7.16.	Paragraph 7.16 should be read in conjunction with paragraphs 7.14 and 7.15. The point being made is that there are risks both ways (that some vehicles may not be explicitly identified, but that also there may be double counting within some of the vehicle types that have been identified). The uplift factors we have applied is our judgement of a reasonable adjustment considering the balance of these risks.
Low 7	Paragraph 7.26 – In our opinion, we believe that it is highly likely that the vehicles considered in this paragraph also operate at lower average speeds in comparison to private motorcars which further minimises the claims risk	We agree that these vehicles will have lower average speeds, and this puts downwards pressure on the claim severity and frequency. However, as set out in paragraphs 7.25 to 7.27, other factors may act in the opposite direction.

Low 8	Paragraph 8.33 – Given the highly specialised nature of the market for the vehicles considered in the Miscellaneous Vehicles category, we are of the opinion that the sales and distribution of the insurance coverage for these vehicles may be closely tied that of the vehicles themselves and as a result, a broker or intermediary is unlikely to be involved. However, in this situation, the insurer is likely to pay commission to the retailer and, on this basis, we do not believe the GAD's commission assumption of 15% to be unreasonable even if we disagree with the argument used in the report to justify it.	From a monetary point of view, there is no difference between commission paid to a retailer and brokerage paid to a broker. Nevertheless, we note the challenge and should these vehicle types not be derogated it may be worthwhile monitoring the distribution channels for the insurance.
Low 9	Paragraph 10.6 and Table 10.1 – Table 10.1 in the GAD report shows the traffic light rating system that the GAD has applied to rank the quality of various sources of data and evidence in this analysis. We note however that under this traffic light rating system, it is possible for the same rating to be applied to items where there is direct evidence and where the only available evidence has been in the form of expert guidance, despite the former being preferable. We recommend that the traffic light system be enhanced to consider two dimensions, the first one being whether the evidence is direct, indirect or based on expert guidance and the second dimension representing the quality of the evidence.	This is correct, but we would argue that this is a strength of the categorisation system, as it means strong expert guidance can result in the same categorisation as good quantitative data. If changes were requested by DfT, it would be possible to implement these as the categorisation commentary is sufficiently detailed to separate out GAD's views on expert guidance and direct evidence.
Low 10	Paragraph 10.8 and Table 10.2 – Table 10.2 of the GAD report summarises the materiality criteria that the GAD has applied in its analysis. The criteria are expressed in percentage terms but Section 10 does not explain how these percentages are measured or which variable they relate to. However, this is made clear in Section 1 of the report. We would, therefore, suggest that this explanation be repeated in Section 10	The percentages are relative to the best estimate selection of overall costs.
Low 11	Paragraph 4.13, first bullet (of GAD's second report "Effect of introducing a cap on third party bodily injury claims") –The GAD report states that under their modelling methodology, there is no connection between the size of the total claims and the number of claimants. However, this assumption is demonstrably untrue given that a claim involving multiple claimants is more likely to be large than a claim involving only a single claimant	This paragraph (and paragraphs 4.12 and 4.13) describes how we have retroactively adjusted the model to introduce the number of claimants. The paragraph states that as a consequence of the approach taken, there is no connection between the size of the total claims and the number of claimants. It does not propose that this is the case in reality, it is instead highlighting a limitation that arises from adjusting the original model to incorporate a new feature.

Low 12	Paragraphs 4.19, 4.20 and Exhibit 4 (of GAD's second report "Effect of introducing a cap on third party bodily injury claims") – The "Scottish Data" considered in this paragraph only considers the number of passengers per vehicle. In comparison, the "DfT Data" comprises of the number of claimants per motor accident. We note that, in many cases, motor accidents will include more than one vehicle. In addition, we also note that not all occupants in a vehicle are necessarily injured in an accident. We think that it would be helpful for the report to set out these limitations.	GAD agrees that these are additional limitations.
Low 13	Paragraph 7.6, second bullet, third sentence (of GAD's second report "Effect of introducing a cap on third party bodily injury claims") – We believe that there is an error in this paragraph. The paragraph refers to the £2.5m / £5m scenario; however we believe this should refer to the £5m / £10m scenario.	Agreed – the second sub-bullet contains a typographical error and should read "compared to the £5m / £10m scenario").