Opting out of opting out

Testing the relative effectiveness of different messages in discouraging people from completing the 'opt-out' process following enrolment into a pension scheme

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Abstract

People save too little for their retirement, relative to their own intentions and expectations. This can cause financial problems for individuals in later life, as well as macro-economic difficulties for countries. Governments have therefore taken a close interest in how to address retirement 'under-saving'. In recent years, much policy focus has been on the use of default choice architectures to increase saving. Such approaches are effective, but still see some 'inappropriate' opt-outs, and leave scope for additional interventions to improve outcomes for individuals through the more effective exercise of choice.

This research explores two aspects of this topic, via a two-part research structure. First, a survey elicited self-reported 'intention to save' in response to different categories of message drawn from different frameworks within the behavioural literature, with a view to assessing the relative impact of these categories. It found that 'just-in-time' educational messages appear to be relatively more impactful than messages drawing on construal level theory, social norm information or seeking to increase perceived feasibility.

Second, a subset of these messages were transposed to a randomised control trial in a field setting, within the opt-out process from a large pension scheme. The trial found that individual propensity to complete the opt-out process is sensitive to the messages deployed within that process. However, the direction of the impact differs to that predicted, and the read-across from the stated-intention impact of messages to the observed impact in the field is weak.

The research suggests that there is scope to further influence savings behaviour, in particular to reduce opt-outs, but that additional research is needed to identify the most effective mechanisms for doing so.

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1. Introduction

Encouraging retirement saving has been rich territory for applying behavioural approaches to public policy. People appear to save too little to meet their own goals in retirement (Thaler & Benartzi, 2004), a challenge for which a range of psychological explanations have been offered (Ariely & Foley, 2016). Individuals recognise that they 'should' be saving more (Choi, Laibson, Madrian & Metrick, 2004), while 'objective' measures of smooth consumption such as income 'replacement rates' (Mitchell & Moore, 1998) show that many people will fall short of benchmark levels of income replacement if they do not increase their savings rates.

Recently, the focus of policy makers has been on the role of defaults to increase participation and contribution levels (see, for example, Choi et al, 2004, and Thaler & Benartzi, 2004). In the UK, since 2012, all employers have been legally required to automatically enrol workers into a pension scheme (DWP, 2006). This has led to a marked increase in overall levels of participation in private pension saving (DWP, 2017).

Nonetheless, within systems using defaults in these ways, at least two significant issues remain. Firstly, each person's 'optimal' savings and consumption behaviour through their lives will vary - sometimes significantly. By contrast, mandated defaults tend to adopt uniform parameters (such as contribution rates) for all participants and are therefore limited in the extent to which they can lead to individually optimal outcomes. This suggests an ongoing role for individuals to exercise choice within or beyond the default framework.

Secondly, default-based systems such as automatic enrolment still leave open the option for people to opt out. Some reasons to opt out at a given time or in a given situation will be consistent with an individual's true underlying preferences or utility. But there are also reasons to believe that for some, opting out will be subject to some of the same biases as reasons for not choosing to save in the first place.

The research presented in this paper is intended to contribute to an understanding of both issues, and in doing so to make two original contributions to the literature on retirement savings behaviour. First, the primary focus is on the extent to which people who are automatically enrolled into a pension but whose initial inclination is to opt out might be influenced not to do so – and instead to keep saving – by messages deployed during the 'opt-out' process. To date, most research on pension saving has focused on stimulating 'opt-in' behaviours such as choosing to save or to contribute more. Applying similar concepts to try to prevent or re-direct a behaviour among those intending to opt out of a savings default, the research will explore whether mechanisms such as automatic enrolment can potentially be made more effective in increasing overall levels of retirement saving.

Secondly, the research will seek to explore, at least to an extent, the comparative impact on pension saving behaviour and intention of different messaging interventions drawn from different theoretical stables. This aspect of the research is potentially applicable beyond the specific focus of influencing opt-out, to help practitioners to influence a range of retirement savings-related behaviours.

In the next section, the paper sets out the theoretical framework relating to pension saving, focusing primarily on a range of interventions that have previously been applied to encourage people to save or to save more.

In subsequent sections the paper describes a two-stage experiment that tests the effectiveness of these approaches in the specific context of the opt-out journey from a large automatic enrolment pension scheme, Nest. The first part of the experiment uses an online survey to elicit rankings of statements based on these theoretical approaches in terms of their impact on stated intentions to begin or increase saving for retirement. The second part takes a subset of these statements and deploys them in a randomised field experiment as part of the online opt-out journey through which savers automatically enrolled into Nest can choose to opt out if they wish.

2. Literature review

This section addresses the main theoretical issues at play in this research. A review of the relevant literature suggests the following: traditional economic theory predicts that people will save enough to smooth their income and consumption into retirement, but in practice people fail to behave in this way – they 'under-save' for retirement, while interventions suggested by traditional economic analysis fail to adequately correct this under-saving (section 2.1). Interventions leveraging choice architecture, in particular the use of defaults, have been more effective in addressing under-saving, but still leave room for examination of further interventions to encourage behaviour change (section 2.2). Research has suggested a range of possible psychological and behavioural reasons for under-saving (section 2.3) which in turn give rise to interventions to further address it (section 2.4).

2.1 People 'under-save' for their retirement

Traditional economic theory makes strong predictions about expected patterns of consumption and saving. People are expected to act rationally and selfishly to maximise their utility (see, for example, Thaler, 2011). Specifically, in this context, people should seek to 'smooth' consumption across fluctuations and peaks in their income (Friedman, 1957, and Ando & Modigliani, 1963). Since retirement represents a significant permanent reduction in income, under traditional economic models people would therefore be expected to withhold some of their working age income to fund their retirement.

In practice, empirical evidence suggests people often fail to save 'enough' for their retirement, both against the normative expectations of traditional economics and by their own self-assessment. The common 'objective' measure of retirement savings adequacy by policy makers is the 'income replacement rate' (Mitchell & Moore, 1998). Evidence suggests that in voluntary systems where people are required to make a choice to save, savings levels are generally insufficient to achieve suggested replacement rates. For example, in the United Kingdom, the independent Pensions Commission estimated that as many as 12 million people may be under saving for retirement (Pensions Commission 2005).

Such under-saving could be explained by different individual utility functions differently prioritising wealth in retirement, or by the failure of replacement rate measures to properly take account of other sources of income or wealth (MacDonald, Osberg & Moore, 2016). However, when asked, people also tend to self-identify that they are not saving at sufficient levels to meet their own needs or expectations in retirement. For example, Choi et al (2004) found two thirds of participants in a trial recognised they were not saving enough for retirement. These studies would suggest that there is a problem of under-saving when measured by savers' 'own lights' (Sunstein, 2009, p20) – an important consideration for the legitimacy of a behavioural nudge or intervention (ibid).

Under-saving does not appear to be fully explained by factors such as financial education or literacy. Studies measuring the impact of underlying levels of financial capability have concluded that apparent differences in behaviour correlated to levels of literacy are likely explained by other psychological factors (de Meza, Irlunbusch & Reyniers, 2008).

Nor is under-saving effectively addressed by interventions leaning on traditional economic analyses. For example, altering financial incentives through changes to tax relief on saving shows only a small behavioural impact (Benartzi, Beshears, Milkman, Sunstein, Thaler, Shankar, Tucker-Ray, Congdon & Galing, 2017). Interventions to increase information or education levels have only mixed results. Educational interventions do not always improve literacy levels or decision-making (Lusardi & Mitchell, 2014), with a significant number of studies showing no or a negative impact (Miller, Reichelstein, Salas & Bia, 2013). Where interventions do have a positive impact, it is often on intention, which is not always followed through in behaviour (Choi et al, 2004, and Clark & D'Ambrosio, 2008). Follow through into measurable behaviour, where it does exist, can be small – Fernandes, Lynch and Netemeyer (2014) found that educational interventions could explain only around 0.1% of downstream behavioural differences in a meta-analysis of 201 studies. Studies also suggest that where there is a positive impact from educational interventions, it fades over time (see, for example, Fernandes et al, 2014, and Barcellos , Carvalho, Smith & Yoong, 2016).

2.2 The impact of defaults, and residual issues of under-saving

As a consequence, public policy attention has shifted to focus on the use of more effective choice architecture – in particular, the use of defaults. Automatic enrolment – enrolling workers into a pension but giving them the right to opt out – has been shown to be effective in driving higher take-up (Madrian & Shea, 2001). Automatic escalation of contributions has been shown to persistently increase savings levels (Thaler & Benartzi, 2004). Offering fewer investment fund choices in a pension plan has been shown to lead to higher participation in the plan (Iyengar, Jiang & Huberman, 2003), overcoming a perceived choice overload (Iyengar & Lepper, 2000), while where a default investment choice is offered, the majority of people remain in it (Nest Insight, 2018a).

The right to 'opt out' from an automatic enrolment framework represents an important safety valve to ensure that those who might not want or need to save are not forced to do so, and is consistent with an underlying principle of libertarian paternalism: that it should encourage good outcomes without restricting choice (Thaler and Sunstein, 2008). However, it is not clear that those opting out are always doing so for 'good' reasons. Empirically, for example, in the UK pensions wealth has been accessible in cash at the age of 55 since 2015, removing the intertemporal nature of the choice to save for people over that age. Yet though employer and tax-relief top-ups for this group therefore essentially represent 'free money' with minimal frictional cost to access, opt-out rates for this group are actually higher than for younger savers, and remained largely unchanged across this change in the law (internal Nest data). This suggests some residual biases are at play.

2.3 Explanations for under-saving

There has been considerable exploration of the reasons why people fail to save at sufficient levels for retirement, identifying a number of possible psychological factors. Explanations have focused on the intertemporal nature of the choice of whether and how much to save (Laibson, 1996). Retirement saving imposes a 'cost' today, for a benefit deferred into the (often far) future. Thus retirement saving is heavily influenced by time preferences.

Individuals tend to exhibit present bias in their time preferences – 'over' valuing consumption or utility now relative to at some future time (see, for example, Laibson, 1997). Present bias may be exacerbated by loss aversion (Kahneman & Tversky, 1979) because saving now for a future benefit can be experienced as a loss today, which is assessed as costlier than the benefit it confers, leading to procrastination.

People experience psychological distance from their future selves (Trope & Liberman, 2010, and Hershfield, Garton, Ballard, Samanez-Larkin & Knutson, 2009), making it harder for them to associate at all with the benefits of retirement saving. This distance and lack of association may increase focus on the near-term 'cost' and pain of making contributions and deferring consumption (Zauberman & Kim, 2011), which in turn might reduce the perceived feasibility of taking meaningful action towards financial wellbeing in retirement.

Retirement savings decisions are complex, involving decisions about contribution levels, investment return assumptions and predictions about future work and income patterns projected far into the future. People tend to self-assess as lacking in confidence and understanding around finances and retirement saving (Money Advice Service, 2015) and exhibit low actual levels of understanding (ibid). Introducing more choice has been shown to increase inertia (Iyengar et al, 2003).

Complexity may exacerbate the perception that the feasibility of taking effective action is low, with perceived feasibility shown to be an important driver of effective goal pursuit (Bandura, 1977, and Ryan & Deci, 2010). The concept of 'status quo bias' (Saumuelson & Zekhauser, 1988) suggests that in the face of uncertainty about different courses of action we tend to prefer inaction over action, and thus stick with the status quo. Each of these factors is likely to exacerbate the impact of present bias to prefer consumption now to deferring consumption in sufficient amounts to adequately fund retirement. Thus where saving for retirement requires an active choice by the saver, it is unlikely to occur.

2.4 Interventions to reduce under-saving

Many theoretical bases and practical interventions have been explored with a view to improving individual decisions specifically about retirement saving or, more broadly, in relation to complex intertemporal choices.

2.4.1 Construal level and psychological distance

A number of researchers have explored the concept of psychological distance (Trope & Lieberman, 2010) in relation to intertemporal choice and present bias. Some interventions on this basis have

sought to directly address (reduce) perceived distance, with positive impacts shown in terms of reduced present bias (Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen & Bailenson, 2011).

Other interventions in this area have utilised the related concept of 'construal level' (Trope & Lieberman, 2010). Studies have explored whether we tend to focus on retirement saving too much in terms of the near-term action required to 'do' it and not enough on the long-term outcomes from having done so. Lieser, Azar and Hadar (2008) and Fujita and Han (2009) have suggested that intervening to prompt higher-level construal of retirement should reduce present bias, an idea given empirical backing in a study by Rudzinska-Wojciechowska (2017) and, in some contexts, in research by Ulkumen and Cheema (2011).

2.4.2 Feasibility and autonomy

Bandura (1977) has highlighted the importance of a sense of self-efficacy in pursuing goals. Individuals need to believe that the action required to achieve the goal is within their grasp. The complexity issues relating to retirement saving, described above, are likely to reduce perceived self-efficacy. Similar arguments arise from self-determination theory (Ryan & Deci, 2010) which highlights the importance of competence in supporting the maintenance of motivation. Thus intervening to increase perceived self-efficacy and feasibility may help to reduce undersaving. Hershfield, Shu and Benartzi (2018) found that presenting a regular savings contribution as a daily amount ($5 per day) led to higher take-up than the equivalent amount expressed monthly ($150 per month), and in part suggest this is due to the increased perceived feasibility of saving a seemingly smaller/less salient amount.

2.4.3 Just-in-time education

Just-in-time education involves administering an educational intervention at the point a financial decision is being made (Fernandes et al, 2014) to re-activate knowledge or aid its retrieval. As an approach it seeks to overcome the challenges identified above in terms of the lack of lasting effects of traditional educational interventions. Carlin and Robinson (2012) found that supplementing a traditional education programme with a just-in-time intervention enhanced various behaviours including debt repayment and contribution levels.

2.4.4 Social norms

The idea of using social norm information to encourage certain types of behaviour has gained traction within the behavioural sciences (Dolan, Hallsworth, Halpern, King & Vlaev, 2010). To date, social norm-based interventions have not been a significant area of focus in research relaying to pension saving (Wolfe, 2018). However, such interventions have been found to be successful in relation to other behaviours sharing similar 'intertemporal choice' characteristics – such as encouraging pro-environmental behaviours, such as towel re-use in hotels (Goldstein, Cialdini & Griskevicius, 2008) or reducing electricity consumption (Allcott, 2009).

2.4.5 Gain frames and loss frames

Research has shown that the framing of information can affect reactions and responses to that information (Ulkumen & Cheema, 2011). In particular, building on prospect theory (Kahneman & Tversky, 1979), messages can be framed in terms of the gains from performing an action, or the losses of not doing so (Eberhart, Bruggen, Post & Hoet, 2017). In the pensions context, loss-framed messages can increase propensity to search out information on pensions but can also create more negative perceptions among recipients (ibid). Gain and loss frames have, respectively, been found to positively influence different types of action (Brown, Kapteyn & Mitchell, 2016).

2.4.6 Family

Traditionally, pensions communications have focused on the benefits to the individual of saving for their retirement. However, research conducted in Mexico identified one barrier to saving being the perceived selfishness of saving for one's own retirement at the expense of spending on family today (Shah, 2018). The same study tested messaging interventions focused on the benefits to savers' families of saving for the future, showing a resultant increase in savings levels as a result (ibid). Similar attitudes were identified among self-employed savers in the UK (Nest Insight, 2018b).

3. Research approach, objectives, questions and hypotheses

Approaches to influencing retirement savings behaviour such as those described in section 2.4 have generally been applied to opt-in decisions to save, while elsewhere, described in section 2.3, at a public policy level governments have moved towards opt-out default architectures such as automatic enrolment. Thus, to date, the ideas discussed in these two sections have been largely 'either/or'. However, given the ongoing scope for under-saving even within systems harnessing default choice architectures, there is still considerable scope and benefit in understanding the effectiveness of different interventions in influencing behaviour within such systems.

The research presented in this paper seeks to meet the following research objectives:

- Firstly, to identify whether there is an observable hierarchy across different types of messages, drawn from different theoretical perspectives but applied to the same fundamental set of behaviours (saving for retirement). Most research to date has focused on establishing the efficacy of interventions based on these theoretical frameworks individually. For practitioners, these represent a menu of potential interventions, and beginning to understand their relative impact in certain circumstances is therefore of considerable potential benefit.
- Secondly, the research seeks to assess the impact of different messages traditionally used to encourage voluntary opt-in to certain behaviours (such as saving or saving more) in the specific context of those who are seeking to opt out of saving (having been defaulted in). Assessing the impact of messages in this context could contribute to increased effectiveness of default programmes such as automatic enrolment in increasing retirement savings.

Specifically, therefore, the research seeks to answer the following research questions:

1. What is the relative impact on stated intentions to start saving or increase saving of messaging based on a range of different theoretical frameworks?

2. For a subset of those messages, what is their impact on people's propensity to complete the online opt-out process once started, following automatic enrolment into a workplace pension scheme?

The study employed a two-stage methodology. First, a within-subjects survey was conducted to test the impact of a range of potential messages on stated intention to either start saving or increase saving in the near future. This stage was exploratory, primarily relating to the first research question, above, and as such, did not seek to test specific hypotheses.

The second stage of the study entailed a between-subjects, randomised control trial in the field, testing a subset of the stage 1 messages in the specific context of the online opt-out journey for enrolees not wishing to remain in their company's pension scheme. This second stage relates to both research questions, and specifically sought to test the following null hypothesis:

H0: Opt-out behaviour is invariant across different messaging treatments inserted into an online opt-out journey.

Building on messages tested in the first stage, the second stage sought to establish whether messages that prove effective in influencing stated intention to save or save more are more effective in practice when deployed during the opt-out journey than either untested messages or those proving less effective in relation to stated intention (in stage 1). This study therefore further tests the following two research hypotheses:

H1: Fewer savers will complete an online opt-out journey including the empirically tested messages in treatments 1 and 2 than do under the existing (untested) journey (the control condition).

H2: Fewer savers will complete an online opt-out journey based on the messages in treatment 1 than in treatment 2 (where those in treatment 1 were more impactful on stated intentions in stage 1 than those in treatment 2).

4. Research design and methodology

This chapter describes the design, approach and results of each of the two stages of research in turn, before chapters 5 and 6 discuss the overall findings of the two stages taken together.

4.1 Stage 1

4.1.1 Stage 1 research approach

Stage 1 of the project entailed a survey to test a range of potential messages drawing on the theories described in section 2.4. Messages were created in four 'groups', corresponding to the first four theoretical frameworks described. Within each 'group' four specific messages were identified, varying the exact treatments to be more or less specific, to focus on different approaches within a given group concept, or to overlay additional theoretical considerations.

Social norms:

Messages were developed highlighting the low levels of opt-out generally observed since the introduction of automatic enrolment. Individual messages were varied via the use of absolute numbers vs percentages, and by focusing on the high numbers staying in (90%/9 in 10) vs the low numbers opting out (10%/1 in 10).

Feasibility:

Messages were developed drawing on the ideas set out by Hershfield et al (2018), focusing on minimising the salience of the 'cost' of contributions by presenting values as daily amounts or 'a few pounds per day' and on monthly amounts in pounds, rather than the traditional pensions presentation of a percentage of salary. Implicit in including the monthly figure was the expectation that the smaller daily and weekly figures would have a higher impact on stated intention to save.

Just-in-time education:

Messages in this group sought to reinforce simple concepts about the value of saving – for example highlighting the compound-interest benefits of starting saving earlier, and the matched contribution elements from the employer and tax relief.

Construal level:

Messages in this group sought to refocus savers specifically on the future benefit of saving (the 'why'), in line with other experimental manipulations of construal level (for example, Ulkumen & Cheema, 2011). Variations sought to bring in the additional considerations described in sections 2.4.5 and 2.4.6, by focusing benefits on 'self' vs 'family', and framed as 'benefits sought' vs 'losses avoided'.

The four groups, and the 16 specific messages, are listed in full in Annex 1.

4.1.2 Stage 1 measures and variables

Respondents were asked to consider, for each statement, whether it made them more or less likely to start saving, or increase current saving levels, in the near future. Survey answers were elicited on a 7-point Likert-type scale as follows:

- Extremely unlikely
- Somewhat unlikely
- Moderately unlikely
- No more or less likely
- Moderately likely
- Somewhat likely
- Extremely likely

The dependent variable was therefore the stated likelihood of starting or increasing saving, with the main independent variable being the different statements the respondents were shown.

The full research procedure and analytical approach for phase one of the research is described in the technical annexes (annex 3). In headline terms, 514 UK adults recruited through an online platform completed a survey which asked them to rate each of the 16 statements on the above scale. Answers were compared to identify whether there were statistically significant differences in stated intentions across the different statements.

4.1.3 Stage 1 results

4.1.3.1. Summary statistics

Overall, the stage 1 survey provides some relatively clear insight in relation to the first research question.

Figures 1-4 show, in turn:

1. the 16 statements ordered in a simple ranking by mean response;
2. a pairwise comparison of each pair of statements to test for statistically significant differences.
3. the 4 groups, ordered in a simple ranking by mean response; and
4. a pairwise comparison of each pair of groups as above.

The data shows a clear hierarchy of both individual statements and groups. Differences in the impact of individual statements are generally statistically significant. Within the analysis of the individual statements, a clear ranking of the groups of statements also emerges, with just-in-time educational statements generally the most impactful, followed by construal level statements, social norm statements and then statements targeting perceived feasibility. This hierarchy is clearly borne out in the statistical tests of the groups, where all of the differences are statistically significant at the adjusted 1% level.

Figure 1: Simple ranking of means, all statements

Variable	Obs	Mean	Std. Dev.	Min	Max
rat3	514	5.459144	1.229623	1	7
congain2	514	5.354086	1.216806	1	7
rat1	514	5.307393	1.203821	1	7
rat4	514	5.284047	1.146679	1	7
rat2	514	5.215953	1.190467	1	7
conloss1	514	5.151751	1.226863	1	7
norm1	514	4.957198	1.195393	1	7
norm2	514	4.933852	1.156178	1	7
congain1	514	4.924125	1.265867	1	7
conloss2	514	4.840467	1.257274	1	7
feas4	514	4.678988	1.294789	1	7
feas1	514	4.533074	1.344933	1	7
norm3	514	4.402724	1.231203	1	7
feas2	514	4.392996	1.348318	1	7
norm4	514	4.319066	1.240695	1	7
feas3	514	3.844358	1.408377	1	7

Figure 2: Pairwise comparison of statements

Statement	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1: Rat3				**	***	***	***	***	***	***	***	***	***	***	***	***
2: CG2						***	***	***	***	***	***	***	***	***	***	***
3: Rat1							***	***	***	***	***	***	***	***	***	***
4: Rat4							***	***	***	***	***	***	***	***	***	***
5: Rat2							***	***	***	***	***	***	***	***	***	***
6: CL1							**	**	***	***	***	***	***	***	***	***
7: N1											**	***	***	***	***	***
8: N2											**	***	***	***	***	***
9: CG1											**	***	***	***	***	***
10: CL2												***	***	***	***	***
11: F4													**	***	***	***
12: F1																***
13: N3																***
14: F2																***
15: N4																***
16: F3																

Notes:

- **Variables are listed by rank order of mean, largest to smallest.**
- **Pairwise relationships are shown based on the Wilcoxon signed-rank test between each pair of statements, with statistical significance shown (red - no significance; light green/** - significant at the 5% level; dark green/*** - significant at the 1% level.**
- **Critical values for significance tests calculated on the basis of a Sidak adjustment using the formula $1 - (1 - \alpha)^{1/n}$, where n = 120.**
  - **5% critical value = 0.00042735**
  - **1% critical value = 0.00008375**

Figure 3: Simple ranking of means, by group

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. summarize ratcom concom normcom feascom
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Variable	Obs	Mean	Std. Dev.	Min	Max
ratcom	514	5.316634	.8739017	1.5	7
concom	514	5.067607	1.027367	1.25	7
normcom	514	4.65321	.8930337	1	7
feascom	514	4.362354	1.009047	1	7

Figure 4: Pairwise mean comparisons, by group

Statement group	1	2	3	4
1: Just-in-time education		***	***	***
2: Construal level			***	***
3: Social norms				***
4: Feasibility				

Notes

- **Group variables are listed by rank order of mean, largest to smallest.**
- **Pairwise relationships are shown based on the Wilcoxon signed-rank test between each pair of grouped variables, with statistical significance (***) indicated at the 1% level.**
- **Critical values for significance tests calculated on the basis of a Bonferroni correction where n=6 and using the formula adjustment = α/n. The critical value used was 0.0083**

Based on the statistical tests, it is also possible to make observations about the relative impact of statements within each group.

Social norm messages appear to be more effective when framed in terms of the large numbers of people doing the desired behaviour (90%/9 in 10), and less effective when framed in terms of the small numbers doing the non-desired behaviour (10%/1 in 10).

In line with research findings elsewhere (Hershfield et al, 2018), for the feasibility group, messages focusing on smaller daily 'costs' of saving were more effective than those focusing on weekly or monthly amounts.

All of the 'just-in-time education' messages had a relatively strong impact, with the more abstract compounding message more effective than the more concrete one, and the higher-value employer-match message performing better than the lower-value tax-relief message.

Within the 'construal level' group, there was no strong preference between gain- or loss-framed, or self- or family-framed messages. The combinations of gain-self and loss-family appear to be more impactful than the alternative pairings.

4.1.3.2. Sub-group analysis

The results of the analysis of individual sub-groups is set out in detail in Annex 4. Deviations between individual sub-groups and the overall results were minimal, and are therefore not included in more depth here.

4.2 Stage 2

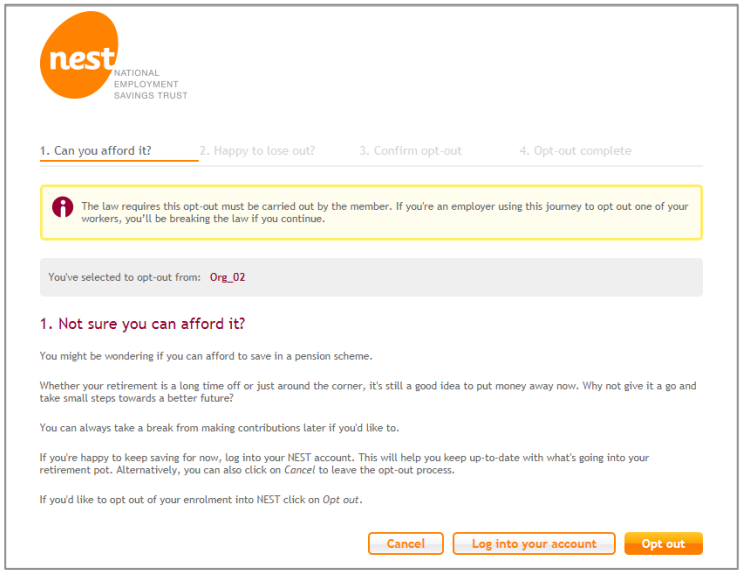
4.2.1 Stage 2 research approach

Stage 2 of the project was a randomised control trial implemented in a field setting with enrolees to Nest (a large UK pension scheme). The trial tested alternative versions of the online process by which individuals enrolled into Nest can opt out of the scheme.

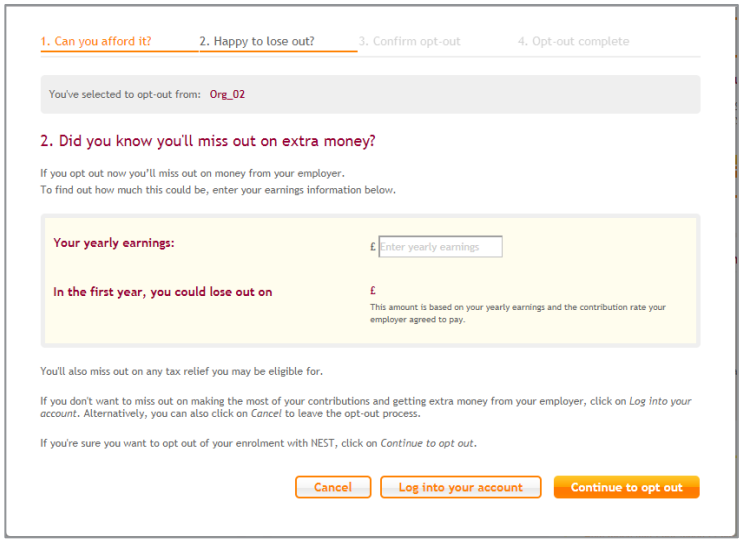
The existing design of the user journey for opt-out from Nest contains a sequential pair of screens designed to ensure those choosing to opt out do so having first given some conscious thought to the reasons for doing so. Screen shots from these two screens are shown in Figure 5.

Figure 5 - screen shots of the current opt-out process

Screen 'control 1'



Screen 'control 2'



The original language on these screens was developed following informal discussion with a group of behavioural scientists. Because of the initial design of the website, these screens could not be tested or compared with alternative messages, and so little evaluation of their impact or effectiveness has previously been undertaken.

The findings from stage 1 of the research were used to narrow down the initial 16 statements to two alternative pairs of statements. These could be adopted as two alternative sequential pairs in the two treatment arms of the trial, with the original journey retained as a control arm. The logic behind the selection of the two pairs of screens is described in Annex 6. The pairs tested were:

Treatment 1 – just-in-time education pair:

- "Contributions to your pension now will grow until you retire – so contributions you make today will be worth more to you at retirement than contributions you make later".
- "When you contribute, your employer does too – for the average member, employer contributions add around £60 per month to your pot".[1]

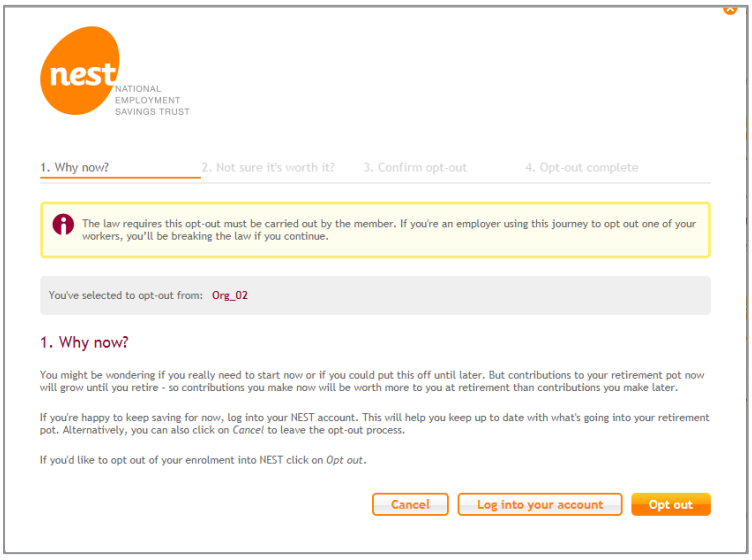
Treatment 2 – construal level and norming pair:

- "Saving money now for your retirement means that you'll be able to afford to keep doing more of the things you enjoy now when you're older"
- "More than 9 out of 10 people now choose to contribute to a pension when offered the chance at work".

These treatments were then tested against the null hypothesis and research hypotheses outlined in section 3. Each of the two treatment conditions were created as alternative online journeys for customers seeking to opt out of Nest. Screen designs and layouts were kept as close to identical as possible as in the control condition (screen grabs of the treatment condition screens are shown in Figure 6 to enable comparison).

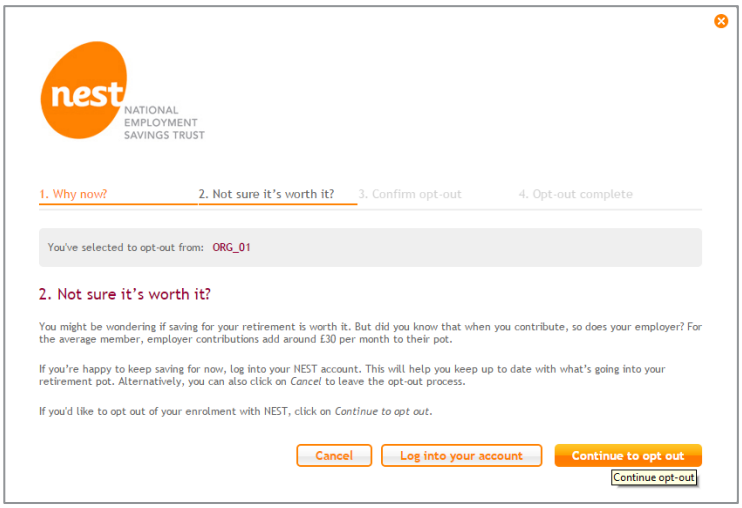
Figure 6 - Screen shots of the treatment group processes

Treatment 1, screen 1

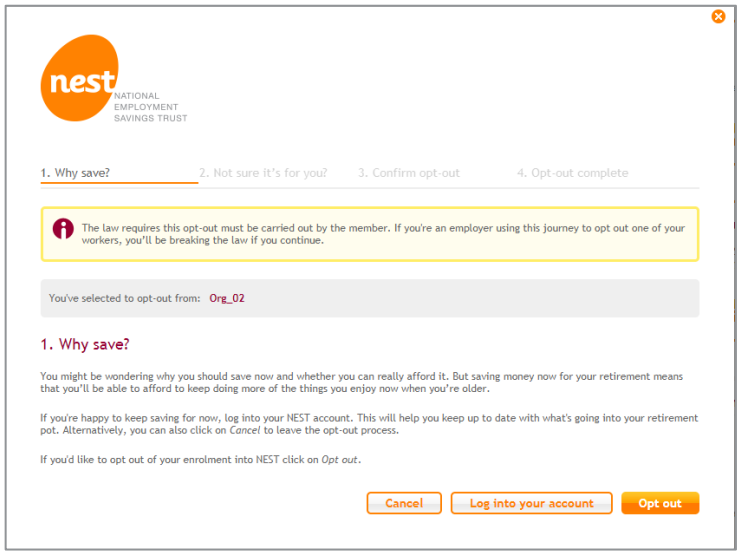


[1] Following compliance checks of the statements between stage 1 and stage 2, this second statement was amended to read £30 instead of £60.

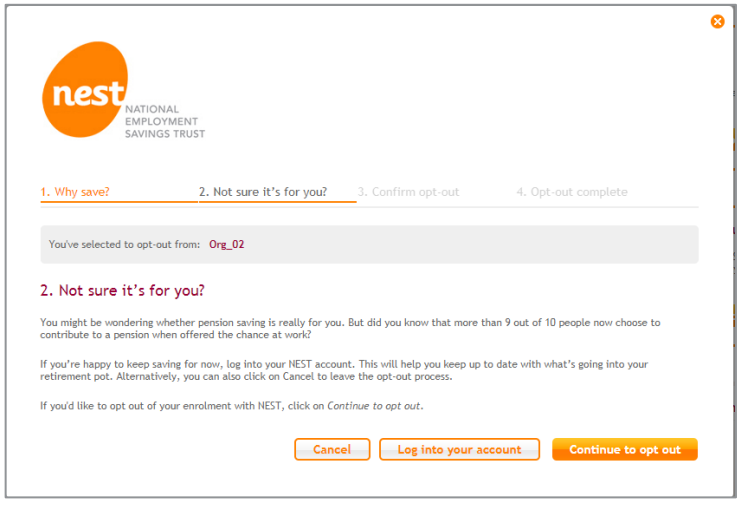
Treatment 1, screen 2



Treatment 2, screen 1



Treatment 2, screen 2



4.2.2 Stage 2 measures and variables

Corresponding to the hypotheses, the primary dependent variable of interest was the total number of people who began the opt-out journey but who failed to complete it: i.e. the people who initially intended to opt out but ended up remaining in the scheme.

Further exploratory analysis was also conducted on the drop-out rates from the 6 individual screens making up the control and two treatment journeys. This enables some comparison of the impact of specific messages or combinations of messages on drop-out rates.

In headline terms, all those enrolees to Nest who sought to opt out online over a 1 month window were randomly allocated to one of three opt-out journeys. Data was gathered on the proportion of enrolees starting each process who made it to the end and opted out, versus those who dropped out at different stages. These proportions were compared across treatment groups using a logit regression analysis.

4.2.3 Stage 2 results

4.2.3. Descriptive statistics

A total of 2483 members of Nest attempted to opt out during the period in question. Figure 7 summarises the headline data for the numbers of members progressing through each screen of the journey, with the final column showing the dependent variable of interest. Figures 8, 9 and 10 present the data for each journey in graphical form.

Figure 7 - Summary statistics from field trial

Group	Total members (N)	Members proceeding screen 1 – screen 2 (drop outs)	Members proceeding screen 2 – opt out (drop outs)	Total opting out (total drop outs – X)
Control	822	791 (31)	772 (19)	772 (50)
Treatment 1	833	827 (6)	807 (20)	807 (26)
Treatment 2	828	822 (6)	808 (14)	808 (20)

Figure 8 - Customer flow through control journey

Figure 9 - Customer flow through treatment 1

Figure 10 - Customer flow through treatment 2

4.2.3.2

Statistical regressions and hypothesis testing

A logit regression was conducted using the control group as the excluded variable. For the dependent variable - numbers completing or dropping out from the opt-out journey - the 'successful' outcome (dropping out) is coded 1, and the 'unsuccessful' outcome (completing the journey) is coded 0. The results are shown in Figure 11.

Figure 11 - Main logit regression outputs

```
. logit dototal treatment1vs treatment2vs

Iteration 0:   log likelihood = -406.39575
Iteration 1:   log likelihood = -398.83176
Iteration 2:   log likelihood = -398.38682
Iteration 3:   log likelihood =  -398.3858
Iteration 4:   log likelihood =  -398.3858

Logistic regression                             Number of obs     =      2,483
                                                LR chi2(2)        =      16.02
                                                Prob > chi2       =     0.0003
Log likelihood =  -398.3858                     Pseudo R2         =     0.0197
```

dototal	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
treatment1vs	-.6982656	.2469737	-2.83	0.005	-1.182325	-.2142059
treatment2vs	-.9618682	.2693194	-3.57	0.000	-1.489725	-.4340118
_cons	-2.736962	.1459292	-18.76	0.000	-3.022978	-2.450946

Evaluating the null hypothesis

The results show that tendency to successfully complete the opt-out process *is* related to the messages an individual sees in that journey, to a statistically significant degree.

Evaluating research hypotheses

The direction of this effect was not as anticipated in the research hypotheses. Propensity to complete the opt-out process was actually higher in the two treatment conditions than in the control, meaning research hypothesis H1 is rejected.

The direction of the effect in comparing the two treatment arms to one another *was* consistent with the research hypothesis, H2, however the size of the effect was not statistically significant. This hypothesis is therefore also rejected.

Figure 12 - Secondary logit regression results

```
. logit dototal treatmenttestA treatmenttestB

Iteration 0:   log likelihood = -406.39575
Iteration 1:   log likelihood = -398.83176
Iteration 2:   log likelihood = -398.38682
Iteration 3:   log likelihood =  -398.3858
Iteration 4:   log likelihood =  -398.3858

Logistic regression                             Number of obs     =      2,483
                                                LR chi2(2)        =      16.02
                                                Prob > chi2       =     0.0003
Log likelihood =  -398.3858                     Pseudo R2         =     0.0197

------------------------------------------------------------------------------
    dototal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+-----------------------------------------------------------------
treatmenttestA |   .6982656   .2469737     2.83   0.005     .2142059    1.182325
treatmenttestB |  -.2636027   .3015598    -0.87   0.382     -.854649    .3274437
      _cons |  -3.435227   .1992503   -17.24   0.000    -3.825751   -3.044704
------------------------------------------------------------------------------
```

4.2.3.3 Exploratory analysis: evaluating the impact of individual screens

On a simple ranking basis, the impact of the 6 screens involved in the test can be summarised as per Figure 13.

Figure 13: Impact of individual screens

Rank	Group	Screen	% drop-outs
1	Control	1 of 2	3.9%
2	Treatment 1	2 of 2	2.4%
3	Control	2 of 2	2.4%
4	Treatment 2	2 of 2	1.7%
5	Treatment 2	1 of 2	0.7%
6	Treatment 1	1 of 2	0.7%

A robust statistical analysis of the impact of the individual screens is beyond the scope of this project, and in any case would be rendered problematic by sequencing effects as it was not possible technically to randomise the sequence of the two screens in each journey as part of this trial.

Nonetheless, from comparing the headline drop-out rates it is possible to see which messages, on the face of it, were more impactful in a true field setting, and to compare this to the findings of stage 1 of the project.

First, it is clear from the data that the most effective screen was screen one in the control journey, with screen two in the same journey effectively the joint second most effective. Possible reasons and implications of this are discussed in section 5.3.

Among the other messages, the findings differ from those that might be implied by the stage 1 findings, as summarised in Figure 14:

Figure 14 – Relative ranking of statements across stages 1 and 2

Screen	Rank, stage 1	Rank, stage 2
Treatment 1, screen 2	1	1
Treatment 2, screen 1	2	3
Treatment 1, screen 1	3	4
Treatment 2, screen 2	4	2

In practice, the social norming message (treatment 2, screen 2) was relatively more impactful compared with the other screens in the field setting, compared to the impact predicted by the survey element.

4.3 Overall summary of results

The main findings of the present research can be summarised as follows:

- Conclusion 1: people exhibit clear differences in stated savings intention when exposed to messages of different types encouraging savings behaviours. Stated intentions are more influenced by 'just-in-time' educational messages, and less influenced by messages seeking to increase perceived feasibility of saving. Messages seeking to increase construal level of retirement saving, and messages based on social norms, fall in between, with the former more impactful;
- Conclusion 2: similar messages (to those referred to in conclusion 1) do have an impact on whether or not the opt-out process is completed when tested in a field setting; however
- Conclusion 3: the relative impact of messages is different to that predicted by stated intentions. Further, the most impactful messages were those already in place – messages eliciting a strong stated intention impact nonetheless performed less well in the natural setting compared to these untested messages.

5. Discussion

This section discusses the three conclusions in turn, before considering limitations of the present research and potential further research that it could prompt.

5.1 Conclusion 1 – impact of different theories on stated intention

The purpose of stage 1 of the research was twofold. First, to help inform hypotheses and design for phase 2 – in so doing, stage 1 contributes to the later conclusions discussed below. But this element was intended to make its own contribution to the literature by beginning to provide some comparative data for the possible impact on pension saving behaviour of interventions derived from a range of theoretical bases within behavioural science.

Since the stage 1 survey was intended to be exploratory, no specific hypotheses were offered and so these findings do not confirm or conflict with any pre-conceived notion. Inevitably, a survey such as this is subject to many limitations and the statements tested were merely a subset of those that could have been developed. Nonetheless, the clear differentiation in the findings has some potential implications both for theory and practice.

5.1.1. Theoretical implications

The findings and this conclusion are perhaps most interesting in terms of the relative strength and weakness of the just-in-time education group and the feasibility group. Whereas the remaining statements overlapped somewhat, the four just-in-time education statements were all in the five most impactful overall and the feasibility statements all in the 6 least impactful.

The strong impact of just-in-time educational messages accords with previous findings in this area, which, as discussed in 2.4.3, suggests that just-in-time educational interventions can be highly effective, in particular where building on previously understood concepts (Hira, 2010). In the present research, these messages focused on highlighting the value of matched contributions and compound interest – both of which would be somewhat familiar as concepts to many participants.

The relatively weak impact of feasibility messages is perhaps more surprising. Within this group, the finding that amounts presented daily are more impactful on intention than equivalent amounts presented weekly or monthly is in line with the findings of Hershfield et al (2018). However, the same study might be read as suggesting a larger general impact for daily-framed messages relative to other groups, given the effectiveness of this approach when tested in the field. One possible explanation is that feasibility messages present a large 'intention-behaviour' gap – i.e. that the real behavioural impact of interventions to increase perceived feasibility in this way is stronger than individuals can predict for themselves or than shows in a stated intention-based approach. This would bear further exploration.

A similar observation could be applied to the social norming messages, which appeared to be relatively more impactful when deployed in the field than in the survey. This is consistent with the broader literature on social norm-based interventions, which tends to show that people do not expect

to be influenced by the reported behaviour of others but are so-influenced in practice (Nolan, Schultz, Cialdini, Goldstein & Griskevicius, 2008).

5.1.2 Practical implications

Pension providers have a particular interest in identifying effective behavioural interventions. From a fiduciary perspective, doing so enables them to help savers to achieve more optimal individual outcomes. From a commercial perspective, to the extent that successful interventions will likely further increase overall savings levels, they can also significantly improve profitability.

While, in isolation, the first conclusion and stage 1 results do not provide a comprehensive set of conclusions, they nonetheless point towards an important area of consideration for practitioners, which is to understand, among a menu of possible theoretical bases for intervention, which types may turn out to be the most effective and in which circumstances? The present research points towards just-in-time educational interventions, in particular, as a potentially powerful area for further exploration.

5.2 Conclusion 2 – overall impact of different messages on actual opt-out behaviour

Perhaps the most important conclusion of the present research is that individuals' initial intention to opt out can be interrupted by the insertion of certain messages to the opt-out process. The research found a relatively small but clearly significant impact from varying the messages experienced by those going through this process.

5.1.1 Theoretical implications

To the knowledge of the researcher, application of the theories addressed in this paper to the specific context of those attempting to opt out from a default savings framework is so far unique to this research. It is not, therefore, possible to compare findings with directly relevant previous research. This in itself represents a potentially important implication. Those choosing to opt out in this setting could be seen as the most intransigent 'non-savers' – those for whom even a default 'opt-in' would not normally be sufficient to get them to save. However, the present research suggests that interventions developed in other adjacent settings – notably those developed to prompt voluntary uptake of saving – can be transposed to this opt-out setting and still have an impact, even within a light-touch overall process (and albeit that in this instance, the relative impact of specific messages differed to that predicted – as discussed in the following section). This is clearly an area that would bear further significant exploration, as discussed below.

5.2.2 Practical implications

The practical implications of this finding are potentially significant. Within the Nest pension scheme, around 72,000 people currently opt out each year (internal Nest data), as new enrolments are created

by job moves and new entrants to the labour market. Based on a set of simplifying assumptions set out and discussed in Annex 8, successfully encouraging an individual not to opt out could increase their pension contributions by around £3,000, on average, before they will next be automatically enrolled. The difference between the control group and the least successful treatment arm in this study was 3.7 percentage points. Extrapolated to the overall Nest data, this suggests that the design of the current process relative to at least one alternative 'avoids' around 2,700 opt-outs each year, increasing savings for that cohort by a total of £8.1m prior to their average next point of enrolment.

5.3 Conclusion 3 – the relative impact of messages differed from that predicted

The final set of findings from the research relates to the rejection of the research hypotheses. In a natural setting, messages selected based on their impact on stated intention performed less well overall than those initially put in place at the launch of the Nest scheme, and with a different relative impact to one another when compared with the impact on stated intention.

5.3.1 Theoretical implications

The first component of this conclusion – the relatively higher impact of the existing (control) screens – can in part be put down to limitations in the design and research approach, discussed in more detail below.

Nonetheless, in terms of the implications of the effectiveness of the control messages, a number of potential explanations can be found in the existing literature. The control group contained one screen (screen 1) that implicitly drew on or evoked multiple theoretical elements. On the face of it, it was intended to encourage individuals' tendency to procrastinate or put off complicated decisions. But in the nature of the messaging, it also potentially increases goal-focus and short-term feasibility – "take small steps towards a better future". Individually, this was the most impactful of all 6 in the trial, suggesting that such multi-faceted interventions could be more effective than those drawing on a single individual theory.

Secondly, some direct comparison is enabled by the similarity of one of the control screens and one of the 'treatment 1' screens, both of which lent on the idea of promoting the value of employer contributions for those staying in.

These two screens were the next two most effective individual screens, and were both equally impactful. This would appear to confirm that just-in-time education-type messages can be effective when deployed in the real-world opt-out setting, consistent with the findings of the stage 1 research. The control version of the screen contained a personalised, lifetime estimate of contributions foregone, whereas the treatment screen used a simple monthly 'loss' amount. More personalised messages have been shown in some settings to be more impactful than generalised ones (Schultz, Khazian & Zeleski, 2008). Intuitively, a lifetime figure might also be expected to have a greater impact – as the inverse of the finding in Hershfield et al (2018) that a perceived cost can be minimised by focusing on a shorter temporal frame. However, in this research, neither consideration appeared to increase the overall impact of the control version of this message (albeit that with sequencing effects, strong conclusions from comparisons of individual screens should be avoided).

Finally, the inconsistency of the impact of the treatments relative to one another and to the control might be seen as according with both general and specific previous research on the relationship between intention and action. In general, the limited predictive value of the stage 1 research for the stage 2 outcomes is consistent with work showing that intention explains only a relatively limited overall proportion of behaviour (see, for example, Webb & Sheeran, 2006).

5.3.2 Practical implications

The main practical implication of these findings is to highlight the value, and importance, of empirical experimentation in field settings for practitioners seeking to influence pension saving behaviour, as opposed to relying on traditional survey methods and 'message testing' approaches. The survey component of the research was only weakly predictive of behaviours in the main trial, and this suggests practitioners should be wary of rolling out interventions across whole populations that have only been tested in survey or laboratory settings.

This supports arguments made recently by researchers in the behavioural science field such as Shlomo Benartzi, who has proposed that the rise of online delivery and engagement channels creates an environment to 'test and learn' from interventions at a cellular level before rolling them out more broadly, facilitating quick (and inexpensive) failure in pursuit of more effective interventions (2017). This is consistent with the idea that behavioural science as a whole is a relatively young discipline that may lack an overarching theoretical framework with reliable predictive force, but is rather at this stage a "collection of tools and ideas" (Camerer & Lowenstein, 2004, p41). Thus, practitioners reading this research should focus on the general conclusion that opt-out behaviours can be influenced, ahead of any specific conclusions about how to influence them, subject to further research in this area.

5.4 Research limitations

A number of limitations in the design of this research could be addressed in future projects.

5.4.1 Exogenous limitations

Some limitations were exogenously imposed by constraints in the research setting or as a result of the research timeline. The use of Prolific academic to generate the sample for stage 1, but enrolees to Nest as the basis for stage 2, means some of the divergence between the stages may be partly explained by inherent differences in the samples, as opposed to intention-behaviour gaps.

A larger sample size as a result of running the research for longer would have increased sensitivity (and may, for example, have led to identification of a statistically significant difference between the two treatment arms).

In an ideal world, within the stage 2 field trial element of the research, data would have been available about individuals in the research to enable sub-group analysis – for example, to investigate whether age, income or gender mediate the impact of different messages. Nest's technical capacity to run trials of this kind is in its infancy and does not yet allow collection of this type of data.

Finally, more robust conclusions about the impact of individual screens would have been made possible by randomising the sequence of the screens in each journey, but again the technical capability to support this does not yet exist.

5.4.2 Design limitations

Other limitations in the research were self-imposed or a function of the ambition of the project. In the case of the former, greater consideration could have been shown to the potential effectiveness of the pre-existing messaging that became the control journey. In particular, the messages contained in these screens could have been included in stage 1, which might either have enabled better hypotheses to be generated or presented further evidence of the gap between the intentions stated in stage 1 and the behaviours observed in stage 2.

The desire to enable at least some comparison of the effectiveness of different theoretically-derived messages in one behavioural setting, though a potentially important contribution, stretched the capacity of the research design. To enable comparability, in both phases interventions were limited to single, simple messages. In practice this is a more effective delivery mechanism for some of these theories than for others. For example, interventions to increase the level at which a goal is construed have generally taken a more involved form than could be replicated in this setting.

5.5 Future research

Various possible areas for future research are suggested by the preceding discussion. Replications of the main field research could build on this research to test additional messages and interventions and to try to create a 'true' control condition. The core finding, that opt-out rates can be influenced by the design of the opt-out journey, holds out the possibility of identifying messages that are more impactful still than the control messages in this trial, creating a further positive impact on retirement savings levels. Further, sub-group analysis within these trials, were that to become possible, would potentially generate further positive impact as, over time, schemes will be able to tailor the journey that enrollees experience according to their known characteristics. A smart approach that varied the messages in this way could reduce opt-out even further.

The present research was conducted within one of the routes through which enrolees can opt out. Further research could helpfully seek to extend the findings to the other available channels (phone, through the use of Interactive Voice Response, and other web-based journeys), as well as seeking to replicate it in schemes other than Nest.

Finally, the ambition of this research to begin to identify the comparative effectiveness of different message-based interventions could be expanded to other aspects of saver-behaviour within pensions. The application here to the opt-out process is of real and continuing interest, however, as discussed elsewhere, the range of behaviours that practitioners and policy-makers might wish to influence in this space is broad. It is likely that the impact of different types of message framing, as well as varying across groups of people, will also vary across types of decision. This is consistent with findings in narrower, more specific research settings such as research into the impact of gain- vs loss-frames

(Eberhart et al, 2017) and construal level theory (Ulkumen & Cheema, 2011) where decision type and context can lead to different, even opposite, impacts from interventions.

Overall, these further areas for research would contribute to a broader *and* more granular toolkit for choice architects within the pensions sphere. Such a toolkit could build on the success of large 'default-based' nudges via the accrual of marginal additional behavioural gains to help retirement systems develop more optimal outcomes for individuals.

6. Conclusions

Addressing people's propensity not to save enough for retirement has been a key focus of policy makers throughout the developed world in recent years. Demographic shifts, in particular, have put pressure on traditional modes of retirement provision and led systems to shift towards models that leave individuals bearing a greater burden of choice and risk. Yet, those individuals often fail to act in line with their own (self-defined) interests or intentions. Retirement saving thus represents a neat case study for the behavioural sciences and their application to policy. It presents evidence for individuals acting contrary both to the normative expectations of traditional economics and to their own plans. Interventions leaning on traditional economic models – changing incentives, or acting to address information imbalances – have proved ineffective or only partially effective. More recently, interventions based on choice architecture, leveraging 'supposedly irrelevant factors' such as whether a decision is framed as 'opt in' or 'opt out', have proven to be more effective – automatic enrolment into pensions has been described as the most successful application of nudge by one of its key architects, Richard Thaler.

I have suggested that while choice architecture interventions such as automatic enrolment are, indeed, hugely effective, they do not necessarily mark the end of the line on addressing undersaving. Individual actions and behaviours within default-based systems can still be made more optimal, relative to the somewhat blunt instrument of population-wide default parameters, while at least some of those electing to opt out from within such systems might be better off if encouraged not to do so.

For practitioners, improving on current default-based approaches therefore likely entails finding ways to support better individual choices on top of the baseline of the default behaviours prompted by such systems. This paper attempts to explore this issue in more depth, by beginning to build a comparative understanding of the impact of different theoretical approaches to the question of increasing saving, and applying that understanding to the specific question of discouraging opt-out.

The findings of the research are mixed. A clear, if simplistic, picture emerges of the relative impact of some different types of intervention on self-reported intentions, with 'just-in-time' educational messages appearing to hold out the most promise. The findings of these self-reports of intention do not accurately predict actual behavioural reactions to these messaging interventions when applied in a field setting. Yet in that field setting, there is nonetheless a clear behavioural effect of varying these messages, one which has a significant impact on overall savings levels. This is a finding worth exploring in further experimental settings, to establish if existing interventions to reduce opt-outs can be made yet more effective, and individuals' financial wellbeing in retirement enhanced as a consequence.

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Annexes

Annex 1: List of statements tested in stage 1

The following table lists the statements tested in stage 1 of the research, and their corresponding group and reference code used in the main body of this paper and in the data and Stata files used for analysis.

Group	Reference code	Statement
Social norms	Norm1	“More than 90% of people now choose to save for their retirement when offered the chance at work”
	Norm2	"More than 9 out of every 10 people now choose to save for their retirement when offered the chance at work”
	Norm3	"Fewer than 10% of people now turn down the chance to save for their retirement at work when offered it”
	Norm4	"Fewer than 1 in 10 people now turn down the chance to save for their retirement at work when offered it"
Feasibility	Feas1	"Contributions to the pension scheme for the average member are only around ¬£3 per day"
	Feas2	"Contributions to the pension scheme for the average member are only around ¬£20 per week"
	Feas3	"Contributions to pension scheme for the average member are only around ¬£90 per month"
	Feas4	"Contributions to your pension don't cost much - a few pounds per day. People generally find it easier to reduce other spending to compensate than they think they will"
‘Just-in-time’ education	Rat1	"Contributions to your pension now will grow until you retire - so contributions made sooner will be worth more to you than contributions you make later. "
	Rat2	"Contributions to your pension now will grow until you retire - ¬£1 saved now does the work of ¬£2 in 15 years time, so it’s much better value to start sooner"
	Rat3	"If you contribute, so does your employer. For the average member, employer contributions add around ¬£60 per month"
	Rat4	"Your contributions get tax relief from government. For the average member this could increase your contributions by around ¬£18 per month"
Construal level	Congain1	"Saving money now for your retirement means you'll be able to spend more money on friends and family when you're older"
	Conloss1	"Saving money now for your retirement will help you to avoid missing out on things you enjoy now when you’re older"
	Conloss2	"Saving money now for your retirement will help you to avoid missing out on spending on friends and family when you’re older”
	Congain2	"Saving money now for your retirement means that you'll be able to afford to keep doing more of the things you enjoy now when you're older"

Annex 2: Stage 1 survey instrument

The complete survey instrument used for stage 1 of the research is shown below:

Increasing retirement saving v5

Start of Block: Default Question Block

Q1

Thank you for taking the time to participate!

In this study, you will be asked to answer 20 questions about your retirement saving behaviour. The survey should only take around 8 minutes to complete. You can withdraw from the study at any stage without explanation.

Your privacy is very important. Only the primary researcher and her/his supervisor will have access to the data. Results from this study will be presented at conferences and written up in journals as well as in the experimenter's MSc thesis. Results are normally presented in terms of groups of individuals. If any individual data were presented, the data would be anonymous, without any means of identifying the individuals involved. This project is in line with the ethical guidelines established by the Research Ethics Committee of the London School of Economics and Political Science.

If you have any questions you'd like to ask before starting the survey, please feel free to contact Will Sandbrook by email at w.l.sandbrook@lse.ac.uk

IMPORTANT: In order to participate in this study, you need to be 18+ and speak English fluently.

If you have read all of the above, and are happy to participate, please choose 'Yes, I want to take part':

- ○ Yes , I want to take part (1)
- ○ No thanks! (2)

Q2 Please enter your prolific ID

_____

Q3 Do you currently make regular contributions to a pension or other retirement saving account?

- ○ Yes (1)
- ○ No (2)
- ○ Don't know (3)

Q4 Taking account of all sources of income, what is your approximate annual income?

- Under £10,000 (1)
- £10,001 - £20,000 (2)
- £20,001 - £30,000 (3)
- £30,001 - £40,000 (4)
- £40,001 - £50,000 (5)
- More than £50,000 (6)
- Prefer not to say (7)

End of Block: Default Question Block

Start of Block: Block 1

Display This Question:
If Do you currently make regular contributions to a pension or other retirement saving account? = Yes

Q5 How likely are you to increase the amount that you currently contribute in the near future?

- Extremely likely (1)
- Moderately likely (2)
- Slightly likely (3)
- Neither likely nor unlikely (4)
- Slightly unlikely (5)
- Moderately unlikely (6)
- Extremely unlikely (7)

Display This Question:
If Do you currently make regular contributions to a pension or other retirement saving account? = Yes

Q6 Imagine that your employer is now offering you the chance to increase your contributions to the pension scheme. For each of the statements that follows, please read the statement and consider, all other things being equal, whether the statement makes you more or less likely to increase your contributions.

Please confirm you have understood these instructions for the next set of questions:

- Yes, got it! (1)

End of Block: Block 1

Start of Block: Block 2

Display This Question:
If Do you currently make regular contributions to a pension or other retirement saving account? = No

Q7 How likely are you to start making regular contributions to a pension in the near future?

- ○ Extremely unlikely (1)
- ○ Moderately unlikely (2)
- ○ Slightly unlikely (3)
- ○ Neither likely nor unlikely (4)
- ○ Slightly likely (5)
- ○ Moderately likely (6)
- ○ Extremely likely (7)

Display This Question:
If Do you currently make regular contributions to a pension or other retirement saving account? = No

Q8 Imagine that you are now being offered a chance to save in a pension through your workplace. For each of the statements that follows, please read the statement and consider, all other things being equal, whether it makes you more or less likely to take up the offer of a pension.

Please confirm you have understood these instructions for the next set of questions:

- ○ Yes, got it! (1)

End of Block: Block 2

Start of Block: Don't not

Display This Question:
If Do you currently make regular contributions to a pension or other retirement saving account? = Don't know

Q25 Imagine that your employer is now offering you the chance to start contributing to the pension scheme. For each of the statements that follows, please read the statement and consider, all other things being equal, whether the statement makes you more or less likely to take up the offer of a pension.

Please confirm you have understood these instructions for the next set of questions:

- ○ Yes, got it! (1)

End of Block: Don't not

Start of Block: Norms 1

Q9 "More than 90% of people now choose to save for their retirement when offered the chance at work"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Norms 1

Start of Block: Norms 2

Q10 "More than 9 out of every 10 people now choose to save for their retirement when offered the chance at work"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Norms 2

Start of Block: Norms 3

Q11 "Fewer than 10% of people now turn down the chance to save for their retirement at work when offered it"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)

- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likley (6)
- ○ Significantly more likely (7)

End of Block: Norms 3

Start of Block: Norms 4

Q12 "Fewer than 1 in 10 people now turn down the chance to save for their retirement at work when offered it"

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Norms 4

Start of Block: Feasibility 1

Q13 "Contributions to the pension scheme for the average member are only around £3 per day"

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Feasibility 1

Start of Block: Feasibility 2

Q14 "Contributions to the pension scheme for the average member are only around £20 per week"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Feasibility 2

Start of Block: Feasibility 3

Q15 "Contributions to pension scheme for the average member are only around £90 per month"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Feasibility 3

Start of Block: Feasibility 4

Q16 "Contributions to your pension don't cost much - a few pounds per day. People generally find it easier to reduce other spending to compensate than they think they will"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)

- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Feasibility 4

Start of Block: Rationality 1

Q17 "Contributions to your pension now will grow until you retire - so contributions made sooner will be worth more to you than contributions you make later. "

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Rationality 1

Start of Block: Rationality 2

Q24 "Contributions to your pension now will grow until you retire - £1 saved now does the work of £2 in 15 years time, so it's much better value to start sooner"

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Rationality 2

Start of Block: Construal gain 1

Q18 "Saving money now for your retirement means you'll be able to spend more money on friends and family when you're older"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Construal gain 1

Start of Block: Construal loss 1

Q19 "Saving money now for your retirement will help you to avoid missing out on things you enjoy now when you're older"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Construal loss 1

Start of Block: Construal loss 2

Q20 "Saving money now for your retirement will help you to avoid missing out on spending on friends and family when you're older"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)

- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Construal loss 2

Start of Block: Construal gain 2

Q21 "Saving money now for your retirement means that you'll be able to afford to keep doing more of the things you enjoy now when you're older"

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Construal gain 2

Start of Block: Rationality 3

Q22 "If you contribute, so does your employer. For the average member, employer contributions add around £60 per month"

- ○ Significantly less likely (1)
- ○ Moderately less likely (2)
- ○ Slightly less likely (3)
- ○ No more or less likely (4)
- ○ Slightly more likely (5)
- ○ Moderately more likely (6)
- ○ Significantly more likely (7)

End of Block: Rationality 3

Start of Block: Rationality 4

Q23 "Your contributions get tax relief from government. For the average member this could increase your contributions by around £18 per month"

- Significantly less likely (1)
- Moderately less likely (2)
- Slightly less likely (3)
- No more or less likely (4)
- Slightly more likely (5)
- Moderately more likely (6)
- Significantly more likely (7)

End of Block: Rationality 4

Annex 3: Stata code used for analysis

Data for both stages of the research was conducted in Stata. The Stata do-files for each stage are copied below.

Stage 1 survey Stata code:

```
*Import data
.import delimited "\\ukpensionnest.local\HData$\Home\wsandbrook\desktop\Masters Dissertation\PRIMARY ANALYSIS FILE pilot data for analysis v1.0.csv", rowrange(35) colrange(18)
(25 vars, 514 obs)

*sort the data to create recognisable field names
.rename q3 currentlysaving
.rename q4 income
.rename q5 likelyincrease
.rename q6 understand1
.rename q7 likelystart
.rename q8 understand2
.rename q25 understand3
.rename q9 norm1
.rename q10 norm2
.rename q11 norm3
.rename q12 norm4
.rename q13 feas1
.rename q14 feas2
.rename q15 feas3
.rename q16 feas4
.rename q17 rat1
.rename q24 rat2
.rename q18 congain1
.rename q19 conloss1
.rename q20 conloss2
.rename q21 congain2
.rename q22 rat3
.rename q23 rat4

*list overall means for each item (and then in rank order)
.summarize norm1 norm2 norm3 norm4 feas1 feas2 feas3 feas4 rat1 rat2 rat3 rat4 congain1 congain2 conloss1 conloss2

.summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3 feas2 norm4 feas3

*perform pairwise comparisons of each group, rank ordered (e.g. 1st vs 2nd, 1st vs 3rd... 15th vs 16th).
.signrank rat3 = congain2
.signrank rat3 = rat1
```

.signrank rat3 = rat4
.signrank rat3 = rat2
.signrank rat3 = conloss1
.signrank rat3 = norm1
.signrank rat3 = norm2
.signrank rat3 = congain1
.signrank rat3 = conloss2
.signrank rat3 = feas4
.signrank rat3 = feas1
.signrank rat3 = norm3
.signrank rat3 = feas2
.signrank rat3 = norm4
.signrank rat3 = feas3
.signrank congain2 = rat1
.signrank congain2 = rat4
.signrank congain2 = rat2
.signrank congain2 = conloss1
.signrank congain2 = norm1
.signrank congain2 = norm2
.signrank congain2 = congain1
.signrank congain2 = conloss2
.signrank congain2 = feas4
.signrank congain2 = feas1
.signrank congain2 = norm3
.signrank congain2 = feas2
.signrank congain2 = norm4
.signrank congain2 = feas3
.signrank rat1 = rat4
.signrank rat1 = rat2
.signrank rat1 = conloss1
.signrank rat1 = norm1
.signrank rat1 = norm2
.signrank rat1 = congain1
.signrank rat1 = conloss2
.signrank rat1 = feas4
.signrank rat1 = feas1
.signrank rat1 = norm3
.signrank rat1 = feas2
.signrank rat1 = norm4
.signrank rat1 = feas3
.signrank rat4 = rat2
.signrank rat4 = conloss1
.signrank rat4 = norm1
.signrank rat4 = norm2
.signrank rat4 = congain1
.signrank rat4 = conloss2
.signrank rat4 = feas4
.signrank rat4 = feas1
.signrank rat4 = norm3

.signrank rat4 = feas2
.signrank rat4 = norm4
.signrank rat4 = feas3
.signrank rat2 = conloss1
.signrank rat2 = norm1
.signrank rat2 = norm2
.signrank rat2 = congain1
.signrank rat2 = conloss2
.signrank rat2 = feas4
.signrank rat2 = feas1
.signrank rat2 = norm3
.signrank rat2 = feas2
.signrank rat2 = norm4
.signrank rat2 = feas3
.signrank conloss1 = norm1
.signrank conloss1 = norm2
.signrank conloss1 = congain1
.signrank conloss1 = conloss2
.signrank conloss1 = feas4
.signrank conloss1 = feas1
.signrank conloss1 = norm3
.signrank conloss1 = feas2
.signrank conloss1 = norm4
.signrank conloss1 = feas3
.signrank norm1 = norm2
.signrank norm1 = congain1
.signrank norm1 = conloss2
.signrank norm1 = feas4
.signrank norm1 = feas1
.signrank norm1 = norm3
.signrank norm1 = feas2
.signrank norm1 = norm4
.signrank norm1 = feas3
.signrank norm2 = congain1
.signrank norm2 = conloss2
.signrank norm2 = feas4
.signrank norm2 = feas1
.signrank norm2 = norm3
.signrank norm2 = feas2
.signrank norm2 = norm4
.signrank norm2 = feas3
.signrank congain1 = conloss2
.signrank congain1 = feas4
.signrank congain1 = feas1
.signrank congain1 = norm3
.signrank congain1 = feas2
.signrank congain1 = norm4
.signrank congain1 = feas3
.signrank conloss2 = feas4

```
.signrank conloss2 = feas1
.signrank conloss2 = norm3
.signrank conloss2 = feas2
.signrank conloss2 = norm4
.signrank conloss2 = feas3
.signrank feas4 = feas1
.signrank feas4 = norm3
.signrank feas4 = feas2
.signrank feas4 = norm4
.signrank feas4 = feas3
.signrank feas1 = norm3
.signrank feas1 = feas2
.signrank feas1 = norm4
.signrank feas1 = feas3
.signrank norm3 = feas2
.signrank norm3 = norm4
.signrank norm3 = feas3
.signrank feas2 = norm4
.signrank feas2 = feas3
.signrank norm4 = feas3

*create variables for groups and populate

.generate normcom=.
.generate feascom=.
.generate ratcom=.
.generate concom=.
.replace normcom=(norm1+norm2+norm3+norm4)/4
.replace feascom=(feas1+feas2+feas3+feas4)/4
.replace ratcom=(rat1+rat2+rat3+rat4)/4
.replace concom=(congain1+congain2+conloss1+conloss2)/4

*list means for groups (in rank order)
.summarize ratcom concom normcom feascom

* perform pairwise comparisons of groups
.signrank normcom = feascom
.signrank normcom = concom
.signrank normcom = ratcom
.signrank feascom = concom
.signrank feascom = ratcom
.signrank concom = ratcom

*list means for those who are currently saving (in all-data rank order)
.summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
feas2 norm4 feas3 if currentlysaving==1

*list means for those who are not currently saving (in all-data rank order)
```

```
.summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
feas2 norm4 feas3 if currentlysaving==2

*create variables for groups with incomes less than £30,000
.generate lowerincome=.
.replace lowerincome=0 if income==1
.replace lowerincome=0 if income==2
.replace lowerincome=0 if income==3
.replace lowerincome=1 if income==4
.replace lowerincome=1 if income==5
.replace lowerincome=1 if income==6

*list means for lower income (in all-data rank order)
. summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
feas2 norm4 feas3 if lowerincome==0


*create variables for groups likely or unlikely to start or increase saving
.generate likelystartincrease=.
.replace likelystartincrease=1 if likelystart==1
.replace likelystartincrease=1 if likelystart==2
.replace likelystartincrease=1 if likelystart==3
.replace likelystartincrease=0 if likelystart==5
.replace likelystartincrease=0 if likelystart==6
.replace likelystartincrease=0 if likelystart==7
.replace likelystartincrease=1 if likelyincrease==1
.replace likelystartincrease=1 if likelyincrease==2
.replace likelystartincrease=1 if likelyincrease==3
.replace likelystartincrease=0 if likelyincrease==5
.replace likelystartincrease=0 if likelyincrease==6
.replace likelystartincrease=0 if likelyincrease==7

*list means for those who are likely/unlikely to start/increase saving (in all-data rank order)
.summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
feas2 norm4 feas3 if likelystartincrease==1

.summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
feas2 norm4 feas3 if likelystartincrease==0
```

Stage 2 survey Stata code:

```
*Import data file
. import delimited "\\ukpensionnest.local\HData$\Home\wsandbrook\desktop\Masters
Dissertation\Trial outputs v2.csv"

*Conduct initial logit regression
.rename ïidentifier identifier
.tab dototal group, all
```

```
.generate treatment1vs=.
.replace treatment1vs=1 if group==1
.replace treatment1vs=0 if group==0
.replace treatment1vs=0 if group==2
.generate treatment2vs=.
.replace treatment2vs=1 if group==2
.replace treatment2vs=0 if group==0
.replace treatment2vs=0 if group==1
.logit dototal treatment1vs treatment2vs

*logit regression to isolate impact of treatment 1 vs treatment 2
.generate treatmenttestA=.
.replace treatmenttestA=1 if group==0
.replace treatmenttestA=0 if group==1
.replace treatmenttestA=0 if group==2
.generate treatmenttestB=.
.replace treatmenttestB=1 if group==2
.replace treatmenttestB=0 if group==0
.replace treatmenttestB=0 if group==1
.logit dototal treatmenttestA treatmenttestB
```

Annex 4: Sub-group analysis explanation and outputs

Sub-group analysis of the stage 1 data was conducted for the following groups:

- Current savings behaviour: those not currently saving were assumed to be a better proxy for those who might opt out of a pension scheme when automatically enrolled.
- Respondent (self-reported) income: the target group for Nest is low and moderate income workers, and the average Nest member has income around £23k, so the sub-group of those reporting lower earnings was assumed to be a better overall proxy for the subjects in the second stage trial.
- Pre-treatment stated intention to start saving or increase saving: those who describe themselves as unlikely to start saving are taken to be a better proxy for those who might be inclined to opt out if automatically enrolled into a pension.

Figure A4.1 below sets out the mean response, for each of the statements for the whole sample, and for each of the three sub-groups described above. Where the rankings differ, this is highlighted in the table below (a blank cell indicates the same result as for the overall sample). As the table shows, for each sub-group, change relative to the overall group is minimal. No statements have shifted their rank by more than one place, and in all cases where two statements have swapped position, the difference in the mean response between those two was minimal.

Figure A.4.1 – differences between sub-groups and overall sample

Whole sample	Not currently saving	Lower income	Unlikely to start/increase saving (pre-treatment)
1: Rat3			
2: ConGain2			Rat1: +1
3: Rat1			Congain2: -1
4: Rat4		Rat2: +1	
5: Rat2		Rat4: -1	
6: ConLoss1			
7: Norm1			Norm2: +1
8: Norm2			Norm1: -1
9: ConGain1			
10: ConLoss2			
11: Feas4			
12: Feas1			
13: Norm3			Feas2: +1
14: Feas2	Norm4: +1	Norm4: +1	Norm3: -1
15: Norm4	Feas2: -1	Feas2: -1	
16: Feas3			

Figures A4.2 – A4.4 show the full breakdown of the descriptive statistics for each of the three sub-groups.

Figure A.4.2 - Descriptive statistics, not currently saving sub-group

```
. summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
> feas2 norm4 feas3 if currentlysaving==2
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rat3	225	5.48	1.264487	1	7
congain2	225	5.328889	1.252965	1	7
rat1	225	5.204444	1.289718	1	7
rat4	225	5.12	1.19478	1	7
rat2	225	5.084444	1.201553	1	7
conloss1	225	5.035556	1.298549	1	7
norm1	225	4.986667	1.29725	1	7
norm2	225	4.951111	1.192353	1	7
congain1	225	4.88	1.267309	1	7
conloss2	225	4.795556	1.289718	1	7
feas4	225	4.684444	1.317119	1	7
feas1	225	4.56	1.406998	1	7
norm3	225	4.466667	1.257123	1	7
feas2	225	4.271111	1.418095	1	7
norm4	225	4.373333	1.286329	1	7
feas3	225	3.826667	1.491404	1	7

```
.
end of do-file
```

Figure A.4.3 - Descriptive statistics, lower income sub-group

```
. summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
> feas2 norm4 feas3 if lowerincome==0
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rat3	373	5.47185	1.201427	1	7
congain2	373	5.36193	1.161825	1	7
rat1	373	5.337802	1.163325	1	7
rat4	373	5.238606	1.149759	1	7
rat2	373	5.243968	1.174092	1	7
conloss1	373	5.134048	1.234906	1	7
norm1	373	4.994638	1.180019	1	7
norm2	373	4.927614	1.132422	1	7
congain1	373	4.895442	1.279409	1	7
conloss2	373	4.782842	1.28202	1	7
feas4	373	4.697051	1.285534	1	7
feas1	373	4.49866	1.353261	1	7
norm3	373	4.418231	1.210123	1	7
feas2	373	4.321716	1.357371	1	7
norm4	373	4.345845	1.23609	1	7
feas3	373	3.817694	1.442074	1	7

```
.
end of do-file
```

Figure A.4.4 - Descriptive statistics, unlikely to start/increase saving sub-group

```
. summarize rat3 congain2 rat1 rat4 rat2 conloss1 norm1 norm2 congain1 conloss2 feas4 feas1 norm3
> feas2 norm4 feas3 if likelystartincrease==0
```

Variable	Obs	Mean	Std. Dev.	Min	Max
rat3	187	5.497326	1.210946	1	7
congain2	187	5.251337	1.211919	1	7
rat1	187	5.272727	1.147908	1	7
rat4	187	5.224599	1.058927	1	7
rat2	187	5.208556	1.028796	1	7
conloss1	187	5.02139	1.213531	1	7
norm1	187	4.925134	1.198009	1	7
norm2	187	4.957219	1.13984	2	7
congain1	187	4.909091	1.238831	1	7
conloss2	187	4.754011	1.232805	1	7
feas4	187	4.631016	1.134835	1	7
feas1	187	4.481283	1.267214	1	7
norm3	187	4.363636	1.189725	1	7
feas2	187	4.385027	1.328509	1	7
norm4	187	4.342246	1.17797	1	7
feas3	187	3.882353	1.382323	1	7

```
.
end of do-file
```

Annex 5: Full results of statistical analysis of stage 1 research

The full results of the stage 1 survey statistical analysis are shown below. These tables correspond to the tables shown in the main paper, section 4.1.4.1. In the table below, the z-statistics and p-values for each pairwise comparison are shown, with comparisons made in descending order of mean responses (for example, the highest mean response was for the statement 'rat3', and the second highest for the statement 'congain2'. In the table, the pairwise comparison result for these two statements is shown by reading across row 1 to column 2).

The results show that differences between statements are generally statistically significant, with only the (maximum) 3 nearest statements failing to show significance in terms of response differences. In the table, red shaded cells denote no significant difference, light green cells denote a difference at the (adjusted) 5% level, and darker-green shaded cells denote a difference at the (adjusted) 1% level.

	Pairwise Wilcoxon signed-rank tests, adjusted (sidak – critical value = **0.00042735**)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1: Rat 3		Z = 2.338 Prob > |z| = 0.0194	Z = 3.173 Prob > |z| = 0.0015	Z = 3.711 Prob > |z| = 0.0002 **	Z = 4.375 Prob > |z| = 0.0000 ***	Z = 5.877 Prob > |z| = 0.0000 ***	Z = 8.598 Prob > |z| = 0.0000 ***	Z = 8.884 Prob > |z| = 0.0000 ***	Z = 8.234 Prob > |z| = 0.0000 ***	Z = 9.288 Prob > |z| = 0.0000 ***	Z = 10.747 Prob > |z| = 0.0000 ***	Z = 12.220 Prob > |z| = 0.0000 ***	Z = 13.850 Prob > |z| = 0.0000 ***	Z = 13.942 Prob > |z| = 0.0000 ***	Z = 14.663 Prob > |z| = 0.0000 ***	Z = 17.046 Prob > |z| = 0.0000 ***
2: CG 2			Z = 0.59 Prob > |z| = 0.5550	Z = 1.244 Prob > |z| = 0.2137	Z = 2.243 Prob > |z| = 0.0249	Z = 5.078 Prob > |z| = 0.0000 ***	Z = 6.853 Prob > |z| = 0.0000 ***	Z = 7.627 Prob > |z| = 0.0000 ***	Z = 8.272 Prob > |z| = 0.0000 ***	Z = 9.372 Prob > |z| = 0.0000 ***	Z = 10.116 Prob > |z| = 0.0000 ***	Z = 11.254 Prob > |z| = 0.0000 ***	Z = 12.770 Prob > |z| = 0.0000 ***	Z = 12.881 Prob > |z| = 0.0000 ***	Z = 14.277 Prob > |z| = 0.0000 ***	Z = 16.706 Prob > |z| = 0.0000 ***
3: Rat 1				Z = 0.401 Prob > |z| = 0.6881	Z = 2.105 Prob > |z| = 0.0353	Z = 3.089 Prob > |z| = 0.002	Z = 5.974 Prob > |z| = 0.0000 ***	Z = 7.027 Prob > |z| = 0.0000 ***	Z = 6.753 Prob > |z| = 0.0000 ***	Z = 7.717 Prob > |z| = 0.0000 ***	Z = 9.203 Prob > |z| = 0.0000 ***	Z = 10.835 Prob > |z| = 0.0000 ***	Z = 11.993 Prob > |z| = 0.0000 ***	Z = 11.843 Prob > |z| = 0.0000 ***	Z = 13.324 Prob > |z| = 0.0000 ***	Z = 15.532 Prob > |z| = 0.0000 ***
4: Rat 4					Z = 1.034 Prob > |z| = 0.3011	Z = 2.187 Prob > |z| = 0.0287	Z = 5.539 Prob > |z| = 0.0000 ***	Z = 6.048 Prob > |z| = 0.0000 ***	Z = 5.426 Prob > |z| = 0.0000 ***	Z = 6.999 Prob > |z| = 0.0000 ***	Z = 8.566 Prob > |z| = 0.0000 ***	Z = 10.480 Prob > |z| = 0.0000 ***	Z = 11.805 Prob > |z| = 0.0000 ***	Z = 11.927 Prob > |z| = 0.0000 ***	Z = 12.931 Prob > |z| = 0.0000 ***	Z = 15.869 Prob > |z| = 0.0000 ***

5: Rat 2						Z = 0.985 Prob > |z| = 0.3246	Z = 4.660 Prob > |z| = 0.0000 ***	Z = 5.139 Prob > |z| = 0.0000 ***	Z = 4.732 Prob > |z| = 0.0000 ***	Z = 5.796 Prob > |z| = 0.0000 ***	Z = 7.930 Prob > |z| = 0.000 ***	Z = 9.684 Prob > |z| = 0.0000 ***	Z = 11.251 Prob > |z| = 0.0000 ***	Z = 11.036 Prob > |z| = 0.0000 ***	Z = 11.924 Prob > |z| = 0.0000 ***	Z = 15.059 Prob > |z| = 0.0000 ***
6: CL1							Z = 3.544 Prob > |z| = 0.0004 **	Z = 3.881 Prob > |z| = 0.0001 **	Z = 4.383 Prob > |z| = 0.0000 ***	Z = 6.190 Prob > |z| = 0.0000 ***	Z = 7.354 Prob > |z| = 0.0000 ***	Z = 8.357 Prob > |z| = 0.0000 ***	Z = 10.661 Prob > |z| = 0.0000 ***	Z = 10.584 Prob > |z| = 0.0000 ***	Z = 11.605 Prob > |z| = 0.000 ***	Z = 15.248 Prob > |z| = 0.0000 ***
7: N1								Z = 1.107 Prob > |z| = 0.2681	Z = 0.010 Prob > |z| = 0.9920	Z = 1.312 Prob > |z| = 0.1895	Z = 4.019 Prob > |z| = 0.0001 **	Z = 5.972 Prob > |z| = 0.0000 ***	Z = 9.496 Prob > |z| = 0.0000 ***	Z = 7.401 Prob > |z| = 0.0000 ***	Z = 10.327 Prob > |z| = 0.000 ***	Z = 13.135 Prob > |z| = 0.0000 ***
8: N2									Z = -0.197 Prob > |z| = 0.8435	Z = 1.024 Prob > |z| = 0.3059	Z = 3.538 Prob > |z| = 0.0004 **	Z = 5.542 Prob > |z| = 0.0000 ***	Z = 8.879 Prob > |z| = 0.0000 ***	Z = 7.398 Prob > |z| = 0.0000 ***	Z = 9.802 Prob > |z| = 0.000 ***	Z = 13.396 Prob > |z| = 0.0000 ***
9: CG 1										Z = 2.109 Prob > |z| = 0.0350	Z = 3.913 Prob > |z| = 0.0001 **	Z = 5.546 Prob > |z| = 0.0000 ***	Z = 7.509 Prob > |z| = 0.0000 ***	Z = 7.211 Prob > |z| = 0.0000 ***	Z = 8.856 Prob > |z| = 0.000 ***	Z = 12.981 Prob > |z| = 0.0000 ***
10: CL2											Z = 2.620 Prob > |z| = 0.0088	Z = 4.328 Prob > |z| = 0.0000 ***	Z = 6.303 Prob > |z| = 0.0000 ***	Z = 6.084 Prob > |z| = 0.0000 ***	Z = 7.358 Prob > |z| = 0.000 ***	Z = 12.515 Prob > |z| = 0.0000 ***
11: F4												Z = 2.651	Z = 3.941	Z = 4.450	Z = 4.474	Z = 11.296

												Prob > |z| = 0.0080	Prob > |z| = 0.0001 **	Prob > |z| = 0.0000 ***	Prob > |z| = 0.000 ***	Prob > |z| = 0.0000 ***
12: F1													Z = 1.775 Prob > |z| = 0.0760	Z = 2.102 Prob > |z| = 0.0356	Z = 2.698 Prob > |z| = 0.0070	Z = 9.470 Prob > |z| = 0.0000 ***
13: N3														Z = 0.056 Prob > |z| = 0.9533	Z = 2.006 Prob > |z| = 0.0449	Z = 7.694 Prob > |z| = 0.0000 ***
14: F2															Z = 0.822 Prob > |z| = 0.4111	Z = 9.028 Prob > |z| = 0.0000 ***
15: N4																Z = 6.786 Prob > |z| = 0.0000 ***
16: F3																

The same approach is used below to summarise the statistical test data from the grouped variables, with dark green once again denoting a statistically significant difference at the 1% level.

	Pairwise Wilcoxon signed-rank tests for groups, adjusted			
	1	2	3	4
1: Just-in-time education		Z = 6.089 Prob > |z| = 0.0000***	Z = 13.777 Prob > |z| = 0.0000***	Z = 16.687 Prob > |z| = 0.0000***
2: Construal level			Z = 9.062 Prob > |z| = 0.0000***	Z = 13.433 Prob > |z| = 0.0000***
3: Social norms				Z = 5.781 Prob > |z| = 0.0000***
4: Feasibility				

Annex 6: Explanation for choice of messages in stage 2 trial

The final design of the treatments for stage 2 of the research was based on the statements tested in the stage 1 survey. The exact statements used were not simply the four most impactful in the survey, for a number of reasons.

First, not all 'pairs' of statements would make logical sense in a single online journey – for example, it would not make sense for a customer to click a screen saying '9 in 10 people choose to remain in the pension scheme' and then to see a further one saying 'only 1 in 10 people choose to opt out of the pension scheme'.

Secondly, the stage 2 study was intended to pick up whether different messages deployed in this process would result in observable differences in behaviour, and so there was felt to be some research value in one treatment taking messages that were slightly less successful overall than in the other treatment arm – this would potentially lead to larger observable differences.

Finally, some consideration was taken of Nest brand guidelines and conventions given the field nature of the trial. In particular, Nest tends to use numbers over percentages, and so between the two social norm messages potentially to be used – 90% or 9 in 10 – 9 in 10 was preferred even though it was (marginally, and not significantly) less impactful in the stage 1 survey.

Annex 7: Sensitivity power analysis for stage 2 research

As set out in the main paper, the sample size for the study was defined by convenience parameters based, in particular, on how long it was possible to run the trial.

Based on previous data, it was anticipated that between 2000 and 2500 people would opt out through the relevant online process within the one-month window for analysis. True randomisation across the three groups suggests this would provide sample group sizes of perhaps 650-850 per group.

Existing drop-out rates from the opt-out journey prior to the trial have historically been around 6%. Using Pocock (1983), with a 5% significance level and with 90% power, a sample size of 650 is predicted to pick up statistical significance with a treatment effect of -3.6% (i.e. drop-out rates of 2.4% or less) or +5% (drop-out rate of 11%) relative to a 6% base case. With a sample of 850 these drop to -3.2%/+4.3%.

A 90% power level is used to reflect there being two treatment arms, and is therefore equivalent to overall power for the study of 81%.

Annex 8: Assumptions underpinning impact assessment figures in section 5.2.2

Individual assumptions

According to Nest internal data, the average job tenure of an enrolee to Nest is 2.5 years. Under the automatic enrolment framework, individuals are re-enrolled following opt-out at their employers re-enrolment date, or on starting a new eligible job, whichever is sooner. Note that an employer's first re-enrolment date is the three year anniversary of their staging date. Then every 3 years from the first re-enrolment date. For the purposes of the figures in the main paper, re-enrolment is assumed to take place after 2.5 years.

The median income of a Nest member is around £21,000 (Nest Insight, 2018a). Starting in April 2019, once the automatic enrolment legislation is fully enacted, individuals will contribute a minimum of 8% of their income above approximately £6,000 to their pension. As such, the minimum pension contribution of the median member will be around £1,200 per year.

A median-earning member who would have opted out, but is persuaded not to do so, can therefore be expected to contribute around £3,000 between the time they would initially have opted out and the point at which they are next enrolled.

This is probably a conservative estimate of the additional contributions an individual will make as a result of being persuaded not to opt out, as:

- If they opt out once, there is a higher probability they will opt out the next time they are enrolled
- They may also make additional contributions, or their employer contribution might be above the minimum, during the time they now contribute.

The assessment also makes no attempt to factor investment growth on these contributions.

On the flip-side, members who do not opt out within their opt out window may still voluntarily cease contributions, though this is very uncommon among existing Nest members. Like members who opt out, they will be re-enrolled at their employers re-enrolment date.

Aggregating assumptions

In the period since April 2018 (the end of the employer-level roll-out of automatic enrolment, and therefore the start of ‘steady state’ for new enrolments) around 100,000 new members per month have been enrolled to Nest (internal Nest data), with an overall opt-out rate of around 6% (Nest Insight, 2018a). This suggests a total number of opt-outs per year in steady state of around 72,000.

The control condition in this study witnessed a drop-out rate from the opt-out process of 6.1%, relative to treatment drop-out rates of 3.1% and 2.4%. If we make a simplifying assumption that a one-click, no-intervention process would result in a 100% completion rate, this suggests that the control condition could be preventing perhaps 4,500 opt-outs in total each year, almost double what would be prevented if treatment condition one were implemented for all members, and around 2.5

times the number that would be prevented under treatment two. On the basis of a very simple aggregation, the current customer opt-out journey could be resulting in around £13.5m of additional contributions for each annual cohort of new enrolees relative to a 'no intervention' journey, and around £6.5-8.1m more than the two alternative journeys tested in this trial.

Other considerations

This is not an holistic impact assessment of the intervention. The additional contributions represent near-term consumption foregone for the individual and additional costs to the employer and government, in the form of tax-relief, for example, and no consideration is made of externalities. The impact assessment is merely a simplistic way of showing the potential scale of impact of reducing opt-out rates.