Technical Annex to Evaluation Paper 18/1

July 2018

Introduction

In July 2014, we published our general insurance add-on products market study final report. The market study found consumer harm in the add-on guaranteed asset protection (GAP) insurance[1] market. It estimated total consumer overpayment for add-on GAP insurance of around £76 million to £121 million a year (out of an estimated market size of £152 million).

We found that:

- vehicle sellers enjoyed a strong point-of-sale competitive advantage, meaning that there was little or no pressure on sellers to lower the price
- a lack of information, including about alternative providers, prevented consumers from being able to compare products
- many consumers did not know that they could buy GAP insurance separately ('standalone') elsewhere, often at a lower price
- as with other add-on products, consumers' focus on the main product (in this case, the vehicle) led to many buying add-on GAP insurance when they may not have wanted and/or needed it

We intervened with measures to address this:

1. mandatory information provision by vehicle sellers to consumers
2. a pause in the sale ('deferred opt-in'), meaning that sellers can start the sales process but cannot conclude the GAP insurance sale for 2 clear days

We believed that having both time and information would enable consumers to decide whether they need GAP insurance, and to shop around if they do.

We expected that our intervention would lead to improved competition between add-on and standalone sellers and better consumer outcomes during the purchasing process. Two of the main outcomes that we expected to see were:

- an overall decrease in add-on GAP insurance sales, given our concern about consumers' buying potentially unsuitable add-on products
- an increased proportion of consumers shopping around and purchasing GAP insurance from standalone providers

As outlined in our proposed framework for post-intervention evaluations[2], we have conducted an evaluation of our September 2015 add-on[3] GAP insurance intervention. This annex outlines the econometric analysis we have undertaken as part of this

1 GAP insurance is sold, predominantly, as an add-on when someone buys a vehicle. It provides cover for a financial shortfall that can happen when: i) a customer's vehicle is written off or stolen; and ii) the motor insurance pay-out does not pay back its original value at purchase or the remaining finance value (if the vehicle is bought on finance).

2 The proposed post-intervention evaluation framework sets out how we intend to use post-intervention evaluations to assess the impact our interventions have had on consumers, firms and markets. Our evaluation work will feed back into our decision-making and how best to use our diagnostic and remedy tools.

3 Consumers can buy GAP insurance at the same time as buying a vehicle (add-on) or separately (standalone).

evaluation. The analysis attempts to measure the impact our intervention had on add-on GAP insurance sales and retail prices in a way that controls for other factors that may have influenced the add-on GAP insurance market.

We structure this annex as follows

- Section 1 provides a summary of the pre-intervention expectations we are seeking to test and our hypotheses
- Section 2 describes our data collected from 41 firms operating in the GAP insurance and complete wheel protection (CWP) markets
- Section 3 details our methodology and the assumptions we have made
- Section 4 sets out our main empirical results
- Section 5 covers various robustness checks we have undertaken to test our results

Section 1: Pre-intervention expectations and our hypotheses

The pre-intervention expectations we test using econometric analysis

Our evaluation tests the pre-intervention expectations we set out in our cost benefit analysis (CBA). We assess how well our intervention has worked relative to what would have happened without the intervention. This is our 'counterfactual'. We assess the impact of our intervention against this counterfactual through undertaking econometric analysis.

For many reasons, it can be hard to identify a counterfactual. Therefore, we have limited our use of econometric analysis to assessing only those pre-intervention expectations for which producing a counterfactual is viable (see Section 3 of the GAP insurance evaluation report for further information). Table 1 outlines the pre-intervention expectations we test using econometric analysis. For each row in Table 1 we set out: a question that, when answered, will help understand the extent to which our intervention has worked; and our pre-intervention expectation, as informed by the CBA.

Table 1: Questions to answer and pre-intervention expectations to test in this report

#	Question to answer	Pre-intervention expectation[4]
1	Has the share of add-on GAP insurance sales to total GAP insurance sales decreased?	For a given number of GAP insurance sales (which was based on the total number of car sales), the share of add-on GAP insurance sales to total GAP insurance sales falls. This means that the share of standalone GAP insurance sales increases.
2	Has the share of add-on GAP insurance sales to car sales decreased?	Our pre-intervention CBA assumed, implicitly, that car sales would remain constant. Our intervention reduces add-on GAP insurance sales (all other things being equal). It does this in two ways: • some people choose not to buy the product • some people switch to standalone GAP insurance[5] Hence, the share of add-on GAP insurance sales to car sales falls.
3	What has happened to add-on and standalone GAP insurance prices?	The price of add-on GAP insurance either: • does not change, or • falls[6] because of lower demand after our intervention, partly due to increased competition from the standalone market.[7] We set no pre-intervention expectation about the price of standalone GAP insurance. Hence, it stays the same.
4	What has happened to the average[8] GAP insurance market price?	This depends on what has happened to: • the share of sales between add-on and standalone GAP insurance • prices in the individual segments Based on pre-intervention expectations 1-3, the average market price falls.

Source: FCA

Descriptive statistics analysis

As well as econometric analysis, we have undertaken other methods to test our pre-intervention expectations. For the expectations outlined in Table 1, we have also produced descriptive statistics analysis.[9] This analysis provides information on how the market has developed after our intervention. These developments could have been driven by:

- the impacts of our intervention, and/or
- other factors which drive changes in the market for GAP insurance, such as macroeconomic conditions or competition between providers

4 Expectations based on analysis set out in: FCA, Guaranteed Asset Protection insurance: a competition remedy, CP14/29, page 5, (including cost benefit analysis annex and technical annex to the CBA).

5 There were 600,000 add-on GAP insurance sales a year in our pre-intervention CBA. We estimated that: i) 10% (60,000) sales would be lost due to add-on consumers no longer buying GAP insurance at all; and ii) 22.5% (135,000) add-on sales would move to the standalone market (under the 'no price change' scenario). Hence, we estimated that 32.5% of add-on GAP insurance sales would no longer take place owing to our intervention.

6 Our pre-intervention CBA set out two scenarios for add-on GAP insurance prices: i) no price change; and ii) a fall in price of 16.7%.

7 Even if there are factors such as adverse selection that might lead to, on average, riskier purchasers buying the product following our intervention.

8 In this report, we use the mean as our average measure unless we state otherwise.

9 For further information see Section 3 of the GAP insurance evaluation report.

The findings from this descriptive statistics analysis for sales and prices are provided in Sections 4 and 5 of the GAP insurance evaluation report respectively.

Hypotheses of our econometric analysis

Although descriptive statistics analysis tells us how the market has developed after our intervention, crucially it cannot tell us:

- if our intervention had a causal impact, and if so
- what the magnitude of that impact was

To estimate this, we assess how the market has developed against a counterfactual. We use econometric analysis to do this.

Table 2 describes the role our econometric analysis plays in answering the questions outlined in Table 1.

Table 2: Questions to answer and the role of our econoemtric analysis

#	Question to answer	Role of econometric analysis
1	Has the share of add-on GAP insurance sales to total GAP insurance sales decreased?	Our econometric analysis estimates if and by how much add-on GAP insurance sales have changed because of our intervention. This can be used to estimate the potential switching effect between add-on and standalone GAP insurance sales.
2	Has the share of add-on GAP insurance sales to car sales decreased?	
3	What has happened to add-on and standalone GAP insurance prices?	Our econometric analysis estimates if and by how much add-on GAP insurance retail prices have changed because of our intervention.
4	What has happened to the average GAP insurance market price?	

Source: FCA

Section 2: Data

Firm data request

In October 2017, we sent out a data request to firms operating in the UK GAP insurance market.[10] The request asked for transaction-level data for GAP insurance and CWP[11], where firms also sold this, for policies sold between 1 September 2013 and 31 August 2017.

Our request sought to cover a range of providers across the market for GAP insurance. It included:

- underwriters, intermediaries (where present) and end retailers of GAP insurance
- firms operating in the add-on GAP insurance market, the standalone GAP insurance market or both markets
- firms operating in the GAP insurance market before, during and/or after our intervention

We received data on GAP insurance sales from 41 firms. Of these, 6 firms also provided information on CWP. We consider that overall these firms provided us with data on the vast majority of sales in each of the respective markets. Table 3 provides a summary of the types of firms which provided us with data.

Table 3: Summary of data request firms

Information	Number of firms
Total number of firms	41
Firm primary activity	
Underwriter	11
Distributor	29
Other[12]	1
GAP insurance market for which firms provided sales data	
Add-on	15
Standalone	19
Both	7

Source: FCA

For each policy sale, we requested data on several variables. These are categorised as follows:

10 These firms were selected based on information gathered from the findings of MS14/1, supervisory knowledge at the FCA and desktop research.

11 CWP is an add-on insurance product that provides cover for tyre replacement and alloy wheel damage.

12 Other accounts for firms which act as a principal for an appointed representative (AR) network made up of motor dealers who sell general insurance products.

- details on the underwriters, intermediaries and end sellers of policies[13]
- the timing of policy sales such as sale and start dates
- policy prices at various stages of the distribution chain
- car sale characteristics such as car price and whether the car sale was financed
- policy characteristics such as cover length and cover limit
- policy claim details such as whether a policy was successfully claimed on and the claim value

Table 4 provides a detailed breakdown of all the variables requested under these categories.

Table 4: Data variables requested

Category	Variable	Description in data request template
Details on the underwriters, intermediaries and end sellers of policies	Underwriter name	Name of underwriter
	Distributor name	Name of distributor
	Vehicle dealer name	Name of vehicle dealer
	Vehicle sale dealership location	Dealer site district postcode (level 2)
Timing of policy sales	Policy sale date	Date on which the policy sale takes place ie signed policy sale completed
	Policy start date	Date on which the policy takes effect ie when the policy comes into force
	GAP sale initiation date	Date when the GAP insurance sales process started
Car sale characteristics	Price of vehicle sold	Final retail price, including tax, at which the vehicle was sold to the customer
	Date of vehicle sale	Date on which the vehicle sale takes place ie purchase signed
	Date of vehicle delivery	Date on which the vehicle is delivered to the customer
	Vehicle brand	Brand of vehicle manufacturer
	Vehicle model	Model of vehicle given manufacturer
	New/used vehicle sold	Sale of a new vehicle or a used vehicle
	Private/fleet sale	Sale of vehicle as part of a private sale or fleet (business) purchase
	Financed purchase	Vehicle purchased using financing or not
Policy prices	Policy retail price	Final retail price (including tax) of the policy sold to the customer
	Policy distributor price	The price charged by the distributor to the vehicle dealer for the policy
	Policy underwriter price	The price charged by the underwriter to the distributor for the policy
Policy characteristics	Policy cover length	Length of period in months for which the policy was taken out
	Policy cover limit	The maximum claim amount that a customer can make. For CWP this was decomposed into the claim number limit and claim value limit for tyres and alloy wheels respectively.

13 We did not collect any information on buyers of GAP insurance or CWP beyond postcode information (where available). This was utilised to match duplicate transactions in our dataset.

	GAP sale mechanism	Whether a GAP insurance sale was add-on or standalone. - Add-on: GAP insurance sold to the retail customer by a vehicle dealer. - Standalone: GAP insurance sold to the retail customer not through a vehicle dealer.
	GAP policy type[14]	Policy 1 of 6 options. i) Return to invoice; ii) Finance; iii) Replacement; iv) Other; v) Lease; and vi) Hybrid
	CWP excess	Excess amount for CWP that the customer must pay when making a claim
Policy claim details	Policy claim paid	Whether a claim has been successfully made and subsequently paid out on the policy
	Policy claim paid date	Date on which the funds relating to a successful claim were paid to the policyholder
	Policy claim paid value	Value of successful claim paid out to the policyholder

Source: FCA

Data management

We carried out the following initial tasks upon receipt of respondents' data:

- data review and quality assessment of each individual response
- imported each response into statistical software to make consistent with our preferred formatting (if needed)[15]
- created a market-level dataset on sales of GAP insurance and CWP through appending all individual responses

We sent our data request to firms operating at different stages in the distribution chain. There was, therefore, the potential for duplicates appearing in our market-level dataset. For example, we may have received policy sales data from an underwriter, which we had already received from a distributor.

We removed duplicates from our dataset to guard against this by using the following approaches:

- By using combinations of variables for each transaction (eg customer postcode, policy retail price, policy start date, car price), we generated unique identifiers for every transaction in our dataset and removed duplicate entries of these unique identifiers.[16]
- In some cases, respondents confirmed that some of the transaction data that they provided would have been provided by other respondents to our data request. We could then confirm this with the firms listed in the data provided for the relevant parts

14 There are several different policy types for GAP insurance which offer differing levels of cover. Return to invoice GAP insurance pays out the difference between the value paid out by the primary motor insurer and the price paid for the vehicle. Finance GAP insurance pays out the difference between the value paid out by the primary motor insurer and the value of any outstanding finance remaining. Replacement GAP insurance pays out the difference between the value paid out by the primary motor insurer and the cost of an equivalent new vehicle. Top up GAP insurance pays out a fixed proportion of the value paid out by the primary motor insurer. Lease GAP insurance pays out the difference between the value paid out by the primary motor insurer and the amount outstanding on a leasing agreement. Hybrid GAP insurance combines the features of 2 or more of the policy types outlined above.

15 We did not drop any policy sales as a result of this cleaning process.

16 Individual firm data responses may also have contained duplicate transactions when provided to us. This approach would also account for this issue.

of the distribution chain. In these cases, we removed the firm's data from our market-level dataset.

Following this process, we had a market-level dataset containing 4.3 million GAP insurance transactions and 0.4 million CWP transactions.

For conducting our econometric analysis, we collapsed[17] the market-level dataset by each dealer site's product line[18] (our panel identifier)[19] and month-year (our time identifier). We summed product sales and calculated averages (mean) for price and other variables (for each dealer site product line and month-year). This provided us with a panel dataset containing 8,895 dealer site product lines[20] with an average of 25 month-year observations for each.[21]

Summary statistics

Table 5 and Table 6 presents summary statistics for add-on GAP insurance and CWP sales, respectively for the period 1 September 2013 to 31 August 2015.[22] Table 7 and Table 8 present summary statistics for add-on GAP insurance and CWP sales, respectively for the period 1 September 2015 to 31 August 2017. We do this for the variables that we use in our econometric analysis.[23]

17 Collapsing our dataset involved using the transaction level data to produce summary statistics such as sums and averages (means) of selected variables by different grouping variables, in this case dealer site's product line and month-year.

18 By 'product line' we mean the add-on product being sold i.e. either GAP insurance or CWP.

19 After some basic cleaning to reconcile the dealer name and dealer post code variables, we combined these two variables to generate a dealer site identifier. As a check for duplicates of this identifier we ran a fuzzy matching programme to identify and, where necessary, reconcile similarly named dealer sites. We combined this identifier with the product variable to produce an identifier for dealer site's product line.

20 Our dataset includes 7,906 dealer sites. In some cases where dealers sell multiple brands as the same location the dealer site product line is also split by brand. The difference between the number of dealer sites and the number of dealer site product lines is driven by some dealer sites selling both GAP insurance and CWP.

21 We do not observe all time periods between September 2013 and August 2017 for all dealer sites. This could be because dealer sites did not make CWP or GAP insurance sales in all months or stopped / started selling these products at a certain point. The relevant months could also just be missing from our dataset. As it is not possible to determine what the reason is for us not observing sales in all time periods we have conducted analysis on our full dataset and on a subset of our data for which dealer sites make sales in every month for the whole period observed (for further information see the Robustness Checks section of this annex).

22 For the remainder of this annex we use a dataset limited to only those transactions that contained information on the dealer where the sale took place. This accounts for around 92% of the market-level dataset for add-on GAP insurance and CWP sales between 1 September 2013 and 31 August 2017.

23 We have used 1st percentile and 99th percentile as opposed to min and max to account for a small number of outliers in the tails of the distribution for some data variables. The analysis presented in this annex was run on a dataset including these outliers, as we were unable to confirm if they were accurate records or not. Although not presented in this annex, we have reproduced our analysis removing these outlier observations. The results from this analysis are in line with the results set out in this document.

Table 5: Summary statistics of selected variables for add-on GAP insurance sales between September 2013 and August 2015[24]

Information	N	Mean	St Dev	1st percentile	99th percentile
Price of vehicle sold (£)	1,752,000	17,790.00	18,055.00	4,039.00	65,715.00
New/used vehicle sold (1 = Used; 0 = New)	1,698,000	0.56	0.50	0.00	1.00
Private/fleet sale (1 = Fleet; 0 = Private)	935,890	0.01	0.11	0.00	1.00
Financed purchase (1 = Financed; 0 = Not)	897,308	0.71	0.45	0.00	1.00
GAP retail price (£)	1,752,000	359.50	140.80	0.00	824.00
GAP distributor price (£)	1,741,000	92.49	53.11	25.59	283.10
GAP underwriter price (£)	1,716,000	65.22	44.83	18.00	209.20
GAP cover length (Months)	1,752,000	38.50	6.69	24.00	60.00
GAP cover limit (£)	1,728,000	19,240.00	16,310.00	3,000.00	100,000.00
GAP policy type (Total)	1,744,398	-	-	-	-
Return to invoice (Type = 1)	285,128	0.16	-	-	-
Finance (Type = 2)	144,034	0.08	-	-	-
Replacement (Type = 3)	69,520	0.04	-	-	-
Other (Type = 4)	527,501	0.30	-	-	-
Lease or Top-up (Type = 5)	1,258	0.00	-	-	-
Hybrid (Type = 6)	716,957	0.41	-	-	-
GAP claim paid (1 = Claim paid; 0 = Not)	1,657,000	0.02	0.15	0.00	1.00
GAP claim value (£)	40,024	2,274.00	3,211	51	14,750

Source: FCA analysis of transaction data provided by firms

24 Where variables are binary (coded as 0 or 1), the mean value in the table is the proportion of transactions with the relevant characteristic. This interpretation applies to the following variables: i) New/used vehicle sold; ii) Private/fleet sale; iii) Financed purchase; iv) all variations of GAP policy type; and v) GAP claim paid.

Table 6: Summary statistics of selected variables for CWP sales between September 2013 and August 2015[25]

Information	N	Mean	St Dev	1st percentile	99th percentile
Price of vehicle sold (£)	158,604	26,026.00	72,531.00	5,147.00	113,394.00
New/used vehicle sold (1 = Used; 0 = New)	158,604	0.50	0.50	0.00	1.00
Private/fleet sale (1 = Fleet; 0 = Private)	134,803	0.01	0.11	0.00	1.00
Financed purchase (1 = Financed; 0 = Not)	158,604	0.89	0.31	0.00	1.00
CWP retail price (£)	158,604	326.00	113.20	125.00	649.00
CWP distributor price (£)	158,604	113.60	54.93	36.50	296.60
CWP underwriter price (£)	158,553	81.78	44.61	30.00	241.00
CWP cover length (£)	158,604	33.55	4.99	24.00	36.00
Total CWP cover limit (£)	144,804	2,349.00	737.10	0.00	3,750.00
Tyre replacement limit	157,591	5.11	0.96	4.00	12.00
Tyre replacement value limit (£)	157,643	216.90	97.98	0.00	450.00
Alloy replacement limit	147,884	9.19	2.12	0.00	12.00
Alloy replacement value limit (£)	145,817	133.30	42.51	0.00	300.00
CWP claim paid (1 = claim paid; 0 = Not)	158,568	0.28	0.45	0.00	1.00
CWP claim value (£)	46,742	258.70	253.70	0.00	1,255.00

Source: FCA analysis of transaction data provided by firms

25 Where variables are binary (coded as 0 or 1), the mean value in the table is the proportion of transactions with the relevant characteristic. This interpretation applies to the following variables: i) New/used vehicle sold; ii) Private/fleet sale; iii) Financed purchase; and iv) CWP claim paid.

Table 7: Summary statistics of selected variables for add-on GAP insurance sales between September 2015 and August 2017[26]

Information	N	Mean	St Dev	1st percentile	99th percentile
Price of vehicle sold (£)	1,809,000	19,116.00	14,149.00	3,995.00	69,999.00
New/used vehicle sold (1 = Used; 0 = New)	1,798,000	0.61	0.49	0.00	1.00
Private/fleet sale (1 = Fleet; 0 = Private)	911,436	0.01	0.12	0.00	1.00
Financed purchase (1 = Financed; 0 = Not)	1,032,000	0.67	0.47	0.00	1.00
GAP retail price (£)	1,834,000	374.50	139.30	0.00	824.00
GAP distributor price (£)	1,805,000	100.10	64.74	8.88	344.50
GAP underwriter price (£)	1,735,000	72.34	58.70	19.92	306.90
GAP cover length (Months)	1,834,000	39.57	55.81	24.00	60.00
GAP cover limit (£)	1,783,000	22,798.00	20,811.00	5,000.00	100,000.00
GAP policy type (Total)	1,823,930	-	-	-	-
Return to invoice (Type = 1)	257,778	0.14	-	-	-
Finance (Type = 2)	163,779	0.09	-	-	-
Replacement (Type = 3)	81,140	0.04	-	-	-
Other (Type = 4)	699,239	0.38	-	-	-
Lease or Top-up (Type = 5)	2,271	0.00	-	-	-
Hybrid (Type = 6)	619,723	0.34	-	-	-
GAP claim paid (1 = claim paid; 0 = Not)	1,761,000	0.01	0.11	0.00	1.00
GAP claim value (£)	21,101	1,397.00	2,430	35	11,570

Source: FCA analysis of transaction data provided by firms

26 Where variables are binary (coded as 0 or 1), the mean value in the table is the proportion of transactions with the relevant characteristic. This interpretation applies to the following variables: i) New/used vehicle sold; ii) Private/fleet sale; iii) Financed purchase; iv) all variations of GAP policy type; and v) GAP claim paid.

Table 8: Summary statistics of selected variables for CWP sales between September 2015 and August 2017[27]

Information	N	Mean	St Dev	1st percentile	99th percentile
Price of vehicle sold (£)	213,803	26,690.00	54,381.00	4,512.00	127,500.00
New/used vehicle sold (1 = Used; 0 = New)	213,804	0.55	0.50	0.00	1.00
Private/fleet sale (1 = Fleet; 0 = Private)	181,319	0.01	0.10	0.00	1.00
Financed purchase (1 = Financed; 0 = Not)	213,804	0.87	0.34	0.00	1.00
CWP retail price (£)	213,804	348.60	121.50	169.00	699.00
CWP distributor price (£)	213,804	121.00	58.48	36.50	318.60
CWP underwriter price (£)	210,480	88.68	49.15	30.50	253.00
CWP cover length (£)	213,804	34.04	5.17	24.00	48.00
Total CWP cover limit (£)	191,889	2,449.00	577.70	1,000.00	3,750.00
Tyre replacement limit	202,557	5.13	0.93	4.00	12.00
Tyre replacement value limit (£)	209,920	221.20	81.80	100.00	450.00
Alloy replacement limit	196,828	9.41	1.82	0.00	12.00
Alloy replacement value limit (£)	201,391	141.40	36.04	0.00	300.00
CWP claim paid (1 = claim paid; 0 = Not)	207,472	0.17	0.38	0.00	1.00
CWP claim value (£)	39,091	204.40	190.10	0.00	936.00

Source: FCA analysis of transaction data provided by firms

27 Where variables are binary (coded as 0 or 1), the mean value in the table is the proportion of transactions with the relevant characteristic. This interpretation applies to the following variables: i) New/used vehicle sold; ii) Private/fleet sale; iii) Financed purchase; and iv) CWP claim paid.

Section 3: Econometric approach

In this section we outline our econometric approach including the methodology, our control product, and our core assumptions.

Methodology

We have used a difference-in-difference (DiD) methodology.[28] The academic literature shows that this method is often used when assessing the impacts of policy interventions and regulation, especially under the conditions of a natural or quasi-experiment.[29]

A natural experiment occurs when an exogenous event[30] (eg a policy change) affects an environment in such a way that a group of operators are affected (the treatment group) while another group of similar operators are not affected (the control group).

We can use the natural variation created between groups to assess the impact of the exogenous event on the treated group relative to the control group.

We need information on outcomes for the control and treatment groups both before and after our intervention to control for systemic differences between the control and treatment groups. This allows us to split our data into 4 different sub groups:

- $y_{1,c}$ - the control group before the change
- $y_{1,t}$ - the treatment group before the change
- $y_{2,c}$ - the control group after the change
- $y_{2,t}$ - the treatment group after the change

We compare the difference in outcomes between the treatment and control group in the period *following the exogenous event* to the difference in outcomes between the treatment and control group *before the exogenous event*. This gives us the impact of the exogenous event. We represent this mathematically as:

$$DiD\ estimator = (y_{2,t} - y_{2,c}) - (y_{1,t} - y_{1,c})$$

Our econometric analysis aims to understand the impact of our September 2015 intervention (exogenous event) on sales and retail prices (outcomes) of add-on GAP insurance (treatment group).

For our comparison, we use CWP, a vehicle add-on insurance product (control group). We detail the reasons why we believe this is a suitable control in the section that follows. Through our regression analysis, we compare pre- and post-intervention sales and retail

28 For further information on the general DiD methodology see: Angrist & Pischke, 2009, Mostly Harmless Econometrics An Empiricist's Companion, p.227-243; and Wooldridge; 2009; Introductory Econometrics A Modern Approach Fourth Edition, p.450-455

29 For selected examples of DiD approaches used in the academic literature in a range of different scenarios see: Ashenfelter & Card, 1985, Using the Longitudinal Structure of Earnings to Estimate the Effect of Training Programs; Meyer, Viscusi & Durbin, 1990, Workers' Compensation and Injury Duration: Evidence from a Natural Experiment; and Card, 1994, Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania.

30 An exogenous event is one that comes from outside of a system and is not driven by the system itself.

price trends of CWP and GAP insurance. The impact of our intervention, controlling for other factors, is measured through the DiD estimator (which we label as the 'DiD' variable in our regression tables). A statistically significant DiD variable indicates that our intervention has had a causal effect on our outcomes (with its size being a function of the coefficient).

The following equation represents our analysis and outlines our baseline regression specification:

$$Y_{i,p,t} = \alpha_0 + \beta_1 time_{i,t} + \beta_2 product_{i,p} + \beta_3 did_{i,p,t} + \gamma X_{i,p,t} + \varepsilon_{i,p,t}$$

where:

i = dealer site product line
p = product (add-on GAP or CWP)
t = time (month-year)
$Y_{i,p,t}$ = number of sales or average retail price
$product_{i,p} = 1$ if product is add-on GAP
$time_{i,t} = 1$ if month-year is September 2015 or later
$did_{i,p,t} = 1$ if product is add-on GAP and month is September 2015 or later
$X_{i,p,t}$ = vector of other controls

Our control product

Our control product is CWP. This is a vehicle add-on insurance product that vehicle dealers sell. It is not, however, subject to our GAP insurance rules.

As well as it being a vehicle insurance add-on, we chose CWP as a suitable control product due to its many similarities with GAP insurance. For example:

- CWP is predominantly sold in the add-on market, with standalone sales making up only a small proportion of total market share[31]
- The point-of-sale (POS) in the CWP add-on market is the vehicle dealership, where vehicle dealers have similar incentives to sell the product and the same POS advantage as with GAP insurance
- The price of CWP is low relative to the base product (ie the vehicle) when sold as an add-on[32]

Whilst CWP has many similarities with GAP insurance, it is not a substitute for GAP insurance from a consumer's perspective. Each product offers cover for substantially different types of risks.[33]

31 Responses to our data request and desktop research indicated only one standalone seller of CWP in the UK. Although there are many standalone providers of GAP insurance, their average share of total GAP insurance sales was 6% before our intervention and around 8% after our intervention.

32 Both before and after our intervention, the average add-on GAP insurance retail price was 2.0% of the average vehicle price when GAP insurance was bought. For CWP, the average proportion was 1.3% both before and after our intervention.

33 This can be illustrated through the different claim ratios during the pre-intervention period. The average 12-month claims ratio for CWP before our intervention was 14.0%. This was higher than the average 12-month

As they are not substitute products, we would not expect consumers to switch from GAP insurance to CWP if they would have bought GAP insurance before our intervention. There might be different consumer preferences for GAP insurance and CWP. This might be because of differences in the underlying profiles and tastes of the different consumer groups. However, we do not consider that GAP insurance consumers differ substantially from CWP consumers.[34,35]

Vehicle dealers may see selling GAP insurance and/or selling CWP to purchasers as good substitutes. Qualitative evidence from firms indicates that dealers tend to offer a suite of add-on products to consumers. These include insurance, warranties and other vehicle-related products or services.

Following our intervention, firms may have chosen to switch their focus away from selling GAP insurance to other add-on products, including CWP. Firms could have stopped selling GAP insurance entirely in favour of other products or may have increased the prominence of other add-on products, such as CWP, in the sales process. If this happened, it could result in firms increasing CWP sales, or other add-on products, because of our intervention and at the expense of GAP insurance (a waterbed effect). This would bias upwards our regression results. However, there is no evidence to suggest that such selling patterns have happened (for further information see the control product and waterbed effects segment of the Robustness Checks section of this annex). As such, we consider that CWP is a suitable control product for GAP insurance and that it is, generally, not 'treated' by our intervention.

Assumptions

The use of a DiD methodology relies on 2 identifying assumptions. They are that:

- there is a known period over which the intervention took place
- there are common trends between the control and treatment groups in the absence of treatment

We meet the first assumption. Our intervention came into force for the whole market as of 1 September 2015. There is no evidence to suggest that there was a significant problem in complying with our intervention around the date of implementation. In addition, our firm data and qualitative information analysis does not indicate that firms attempted to comply with our rules prior to the intervention date and they had no incentive to.[36] Meeting this assumption means there is a clean break between the periods before and after our intervention which we are able to compare.

claims ratio for add-on GAP insurance over the same period, which was 1.5%. Similarly, the average CWP claims frequency before our intervention was 14.8% compared to 0.5% for add-on GAP insurance.

34 We do not consider CWP to be a complementary product to GAP insurance, although consumers taking out GAP insurance or CWP may display lower risk aversion in their preferences. This could result in them being more likely to buy insurance products in general.

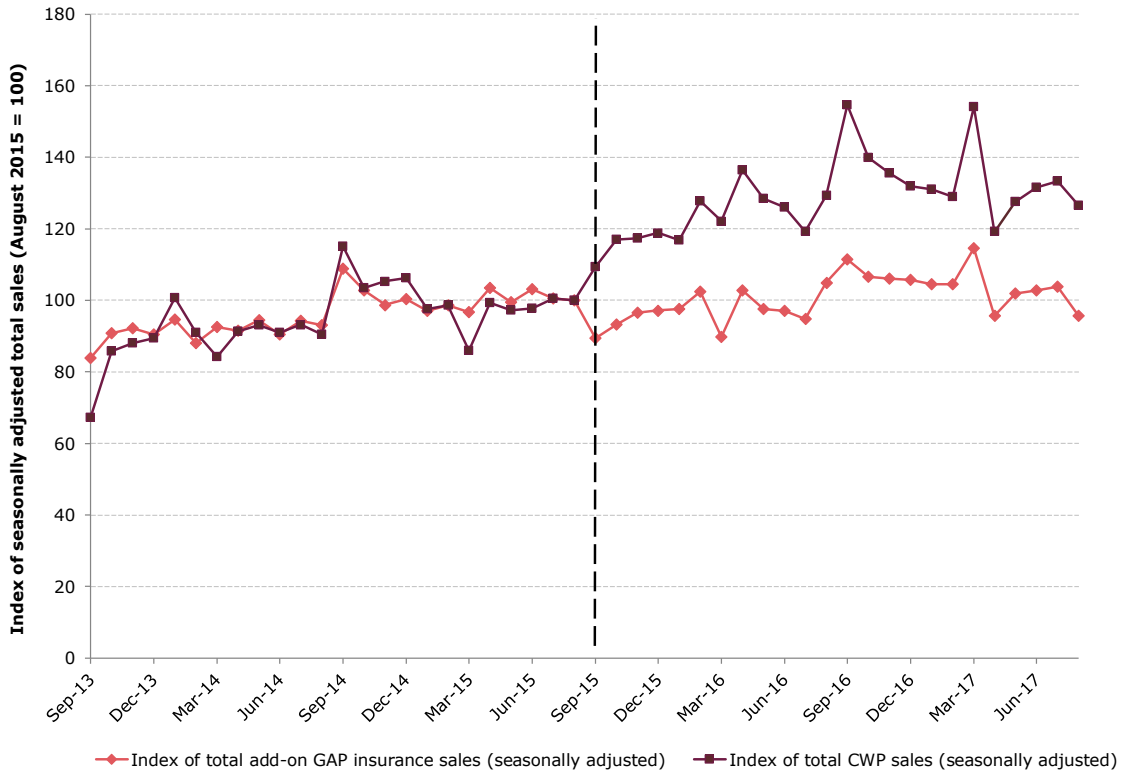
35 The summary statistics tables show that, on average, consumers of CWP tend to buy more expensive cars and are more likely to buy a new car than consumers of add-on GAP insurance. They are also more likely to purchase their car on finance. This remains the case in the pre-intervention and post-intervention period. Our econometric analysis outlined later in this annex attempts to control for these differences between consumers. We do not have consumer demographic information which may inform preferences and for which we can compare consumers of CWP and add-on GAP insurance.

36 Following publication of the final report for MS14/1 (July 2014) we published a consultation paper on our new GAP insurance rules in CP14/29 (December 2014) and subsequently confirmed these rules in PS15/13 (June 2015), 3 months prior to our rules coming into force.

The second assumption of common trends is the main identifying assumption for a DiD model. Our analysis assumes that the trends for the treated product's (add-on GAP insurance) outcome variables would have followed the trends for the control product's (CWP) outcome variables, had we not intervened.

We chart sales and average price trends for add-on GAP insurance and CWP before and after our intervention to test this assumption. Figure 1 shows an index of total CWP and add-on GAP insurance seasonally-adjusted sales.[37] We use an index to compare the sales of the products as they have a significantly different level of average monthly sales. We base the index around August 2015. This is the month before our intervention happened. The dotted black line signifies the month that our intervention came into effect. Add-on GAP insurance and CWP sales follow a similar trend in the period before our intervention. From September 2015, add-on GAP insurance sales initially declined and then remained constant. Meanwhile, CWP sales continued to increase over time, with sales growth slowing towards the end of the period. Figure 1 demonstrates that our assumption of common trends holds for sales.

Figure 1: Index of seasonally-adjusted sales of add-on GAP insurance and CWP between September 2013 and August 2017[38]



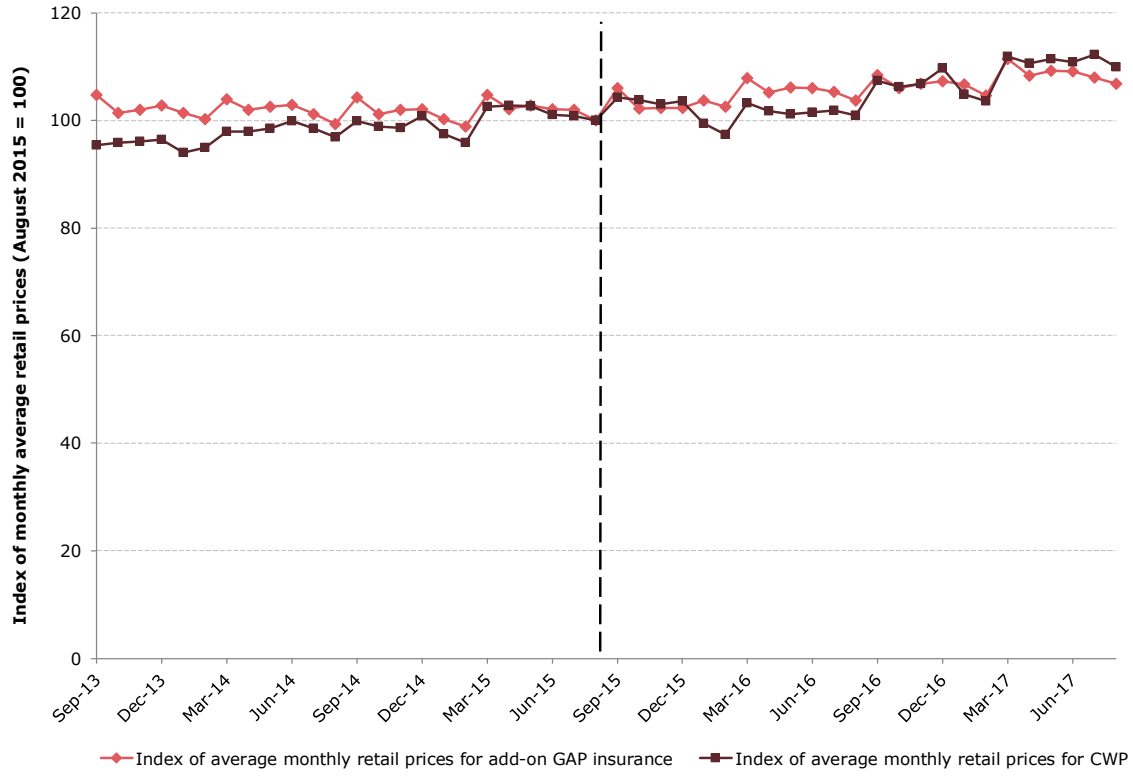
Source: FCA analysis of transaction data provided by firms

37 Add-on GAP insurance and CWP sales follow a seasonal pattern with sales peaking in March and September in line with vehicle sales, which also peak then. These spikes correspond with the release of the UK's latest number plate variations. We adjusted the data for seasonality by running an OLS regression with a constant and monthly dummy variables. The residuals predicted by this regression were then added to the mean value of sales over the period to construct a seasonally-adjusted series.

38 This analysis uses data in our sample for which respondents provided dealer name and/or postcode information. We use these variables to specify our panel identifier when undertaking our econometric analysis. As such the trends and absolute numbers in this chart for add-on GAP insurance may slightly differ from those presented in Section 4 of the GAP insurance evaluation report.

Figure 2 shows an index of average CWP and add-on GAP insurance retail prices (in nominal terms). As above, we base the index around August 2015. The dotted black line signifies the month that the intervention came into effect. The 2 sets of average retail prices follow a similar path in the period before our intervention. From September 2015, average retail prices for add-on GAP insurance and CWP continue to grow at a relatively slow rate, with average CWP retail prices increasing slightly faster than add-on GAP insurance towards the end of the period. This chart indicates that our assumption of common trends holds, generally, for average retail prices.

Figure 2: Index of average retail prices of add-on GAP insurance and CWP in nominal terms between September 2013 and August 2017[39]



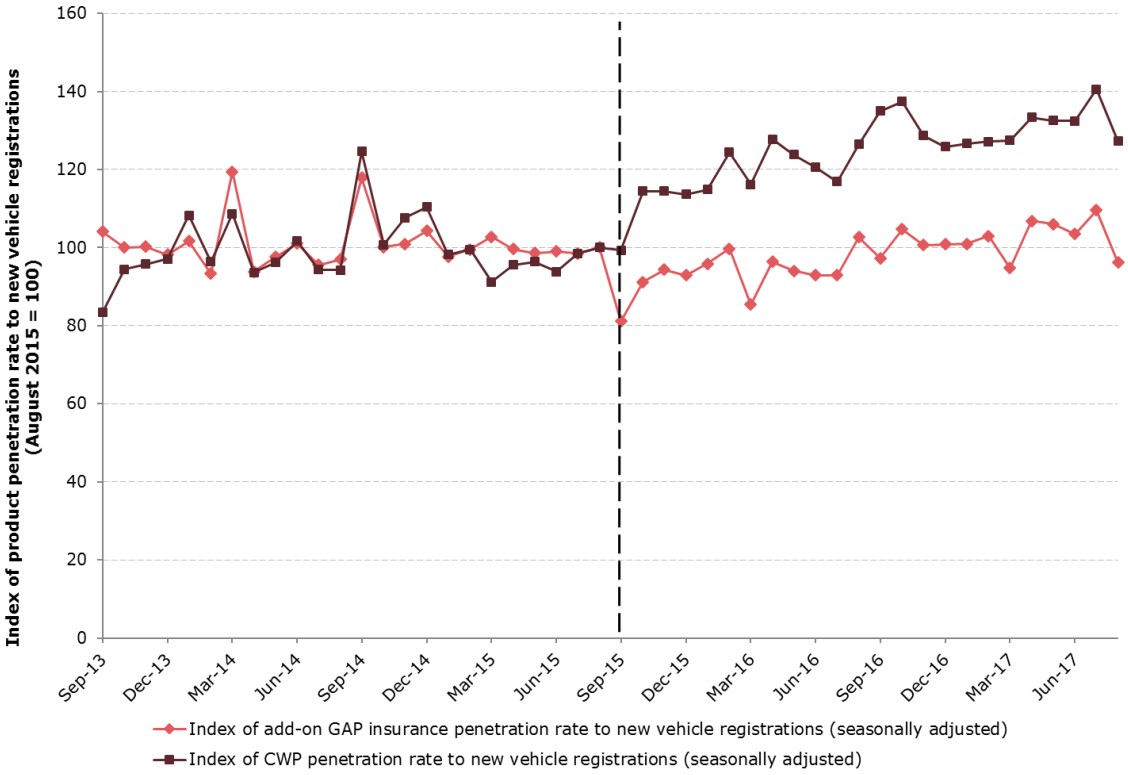
Source: FCA analysis of transaction data provided by firms

Our common trends assumption is also premised on common time effects between CWP and add-on GAP insurance. This means that broader time varying effects, such as macroeconomic changes, have similar impacts on both products. In the cases of CWP and add-on GAP insurance one of the most significant drivers of sales is purchases of new vehicles. This in turn is driven by broader macroeconomic changes for factors such as consumer incomes and access to finance.

Figure 3 shows an index of the new vehicle penetration rate for add-on GAP insurance and CWP between September 2013 and August 2017. In the pre-intervention period, the trends in the new vehicle penetration rate for both products are broadly similar. This suggests that there is a common relationship between car sales and sales of both products prior to our intervention.

39 This analysis uses data in our sample for which respondents provided dealer name and/or postcode information. We use these variables to specify our panel identifier when undertaking our econometric analysis. As such, the trends and absolute numbers in this chart for add-on GAP insurance may slightly differ from those presented in Section 5 of the GAP insurance evaluation report.

Figure 3: Index of the new vehicle penetration rate of add-on GAP insurance and CWP between September 2013 and August 2017[40]



Source: FCA analysis of transaction data provided by firms and DVLA car registration data

In addition to our key identifying assumptions, we need an additional assumption to hold for our retail price analysis.

We need any changes over time in buyer characteristics for add-on GAP insurance or CWP not to affect the prices offered. This is often not the case for insurance prices since it is, fundamentally, a product priced on underlying risk, which often uses consumer characteristics as proxies. Discussions with insurance underwriters and distributors in both markets indicate that GAP insurance and CWP pricing is based on modelling historical claim rates and values rather than specific consumer characteristics. Insurers also consider the value being insured and policy cover length through methods of differing sophistication.

We do not expect any changes to the consumer type buying add-on GAP insurance to affect the pricing of risk that we see post-intervention over the time period (ie 2 years) based on: i) our discussions with firms (as explained); ii) the small changes to insured car value and iii) the average duration of an add-on GAP insurance policy being over 3 years. This is confirmed by the minimal change that we see in the underwriter price pre- and post-intervention (see Table 5 and Table 7).

40 This analysis uses data in our sample for which respondents provided dealer name and/or postcode information. We use these variables to specify our panel identifier when undertaking our econometric analysis. As such, the trends and absolute numbers in this chart for add-on GAP insurance may slightly differ from those presented in Section 4 of the GAP insurance evaluation report.

Section 4: Empirical results

This section, initially, describes the variables and specifications that we have used as part of our econometric analysis. It, then, outlines our results and findings.

One of the ways that we have tested our regression analysis is to run a variety of different specifications. This helps us to see how stable our estimates are in the presence of different control variables.

These specifications include additional variables to control for seasonality, time trends and other observed factors that may vary with time. These factors could cause changes in the outcomes independent of our intervention. Including these additional variables, therefore, helps us to control for any systemic differences in these factors either: between our control and treatment products; or before and after our intervention.[41]

The main specifications types that we set out below are:

- baseline
- baseline with month-year dummies
- baseline with month-year dummies and other controls[42]

Table 9 outlines the variables included in each regression specification.[43]

Table 9: Variables included in regression specification

Specification	Description	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
Product dummy	Dummy equal to 1 if product is GAP and 0 otherwise	✓	✓	✓
Time dummy	Dummy equal to 1 if the date is September 2015 onwards and 0 otherwise	✓	✓	✓
DiD dummy	Dummy equal to 1 if the product is GAP insurance and the date is September 2015 onwards and 0 otherwise	✓	✓	✓
Time and month dummies	Individual dummy equal to 1 for each month-year and 0 otherwise		✓	✓

41 Including these control variables also reduces the size of the error variance and therefore the standard error of the DiD variable, the measure of the impact of our intervention.

42 The specifications and variables included within this annex are not exhaustive of all the regressions we have undertaken. For ease of viewing we have focused on these specifications. However, the results obtained from other regressions we undertook were substantially in line with the results outlined in this document.

43 For ease of viewing we have not included the coefficients from all the control variables in our empirical results but summarise which controls were used.

Car price	Average price of a car sold for which GAP insurance or CWP was bought			✓
New or used car	Average proportion of used cars sold for which GAP insurance or CWP was bought			✓
Cover length	Average cover length of GAP insurance or CWP policies sold			✓
Cover limit	Average cover limit of GAP insurance or CWP policies sold[44]			✓
Excess	Average value of excess of GAP insurance or CWP policies sold			✓
Vehicle brand share	Individual variables for each vehicle brand with the share of that vehicle sold as a proportion of all vehicles sold for which GAP insurance or CWP was bought[45]			✓

Source: FCA

We look at our DiD variable to understand: whether our intervention has had a statistically significant impact; and the size of our intervention's impact. We consider the DiD variable's point estimate on the coefficient and the 95% confidence interval. This provides us with a range for our intervention's likely impact.

We have conducted all our regressions using a dependent variable in logarithmic form.[46,47] This means that we need to perform the following calculation to convert the coefficient on the DiD variable to a percentage change impact:[48]

$$\beta_1 \%\Delta = 100[e^{\beta_1} - 1]$$

For example, using the formula, a dummy variable with a coefficient β_1 of -0.105 results in a 10% decrease in the dependent variable when that dummy variable is equal to 1.

44 We recoded transactions where a GAP insurance policy had an unlimited claim value in our dataset as the value of the car purchased. For CWP, we estimated a total claim value as the total limit value for tyre claims (limit on the number of tyre claims multiplied by the value limit per tyre claim) plus the total value for alloy claims (limit on the number of alloy wheel claims multiplied by the value limit per alloy wheel claim).

45 Vehicle brands included those for cars, motorbikes and vans. The brands for which we produced these variables included: Abarth; Aixam; Alfa Romeo; Aprilia; Aston Martin; Audi; Benelli; Bentley; BMW; Buell; Chevrolet; Citroen; Dacia; ds; Ducati; Ferrari; Fiat; Ford; Harley Davidson; Honda; Hyosung; Hyundai; Indian; Infiniti; Izuzu; Jaguar; Jeep; Kawasaki; Keeway; Kia; KTM; Kymco; Lamborghini; Landrover; LDV; Lexus; Leyland; Lifan; Lotus; MAN; Maserati; Mazda; McLaren; Mercedes Benz; MG; Mini; Mitsubishi; Motoguzzi; MVagusta; Nissan; Norton; Piaggio; Porsche; Renault; Royal Enfield; Rusi; SEAT; Skoda; SMART; Ssangyong; Subaru; Suzuki; Tesla; Toyota; Triumph; Vauxhall; Victory; Volkswagen; Volvo; and Yamaha. These brands accounted for 98% of all vehicles for which GAP insurance and CWP were bought in our dataset, where we were provided with data on brand. In the remaining 2% of cases, we recorded the car brand as 'Other'.

46 We used the natural logarithm to make this transformation. We undertake this transformation to account for positive skew in our dependent variables, to scale our dependent variable for the control and treatment products and to provide ease of interpretation.

47 To account for the potential effects of heteroskedasticity, all our regressions have been undertaken using robust standard errors.

48 For further detail on this calculation: Wooldridge; 2009; Introductory Econometrics A Modern Approach Fourth Edition, p.233.

Sales regression results

Table 10 outlines the results of our sales regressions.

Table 10: Sales regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.221***	-0.223***	-0.216***
	(0.0210)	(0.0211)	(0.0216)
product	-	-	-
	-	-	-
time	0.230***	-0.254***	-0.246***
	(0.0199)	(0.0253)	(0.0259)
constant	2.160***	2.457***	2.057***
	(0.00334)	(0.0102)	(0.144)
N. of observations	226,338	226,338	209,197
N. of dealer site product lines	8,895	8,895	8,414
R squared	0.004	0.142	0.159
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

In all cases, the DiD variable is statistically significant and negative. This indicates that sales would have been higher but for our intervention.

Our baseline regression indicates that the magnitude of this impact ranges between -16.5% and -23.0%, with a point estimate of -19.8%.[49] Adding more explanatory variables reduces this range of impact to -16.0% and -22.8%, with a point estimate of -19.4%.

Adding more explanatory variables appears to have a limited impact on the size of the DiD coefficient.

49 Using the formula outlined earlier and replacing $\beta_1$with the baseline regression DiD coefficient value of -0.221, this was calculated as $100[e^{-0.221} - 1]$ = 19.8

Retail price regression results

Table 11 outlines the results of our retail price regressions.

Table 11: Retail price regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.0171***	-0.0168***	-0.0269***
	(0.00429)	(0.00428)	(0.00421)
product	-	-	-
	-	-	-
time	0.0503***	0.0527***	0.0523***
	(0.00393)	(0.00569)	(0.00569)
constant	5.790***	5.792***	5.632***
	(0.000814)	(0.00292)	(0.0287)
N. of observations	224,863	224,863	208,128
N. of dealer site product lines	8,841	8,841	8,362
R squared	0.013	0.019	0.052
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

In all cases, the DiD variable is statistically significant and negative. This indicates that retail prices would have been higher without our intervention.

Our baseline regression indicates that the magnitude of this impact ranges between -0.9% and -2.5%, with a point estimate of -1.7%. The inclusion of additional explanatory variables increases this range of impact to -1.8% and -3.4%, with a point estimate of -2.7%. While adding month-year dummies appears to have a limited impact on these results, adding other controls increases the estimated impact of our intervention.

GAP insurance retail prices increased in real terms after our intervention (see Section 5 of the GAP insurance evaluation report). Based on our regression analysis, we can interpret our intervention's impact as placing some, albeit small, downward pressure on the growth of retail prices of add-on GAP insurance.

Section 5: Robustness checks and other potential issues

The empirical results presented above outline the main findings from our analysis. To ensure these results are robust, we have undertaken several additional checks including:

- placebo tests for the time dummy and product dummy
- reproducing our regressions on balanced and restricted samples
- assessing the potential issue of waterbed effects[50]

Overall, these additional tests suggest that our main findings are a robust representation of our intervention's impact on sales. Our findings are less clear for retail prices.

Time dummy placebos

The DiD estimator in our model measures the differences in trends between outcome variables for add-on GAP insurance and CWP in the post-intervention period. We attribute this impact to our intervention.

However, it might be that a third factor, which changes over time but is unrelated to our intervention, is causing there to be differences between add-on GAP insurance and CWP.

We test for this by reproducing our regressions for 2 sub-sampled periods with a placebo time and DiD variable for each. If a third factor were causing the changes that we see in our main findings, we would expect our placebo DiD variable to have a statistically significant effect with a similar direction and magnitude to our main findings.

We defined these placebo dummy variables as follows:

- Pre-intervention time dummy placebo: Data restricted to the period September 2013 to August 2015, with a placebo time variable equalling 1 from September 2014 and a placebo DiD variable equalling 1 from September 2014 when the product is add-on GAP insurance.
- Post-intervention time dummy placebo: Data restricted to the period September 2015 to August 2017, with a placebo time variable equalling 1 from September 2016 and a placebo DiD variable equalling 1 from September 2016 when the product is add-on GAP insurance.

Table 12 sets out time placebo sales regression results.

For the pre-intervention time placebo regressions, the placebo DiD variable is not statistically significant and has a much smaller size than our main findings. For the post-intervention time placebo, the baseline and baseline with month-year dummies regressions have a statistically significant placebo DiD variable, although the size of the coefficients are much smaller than in our main findings. Once we add in other controls, however, the placebo DiD variable is only significant at the 10% level.

50 We attempted to use econometric analysis to see the effect of compliance on our intervention's impact using data on sale and sale initiation dates provided by firms. The results of this analysis were inconclusive, which may have been driven in part by data quality and sampling issues.

These results suggest that there is not a third factor, unrelated to our intervention, that is changing over time and influencing our results.

Table 12: Time placebo sales regression results

	Pre-intervention time placebo			Post-intervention time placebo		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
placebo DiD	-0.0108	-0.00984	-0.0167	-0.0483***	-0.0460***	-0.0264
	(0.0180)	(0.0180)	(0.0184)	(0.0158)	(0.0158)	(0.0162)
product	-	-	-	-	-	-
	-	-	-	-	-	-
placebo time	-0.00553	-0.468***	-0.458***	0.111***	-0.435***	-0.446***
	(0.0171)	(0.0214)	(0.0220)	(0.0146)	(0.0194)	(0.0201)
constant	2.182***	2.473***	2.259***	2.154***	2.458***	2.609***
	(0.00259)	(0.00902)	(0.102)	(0.00277)	(0.00869)	(0.123)
N. of observations	110,038	110,038	101,487	116,300	116,300	107,710
N. of dealer site product lines	6,991	6,991	6,089	7,490	7,490	7,103
R squared	0.000	0.173	0.194	0.004	0.147	0.167
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Table 13 outlines the regression results for the time placebo retail price regressions.

For the pre-intervention and post-intervention time placebo regressions, the placebo DiD variable is statistically significant and has a similar size to the one in our main findings. This may indicate that a third factor, unrelated to our intervention, is influencing our main retail price results.

Table 13: Time placebo retail price regression results

	Pre-intervention time placebo			Post-intervention time placebo		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
placebo DiD	-0.0270***	-0.0268***	-0.0297***	-0.0210***	-0.0213***	-0.0251***
	(0.00379)	(0.00379)	(0.00363)	(0.00398)	(0.00398)	(0.00394)
product	-	-	-	-	-	-
	-	-	-	-	-	-
placebo time	0.0315***	0.0317***	0.0320***	0.0359***	0.0358***	0.0353***
	(0.00347)	(0.00475)	(0.00448)	(0.00371)	(0.00507)	(0.00501)
constant	5.784***	5.785***	5.657***	5.819***	5.811***	5.656***
	(0.000675)	(0.00255)	(0.0325)	(0.000673)	(0.00206)	(0.0463)
N. of observations	109,229	109,229	100,907	115,634	115,634	107,221
N. of dealer site product lines	6,939	6,939	6,041	7,460	7,460	7,078
R squared	0.002	0.004	0.041	0.005	0.010	0.064
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Product dummy placebos

Our DiD model is based on using CWP as a control product for add-on GAP insurance. However, it might be that the DiD variable in our regression analysis is potentially biased by changes within the add-on GAP insurance or CWP markets, independent of each other. For example, different effects on different firms within the add-on GAP insurance market might cause bias in our results.

To test for this, we reproduced our regressions for 2 sub-sampled datasets with a placebo product and DiD variable for each. We define these variables as follows:

- GAP v GAP: We randomly and evenly split dealers selling GAP insurance into 2 sub-samples. We defined a product dummy variable as 0 for one group and 1 for the other.
- CWP v CWP: We randomly and evenly split dealers selling CWP into two sub-samples. We defined a product dummy as 0 for one group and 1 for the other.

We would expect our placebo DiD variable to have a statistically significant effect, a similar size and direction to the main findings if there were factors within each product type causing bias in our results. Table 14 and Table 15 outline our regression results for the product placebo sales and retail regressions respectively.

In all cases, the placebo DiD variable is not statistically significant. It has a much smaller size than our main findings. The DiD variable for the placebo sales regression has a positive, rather than negative, sign.

These results suggest that there are no underlying differences that are biasing our results at a 'within product' level.

Table 14: Product placebo sales regression results

	GAP v GAP			CWP v CWP		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
placebo DiD	0.00550	0.00555	0.00690	0.00519	0.00866	0.00505
	(0.0135)	(0.0136)	(0.0145)	(0.0398)	(0.0400)	(0.0394)
placebo product	-	-	-	-	-	-
	-	-	-	-	-	-
time	0.00689	-0.503***	-0.481***	0.228***	-0.124**	-0.138**
	(0.00963)	(0.0180)	(0.0193)	(0.0274)	(0.0520)	(0.0538)
constant	2.216***	2.524***	2.159***	1.819***	2.042***	1.601***
	(0.00342)	(0.0104)	(0.156)	(0.0112)	(0.0368)	(0.255)
N. of observations	194,176	194,176	179,408	32,162	32,162	29,789
N. of dealer site product lines	7,584	7,584	7,253	1,311	1,311	1,161
R squared	0.000	0.137	0.159	0.025	0.168	0.176
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Table 15: Product placebo retail price regression results

	GAP v GAP			CWP v CWP		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
placebo DiD	-0.00143	-0.00155	-0.00110	-0.00490	-0.00387	-0.00346
	(0.00346)	(0.00345)	(0.00346)	(0.00786)	(0.00783)	(0.00705)
placebo product	-	-	-	-	-	-
	-	-	-	-	-	-
time	0.0340***	0.0244***	0.00992*	0.0528***	0.125***	0.0864***
	(0.00246)	(0.00536)	(0.00571)	(0.00582)	(0.00924)	(0.00848)
constant	5.794***	5.802***	5.622***	5.767***	5.731***	4.824***
	(0.000875)	(0.00322)	(0.0362)	(0.00221)	(0.00584)	(0.0780)
N. of observations	192,727	192,727	178,347	32,136	32,136	29,781
N. of dealer site product lines	7,532	7,532	7,202	1,309	1,309	1,160
R squared	0.011	0.016	0.064	0.038	0.068	0.336
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Balanced sample analysis

Our econometric analysis dataset has dealer sites that do not have sales data for all periods.

This could be because dealer sites:

- did not make sales in all periods
- entered the market for add-on GAP insurance or CWP after September 2013
- exited the market for add-on GAP insurance or CWP prior to August 2017
- have missing data for certain periods

Given these missing data, we refer to this as an econometrically 'unbalanced' dataset. An econometrically balanced sample lets us see how firm-specific effects (eg on sales and prices) develop across the whole period. We can compare our results from a balanced sample against our main findings to see if an unbalanced sample is having a significant effect on our results. To do this, we reproduced our regressions on a sample of data for firms that we have data for in all 48 months between September 2013 and August 2017.

Table 16 outlines the regression results for the balanced sample sales regressions.

In all cases, the DiD variable remains statistically significant with a negative coefficient. However, the coefficient size is slightly lower than our main findings. The baseline regression results indicate that add-on GAP insurance sales would have been 14.2% higher but for our intervention. This increased to 14.7% when we include month-year dummies and other controls.

Table 16: Balanced sample sales regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.153***	-0.153***	-0.159***
	(0.0259)	(0.0259)	(0.0261)
product	-	-	-
	-	-	-
time	0.162***	-0.473***	-0.435***
	(0.0240)	(0.0331)	(0.0338)
constant	2.862***	3.172***	3.121***
	(0.00447)	(0.0126)	(0.245)
N. of observations	74,976	74,976	74,852
N. of dealer site product lines	1,562	1,562	1,562
R squared	0.004	0.270	0.275
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Table 17 outlines the regression results for the balanced sample retail price regressions. In all cases, the DiD variable remains statistically significant with a negative coefficient and a similar size to our main findings.

Table 17: Balanced sample retail price regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.0315***	-0.0315***	-0.0291***
	(0.00619)	(0.00619)	(0.00616)
product	-	-	-
	-	-	-
time	0.0595***	0.0527***	0.0525***
	(0.00556)	(0.00844)	(0.00896)
constant	5.890***	5.883***	5.759***
	(0.00123)	(0.00284)	(0.0915)
N. of observations	74,833	74,833	74,709
N. of dealer site product lines	1,561	1,561	1,561
R squared	0.029	0.041	0.066
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Restricted period analysis

Our intervention's impact may change over time following its implementation.

For example, it could be that the intervention had a large effect following implementation, which has then, subsequently, reduced over time. On the other hand, it could be that our intervention's impacts increase over time. Additionally, over time, there is a higher probability of other (third) factors driving changes in the add-on GAP insurance market.

We ran our regressions and restricted the observations to data one year either side of our intervention date (ie September 2014 to August 2016) to test for these effects.

If the regression results are similar to the main findings, it might indicate that our intervention's impact is similar over time. If the results are different, it might indicate that our intervention's impact changes over time.

Table 18 sets out the regression results for the restricted period sales regressions.

In all cases, the DiD variable remains statistically significant with a negative coefficient. The coefficient size is in line with our main findings. This might indicate that our intervention has had a similar impact on sales over time.

Table 18: Restricted period sales regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.217***	-0.219***	-0.211***
	(0.0190)	(0.0191)	(0.0197)
product	-	-	-
	-	-	-
time	0.166***	-0.318***	-0.351***
	(0.0180)	(0.0221)	(0.0229)
constant	2.167***	2.539***	2.406***
	(0.00302)	(0.00832)	(0.101)
N. of observations	116,098	116,098	103,658
N. of dealer site product lines	7,283	7,283	6,345
R squared	0.004	0.141	0.170
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Table 19 outlines the regression results for the restricted period retail price regressions.

For the baseline and baseline with month-year dummy regressions, the coefficient is statistically significant. It has a small, positive coefficient. When we add other controls, this statistical significance disappears and the coefficient has a negative sign. This indicates that the DiD estimate is sensitive to the period of analysis. It might also point to there being stronger effects in the years of data outside of the restricted sample. These data might be influencing our overall findings.

Table 19: Restricted period retail price regression results

	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	0.00941***	0.00957***	-0.000782
	(0.00356)	(0.00357)	(0.00344)
product	-	-	-
	-	-	-
time	0.0157***	0.0222***	0.0170***
	(0.00318)	(0.00432)	(0.00400)
constant	5.779***	5.781***	5.647***
	(0.000725)	(0.00213)	(0.0318)
N. of observations	115,288	115,288	103,171
N. of dealer site product lines	7,249	7,249	6,315
R squared	0.007	0.011	0.049
FE	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes
Other controls	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

The control product and waterbed effects

A possible issue with our econometric approach is the potential for our intervention to have affected our control product (CWP).

Add-on GAP insurance and CWP are both sold primarily at the POS (at a vehicle dealership).

Following our intervention, firms may have chosen to switch their focus away from selling GAP insurance to other add-on products, including CWP. Firms could have stopped selling GAP insurance entirely in favour of other products or may have increased the prominence of other add-on products, such as CWP, in the sales process. If this happened, it could result in firms increasing CWP sales, or other add-on products, because of our intervention and at the expense of GAP insurance (a waterbed effect). This would bias upwards our regression results. This is because it would exaggerate the difference in sales trends between add-on GAP insurance and CWP after our intervention.

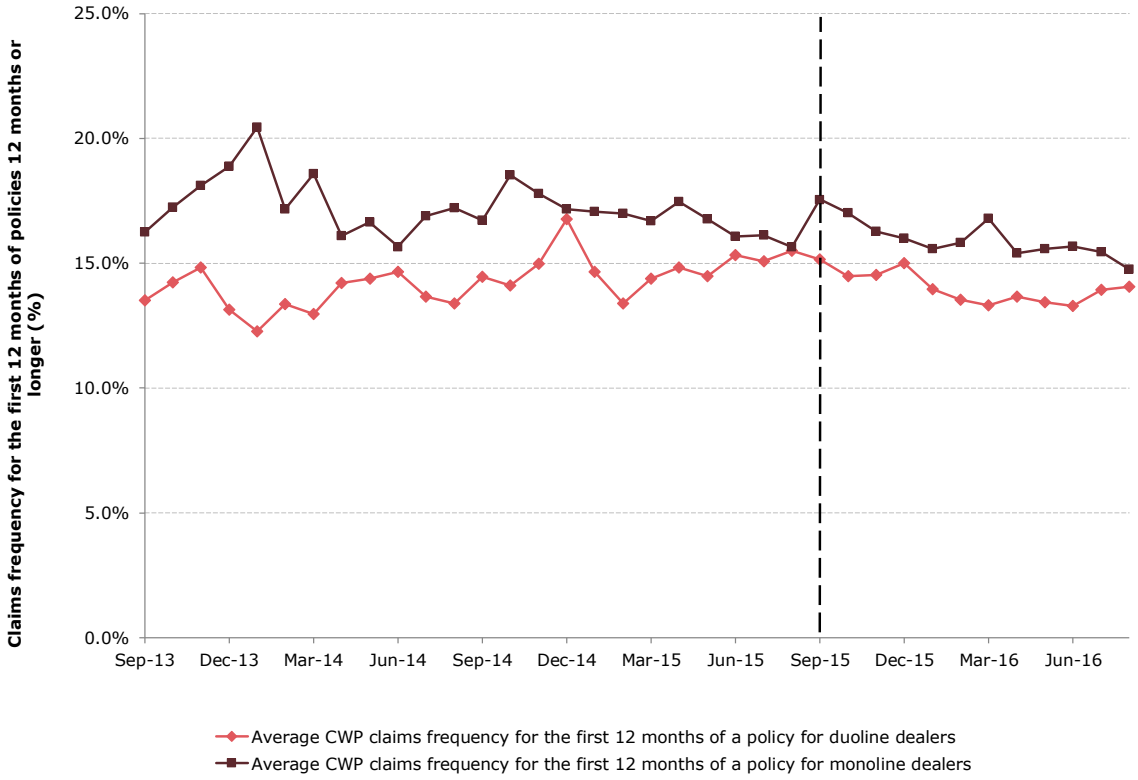
To test whether this might be biasing our main findings, we have carried out the following tasks. We have:

- examined the impacts on CWP claims frequencies and claims ratios following the intervention
- conducted regression analysis for firms selling only one product out of GAP insurance and CWP (monoline dealers) and for firms selling both (duoline dealers)
- gathered qualitative evidence from firms in the market for add-on GAP insurance and CWP

If firms responded to our intervention by switching to selling CWP, increasing incentives to sell CWP relative to GAP insurance or by increasing its prominence in the sales process, this might have led to higher sales to consumers for whom CWP might not be an appropriate product. We would expect this to lead to falling CWP claims frequencies and claims ratios.

Figure 4 shows the average 12-month claims frequency for CWP for both monoline[51] and duoline dealers.[52] Before our intervention, the 12-month claims frequencies were broadly stable, although relatively lower for duoline dealers compared to monoline dealers. After our intervention, the 12-month claims frequencies remained constant. We do not see a fall (which we might expect if CWP was sold to consumers who might be disproportionately less likely to claim).

Figure 4: CWP 12 months claims frequency for monoline and duoline dealers between September 2013 and August 2017



Source: FCA analysis of transaction data provided by firms

Figure 5 shows the average 12-month claims ratio for CWP for both monoline and duoline dealers.

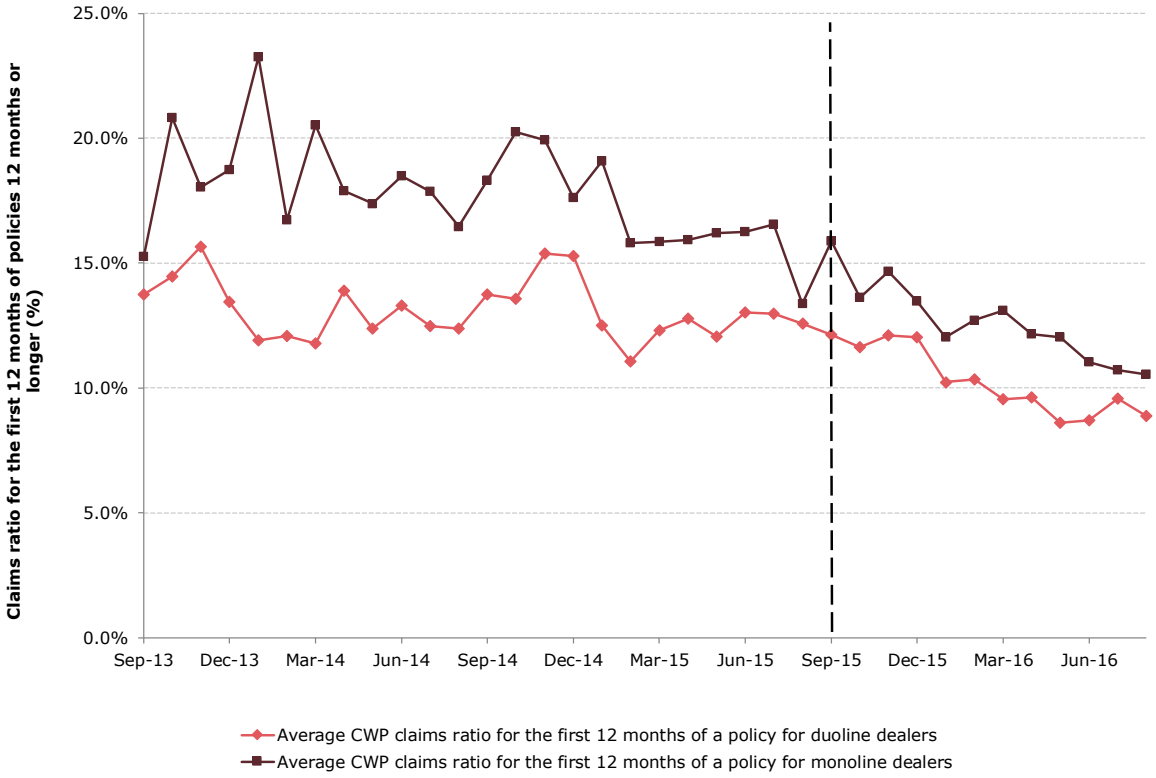
As with claims frequencies, the claims ratios are relatively lower for duoline dealers compared to monoline dealers. The 12-month claims ratios for CWP started to decline before our intervention. This fall continued after our intervention. Average claim values are driving this decline, along with a smaller effect of higher CWP retail prices. Although this may indicate some CWP consumer demographic change, the stable claims frequency

51 Monoline dealers are those dealers in our dataset who, for the entire period we observe, sell only one product, either GAP insurance or CWP.

52 Duoline dealers are those dealers in our dataset who at some point during the entire period we observe make sales of both GAP insurance and CWP.

suggests that there has been no significant waterbed effect between CWP and add-on GAP insurance after our intervention.

Figure 5: CWP 12 months claims ratio for monoline and duoline dealers between September 2013 and August 2017



Source: FCA analysis of transaction data provided by firms

We ran regressions using variations created by which add-on product dealers chose to sell to help further test whether there is a waterbed effect.

While some dealers sell both CWP and add-on GAP insurance, others sell only one of these products. We can, therefore, split our sample into 2 groups:

- dealers selling only GAP insurance or CWP (monoline)
- dealers selling both GAP insurance and CWP (duoline)

If our common trends assumption holds for both groups, we can reproduce our regression analysis for each type of firm.

This will allow us to:

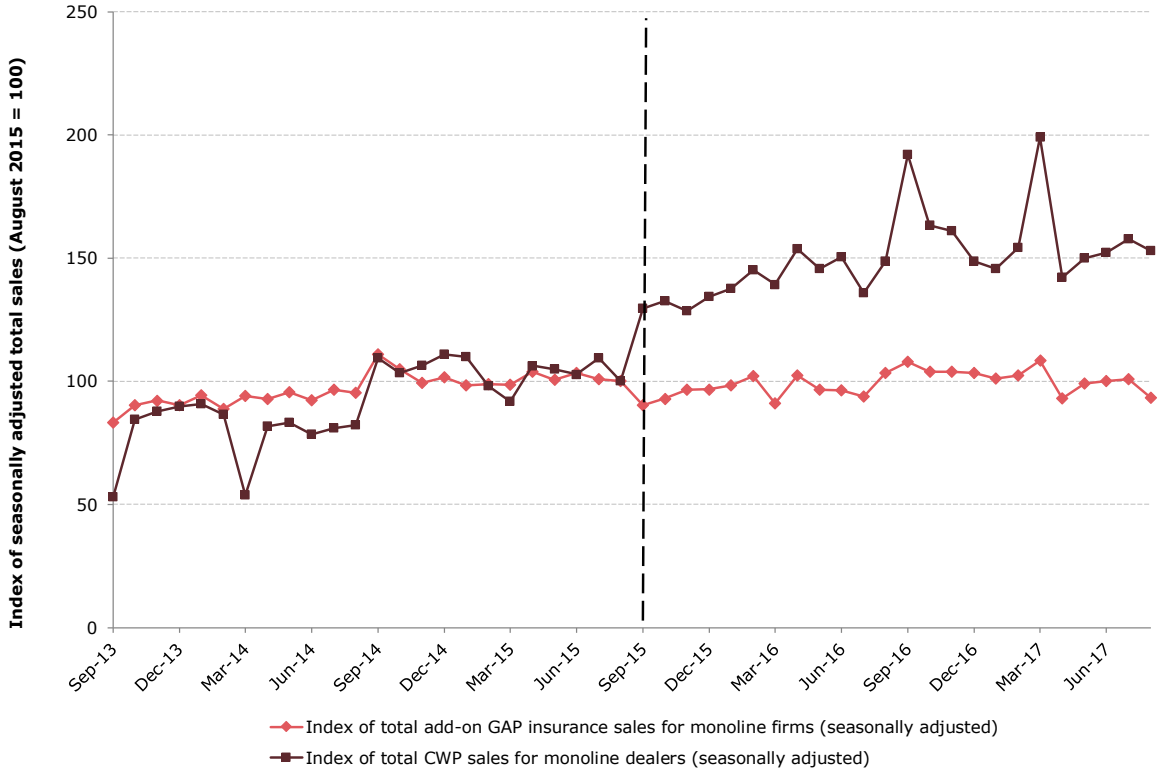
- produce regression results for a group of firms for whom a waterbed effect between GAP insurance and CWP is not possible as they only sell one of these products
- examine if the intervention's impact is similar for both monoline and duoline dealers

If a waterbed effect were present, we would expect our intervention's impact to be greater for duoline dealers relative to monoline dealers.

Figure 6 shows an index of monoline dealers' total CWP and add-on GAP insurance sales on a seasonally-adjusted basis. We base the index around August 2015. Figure 7 shows the same information but for duoline dealers.[53]

In both cases, we appear to have common trends between add-on GAP insurance and CWP in the pre-intervention period. Monoline dealers' CWP sales growth in the pre- and post-intervention periods is higher than duoline dealers'. In the post-intervention period whilst monoline and duoline dealers see an initial dip in GAP insurance sales, duoline dealers see some recovery in their sales growth whilst monoline dealers' sales remain relatively flat.

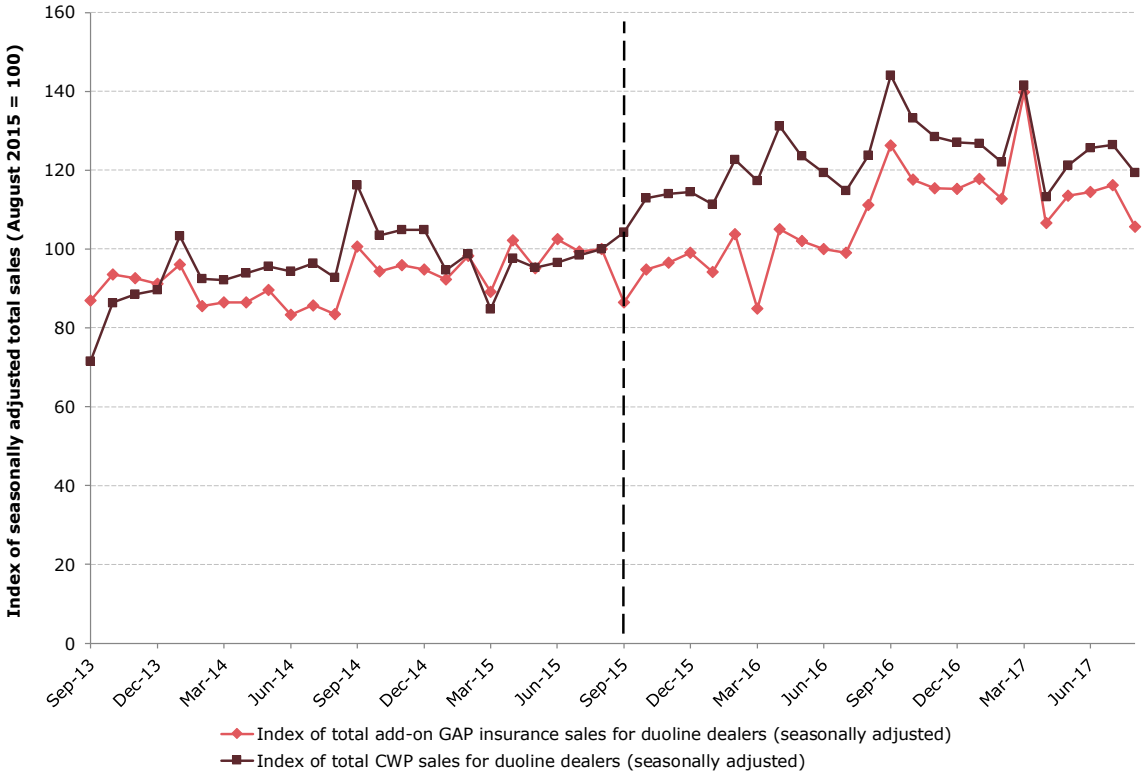
Figure 6: Index of seasonally-adjusted sales of add-on GAP insurance and CWP for monoline dealers between September 2013 and August 2017



Source: FCA analysis of transaction data provided by firms

53 Of the 7,906 dealer sites in our dataset, 989 were classified as duoline dealers selling both GAP insurance and CWP, while 6,917 were classified as monoline dealers. Of these monoline dealers 6,595 sold GAP insurance and the remaining 322 sold CWP.

Figure 7: Index of seasonally-adjusted sales of add-on GAP insurance and CWP for duoline dealers between September 2013 and August 2017



Source: FCA analysis of transaction data provided by firms

Table 20 outlines the regression results for the monoline and duoline sales regressions.

For both groups of dealers, the DiD variable is statistically significant with a negative coefficient. The coefficient size, in both cases, is similar to our main findings. However, it is slightly higher for monoline dealers and has a higher degree of uncertainty (larger standard errors).

These results suggest that our intervention's impact on sales is similar across both groups of firms. Hence, we do not see a significant waterbed effect between GAP insurance and CWP.

Table 20: Monoline and duoline sales regression results

	Duoline dealer sites			Monoline dealer sites		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
DiD	-0.205***	-0.211***	-0.204***	-0.257***	-0.258***	-0.257***
	(0.0280)	(0.0281)	(0.0288)	(0.0429)	(0.0434)	(0.0439)
product	-	-	-	-	-	-
	-	-	-	-	-	-
time	0.219***	-0.280***	-0.297***	0.266***	-0.215***	-0.197***
	(0.0224)	(0.0360)	(0.0363)	(0.0423)	(0.0470)	(0.0479)
constant	2.296***	2.607***	1.467***	2.112***	2.406***	2.302***
	(0.00750)	(0.0205)	(0.355)	(0.00367)	(0.0117)	(0.0886)
N. of observations	58,310	58,310	56,390	168,028	168,028	152,807
N. of dealer site product lines	1,978	1,978	1,853	6,917	6,917	6,561
R squared	0.011	0.178	0.189	0.002	0.131	0.153
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

Table 21 outlines the regression results for the monoline and duoline retail price regressions. For duoline dealers the DiD variable is statistically significant with a negative coefficient. The magnitude of the coefficient is similar to our main findings. However, for monoline dealers the DiD variable is not statistically significant or is only weakly significant. These results may suggest the presence of some waterbed effect in terms of prices, with dealers potentially increasing prices on CWP to recover perceived lower GAP insurance prices.

Table 21: Monoline and duoline retail price regression results

	Duoline dealer sites			Monoline dealer sites		
	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls	Baseline	Baseline with month-year dummies	Baseline with month-year dummies and other controls
placebo DiD	-0.0316***	-0.0328***	-0.0387***	0.00183	0.00236	-0.00635
	(0.00602)	(0.00601)	(0.00616)	(0.00809)	(0.00808)	(0.00810)
product	-	-	-	-	-	-
	-	-	-	-	-	-
placebo time	0.0558***	0.0790***	0.0743***	0.0334***	0.0273***	0.0208**
	(0.00450)	(0.00736)	(0.00760)	(0.00786)	(0.00939)	(0.00947)
constant	5.839***	5.835***	5.414***	5.773***	5.777***	5.611***
	(0.00165)	(0.00443)	(0.0687)	(0.000933)	(0.00358)	(0.0326)
N. of observations	58,234	58,234	56,332	166,629	166,629	151,796
N. of dealer site product lines	1,975	1,975	1,851	6,866	6,866	6,511
R squared	0.027	0.041	0.143	0.011	0.016	0.049
FE	Yes	Yes	Yes	Yes	Yes	Yes
Month-year dummies	No	Yes	Yes	No	Yes	Yes
Other controls	No	No	Yes	No	No	Yes

Note: Robust standard errors, * significant at 1%, ** significant at 5%, * significant at 10%**
Source: FCA analysis of transaction data provided by firms

The empirical evidence outlined above is corroborated by qualitative evidence from firms which highlighted to us that there has not been a switch by dealers away from selling GAP insurance and towards selling other add-on products, including CWP, following our intervention. Analysis of our firm dataset also appears to confirm this, showing limited structural change before and after our intervention in the number of dealers entering or exiting the markets for GAP insurance and CWP.

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