Anglian Water

11B. APPLYING BEHAVIOURAL SCIENCE TO BAD DEBT COLLECTION

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THE QUEEN'S AWARDS FOR ENTERPRISE: SUSTAINABLE DEVELOPMENT 2015

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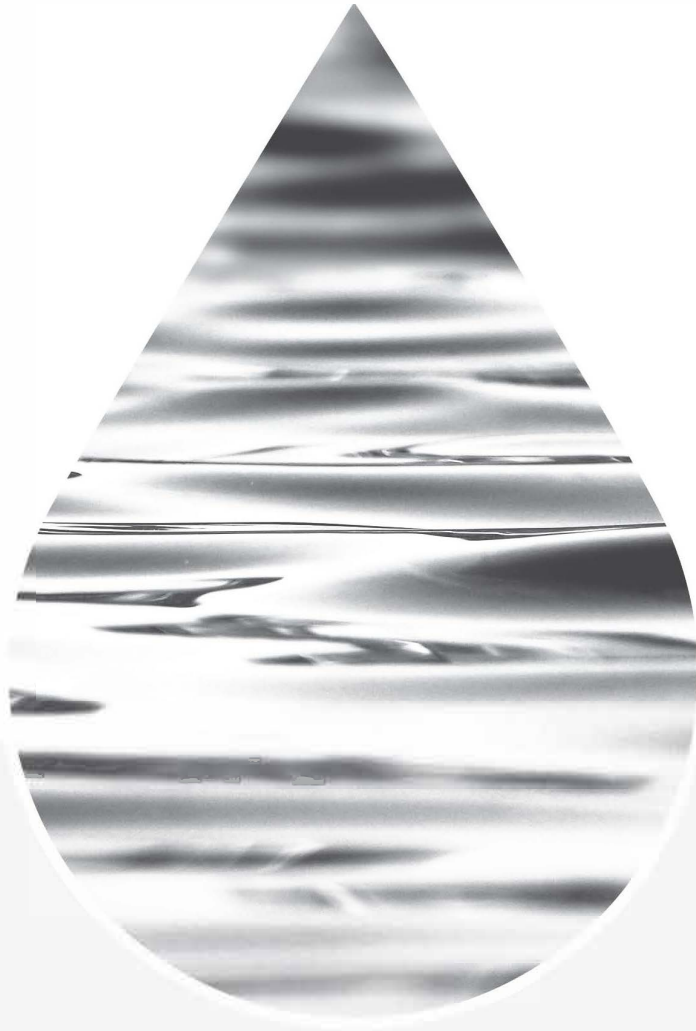
anglianwater

Applying Behavioural Science to Bad Debt Collection

16 March 2018

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EXECUTIVE SUMMARY

Working Together to Improve Bad Debt Collection

Anglian Water commissioned The Behaviouralist to improve the 'reminder' letters sent to customers who are in arrears. We redesigned the letters to include behavioural nudges, and evaluated the effects of these changes with a field experiment. Both of the redesigns were more effective than the business-as-usual letter. We estimate that the more successful intervention would lead to around £400,000 in new revenue per year and £400,000 in accelerated income for Anglian.

The purpose of the redesign was to improve engagement and compliance for debt payments. We trialled two letter designs with customers in a large-scale randomised controlled trial, building in nudges based on social norms and omission-commission bias.

The trial showed that the letter redesigns were successful. Both letters saw higher average repayments, with the largest improvement observed among those who received the omission-commission letter (recipients paid back an extra £4 on average). The treatment groups were more likely to make complete and partial payments compared to the control group.

Applied across an entire year to all households in bad debt, the omission-commission letters would generate a conservatively estimated return of over £500,000 compared with the letters currently in use. The effect would, however, likely be larger. When controlling for differences across the treatment groups, we estimate that the omission-commission letter would generate roughly £800,000 per year compared to the letters currently in use (this can be viewed as a higher-bound estimate).

Given the stronger performance of the omission-commission letters relative to the control and social norms letters, we would recommend using this letter. Further research could usefully be conducted to increase the impact of these new letters, including the use of predictive analytics to maximise the effect of targeted communications. We would also recommend looking for further opportunities to use behavioural science to help solve customer-related challenges.

INTRODUCTION

Collecting customer debts represents a significant challenge for utility companies, which must balance collection against potentially alienating or upsetting their customers. Utility debt is widespread, with over 63% of UK adults having experienced debt recovery procedures (Echo Managed Services, 2016). Utility debt is an increasing problem for water companies, which have seen unpaid customer debts rising from £1.9 billion to £2.2 billion between 2010-11 and 2014-15.

As such, reliable and cost-effective debt collection methods are important for water companies. While governments and companies use reminder letters to overcome the most common reason for late payment of bills – the customer simply forgetting to pay – they are often ineffective.

Anglian Water's current debt collection reminders result in full repayment for 25.3% of recipients. The Behaviouralist was commissioned to improve this. We conducted a natural field experiment exploring ways to boost the repayment of customer debts between September 2017 and January 2018. We re-framed and re-designed Anglian Water's payment reminder letters using insights from behavioural science, and tested whether strategic interventions could encourage late payers to be more compliant.

This report recaps the project and our main findings and recommendations. Section one outlines the context of the project. Section two provides an overview of how behavioural science and experiments can be applied to improving the collection of debts. The third section then outlines the design and implementation of our field experiment. In section four we present our results, including the differential effects of re-framing letters for different risk groups, and the projected increases in revenue from adopting our approach. Finally, in section five we outline how Anglian Water can continue to use behavioural science and experimentation to improve communication with customers, customer experience, and environmental outcomes.

1. BACKGROUND

Bad Debt at Anglian Water

Debt accrued by customers who are either unable to pay on time or at all is labelled 'bad debt'. In 2016, the yearly bad debt charge for Anglian Water was £31.9 million.[1] While this total had fallen 3.6% from the previous year's sum, it was still equivalent to 2.7% of Anglian Water's total revenue.

Improving the repayment of these debts is not as simple as sending a strongly worded letter. Aggressive debt collection strategies can backfire. Business customers may respond to coercive or deceptive debt collection reminders by switching suppliers, and domestic customers may run up 'protest debt' by intentionally delaying payment in response to a perceived sleight.

Coercive debt collection tactics may also lead to bad press and possible regulatory action. In 2014, some utility companies were found to be sending letters that appeared to be from an official debt collection company, when they were actually from the utility supplier themselves (BBC News, 2014). This led to widespread backlash, with the regulator Ofgem labelling the practice 'unacceptable'.

In short, there are better ways to improve the timeliness of payments and quantity of debt repaid than sending overtly threatening letters – such as building behavioural 'nudges' into debt collection reminders.

The current reminder letters sent after customers enter arrears see only 23.5% of recipients pay their debt in full. From 2011 to 2017, Anglian Water pursued over £420 million in customer debt. Just over half of this was recovered.

In designing more effective repayment reminders, it is important to consider the characteristics of Anglian's customer base. At the beginning of our experiment, 6% of Anglian Water customers were in arrears. Of these customers, 39% were placed into the low and medium risk group given their expected likelihood of repayment, 10% were classified as high risk, and 51% as very high risk.

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[1] http://www.anglianwater.co.uk/_assets/media/ara2016_navigable_Jan2017.pdf

The level of debt per household also varies significantly across Anglian Water customers. Households in the 10th percentile of debts owe an average of £38.80, while those in the 90th percentile owe an average of £401.50. There is also significant geographic variation in the level of debts, as seen in Figure 1.

Initial Average Debt (£)

0 - 153
153 - 181
181 - 229
229 - 288
288 - 1023

Figure 1. Average debt by postcode amongst Anglian Water customers
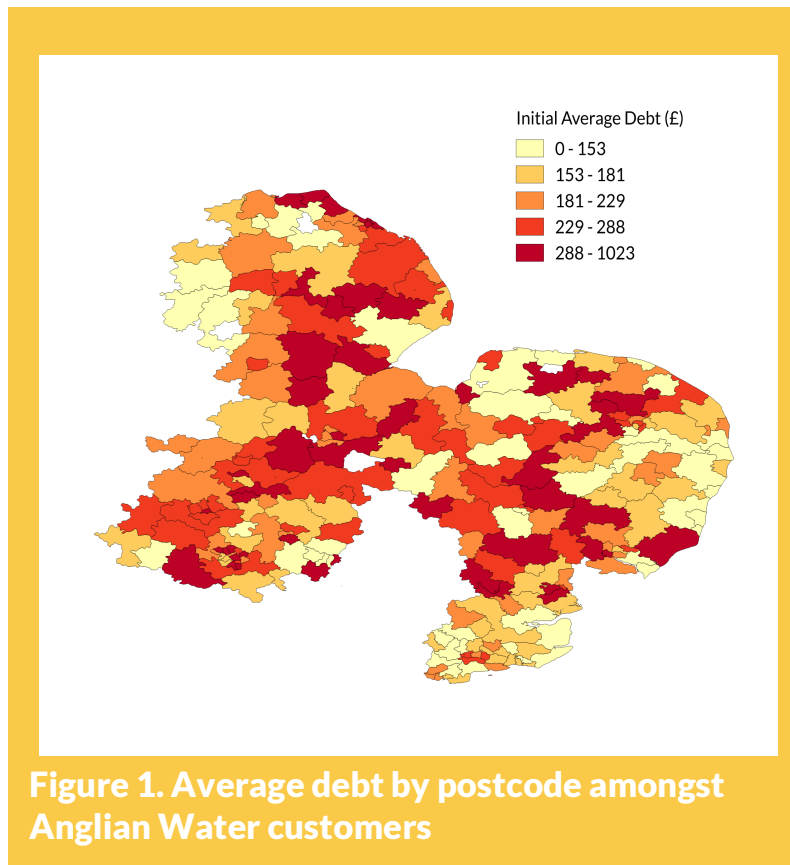
2. USING BEHAVIOURAL SCIENCE TO IMPROVE DEBT COLLECTION

Behavioural Science in Practice

Human decision making is not entirely rational, relying as it does on a mixture of calculated decision making and heuristics ('rules of thumb'). These heuristics give rise to a number of behavioural biases, and mean that presenting the same information in different ways can lead to very different responses. Behavioural science is the systematic analysis and investigation of these deviations from what might be considered the 'rational' norm.

Over the past few decades, behavioural science has seen a "cognitive revolution" take theory and laboratory findings and apply them in real-world situations. This has given us an extensive toolkit of tried and tested behavioural insights that we can use to understand, anticipate and alter human behaviour.

The notices, reminders and legal warnings sent to customers by utility companies are an excellent opportunity to influence the behaviour of the recipients. Building behaviourally informed 'nudges' into these letters is a simple and low-cost way to improve their effectiveness.

We select and test our approaches using a two-part strategy. The first is MINDSPACE[2] – a framework on the factors that unconsciously affect human behaviours. This framework was developed for the UK Cabinet Office by The Behaviouralist's co-founder Robert Metcalfe, and our academic adviser Paul Dolan, and outlines a set of biases (See Table 1) we can play to when attempting to change behaviour.

The second major part of our approach is proving that our techniques work in practice. To do this, we design, run and analyse field experiments that allow us to estimate the effects of our projects.

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[2] Dolan, Paul and Hallsworth, Michael and Halpern, David and King, Dominic Metcalfe, Rob and Vlaev, Ivo (2012) *Influencing behaviour the mindspace way.* Journal of Economic Psychology

Table 1. MINDSPACE framework

Element	Mechanism
Messenger	We are heavily influenced by who communicates information
Incentives	Our responses to incentives are shaped by predictable mental shortcuts such as strongly avoiding losses
Social Norms	We are strongly influenced by what others do
Defaults	We 'go with the flow' of pre-set options
Salience	Our attention is drawn to what is novel and seems relevant to us
Priming	Our acts are often influenced by sub-conscious cues
Affect	Our emotional associations can powerfully shape our actions
Commitment	We seek to be consistent with our public promises and reciprocate acts
Ego	We act in ways that make us feel better about ourselves

To conclusively demonstrate which interventions work, and for whom, we use Randomised Control Trials (RCTs). These are the 'gold standard' for evaluating policy interventions, adopting the rigour and approach of medical trials. In a randomised control trial, a sample of subjects is divided randomly into control and 'treatment' groups. The difference in outcomes between the two groups allows us to estimate the effects of our changes.

By combining behavioural insights with rigorous testing, we have been able to develop a cost-effective set of tools to target different 'types' of customer debts.

3.THE PROJECT

The Challenge

Currently, Anglian Water customers failing to pay their monthly bill on time are sent a first reminder asking them to make a payment. After a specified period of time has elapsed, if no payment has been made (or the customer has failed to cover the agreed balance) a second reminder is set. Those who do not pay in full after the second letter will eventually receive a notice of court action explaining that Anglian Water is taking the customer to court to recover the money owed.

In early 2017, Anglian Water commissioned The Behviouralist to examine the potential for improving the collection of debts by incorporating behavioural insights into the design of the reminder letters.

Our Proposed Solution

Anglian Water is aware that different customers present different 'risks' of non-payment, and as such divides customers into risk groups – low, medium, high, and very high – based on their likeliness to make a payment after receiving a reminder letter. Households in different risk groups receive slightly different letters. We redesigned the letters for all groups to include behaviourally informed nudges. Examples of redesigned and default letters sent by Anglian Water can be found in Appendix A.

In selecting these nudges, we discarded a number of potential treatments that were found to have relatively small effects in other contexts. Messaging based around the public good, for instance, showed small but positive treatment effects in previous experiments with HMRC. While this messaging could have been included in the trial, the size of the experiment meant there was a risk that we would be unable to show whether it made any significant difference.

In the end, we recommended two frames for improving outcomes: social norms and omission commission bias. Both of these techniques have been applied with large and positive results in other payment collection contexts, and we felt that we would be able to demonstrate conclusively whether they could usefully be applied. Table 2 details the two elements from MINDSPACE used to frame the reminder letters.

Table 2. MINDSPACE elements used in treatment letters

Element	Theory	Explanation	Example
Norms	We are strongly influenced by what we think others do.	Rules and standards that are understood by members of a group and that guide/constrain social behaviour	Social Norms "95% of your neighbours pay their utility bills on time"
Ego	We act in ways that make us feel better about ourselves	The tendency to judge harmful actions (commissions) as worse than equally harmful omissions	Omission Bias "If you do not respond we will treat this as an active choice"

Experimental Design

Households that entered arrears between 18 October and 28 November 2017 were randomly assigned to one of three groups; a control group that received the default letters, and two treatment groups; one receiving re-designed letters with social norm messages and another receiving omission commission bias messages.

Totally random assignment of households could have run into problems; if experimental groups contained different proportions of low and high-risk households, for instance, then our results could simply have reflected these differences in the groups.

As such, we suggested that Anglian Water conduct a block-randomisation within each group. Figure 2 (overleaf) details how block-randomisation across the three risk groups is structured. A total of 41,643 households that entered arrears were randomly assigned to the three experimental groups.

Figure 2. Block randomization (within risk groups)
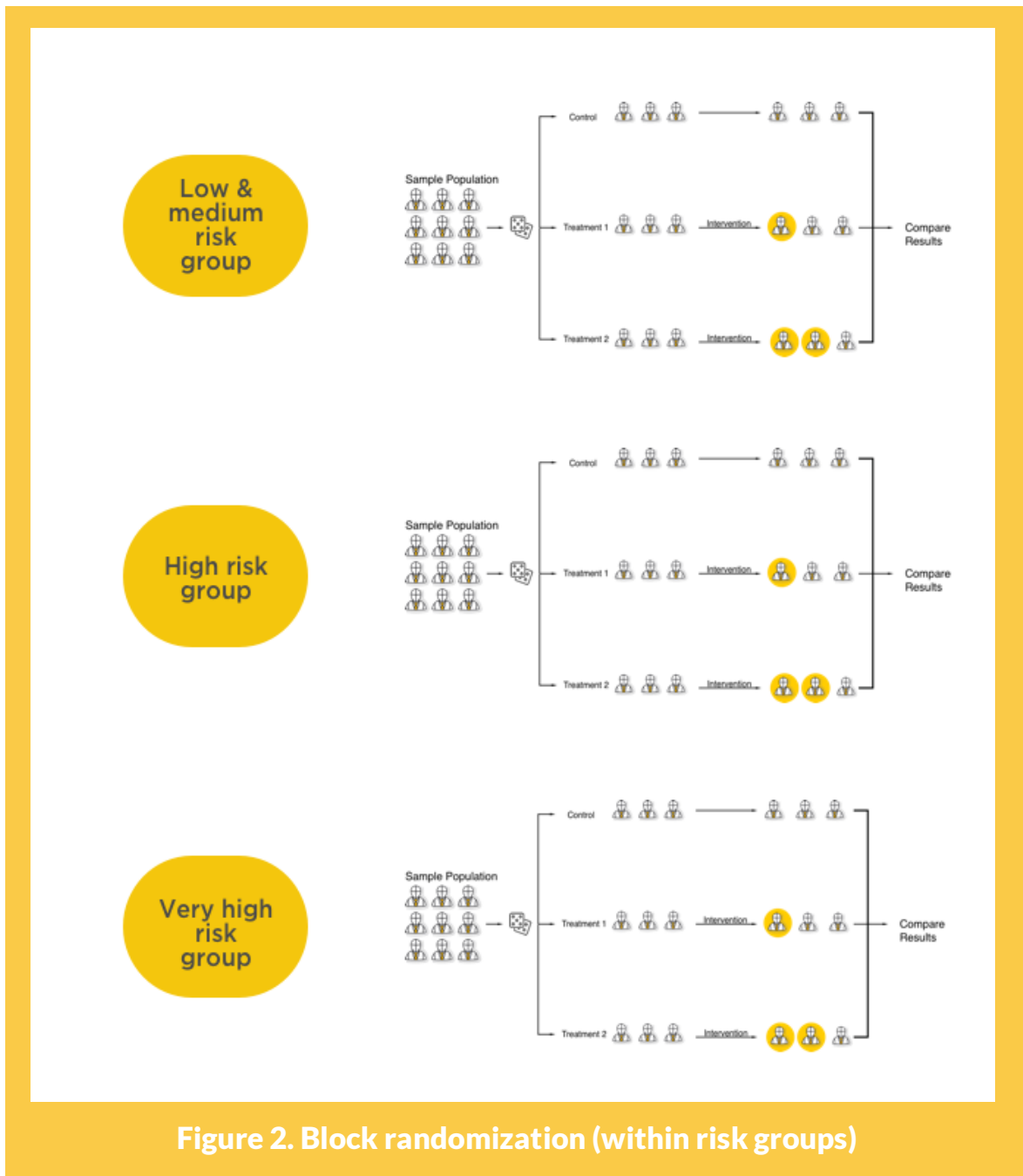
Our intent was for each of the three experimental groups to contain the same number of households. However, the randomisation process within the low and medium risk group did not occur as planned. On four out of 26 days when randomisation took place, more than 65% of low and medium risk households were assigned to the control group. In Appendix C, we show a breakdown by day of the randomisation of households in the low and medium risk group.

Given that this is beyond what we would reasonably expect from a randomisation, we removed from the analytical sample low and medium risk households that entered the

experiment on days that the randomisation was anomalous (over 65% in the control group). This reduced the number of low and medium risk households from 16,259 to 10,874 and our total sample size from 41,643 to 36,258. We test the robustness of our analysis with a different cut-off in Appendix C.

In Table 3, we show the sample of households by risk group and experimental status after correcting for randomisation issues. We collected payment data for 64 days after the first letters were sent. At the end of the trial we analysed the effect that the re-framed letters had on payment compliance and size of payments relative to debt.

Table 3. Experimental sample size

	Control	Omission Commission	Social Norm	Total
Low & Medium Risk	4,017	3,432	3,425	10,874
High Risk	1,398	1,394	1,394	4,186
Very High Risk	7,060	7,066	7,072	21,198
Total	12,475	11,892	11,891	36,258

4. RESULTS

Main Effect of Reminder Letters

Payment data was collected for 64 days after the initial reminder letters were sent, from 18 October to 22 December 2017. As households entered the trial on a rolling basis we do not have the same amount of payment data for all of them. Moreover, the payment behaviour in the period we analyse might not be representative of that of the entire year.

Nonetheless, we can be confident that the conclusions discussed below hold for the period we analysed. We do recommend that, if possible, further analyses are undertaken throughout the year to account for seasonal fluctuations in payment behaviours.

Without accounting for differences in the composition of the three letters groups, as we can see in Table 4, households in both treatment groups payed more on average that those that received the default letters. Households that received the omission commission letters paid £68.80 on average, £2.80 more than households that received the default letters, and £2.50 more than those that received letters with social norms.

A larger share of households in the treatment groups than in the control group made complete and partial payments after receiving payment reminder letters. Again, those in the omission commission group performed the best. Within the omission commission group, nearly 61 per cent of households made partial payments and 28 per cent made payments for the full balance. In comparison, in the control group 59 per cent made partial payments and 27 per cent made payments in full.

Table 4. Payments by households

	Control	Omission Commission	Social Norms
Average paid per household	£65.96	£68.78	£66.24
Percent that paid any amount	58.9%	60.8%	60.3%
Percent that paid in full	26.8%	28.1%	28.0%
N (Households)	12,475	11,892	11,891

In Table 5, we report on the total size of payments relative to debt for each letter group. Omission commission letters successfully recovered 31.2% of the approximately £2.6 million collectively owed by households. Social norms letters recovered nearly 30%, and the default letters recovered 28.6%.

Table 5. Total payments relative to debt

	Control	Omission Commission	Social Norms
Total initial debt	£2,876,416.80	£2,620,824.80	£2,635,465.70
Total payments	£822,860.70	£817,978.14	£787,605.31
Percentage of debt collected	28.6%	31.2%	29.9%
N(Households)	12,475	11,892	11,891

By controlling for the differences in composition of the three letters groups, we can obtain more precise estimates of the effects the letters have on payment behaviours.

Holding the household risk level, the number of days in the trial, and the number of letters received constant, we can show that both reframed letters have a positive effect on payments. However, letters reframed with omission commission messages were significantly more effective (See Figure 3). On average, letters framed with omission commission messages elicited £4 more per household than the default letters. Social norms letters improved payments by £1.50 on average, but this increase was not statistically significant.

Figure 3. Uplift in average payments by household
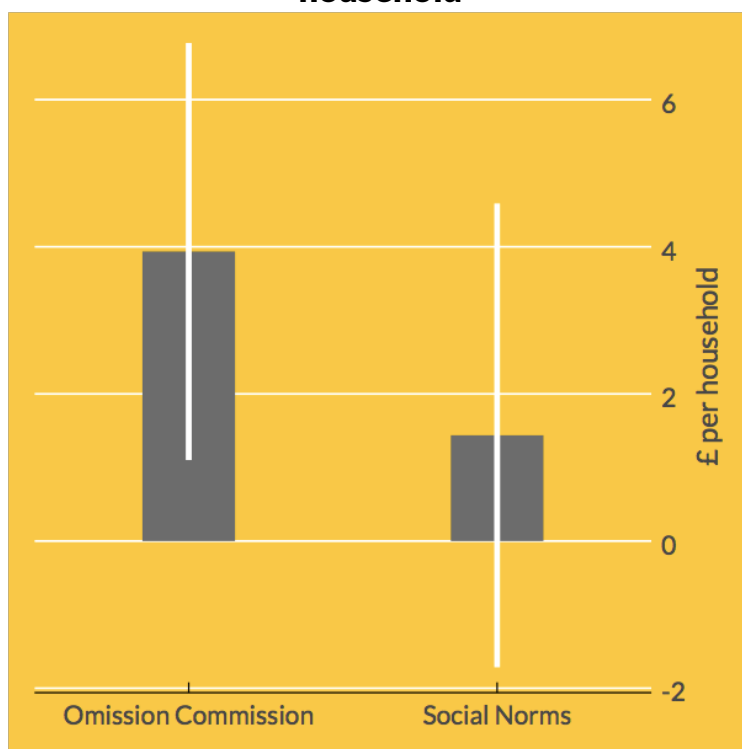
Notes: figure shows results from OLS regression controlling for household variables such as risk group, days in trial and number of letters received. White vertical lines represent the 95% confidence interval. Regression estimates in Appendix B.

Applying the same analysis to compliance levels for partial and complete payments, we can see that both reframed letters had a similar effect on eliciting complete payments (See Figure 4). Holding all else equal, the likelihood of paying the full balance increased by an average of 2.02 per cent after receiving an omission commission letter, and 1.9 per cent after receiving a social norms letter. Omission commission letters saw an average increase of 3.1 per cent in the likelihood of partial payments, compared to 2.5 per cent for social norms letters. We include the estimation equation used for both analyses in Appendix B.

Figure 4. Uplift in likelihood of making payments

Notes: figure shows results from OLS regression controlling for household variables such as risk group, days in trial and number of letters received. White vertical lines represent the 95% confidence interval. Regression estimates in Appendix B.
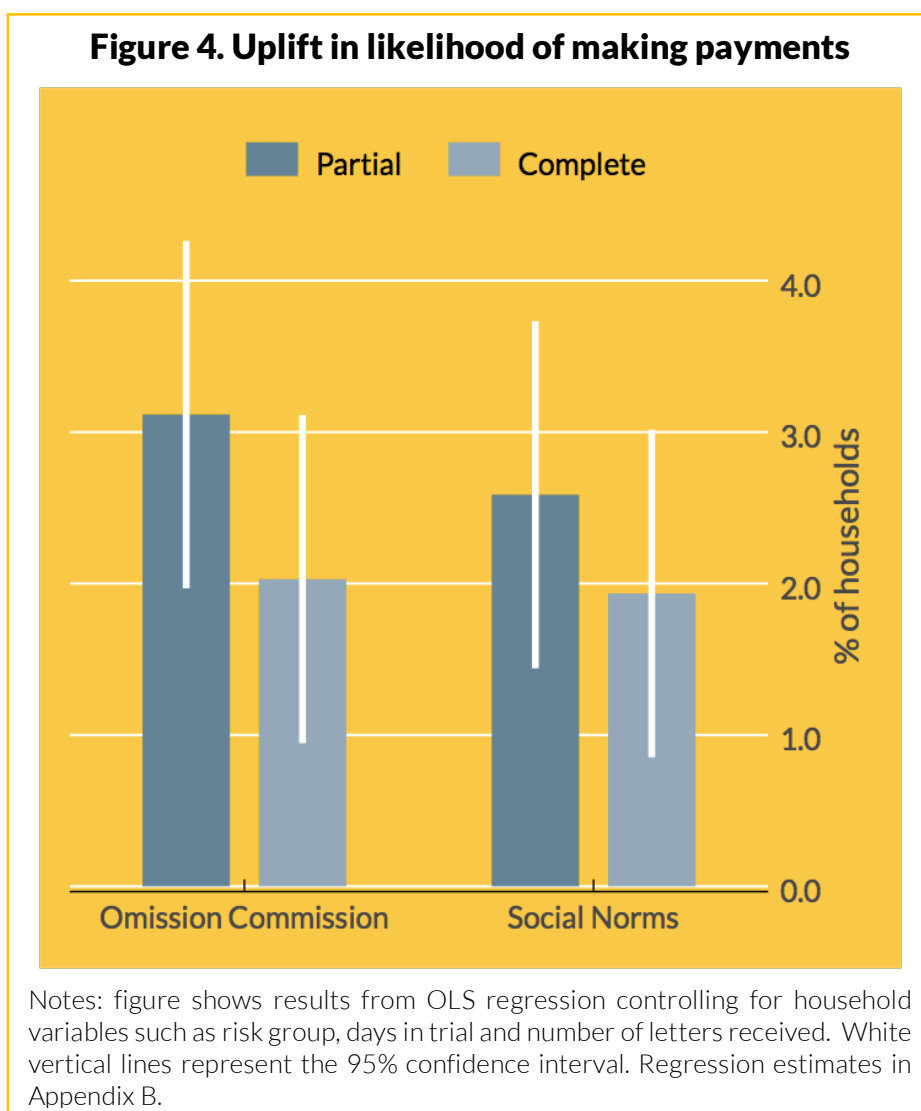
Combining the two treatment groups, we found that the project created additional yield of approximately £63,886 for Anglian Water in 64 days. Because we are unable to ascertain exactly how much debt is finally collected, we consider this yield to be a mixture of accelerated revenue and new revenue.

Table 6. Projected savings

	Control	Omission Commission	Social Norms
Payments across full sample	£2,391,605	£2,493,966	£2,401,563
Increased income vs control	-	£102,360	£9,957
Payments across full sample and over a year	£13,639,627	£14,223,404	£13,696,418
Increased income vs control across full sample and over a year	-	£583,776	£56,790

Had we applied the omission commission letter to the whole sample for this period, we conservatively estimate that it would have generated approximately £102,360 in additional repayments when compared to the default letter[3]. If this is projected over the remainder of the year, the estimated return from applying the omission commission letter to the same sample would be approximately £583,776. Controlling for differences across the letter groups (household risk level, the number of days in the trial, and the number of letters received), the estimated savings of applying the omission commission letter across the full sample and over an entire year would be £813,797. For full calculation details see Appendix B.

Effects of Letters at Each Stage of Arrears

We now explore the effect of reframed letters at different stages of the arrears collection process. Customers in arrears that do not cover their balance in full within a certain amount of time after receiving the first letter are sent a second one. Understanding whether the frames have differential effects on different stages is essential for designing a targeted communication strategy.

While households in both treatment groups paid greater sums after the first letter – especially the omission commission group – they paid less than the control group after the second letter (see Table 7). This could suggest that reframed letters are not as effective after the first letter.

However, there are several caveats to this interpretation. Firstly, the sample is limited to households in the low and medium risk group, which were the only ones to receive more

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[3] This calculation is done without controlling for differences in the letter groups.

than one letter. Secondly, the estimates for payments after the second letter are not statistically significant. Finally, it is likely that the apparent decrease in payments for households in the treatment is caused by the uplift after the first letter: customers who were likely to pay might have done so already.

Table 7. Payments at each stage of arrears

|	Control	Omission Commission	Social Norms
1st Reminder	£61.46	£65.13	£62.17
N (Households)	12,475	11,892	11,891
2nd Reminder	£82.98	£77.11	£79.93
N (Households)	677	564	605

Heterogeneity Effects of Letters on Risk Groups

We extend the analysis to investigate whether the letters had different effects on different risk groups. The effects of the treatment letters on the low and medium and the very high-risk groups was positive, as expected (See Table 8). However, the reframed letters did not seem to have made a positive effect on households in the high-risk group. It would be worth conducting further research to better understand these differences in household behaviour.

Table 8. Payments by risk group

		Control	Omission Commission	Social Norms
Low & Medium Risk Group	**Average paid per household**	£85.08	£89.33	£90.54
	Percent that paid in full	40.4%	43.8%	44.3%
	N (Households)	4,017	3,432	3,425
High Risk Group	**Average paid per household**	£73.33	£70.25	£68.20
	Percent that paid in full	34.5%	34.6%	32.4%
	N (Households)	1,398	1,394	1,394
Very High Risk Group	**Average paid per household**	£53.62	£58.52	£54.08
	Percent that paid in full	17.6%	19.2%	19.2%
	N (Households)	7,060	7,066	7,072

Figure 5. Uplift in likelihood of making complete payments by risk group
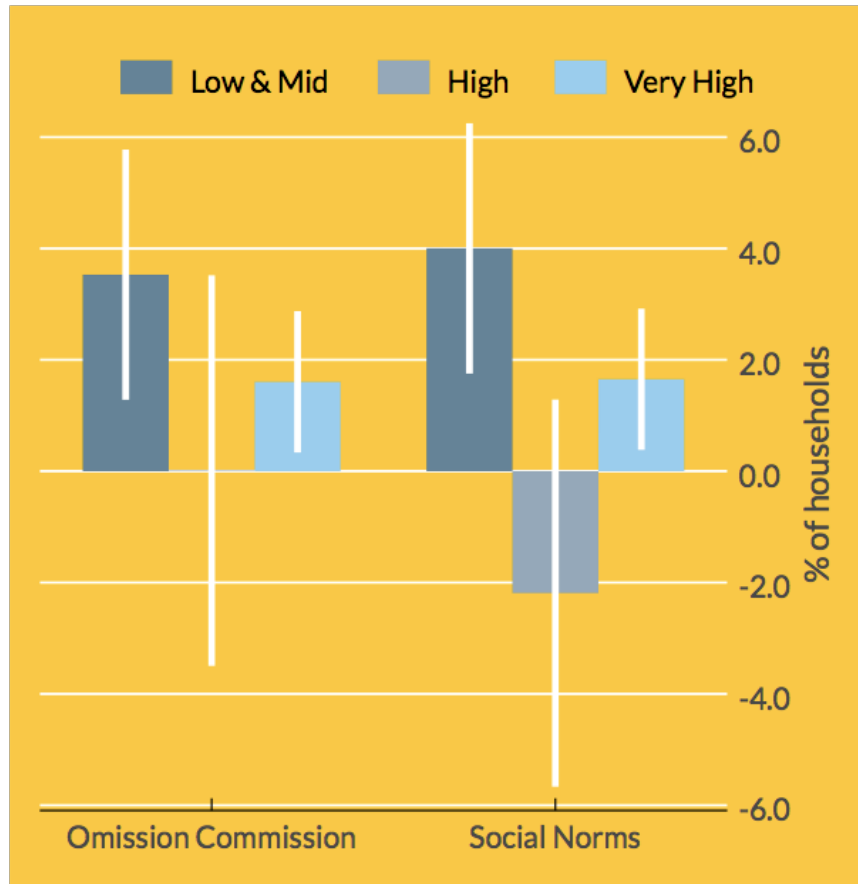
Notes: figure shows results from OLS regression for each risk group and controlling for household variables such days in trial and number of letters received. White vertical lines represent 95% confidence interval.

5. MOVING FORWARD

Conclusions & Recommendations

Following the conclusion of our trial, we believe that our letter redesigns were broadly successful. In particular, the omission commission letters saw a statistically significant increase in the amount repaid and the probability of repayment.

As such, we recommend that Anglian adopt this message frame across all debt collection letters.

The size of the improvement generated demonstrates that there is significant potential for improving communication for customers by incorporating behavioural insights.

We recommend that Anglian examine the potential for further including behaviourally informed messaging in other communications with customers.

Finally, the different effects on household behaviour across risk groups and different stages of arrears demonstrate the need for further research to better understand the mechanisms driving the responses to these letters.

We recommend that Anglian conduct further research on how customers react to these letters.

There are a number of opportunities for further research that could potentially benefit Anglian. One avenue would be applying behavioural insights to other types of payments, for instance redesigning bills to improve payment timeliness and reduce the number of customers entering the arrears process, or encouraging customers to enrol in Direct Debit or Standing Order payment schemes.

Further improvements to the arrears process could also be made. The use of predictive analytics to improve the targeting of programs and communications could be trailed, and the long-term effects of interventions could be tested. We would also recommend examining whether there are 'spillover' effects from these interventions in other customer behaviours. Finally, it would be worthwhile surveying households to better understand how these interventions worked.

APPENDIX A

Appendix A1. Default Letter

GIRO

love every drop
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anglianwater.co.uk

0800 197 3886
Lines open: 8-8 Mon to Fri, 9-1 on Sat

Mrs O Winfrey
Mr D Diamond
1 Sauchiehall Street
Glasgow
G12 9OP

Date: 19 February 2015

Your account number:
109117052

Your supply address:
21 St Trinians Court
St Trinians Way
Great Staughton
Huntingdon
PE45 OPO

HAVE YOU FORGOTTEN TO PAY YOUR BILL?

We wanted to let you know that we haven't received the **£100.00** that was due on **2 December 2015**. If you want to know what this amount is made up of, please call us.

WHAT TO DO

You can pay your bill for free today using one of the ways on the right. Make sure your payment reaches us by **26 February 2015**.

Have you thought about setting up a Direct Debit?

It's quick and easy to do, it spreads the cost of your bill throughout the year and means you'll never miss a payment again. Set it up at **anglianwater.co.uk/directdebit** or call us on **0800 197 3886**.

If you're finding it hard to pay, please let us know

We can help you find a way to pay your Anglian Water bills so call us on **0800 197 3886**. It's important you talk to us as if we don't hear from you, we'll have to take action to collect the money you haven't paid.

You should also know that whilst your account is overdue, your credit rating is being affected.

See overleaf for **FAQs** and the **Giro slip**

Online

Visit **anglianwater.co.uk/paybycard** with your debit or credit card details.

Over the phone

Call our automated 24 hour line **0800 197 3886** to pay by debit or credit card.

At a Payzone

Take cash payments and the slip over the page to any outlet. Visit **payzone.co.uk** for your nearest retailer.

Barclays Bank

Use the slip over the page at your branch or scan this code to pay by Pingit.

pingit

Appendix A2. Omission Commission Letter

love every drop
anglianwater

anglianwater.co.uk

0800 0857779
Lines open: 8-8 Mon to Fri, 9-1 on Sat

Miss Daisy
Mr M Freeman
Flat 1a
23 Coronation Street
Weatherfield
Manchester
M12 9ZZ

Date: 18 January 2016

Your account number:
109117051

Your supply address:
Flat 1a
23 Coronation Street
Weatherfield
Manchester
M12 9ZZ

PLEASE ARRANGE PAYMENT OF £500 WITHIN 7 DAYS

We have treated your lack of payment as an oversight. If you do not respond to this letter, we will treat it as an active choice not to pay your bill. We will be monitoring closely how long it takes you to respond to this letter.

Your credit rating may be affected

You should know that whilst your account is overdue, your credit rating may be affected.

How do I pay?

Please use one of the ways on the right to pay what you owe. If you're finding it difficult to pay, we can help find a solution -
Call us on **0800 0857779**

If you recieve benefits, please tell us as the Department for Work and Pensions may be able to pay us directly.

Online

Visit **anglianwater.co.uk/ paybycard** with your debit or credit card details.

Phone

Call our automated 24 hour line **0800 0857779** to pay by debit or credit card.

Payzone

Take cash payments and the Giro slip over the page to any outlet. Visit **payzone.co.uk** for your nearest retailer.

Bank

Use the Giro slip over the page at your branch or scan this code to pay by Pingit.

Spencer Hough
Head of CS Billing and Collections

pingit

See overleaf for **FAQs** and the **Giro Slip**

Appendix A3. Social Norms Letter

love every drop
anglianwater

Miss Daisy
Mr M Freeman
Flat 1a
23 Coronation Street
Weatherfield
Manchester
M12 9ZZ

Date: 18 January 2016

Your account number:
109117051

Your supply address:
Flat 1a
23 Coronation Street
Weatherfield
Manchester
M12 9ZZ

PLEASE ARRANGE PAYMENT OF £500 WITHIN 7 DAYS

Over 95% of people pay their Anglian Water bills on time. You are in the small minority of people who have not yet arranged payment. We will be monitoring closely how long it takes you to respond to this letter.

Your credit rating may be affected

You should know that whilst your account is overdue, your credit rating may be affected.

How do I pay?

Please use one of the ways on the right to pay what you owe. If you're finding it difficult to pay, we can help find a solution -
Call us on **0800 0857506**

If you recieve benefits, please tell us as the Department for Work and Pensions may be able to pay us directly.

Spencer Hough
Head of CS Billing and Collections

Online

Visit **anglianwater.co.uk/ paybycard** with your debit or credit card details.

Phone

Call our automated 24 hour line **0800 0857506** to pay by debit or credit card.

Payzone

Take cash payments and the Giro slip over the page to any outlet. Visit **payzone.co.uk** for your nearest retailer.

Bank

Use the Giro slip over the page at your branch or scan this code to pay by Pingit.

pingit

APPENDIX B

Appendix B1. Estimation equations

(1) Main estimation equation:

$$Y_{i(t_1,t_2)} = \alpha + \beta_1 TREAT_{i(t_1,t_2)} + \delta X_i + \varepsilon_i$$

where, Y_i represents a given outcome of interest (e.g. debt collected, complete or partial payment) for household i, β_1 captures the intent-to-treat (ITT) effect of both treatment arms (t_1, t_2), X_i is a vector of household variables that include risk group, letter sequence controls, days in trial, and ε_i is the error term.

(2) Heterogeneity equation:

$$Y_{i(t_1,t_2)} = \alpha + \beta_1 TREAT_{i(t_1,t_2)} + \beta_2 TREAT_{i(t_1,t_2)} * Risk_i + \delta X_i + \varepsilon_i$$

where, β_2 captures the interaction effect of the risk group and the treatment arm (t_1, t_2), X_i is a vector of household variables that include risk group, letter sequence controls, days in trial, and ε_i is the error term.

Appendix B2. Savings projections calculations

$$Payments\ across\ full\ sample_t = \sum y_t * N$$

$$Increased\ income\ vs\ control_t = \sum (y_c - y_t) * N$$

$$Increased\ income\ vs\ control\ across\ year_t = \frac{365}{days} * \sum (y_c - y_t) * N$$

where, y_t represents the payments made by households in treatment group **t**, y_c are payments made by households in the control group, **N** is the full sample of households, and **days** is the duration of the field experiment.

Appendix B3. Projected savings (controlling for differences)

	Omission Commission	Social Norms
Realized savings per household	£3.94	£1.44
Realized savings from trial	£46,800.96	£17,084.90
Projected savings across full sample (36,258)	£142,693.33	£52,095.22
Projected savings across full sample and full year (365/64)	£813,797.93	£297,105.54
Notes: These estimates control for differences in household repayment risk, days in trial and letter sequence.		

Appendix B4. Treatment effects - regression results

	Average Payment		Partial Payment		Complete Payment	
	Sample 1	Sample 2	Sample 1	Sample 2	Sample 1	Sample 2
Omission Commission	3.94***	3.51**	3.12***	2.98***	2.03***	1.79***
	(1.45)	(1.47)	(0.59)	(0.60)	(0.55)	(0.56)
Social Norms	1.44	0.90	2.59***	2.23***	1.93***	1.69***
	(1.61)	(1.65)	(0.59)	(0.60)	(0.55)	(0.56)
N (Households)	36258	34822	36258	34822	36258	34822
Notes: OLS regression results using risk group, days in trial and letter sequence as controls. Standard errors in parentheses. Sample 1 - used throughout report - and Sample 2 are explained in appendix C. Star level: * p<0.1 ** p<0.05 *** p<0.01						

APPENDIX C

Appendix C1. Unbalanced randomisation among households in low & medium risk group

Date of Randomisation	Control	Omission Commission	Social Norms	% in Control
18-Oct-17	2,016	1	1	100%
19-Oct-17	34	0	0	100%
20-Oct-17	22	13	13	46%
23-Oct-17	1,882	467	466	67%
25-Oct-17	0	1	0	0%
26-Oct-17	38	35	35	35%
27-Oct-17	466	26	26	90%
30-Oct-17	342	205	203	46%
31-Oct-17	258	253	253	34%
1-Nov-17	128	85	85	43%
2-Nov-17	194	185	184	34%
3-Nov-17	346	312	312	36%
6-Nov-17	357	277	276	39%
7-Nov-17	118	118	118	33%
8-Nov-17	1	2	2	20%
10-Nov-17	308	268	268	36%
13-Nov-17	131	108	107	38%
16-Nov-17	279	258	258	35%
17-Nov-17	134	108	108	38%
20-Nov-17	263	257	255	34%
21-Nov-17	327	267	266	38%
22-Nov-17	117	111	111	35%
23-Nov-17	139	100	101	41%
24-Nov-17	236	220	221	35%
27-Nov-17	278	249	249	36%
28-Nov-17	1	0	0	100%
Notes: Red cells are cohorts in which over 65% of low and medium risk households were assigned to the control group, in orange are those that over 40% were assigned to the control group.				

We conduct a sensitivity analysis (results below) with a sample that excludes all low and medium risk households from randomisations in which more than 40% (red and orange rows in Table C1) of the sample were assigned to the control group.

Appendix C2. Sample size - sensitivity analysis

Risk Group	Control	Omission	Norm	Total
Low & Medium	3,386	3,029	3,023	9,438
High	1,398	1,394	1,394	4,186
Very High	7,060	7,066	7,072	21,198
Total	11,844	11,489	11,489	34,822

Appendix C3. Payments by household - sensitivity analysis

	Control	Omission Commission	Social Norms
Average paid per household	£63.82	£66.77	£64.12
Percent that paid any amount	57.8%	60.1%	59.3%
Percent that paid in full	26.2%	27.5%	27.4%
N (Households)	11,844	11,489	11,489

Appendix C4. Realised and projected savings - sensitivity analysis

	Omission Commission	Social Norms
Realized savings per household	£3.51	£0.90
Realized savings from trial	£40,289.05	£10,324.40
Projected savings across full sample (34,822)	£122,112.05	£31,292.20
Projected savings across full sample and full year (365/64)	£696,420.28	£178,463.35
Notes: These estimates control for differences in household repayment risk, days in trial and letter sequence.		

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