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Do Consumers Understand PCP Car Finance? An Experimental Investigation

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Abstract Personal contract purchase (PCP) plans are innovative and increasingly popular forms of car finance. PCPs are inherently more complex than established financing options. The present study used experimental behavioural science to explore consumers' comprehension of PCP plans and scope for beneficial interventions. Choice tasks, product rating tasks, and multiple choice comprehension questions were deployed to measure the consistency of decision-making and explicit comprehension of the product. Disclosures and advice were varied across conditions. A representative sample ($n = 100$) of consumers was initially given information on PCP deals as typically disclosed by car dealers. Results revealed that understanding was poor. One quarter of participants performed below chance on multiple-choice comprehension questions. Participants were prone to inconsistencies and objective mistakes when deciding between and rating offers. Disclosures designed to improve processing of mileage and cost information had ambiguous effects. Consumer advice sheets improved comprehension and reduced mistakes, with advice containing a diagram outperforming advice containing only text. The findings raise consumer protection concerns and support improved advice and stronger regulation.

Keywords Personal contract purchase (PCP) · Explanatory diagram · Decision-making · Comprehension

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For many households, the purchase of a car is the second largest financial transaction. Disadvantageous decision-making with respect to car finance has the potential to cause substantial consumer detriment and, if widespread, may have broader consequences for consumer debt levels. Consequently, the impact of innovations in car finance on consumer decisions is an important research issue with potential implications for consumer policy.

The most prominent innovation in recent times is the personal contract purchase (PCP) plan, which has received little attention from consumer researchers heretofore. PCP plans, referred to in some countries as "car leasing," typically involve lower monthly payments than hire purchase (HP) deals or personal loans, allowing consumers to benefit from increased affordability. However, PCP plans are also relatively complex and involve potential drawbacks that may, or may not, be properly understood by consumers. This paper exploits the methods of experimental behavioural science to investigate consumer decision-making and comprehension with respect to PCPs. It also explores scope for improvement in understanding through the provision of consumer advice. As far as we can see, it is the first empirical study to investigate this issue.

PCP plans have similarities with traditional HP deals in that the consumer acquires a new vehicle by making an initial payment (typically termed the "deposit," although non-refundable), followed by regular monthly repayments. In financial terms, PCP plans are a form of operating lease as distinct from a finance lease. Operating leases have generally been associated with business-to-business rather than business-to-consumer transactions, so PCP plans represent an innovation in a consumer context. In practical terms, the distinction means that rather than paying off the full cost of the car over the term of the deal, as would be the case with an HP deal, the consumer instead pays off only depreciation in the car's value. This is calculated as the difference between the retail price and a guaranteed minimum future value (GMFV), which forms part of the deal and is subject to agreed conditions in relation to maximum mileage allowance and care of the car. At the end of the deal, the car can be purchased at the GMFV price, assuming that the consumer can afford the necessarily substantial final payment. Otherwise, there are two possibilities. If the car has depreciated less than expected, the consumer can make use of this "equity" as part of a deposit for a new PCP plan with the same provider. Alternatively, the consumer can simply return the car. Evidently, therefore, PCP deals are more complex than previous forms of car finance.

It is important to recognize that PCP deals have advantages and enjoy increasing popularity. Because consumers repay only depreciation, monthly repayments are lower and car purchase more affordable. In Ireland, where the present study was conducted, a majority of car dealerships and brands now market PCP plans as their primary attraction for new car buyers. The PCP share of car related bank debt in Ireland increased by 72% between 2014 and 2017 (Sherman et al. 2018). The central innovation behind PCP deals originated in the USA and is spreading internationally. PCP deals are now available in the UK, Italy, the Netherlands, South Africa, and Russia, with closely similar deals centred on monthly repayment of depreciation available also in Australia, Canada, China, Switzerland, and Germany.

Nevertheless, in some countries, consumer organizations, regulators (Financial Conduct Authority 2018), and consumer journalists (e.g., Briscoe 2017; Eley 2017; Inman et al. 2017; Weston 2017) have expressed fears about comprehension of PCP plans and associated levels of debt. In 2017, the UK Financial Conduct Authority announced a review of the implications of PCP plans for consumers. The products are relatively complex and multiple downsides are possible. In an ideal scenario, the consumer puts down an initial deposit, makes regular monthly payments over a set term (typically 36 months), and abides by the mileage restrictions

and wear and tear conditions. Assuming the market value of the car exceeds the pre-set GMFV, this equity can contribute to a deposit on a new PCP plan (with the same dealer), or the consumer can realize it by purchasing the car for the price of the GMFV. There are at least four potential downsides, however. First, the consumer shoulders the market risk. If the market price falls below expectations, the consumer will have spent a substantial amount of money over 3 years with little to show for it. Second, any excessive optimism about meeting mileage restrictions or wear and tear conditions may result in the consumer being penalized and losing equity. Third, the consumer may find themselves in a weak negotiating position in which they are tied to a single dealer unless they have sufficient liquidity to pay the GMFV and take their business elsewhere (or threaten to, if given a low valuation or offered a poor next deal). Lastly, even if the consumer understands all of this and enters the deal well informed, the additional complexity may tax their cognitive resources and negatively affect the quality of their decision-making when choosing between deals. Previous consumer research in other contexts has shown that consumers struggle with the constructs at the heart of PCP finance, including trade-offs between immediate and future costs (Dasgupta et al. 2007; Herrmann and Wricke 1998), other aspects of price framing (Wonder et al. 2008), non-linearities inherent in interest calculations (e.g., Lusardi and Mitchell 2011), and calibration of likely usage (Grubb 2009). We briefly review relevant findings in the following section.

Given this backdrop, consumer policy should benefit from empirical evidence in relation to whether consumers understand the structure and consequences of PCP plans. Consistent with the notion of empirically informed regulation (Sunstein 2011), the present study had the explicit aim of deploying behavioural science to inform relevant consumer policy and was undertaken in close collaboration with Ireland's Competition and Consumer Protection Commission (CCPC). Specifically, we set out to address two primary research questions: (i) How well do consumers understand PCP plans? (ii) Can understanding be improved via disclosure or advice?

Given the lack of existing literature and exploratory nature of the research questions, the investigation deployed multiple tasks in a controlled laboratory study. Use of the experimental method permitted a more controlled investigation than would have been possible via a survey, allowing the investigators to dictate precise exposure to written information and reading time, communicate directly with participants, and monitor participants' engagement with materials and tasks. The study began by providing a representative sample of 100 consumers with information of the sort typically distributed by car dealerships offering PCP finance. Participants then completed a series of computerized tasks. First was an adaptive choice task (ACT) designed to assess the consistency of decisions, via a between-subjects comparison of equivalent PCP and HP deals. Second was a rating scale (RS) task in which participants rated a series of PCP deals for good value, with the format of mileage and financial information manipulated between-subject. The outcome of interest was the relative scores given to pairs of deals within the series, one of which strictly dominated the other.[1] Third was a set of multiple-choice questions (MCQ) that tested explicit comprehension of the key components of PCP deals. Participants were incentivized to provide correct answers. After this third task, participants experienced one of two interventions consisting of exposure to consumer advice. One originated from the CCPC website; the other was designed by the research team. Following this, the fourth task presented a counterbalanced set of incentivized MCQs. A fifth and final

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[1] Strict dominance means that one deal was objectively superior since it was at least as good on all product attributes while being superior on at least one.

task involved another sequence of RS responses. Changes in pre- and post-intervention performance were used to assess the two interventions.

The rest of the paper proceeds as follows. Section "Literature Review and Hypotheses" describes existing literature suggesting that consumer understanding of PCP deals may be unsound, then uses it to generate specific hypotheses related to our two primary research questions. Section "Methods" outlines the experimental methods and Section "Results" provides results. Section "Discussion" summarizes the findings, implications for policy and theory, and potential limitations of the study. Section "Conclusion" briefly concludes with reference to our two primary research questions.

Literature Review and Hypotheses

Comprehension and Cognitive Load

In what follows, we consider the concept of comprehension to cover understanding of individual product features and the basic interactions between them. Although previous studies have not addressed comprehension with respect to PCP plans specifically, there is a growing empirical literature on how consumers comprehend key components of personal loans, which offers relevant insights. Empirical investigations generally employ either surveys or laboratory experiments and one of three types of tasks: judgement tasks, rating/ranking tasks, and choice tasks. One way to view a PCP deal is that it possesses the same properties as a consumer loan (principal, term, interest rate, financial cost) plus several additional features and considerations. Thus, it is a reasonable presumption that empirical findings that relate to personal loans may apply also to PCP plans. However, additional effects may not only accompany features specific to PCPs but may also arise because the existence of additional features is likely to increase cognitive load.

In judgement tasks, respondents are provided with information about a loan and asked to estimate another aspect that is determined by the information provided. For instance, they may be required to estimate how long it will take to pay off a loan with a given principal, monthly repayment (MR), and APR. The non-linearities inherent in these relationships cause problems, with consumers underestimating the time to pay off loans (Overton and MacFadyen 1998; Ranyard and Craig 1995; Yard 2004) and overestimating the financial cost of shorter loans (McHugh et al. 2011). The complexity of interactions between components may also explain why, when asked to rate or rank sets of loans, participants rank short-term loans with very high APRs above longer term loans with lower APRs (Yard 2004) and do not weight price components equally in terms of cash value (Herrmann and Wricke 1998).

Several choice experiments reveal that consumer decisions over loans are easily influenced by superficial presentational aspects, such as the disaggregation of repayments into smaller more regular amounts or setting repayments just below salient round numbers (Estelami 2001). Choices are also sensitive to which of the subset of co-determined properties of a loan (principal, APR, term, financial cost) are explicit at the decision-point (Lunn et al. 2016; McHugh et al. 2011).

Generalizing from these empirical studies, two points might be emphasized. First, the complexity (perhaps, especially, non-linearity) of the key relationships that underlie a loan biases judgements. This finding is in keeping with a wider literature on financial literacy that documents consumers' difficulty in handling non-linear relationships and interest

compounding (Lusardi and Mitchell 2011; Stango and Zinman 2009) and shows how individual differences affect credit decisions (Disney and Gathergood 2013). Second, the volume of information processing leads to inconsistent weighting of loan attributes in decisions. Out of necessity, loans involve interacting factors expressed in diverse units of measurement (Köcher and Holzmüller 2014), e.g., Euros per month, % APR, accumulated cost of credit. Cognitive processing of individual factors may be taxing even before the requirement to integrate them (Homburg et al. 2014).

A PCP plan is a more complex loan. Field and laboratory studies suggest that product complexity can, in general, adversely affect decision-making. Individuals may focus on a subset of available information (Simon 1955), struggling to evaluate complex choices accurately (Jacoby 1984; Schwartz 2004; Agnew and Szykman 2005) or choosing dominated options (Bhargava et al. 2017). Complex price structures mean that consumers often do not pay the lowest price for homogenous goods in markets for residential electricity (Wilson and Waddams Price 2010), credit products (Agarwal et al. 2009; Agarwal et al. 2015), and broadband internet (Lambrecht and Skiera 2006).

Marrying this previous empirical work with the fact that PCPs require additional product attributes to be taken into account, including a mileage limit, conditions relating to care, a GMFV, and contractual conditions surrounding options at the end of the contract, the likelihood is that information processing capacity will be further challenged relative to traditional personal loans and HP finance. It should be noted also that cognitive load is likely to be further increased where finance packages are offered in the same context as the car purchase itself. Some evidence specific to the car market indicates failure to integrate relevant financial information (Wonder et al. 2008). Lastly, one notable feature of PCP deals is that consumers must consider the situation they are likely to face at the end of the deal. Any "present bias" (Frederick et al. 2002) will lead them to weight this aspect of the deal substantially less than immediate benefits and costs. This tendency may be strengthened by the negative effect of cognitive load on self-control (Baumeister et al. 2007; Fudenberg and Levine 2006; Shiv and Fedorikhin 1999; Ward and Mann 2000). Lower self-control is linked to higher use of easy-to-access credit products (Gathergood 2012).

Boosting Comprehension

The above conclusions regarding cognitive capacity imply that consumers may be susceptible to marketing that gives prominence to key attractive features of PCP plans while making potential downsides less salient. Of course this claim may be true of many products, but it is likely to be particularly the case where cognitive capacity is so strongly taxed. One result is that PCPs may be an area where consumer advice is especially needed, to ensure that both positive and negative product features are sufficiently salient. Building on Tversky and Kahneman's (1981) notion that individuals build specific mental constructs to compare alternatives, Thaler (1999) developed the concept of mental accounting to describe the segregation and integration of economic choices. In the context of PCP plans, consumers might be aided by ensuring that important information enters the mental account or by framing information in such a way as to simplify the main relationships and improve integration of information within the consumer's mental account. PCPs may thus be a product for which transparency, comprehensibility, and comparability are insufficient, while the quality of consumer information is vital (Oehler and Wendt 2017). Previous empirical studies suggest that the layout and readability of financial product information can have positive benefits for consumers (e.g., Garrison et al. 2012; Van

Boom et al. 2016), although simplification of financial consumer information is not always effective (e.g., Beshears et al. 2011; Choi et al. 2009).

The present study focused on the provision of consumer advice and three specific types of framing manipulation, the empirical rationale for each of which was informed by previous work as briefly outlined in the following subsections.

Minimum Total Cost

One possible way to reduce cognitive load when processing information about PCPs is to frame the cost of the deal as a simplified single figure. Summing the monthly payments and deposit generates a minimum total cost (MTC) that represents the minimum amount of money that the consumer has agreed to part with over the duration of the deal. This is a potentially helpful simplification, because regardless of circumstances and decisions at the end of the deal, the MTC will be exchanged for leasing the car for the period. Experimental evidence suggests that making financial cost information salient for personal loans may improve comprehension and influence decisions (McHugh et al. 2011; Ranyard et al. 2006). There is nevertheless a danger associated with an additional information disclosure in a context where consumers already struggle with the volume and complexity of information, even if in theory that disclosure integrates some existing information into a simplified form. In their loan study, Lunn et al. (2016) found that while presenting financial cost information lessened bias, it simultaneously reduced the consistency with which information was integrated into decisions. Here, we test the hypothesis that MTC information improves consumers' rating of PCP deals.

Weekly Mileage

Another unique feature of PCP finance is the mileage limit. If the limit is violated, the consumer typically incurs a fine. Violation also reduces the likelihood of positive equity at the end of the deal, as it decreases market value. In marketing literature, the mileage allowance is expressed annually, typically ranging from 10 000 to over 30 000 km/year. Annual mileages may not be intuitive and such large absolute figures may reduce the sensitivity of consumers to important variation in these limits. Yet accumulations over time can be framed in multiple ways with impacts on consumer decisions. Reframing a lump sums as smaller ongoing expenses can increase transaction compliance (Price 1994)—sometimes referred to as the "Pennies-a-Day" strategy (Gourville 1998). We hypothesize that framing the mileage limit in weekly terms may make it more salient and easy to process, helping consumers to integrate it into assessments of PCP plans.

Explanatory Diagrams

PCP plans contain more related attributes than HP deals. One possible way to help consumers to understand the relationships between attributes is via explanatory diagrams. Graphical diagrams have not been systematically studied in the context of consumer financial decision-making, but empirical evidence from other contexts suggests they may be helpful. Diagrams can aid understanding of complex relationships by shifting part of the information processing burden to the perceptual system (Lurie and Mason 2007) and, more generally, can promote causal inference relative to equivalent blocks of text (Butcher 2006; Mayer 2002; McCrudden et al. 2007). Hence, diagrams could help consumers to understand PCP plans by

unlocking additional cognitive capacity or replacing textual information (Ainsworth 2006). For example, one concern is whether consumers realize what components of a PCP deal make up the principal that interest is charged on (retail price minus both deposit and GMFV). Graphical presentation of these central relationships may help consumers.

Hypotheses

Based on the above analyses, we developed the following hypotheses in relation to our first research question regarding comprehension of PCPs:

> H1: PCP agreements will increase the inconsistency of consumer choices relative to more traditional finance agreements such as HP.
> H2: Consumers will make objective mistakes when evaluating PCP deals, often judging unarguably poorer deals to be better than superior ones.
> H3: Consumers will struggle to understand the main features of PCP plans based on standard marketing material.

Note that while hypotheses 1 and 2 may overlap in their implications for underlying psychological mechanisms, they are also distinct in relation to measurement of decision-making accuracy. A consumer who struggles to understand PCPs and is hence uncertain of what constitutes a good deal is likely both to make less consistent choices and to make objective mistakes when rating offerings. However, H1 is a conjecture about the relationship between multiple *subjective* consumer choices, while H2 hypothesizes *objective* errors in assessments of deals, regardless of individual preferences.

Based on the analysis of the previous section, the following hypotheses were developed regarding the potential to improve consumer comprehension of PCP deals:

> H4: Consumers' comprehension of PCP plans will be improved substantially by independent consumer advice highlighting key features from their perspective.
> H5: Consumers' evaluation of PCP deals will improve when provided with MTC information.
> H6: Consumers' evaluations will improve when mileage limits are expressed in weekly terms.
> H7: Consumers' comprehension will improve in response to advice containing a diagram that illuminates the relationship between the main components of a PCP plan.

H5 and H6 relate only to evaluation of deals, because the disclosures involved are designed to assist consumers to integrate information. By contrast, H4 and H7 concern more general improvements in overall product comprehension, which should improve both factual knowledge and product evaluation.

Methods

Given the exploratory nature of the research questions and hypotheses, our experimental study used multiple sequential tasks. Informed by previous empirical work on loans, we deployed a mixture of choice, rating, and judgement tasks, with the latter organized into MCQs. The

experimental session consisted of eight stages: (1) initial briefing, (2) car preference selection, (3) adaptive choice task (ACT), (4) rating scales (RS), (5) multiple-choice questions (MCQs), (6) advice intervention, (7) post-intervention MCQs, and (8) post-intervention RS. These stages are summarized in Table 1. In addition to testing our hypotheses, the tasks were grounded in behavioural economic theory and empirical practice. Each was sensitive to different potential deviations from the standard microeconomic model. DellaVigna's (2009) influential taxonomy defines three types of deviations: nonstandard preferences, nonstandard decision-making and nonstandard beliefs. The ACT (stage 3) tests for the first of these by measuring inconsistency in choices. The RS (stage 4) mainly tests for the second, by measuring the effect of reframing mileage and cost information, although arguably all three deviations could cause poor overall performance during this stage, in which the main outcome measure we record is violations of dominance. The MCQs (stage 5) test for the third type of deviation by measuring erroneous beliefs about the product. Moreover, each of these measures has been used previously to make inferences about decision-making quality in empirical investigations of various aspects of decision-making. For instance, Bruine de Bruin et al. (2007) employed choice consistency as a primary measure of decision competence across domains; Bhargava et al. (2017) recently employed violations of dominance as a measure of decision-making quality with respect to health insurance choices, and numerous studies have used MCQs to test beliefs about financial concepts in general (e.g., Lusardi and Mitchell 2011; Lusardi and Tufano 2015) and about specific products such as mortgages (Lacko and Pappalardo 2010) and credit cards (Soll et al. 2013).

Participants

Participants were 100 consumers aged 20–65 years from the Dublin area, recruited by a market research company. The sample was matched to the general population by gender, age, and working status. Participants were paid €30 for participation and understood that they could win an additional €50 voucher through a lottery in which their chance of winning was based on performance. Each participant began with a single lottery ticket

Table 1 Structure of the experiment, which consisted of eight stages undertaken in chronological order

Stage	Task	Description
(1)	Initial briefing	Participants read a typical information sheet from providers describing PCP and HP deals
(2)	Car preference selection	Participants selected a favourite and second favourite car from a selection of current leading models
(3)	Adaptive choice task (ACT)	Multiple binary choices within a staircase procedure balanced preference for first versus second car against difference in the retail price or APR. Half chose among PCP deals; half HP deals
(4)	Rating scales (RS)	Participants rated PCP deal for good versus bad value on a 7-point scale
(5)	Multiple-choice questions (MCQs)	Participants responded to questions probing understanding of the components of a PCP deal
(6)	Advice intervention	Participants read a consumers advice sheet. Half read the regulator's website advice; half read advice designed by the experimenters that includes a diagram of a PCP
(7)	Post-intervention MCQs	Participants responded to questions counterbalanced from stage 5
(8)	Post-intervention RS	Participants rated PCP deals again for good versus bad value

and won an additional ticket for every correct response provided to the MCQs in stages 5 and 7.

Design and Materials

The tasks were computerized. They were programmed in Python using the PsychoPy package (Peirce, 2007, 2009) and presented on 14 in. (1366 × 768) laptops. In addition to the computer interface, at different stages of the study, participants were given an information sheet and consumer advice in hard copy. Full versions of all experimental materials are available from the authors on request.

PCP Information Sheet

Participants were given an initial one-page "PCP Explained" information sheet. This sheet was based on information given on websites of the main car dealerships and brands in Ireland. Thus, it was designed to mimic the type of information consumers receive from PCP providers when considering deals. Since the quality of this initial information was potentially an important determinant of performance and we did not wish to underestimate consumers' capabilities, we combined the clearest text we could find from multiple sites. The quality of this sheet was therefore arguably somewhat higher than information a consumer might typically be given by an individual dealer. A brief description of HP appeared also.

Car Preference Selection

Participants negotiated a simple onscreen decision tree to select a first and a second preference car. A first screen showed four classifications (small hatchback, regular hatchback, saloon, sport utility vehicle (SUV)) from which participants clicked through to a second screen showing five options within the chosen class from the five highest selling car brands in Ireland in 2016: Ford, Nissan, Toyota, Hyundai, and Volkswagen (The Society of the Irish Motor Industry 2016). They could click back to switch classifications as they wished. For realism in the choice environment, we displayed a variety of colours across the models, but each model remained the same colour for every participant. In the subsequent stage, we aimed to measure the consistency with which consumers could trade-off cost against their preference for the first choice car over the second choice car, so whether that preference was driven by the difference in brand, model, or colour was immaterial, provided each was held constant for the first and second choice cars.

Adaptive Choice Task

Participants were randomized into a PCP or HP condition and completed a series of binary choices designed to test the consistency of choices. Their first preference car was presented on the left-hand side of the screen and their second preference car on the right, with each associated with a different PCP (or HP) plan. An example trial is shown in Fig. 1 (in the experiment branding was included and images were colour). The task was a simple binary choice task: Participants were asked to compare the offers (car plus financial plan) and select the one they preferred. Responses were entered by clicking on the chosen offer.

The pairs of offers presented were scheduled according to an interleaved staircase procedure designed to home in on balance points for the trade-offs between the preference for the first over the

Fig. 1 Example display from the adaptive choice task in stage 3. The favourite car is on the left and the second favourite on the right. In this example, the deals do not differ in cost. Hence, the participant should choose the deal on the left. The next trial from this staircase would then increase the APR on the favourite car by a step of 4%

second choice car and the main cost elements of the financial plan, namely the retail price and APR. Two staircases were "top-down," meaning that they initially presented a much more expensive (higher retail price or higher APR) first preference car. On selection of the second preference car, the gap in cost was narrowed in steps of €900 or 4%-points for the next scheduled trial in that staircase. Two staircases were "bottom-up," meaning that they started with equivalent financial plans. On selection of the first preference car, the gap in cost was widened for the next scheduled trial in that staircase, with the first preference car becoming one step more expensive. The scheduled trials for the interleaved staircases were presented in a pseudorandom order, with no two consecutive presentations coming from the same staircase. In addition, the PCP condition had a fifth staircase interleaved, in which the two offers both involved the favourite car but where the GMFV had to be traded off against the mileage limit. Additional trials were added to the HP condition to ensure that the overall length of the task was equivalent between conditions.

Rating Scales

In the RS task, 12 single PCP offers were presented for participants to rate on a scale from 1 to 7. The financial offers were the same for each participant, but the cars associated with them matched the brand preference shown in stage 1. An example presentation is shown in Fig. 2 (in the experiment branding was included and images were colour). Offers were realistic for the market at the time of the experiment, based on average retail prices plus or minus 3%, APR varying between 1.5% and 5.5%, and a deposit of 15% rounded to the nearest €500. Trials were partially randomized to ensure that the same car did not appear consecutively. Unbeknownst to participants, trials were paired such that within each pair one offer strictly dominated the other. Pairs were the same on all attributes (brand, model, colour, and all listed attributes of the financial plan) except APR and mileage allowance, with one offer having a higher APR and stricter mileage limit. At this stage, participants were randomized into four conditions, with half presented with a weekly mileage alongside the
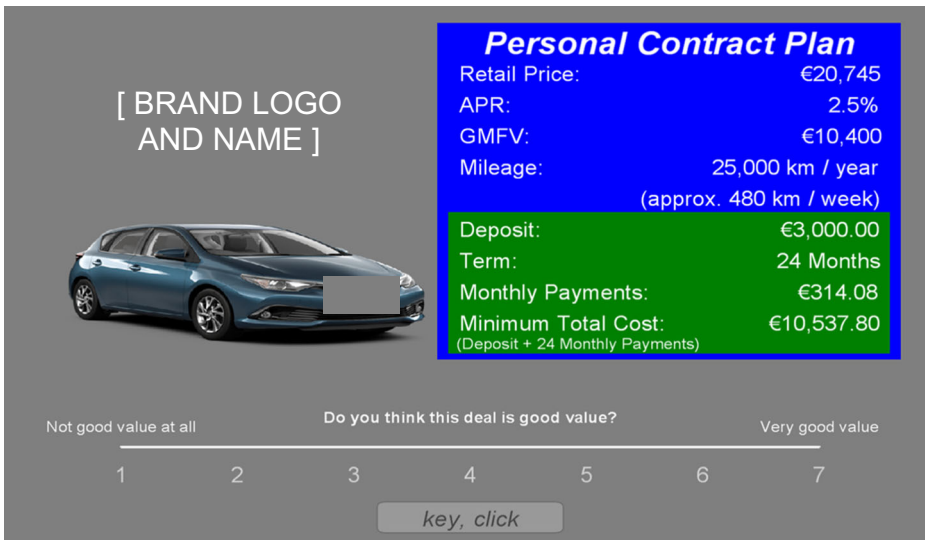
Fig. 2 Example rating scale (RS) display in stages 4 and 8, for the condition that included both the weekly mileage and minimum total cost (MTC). The participant rates the offer on a scale of 1–7 in terms of value

annual limit and half presented with minimum total cost (MTC) information. This followed an orthogonal 2 × 2 structure, such that one quarter of participants received both manipulations and one quarter received neither.

Multiple-Choice Questions

Eight MCQs were presented sequentially to test explicit understanding of the properties and operation of a PCP agreement. Two questions explored whether the components of a PCP deal were understood: What APR is charged on; how equity is calculated. These questions had four possible answers. Two questions were true/false questions and explored basic factual issues: Who owns any equity at the end of the deal; whether equity is transferable. Four questions tested whether participants understood the direction of key relationships: Higher GMFV implies lower repayments, higher second-hand car market implies increased chance of equity at the end of the deal, higher GMFV implies decreased chance of equity at the end of the deal, and higher mileage allowance implies lower GMFV. These questions had four possible answers. Responses were given by clicking on an answer.

After the initial set of questions was established, a second set was developed in which each relationship was inverted, e.g., the first set asked about the implications of higher GMFV for repayments while the second asked about the implications of lower GMFV. Half the participants answered the first set of questions, and half answered the second. One full list of MCQs is provided in the Appendix.

Advice Intervention

Participants were randomly assigned to two conditions. In one, they were given a hardcopy version of the advice on PCPs given on the CCPC website. The advice consisted of text designed to elucidate the pros and cons of PCPs. In the second

condition, developed by the experimenters, the hardcopy sheet focused on a graphical aid that showed an example PCP deal and was designed to convey the relationships between different factors in a PCP agreement. We refer to the two groups as the textual intervention (TI) and graphical intervention (GI) groups. The diagram provided to the GI group is shown in Fig. 3 (in the experiment the diagram was in colour).

Post-Intervention MCQs

Participants were presented with whichever set of eight MCQs was the inverse of the set they tackled prior to the intervention.

Post-Intervention RS

In this final stage, participants repeated the RS task from stage 4.

Procedure

The study was conducted in line with institutional ethical guidelines. It was undertaken in groups at the experimenters' research institute, with up to five participants per group. Before and on arrival participants were informed that they were taking part in a study on choosing car finance. Participants were presented with an information sheet describing what to expect but were not informed of the purpose of the study nor of the funder, in order to minimize experimenter demand. Consent was otherwise informed.

In stage 1, participants were invited to open an envelope on the table in front of them and told to read it carefully. After a period of 2 min—enough to read the sheet carefully more than once—they were instructed to return the sheet to the envelope. They then proceeded to stage 2, where they were asked to select a favourite and second favourite car. At stage 3, participants were instructed always to choose their preferred option of the two onscreen deals. They could proceed at their own pace.

When participants began stage 4, it was stressed that they were no longer to respond according to how much they liked what was on offer. That is, they were to ignore whether the offer related to a hatchback or SUV etc., but instead to respond according to whether the offer represented objective good value. Participants clicked on the scale from 1 ("Not good value at all") to 7 ("Very good value") and were then asked to confirm their rating.
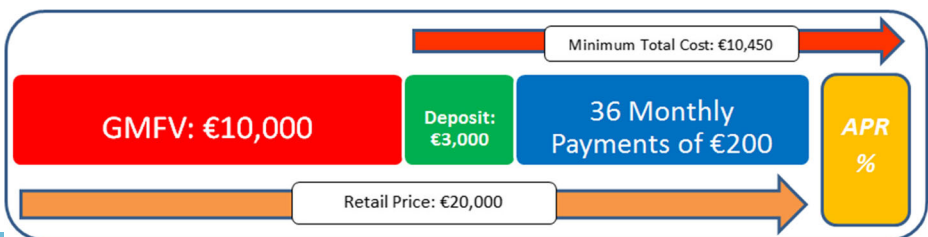

Fig. 3 Diagram included in advice for the graphical intervention (GI) group at stage 6. The diagram was designed to break a PCP deal down into its components

Ahead of stage 5, participants were reminded that each correct answer increased their chances of winning a €50 voucher. After clicking on each answer, they were invited to confirm their response before the next question was presented.

At stage 6, participants were invited to open a new envelope (which had been placed on the table in front of them during stage 5) and to read the contents carefully. They had 6 min before they were instructed to put the document back into the envelopes—enough time to read the entire document and to revisit key parts as they wished. Following the intervention, participants were asked to complete stage 7 and then stage 8, introduced as above for stage 5 and stage 4 respectively.

Following the completion of the final stage, participants provided some basic background information, including their age, gender, educational attainment, and whether they were a car owner. In total, the experimental session lasted less than half an hour.

Results

Adaptive Choice Task

Participants' consistency in stage 3, the ACT, was assessed separately for each of the two trade-offs undertaken in the PCP and HP conditions (price difference vs. car preference; APR difference vs. car preference). For each trade-off, the staircase had an upper branch (starting with a large price/APR difference and decreasing it in steps) and a lower branch (starting with equal price/APR and increasing the difference in steps). We first produced a best estimate of the implied price/APR difference at which participants were indifferent between their first and second choice car, following principles similar to those employed with staircase procedures in perceptual psychophysics. For each participant and staircase, we located the smallest price/APR difference reached by the upper branch and the highest price/APR difference reached by the lower branch, then calculated the mean price/APR difference of these and subsequent trials as our best estimate of the participant's point of indifference. We then calculated the proportion of all responses consistent with this point of indifference.[2]

Cumulative distributions of consistent responses by staircase and condition are shown in Fig. 4. Around half the sample produced consistent responses. For staircases where participants had to trade-off their choice of car against an APR difference, more inconsistent responses were recorded for participants in the PCP group compared to the HP group. The same pattern did not arise for the trade-off with the retail price, where the distributions of the proportion of inconsistent responses were closely similar between the two conditions.

The number of inconsistent choices was modelled using Tobit regression, which takes account of left-censoring at zero. Dummy variables for gender, age, whether the participant had a degree, and whether they were a car owner were included also. Results are presented for both the APR and retail price staircases in Table 2. In the APR condition, model (1) finds that the number of inconsistent responses was higher in the PCP condition compared with the HP condition. For reasons of convention and to maintain consistency within the table, the asterisks in Table 2 relate to two-tailed significance tests. However, HI is a directional hypothesis and so the appropriate test is one-tailed, meaning that this effect is statistically significant at the 5%

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[2] Data for three participants were discarded on the grounds that their responses were too erratic to estimate an indifference point.
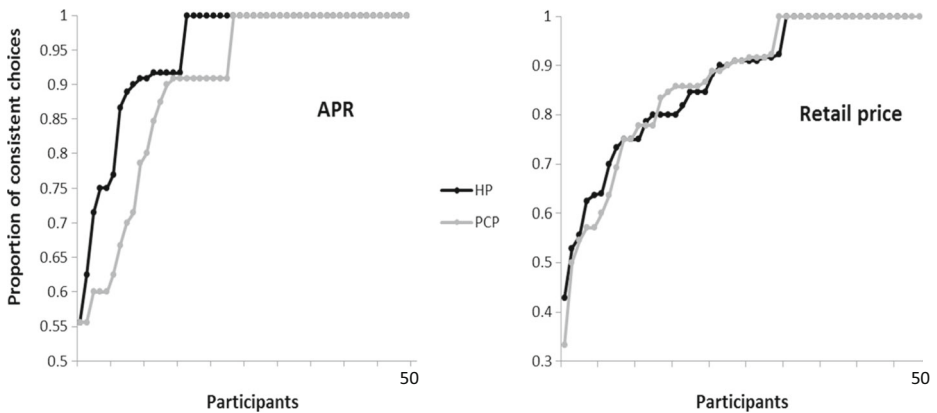
Fig. 4 Proportion of consistent responses in the ACT task (stage 3) for PCP deals and HP deals, when trading off APR differences against car preference and when trading off retail price against car preference

level. The number of inconsistencies was significantly lower among participants aged over 40 years and those with a degree. Model (2) shows that there was a significant interaction between the PCP condition and age. The pattern of coefficients implies that the PCP condition generated more inconsistent choices among only younger participants.[3] The estimated effect size for younger participants is of similar magnitude to possessing a degree. Models (3) and (4) repeat this analysis for the retail price staircases. There was no equivalent effect of the PCP condition. Those with a degree were more consistent in their choices.

The remaining responses required those in the PCP group to trade-off GMFV against mileage allowance and monthly payment. A low GMFV not only increases repayments but also loosens mileage restrictions and increases the chances of equity at the end of the contract. We tested whether participants would reach a balance between these factors or whether they would always favour one direction. Just over one third of participants (17) failed to home in on a point of indifference. In 12 cases, the participant reached the point where they accepted a mileage limit of just 5000 km, less than one third of average mileage for Irish car owners and half of the lowest limit offered in the market, at which point the staircase terminated. Similarly, in five cases participants reached a GMFV of just €3500 for a 3-year old car. We found no impact of age, gender, education, or car ownership on the likelihood of homing in on a point of indifference.

Rating Scales

There is a lack of consensus regarding when subjective response scales may be considered to be interval scales (Kemp 2015), though many argue that parametric analysis of such scales is generally appropriate (Carifio and Perla, 2007). In the present case, the rating scales were numeric, evenly spaced, and labelled only at the end-points (Fig. 2). We assume that participants perceived the gap between each number and space as being of equal magnitude and hence we treat responses as an interval scale. Our main findings are in any case replicated via ordered logistic regression (described below). The mean

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[3] We also tested for interactions of the PCP condition with gender and car ownership, both of which were non-significant and are excluded here for reasons of parsimony. Including these interaction terms does not alter the reported results.

Table 2 Tobit regressions for the number of inconsistent responses in the ACT task (stage 3), when trading off APR differences against car preference and when trading off retail price against car preference

	APR		Retail price	
	(1)	(2)	(3)	(4)
PCP	.101*	.204**	− .026	.002
	(.057)	(.077)	(.048)	(.068)
Female	− .012	− .011	− .028	− .026
	(.056)	(.054)	(.048)	(.048)
Age > 40	− .170***	− .046	− .067	− .039
	(.063)	(.084)	(.052)	(.071)
PCP*age > 40		− .222**		− .056
		(.111)		(.096)
Degree	− .178***	− .177***	− .147***	− .147***
	(.063)	(.062)	(.052)	(.052)
Car owner	− .038	− .044	− .055	− .057
	(.060)	(.059)	(.052)	(.052)
Constant	.113	.071	.252***	.241***
	(.079)	(.081)	(.066)	(.069)
N	97	97	97	97
Pseudo R^2	0.196	0.250	0.172	0.178

Standard errors are in parentheses

*$p < .1$; **$p < .05$; ***$p < .01$

rating given to offers in stage 4, prior to the advice intervention, was 4.47 (sd = 1.45). Rating differences were calculated for each dominant-dominated pair, such that a positive rating difference indicated that the objectively better offer (lower APR and higher mileage limit) had been rated more highly. Of the 600 pairs rated, this was the case for 303 (50.5%). However, in 143 (23.8%) of cases, the dominant offer was rated as a worse deal than the dominated one. These frequent violations of dominance were not confined to a minority of participants: 71 of the 100 participants generated at least one violation among six paired ratings.

Rating differences passed standard tests for normality (Shapiro–Wilk, $p > .5$). To test for differences by condition, we estimated random intercept models (i.e., assuming normal variation in the tendency to give high or low ratings across participants) with the rating difference as the dependent variable and the presence of weekly mileage and MTC information as covariates. Model (1) of Table 3 shows that neither of these information disclosures helped participants to rate the objectively better deal more highly. In fact, both estimated coefficients indicate a negative influence, with the negative influence of the MTC information statistically significant at the 10% level. A test for an interaction between the two disclosures was non-significant. Thus, there was a high level of mistakes in the rating of the PCP deals, which was not helped by the additional information disclosures.

Ratings were taken again in stage 8 following the consumer advice interventions. The number of pairs for which the dominant offer received a worse rating fell to 114 (19%), with 59 participants making at least one error. Model (2) in Table 3 expands the regression analysis to include the pairs from stage 8, testing separately for an effect of the two different consumer advice interventions. Both had a positive effect on the rating difference relative to pre-intervention performance, with the TI advice significant at the 10% level and the GI advice significant at the 5% level.

Table 3 Random intercept models for the rating difference (dominant–dominated) in stage 4 (model (1)) and stages 4 and 8 (models (2) and (3)), estimating the effects of mileage and MTC disclosures and the effects of consumer advice

	(1)	(2)	(3)
Weekly mileage	− .110 (.198)	.015 (.177)	.014 (.165)
MTC	− .370 (.198)*	− .139 (.177)	− .289 (.177)
TI advice		.212 (.129)*	.224 (.129)*
GI advice		.344 (.157)**	.333 (.153)**
Female			.288 (.173)*
Age (Ref = 20–29)			
30–39			.304 (.262)
40–49			− .197(.254)
50+			− .166 (.270)
Degree			.242 (.195)
Car owner			.074 (.191)
Constant	.818 (.190)***	.640 (.181)***	.391 (.290)
Obs.	600	1200	1200
N	100	100	100

Cluster robust standard errors in parentheses

*$p < .1$; **$p < .05$; ***$p < .01$

Two robustness checks were performed. First, although random assignment to condition is designed to ensure that observed differences are not due to individual differences, model (3) nevertheless introduces background variables as controls and to test for any differences by gender, age, education, and car ownership. The primary results relating to the interventions are unaffected. Having a degree, car ownership, and age have no impact, but the performance of females is estimated to be somewhat superior (significant at the 10% level). Second, while we chose the rating difference as our dependent variable in order to maximize variation in the data, it could be argued that the directional difference from zero is more important than variation in the rating difference away from zero, perhaps especially the likelihood of a negative difference that indicates dominance violation. Thus, we first re-estimated the model as a mixed-effects ordered logistic, with the rating difference categorized into three outcomes (negative, equal, positive), then again as a mixed-effects binary logistic (negative rating or not). Results for the interventions tested were closely similar to those in Table 3. The positive effect for females became significant at the 5% level in both models—women were significantly less likely to generate dominance violations.

The above analysis focuses on mistakes (dominance violations) and whether interventions reduced the likelihood of error. Also of interest is whether the consumer advice had any overall effect on ratings of PCP deals. If participants had specific misconceptions that were altered by the advice, overall ratings might have changed as participants found PCP deals in general more or less appealing. To test this, we matched pre- and post-intervention pairs and computed the difference between ratings, with a positive difference indicating a higher rating post-intervention. Of the 1200 pairs, for 473 (39.4%) the post-intervention rating decreased, while for 347 (28.9%) it increased. Employing a similar random intercept model to model (1) above, but with the post- versus pre-intervention difference as the dependent variable, we tested the significance of this effect by condition. The form of advice (TI vs. GI) had no significant effect ($p > .1$), but the effect did depend on the weekly mileage and MTC disclosures. Participants given the weekly mileage displayed greater decreases in ratings ($\beta = -0.423$, s.e. $= 0.212$, $p < .05$) as did those given the MTC ($\beta = -0.318$, s.e. $= 0.173$, $p < .1$), although there was a

significant positive interaction between the two ($\beta = 0.617$, s.e. $= 0.291$, $p < .05$). Looking across this pattern of estimated coefficients, the upshot is that ratings were decreased significantly by the advice for participants who were given either piece of additional information, but not for those who were given both.

Multiple-Choice Questions

Six of the eight MCQs had four possible responses while two MCQs had two possible responses. Thus, the expected total correct for a participant performing at chance was 2.5/8. The mean total correct in stage 5 was 3.46 (sd $= 1.32$). Twenty-three of the 100 participants performed no better than chance, i.e., scored 2 or less. No participant scored the maximum 8. In stage 6, following the consumer advice intervention, the number of correct scores increased, but did so differentially according to which intervention the participant received. The mean score following the TI advice was 3.98 (sd $= 1.53$), a significant increase (paired, $t(98) = -2.65$, $p < .01$). For GI advice, it climbed to 5.22 (sd $= 1.57$), also a significant increase (paired, $t(98) = -5.16$, $p < .001$). The post-intervention mean score for the GI advice was significantly higher than that of the TI advice (unpaired, $t(98) = -4.00$, $p < .001$).

The proportion of correct responses pre- and post-intervention by the type of consumer advice intervention is shown for each of the eight individual questions in Table 4. Statistical significance was determined by estimating a separate logistic regression for each question, where the dependent variable was whether the response was correct, the intervention type was specified as two dummy variables, and a separate dummy variable was included to control for which version of the question was asked pre- and post-intervention (see subsection "Multiple-Choice Questions"). The pattern of responses in stage 5 indicates that participants initially struggled in particular to understand the impact of the second-hand car market on a PCP contract (Q2). Of the six questions with four responses, the question that related to the mileage-GMFV relationship (Q4) had the highest proportion of correct responses, while the proportion of correct responses on the other five questions did not exceed 38%. The TI advice significantly improved performance on two questions. The GI advice significantly improved performance on five questions, most of which related to relationships between components of a PCP plan.

Additionally, we estimated a mixed logistic regression for responses to all questions, with the probability of a correct answer assumed to vary normally across individuals and control

Table 4 Proportion of correct responses to each MCQ answered pre-intervention (stage 5) and post-intervention (stage 6), separated by type of consumer advice intervention

No.	Question topic	Response options	Correct responses (%)		
			Stage 5	Stage 6 (TI)	Stage 6 (GI)
Q1	What is APR calculated on?	4	35	38	70***
Q2	Implication of second-hand market movements?	4	27	26	62***
Q3	Is equity transferable?	2	50	66*	50
Q4	Direction of mileage-GMFV relationship?	4	64	62	76
Q5	How is equity calculated?	4	34	48	76***
Q6	Direction of GMFV-repayments relationship?	4	38	54**	70***
Q7	Who owns equity?	2	63	74	64
Q8	Direction of equity-GMFV relationship?	4	35	30	54**
	Total		43.3	49.8**	65.3***

$*p < .1$; $**p < .05$; $***p < .01$

variables specified for which question was asked. This assumption was supported by our descriptive data, since the distribution of the number of correct responses across participants was approximately normally distributed (Shapiro–Wilk, $p > .5$). The results are shown in the final row. The improvement associated with the TI advice was statistically significant at the 5% level. The improvement associated with the GI advice was substantially greater and statistically significant at the 0.01% level. These results were unchanged by adding variables to the specification for gender, age, car ownership, and whether the participant had a degree. Of these, only car ownership had a possibly significant influence on the likelihood of giving a correct response, although the effect ($\beta = .221$, s.e. $= .125$, $p < .1$) was weak relative to those associated with the TI advice ($\beta = .307$, s.e. $= .130$, $p < .05$) and, especially, the GI advice ($\beta = .925$, s.e. $= .134$, $p < .001$). The equivalent test comparing the two interventions revealed that the GI advice significantly increased the probability of a correct response over and above the TI advice ($p < .001$). Interacting these dummy variables with the specific questions generated a very similar pattern by question to that shown in Table 4 (not shown).

Discussion

Given the lack of previous empirical consumer research on PCP finance, the present study set out to be exploratory in nature and to examine multiple hypotheses. In this final section, we summarize relevant findings with respect to each hypothesis before considering the implications of the results for consumer policy and future research.

Summary of Empirical Findings

The findings offer some support for the hypothesis that PCPs reduce the consistency of consumer choices relative to HP finance (H1). Consumers in the PCP group gave less consistent responses over a sequence of pair-wise choices in which preferences for model of car had to be traded off against APR, while no difference emerged in the equivalent trade-off against the retail price. Difficulty in understanding the credit aspect of a PCP deal is the obvious candidate to explain the difference, which was due to inconsistent responses among participants aged under 40. In addition, nearly one quarter of participants in the PCP condition accepted a mileage allowance of 5000 km/year in return for a higher GMFV, just half the minimum mileage commonly offered by dealerships. While it is feasible that these participants would not use a car enough to violate this exceedingly low allowance and did not mind the minimal chance of future equity given the accompanying high GMFVs, some may have been overly attracted by low monthly payments.

Similar difficulties were evident when consumers undertook the rating scale (RS) task. Almost one quarter of the time participants judged a deal to be better value than another that was objectively superior, because it offered a lower APR and higher mileage limit but was otherwise identical. This violation of dominance supports the hypothesis that consumers often make objective mistakes when evaluating PCP deals (H2).

Perhaps most striking, however, was performance in multiple-choice questions (MCQs) that explicitly tested comprehension. The MCQs did not require any arithmetic, or indeed any kind of explicit calculation, only understanding of the essential elements of ownership, deal structure, and directional relationships among key attributes. Yet, following exposure to standard marketing material of relatively high-quality, performance barely exceeded chance for a group of consumers

who were incentivized to provide correct responses and more than half of whom were educated to degree level. This amounts to strong support for the hypothesis that consumers struggle to understand the main features of PCP plans (H3). Participants had particular difficulty with questions related to the situation at the end of the contract, such as the likelihood of equity and how this relates to the GMFV and movement in the second-hand market.

In sum, our first three hypotheses were supported and, consequently, the findings imply a clear answer to our primary research question. Consumers' comprehension of PCP finance appears to be poor.

Our second research question was whether comprehension could be improved. Exposure to independent consumer advice both increased the number of correct responses to MCQs and reduced the frequency of dominance violations in the RS task, providing evidence for the usefulness of independent advice written from the consumer's perspective (H4). However, two additional information disclosures we tested produced mixed results. Neither expressing the mileage limit as a weekly figure nor making explicit the minimum total cost (MTC) over the contract helped consumers to avoid dominance violations when rating deals. Indeed, the MTC intervention probably made matters worse. Thus, any improvement of comprehension associated with reframing this key aspect of the product may have been outweighed by the degree to which adding this piece of information further taxed cognitive capacity in a context where consumers must already process multiple aspects of a PCP deal (retail price, APR, GMFV, mileage allowance, cost of credit, deposit, term, monthly repayments). Overall, therefore, we found little if any support for H5 and H6. However, while not assisting participants to make good relative comparisons, exposure to one of these disclosures (but not both simultaneously) did result in ratings in general falling after reading consumer advice. The implication may be that the disclosures do highlight important elements of PCP deals, but are nevertheless inclined to worsen information overload. Finally, we recorded clear evidence that the consumer advice designed by the experimenters (GI), the main innovation of which was to display a diagram of the components of a PCP deal, had a larger effect on comprehension than the primarily text-based advice (TI) available online at the time of the experiment. This finding supports H7. The advice containing the graphic was particularly effective in improving understanding of how the different components of a PCP plan relate to one another.

Potential Limitations

Before considering the implications of the findings, it is apt to consider the potential limitations of the present study. As with all laboratory experiments, thought must be given to the extent to which responses given in the lab are a guide to choices and behaviours in real-world settings. We discuss three issues.

First, the study was hypothetical. It is possible, given the substantial sums involved, that car buyers devote more time and effort to understanding PCP deals than did our participants and, consequently, that they understand PCP deals better than our study implies. Although the results we present cannot rule this possibility out, they offer reasons to be sceptical of any such claim. Recall that participants were incentivized on a question-by-question basis and read the PCP marketing and advice material in the knowledge that they were about to face questions about it. They also displayed a substantial improvement in responses after reading the independent advice (especially in the GI condition). This improvement strongly indicates that participants tried hard to absorb information they were given and to produce good responses. It is ultimately a

matter of judgement whether a typical car buyer tries to understand a PCP plan more determinedly than our participants did. However, given the extent of effort induced by our design and indicated by the data, we contend that a step-jump in comprehension from our participants to a typical car buyer is unlikely. Recall also that the marketing material shown to participants at the beginning of the study was based on the material supplied by providers in the Irish market at the time of the study and selected to be the most easily understood material we could locate. Although this judgement is admittedly a subjective one made by the research team, the information placed before the average buyer is unlikely to be more helpful.

Second, the difficulty of the tasks in our study was set by the experimenters, so the absolute level of performance reflects this process as well as the comprehension of participants. The level of difficulty was not set arbitrarily, however, but on the basis of a judgement that failure to respond accurately would indicate a consumer protection issue. For instance, where consumers cannot make consistent choices between pairs of products, or where they rate an offer more highly than another when it is objectively poorer (and judged just moments apart), they will struggle to home in on good deals when conducting internet searches. Similarly, where consumers do not understand that when one component of a deal goes up another comes down, or that a choice made now has a specific consequence for their financial situation at a future date, there is an increased possibility that they will encounter an unpleasant surprise at some point after making a substantial financial decision.

Third, the specific experimental design employed may have somewhat overestimated the influence of independent advice. We opted to compare responses to MCQs on a pre- and post-intervention basis, inverting each question between the two sets such that it had to be tackled afresh. With such a design, it is possible that some improvement took place simply because participants learned as they progressed through the session or that while reading the independent consumer advice participants specifically sought to understand the issues probed in the first set of MCQs. We opted not to include a control group that received no advice because we wanted to devote statistical power to the difference between the two advice formats. Indeed, the fact that the two interventions had differential effects, both in terms of magnitude and focus, strongly suggests that the results were not driven by learning during the session. It remains possible that when reading advice participants sought information specific to the MCQs previously asked. If so, they might have outperformed a cold reader and, therefore, produced stronger performance in the second set of (inverted) questions. We cannot be certain, given present data. Again, however, the differential comprehension induced by the TI and GI advice suggests otherwise, since information sufficient to answer the specific questions was available in both. Furthermore, it is perhaps an unlikely strategy for participants to adopt. They did not know that they would be asked a second set of MCQs and it would in any case be a considerable feat of working memory to retain the eight separate concepts underlying the MCQs while searching actively within a technical document for information specific to each.

Policy Implications

PCP plans should be considered a complex financial product. The scale of misunderstanding of PCP finance implied by the present study provides evidence that a substantial proportion of car buyers are unlikely to comprehend such deals. It should be noted that this does not

necessarily imply that their decisions are at fault nor that they will suffer negative consequences. However, the likelihood of these eventualities is surely higher than when consumers engage with products that they understand better. The evidence presented here also implies that car buyers will struggle to locate the better deals. Of perhaps particular concern is the difficulty of comprehending the factors that dictate circumstances faced at the end of a PCP deal. As outlined in the introduction, the consumer bears the market risk, may fail to meet mileage and wear-and-tear conditions, and is tied to a single dealer unless they have sufficient liquidity to make a large final payment. Our findings suggest that this scenario is not well understood. A proportion of consumers may therefore be surprised to discover that having paid a substantial sum over, say, 3 years, tried to care for the car and to stay within stringent mileage limits, they own little or no part of any useful asset in return.

These findings and the lack of previous studies suggest that PCP finance requires greater attention from consumer policymakers than has perhaps been acknowledged. Nevertheless, consumer protection concerns need to be balanced against the positive benefit of increased affordability that has accompanied the arrival of PCP plans. Evidence suggests that many standard financial products generate confusion among consumers. Studies now link various features of insurance products (Bhargava et al. 2017; Suter et al. 2017) and investment products (Beshears et al. 2011) to objective mistakes. Key elements of mortgage products are not well understood by homeowners (Lacko and Pappalardo 2010) and those with poor financial literacy are more likely to choose riskier mortgages (Gathergood and Weber 2017). The degree to which preferences for pension products are subject to framing effects (Brown et al. 2008) suggests they are not well understood either. These inconsistencies, biases, and straightforward mistakes present challenges for policymakers, where a balance must be struck that allows consumers to reap benefits yet protects them from pitfalls. The same is true of PCP plans.

In this context, the current study provides evidence that consumers considering PCPs would benefit from good independent advice; comprehension of PCP plans can be improved substantially. Advice that included an explanatory diagram was particularly effective. The findings therefore raise the issue of how best to get effective advice in front of car buyers. The scale of miscomprehension revealed here might be taken to support a more interventionist approach, moving policy beyond the provision of independent information about PCPs that car buyers can seek if they wish, to the mandating of more effective disclosures at the point of sale. In keeping with the principles of empirically informed regulation (Sunstein, 2011) and given the regulatory costs involved, disclosures might be pre-tested for effectiveness to inform such a policy.

Theoretical Implications

As described in Section "Literature Review and Hypotheses," the hypotheses and interventions tested in this study were derived from previous empirical and theoretical work in psychology and behavioural economics. In particular, we focused on the interaction between product complexity and cognitive load. We reasoned that the additional complexity of PCPs relative to more traditional credit products would challenge cognitive capacity and that interventions designed to simplify the required information processing, draw attention to important attributes, or reduce cognitive load via diagrams would aid decision-making.

The confirmation of hypotheses relating to consistency of decisions, errors, and explicit comprehension (H1–H3) adds to the growing body of evidence that cognitive capacity constraints cause consumers problems when dealing with complex products. The finding that

inconsistencies were more likely in the PCP (relative to the HP) condition when participants had to trade-off their preference for model of car against the APR, rather than the retail price, is also consistent with the view that nonlinear relationships add to this difficulty (Lusardi and Mitchell 2011; Stango and Zinman 2009). However, the interventions that we designed to reduce cognitive load were only partially successful. "Meta-attributes," like our MTC disclosure, aim to reduce cognitive load by replacing multiple attributes with a single attribute that incorporates them. Nevertheless, unless they replace presentation of the attributes they summarize, in the first instance, they constitute an additional piece of information, with the potential to backfire. Helpful reframing, like with our weekly mileage disclosure, aims to make information easier to process, reducing cognitive load and perhaps allowing more information into the consumer's mental account (Thaler 1999). Any effect of reframing we recorded here was, however, marginal.

More encouraging was the impact of advice that included an explanatory diagram, which had a substantial impact on explicit comprehension—larger than the text-based advice. It was particularly effective in improving understanding of how the different components of a PCP plan relate to one another. Some caution is warranted here, as the diagram was not the only difference between the two forms of advice tested. We did not independently manipulate differences in diagrams and text, because the primary aim was to generate evidence for policy. Nevertheless, it is a reasonable conjecture that the diagram made a substantial contribution. Diagrams may prove useful for explaining other retail financial products. Additionally, the finding supports the broader theory that diagrams aid understanding of complex relationships and promote causal inference (Butcher 2006; Mayer 2002; McCrudden et al. 2007), by adding empirical evidence from the domain of consumer finance.

Future Research

The effect of explanatory diagrams is one potentially fruitful area for future research implied by the current study. Moreover, the increased application of behavioural science to policy means that policymakers have similarly increased access to experimental methods for designing and pre-testing diagrams as tools of information provision and disclosure.

The findings point to a perhaps more urgent need, however, for more research to support consumer policy on car finance. As stated at the outset, car purchase is one of the largest financial transactions households undertake. PCP plans are an innovative form of finance of increasing popularity, yet consumers struggle to understand the basics of how they work. An important research question, therefore, is how well consumers who already have PCP deals understand the terms of their contract and the situation they are likely to face when it comes to an end. Our results suggest a likely answer indirectly, but field studies or surveys could be deployed to obtain an answer directly.

Another question not addressed in the current study is the degree of confidence that consumers have in their understanding. Work on financial literacy suggests that in some domains, consumers are excessively confident in their understanding (OECD, 2005) and, in general, overconfidence is more likely when tasks are difficult (Fischhoff et al. 1977; Kahneman and Tversky 1996), such as when assessing the future market value of a car. This is important, because overconfidence may make consumers less inclined to seek the sort of independent advice that our results show can be effective, potentially strengthening the case for stronger mandated disclosure.

Conclusion

This study used an exploratory set of experimental tasks to address two primary research questions: (i) How well do consumers understand PCP plans? (ii) Can understanding be improved via disclosure or advice?

With respect to the first question, the findings indicate that consumers struggle to comprehend PCP deals. The results suggest that consumers make more inconsistent decisions relative to more traditional forms of finance. They also make errors in relevant judgements and decisions. In this study, dominated offers were rated more highly than their dominating counterpart in approximately one quarter of judgements, regardless of how information was presented. Initial performance on questions that tested explicit comprehension of the product, with no requirement for arithmetic calculation, was straightforwardly poor. Crucial product features were not understood based on information typically supplied by car dealerships. With respect to the second question, our findings are mixed. Disclosing a minimum cost or reframing mileage restrictions was of little or no measurable benefit. However, reading consumer advice improved comprehension, especially advice containing an explanatory diagram of the main components of a PCP.

Overall, the findings raise concerns from a consumer protection perspective. PCPs are increasingly prevalent and popular. They involve large sums relative to household budgets. Yet they appear to be poorly understood.

Appendix

One set of multiple-choice questions (MCQs). Questions were rephrased or inverted for the second set, with the order of the two sets counterbalanced across participants.

1. In a PCP agreement, what is the APR (annual percentage rate) charged on?

    (a) The retail price of the car minus the GMFV
    (b) The retail price of the car minus the initial deposit
    (c) The GMFV (guaranteed minimum future value) of the car
    (d) The retail price minus both the initial deposit and the GMFV [correct]

2. Assume the second-hand car market has done well over the course of your PCP deal and the price of a second-hand car has generally risen:

    (a) This could be good for you because you have a greater chance of having positive equity at the end of your deal [correct]

(b)   This could be bad for you as you will need to pay more to purchase your car at the end of your deal

(c)   This has no relevance for you and your PCP agreement

(d)   I do not know

3.   At the end of a PCP agreement, the dealer evaluates the market value of the PCP car. You can then use any positive equity on the car towards the final payment on the car in order to take full ownership:

(a)   True

(b)   False [correct]

4.   When establishing the mileage allowance for a PCP deal, the higher the mileage:

(a)   The lower your GMFV should be [correct]

(b)   The higher your GMFV should be

(c)   Neither of the above

(d)   I do not know

5.   At the end of a PCP deal, the dealer evaluates the market value of the PCP car. If you wish to move onto a second PCP deal, what aspect of your previous PCP deal can be put towards your new deposit?

(a)   Your original deposit from your first PCP agreement

(b)   The market value of your first PCP car

(c)   The difference between the market value of your first PCP car and its guaranteed minimum future value [correct]

(d)   The guaranteed minimum future value of your first PCP car

6.   At the start of a PCP deal, the higher your GMFV:

(a)   The lower your monthly payments [correct]

(b)   The higher your monthly payments

(c)   Neither of the above

(d)   I do not know

7.   At the end of a PCP agreement, the dealer evaluates the market value of the PCP car. If I choose to walk away and not purchase the car or enter into a second PCP agreement, I am not entitled to be rewarded or make use of the positive equity on my PCP car for returning it in good condition:

(a)   True [correct]

(b)   False

8. At the start of a PCP deal, the lower your GMFV:

   (a)   The lower your chances of having positive equity at the conclusion
   (b)   The higher your chances of having positive equity at the conclusion [correct]
   (c)   Neither of the above
   (d)   I do not know

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