

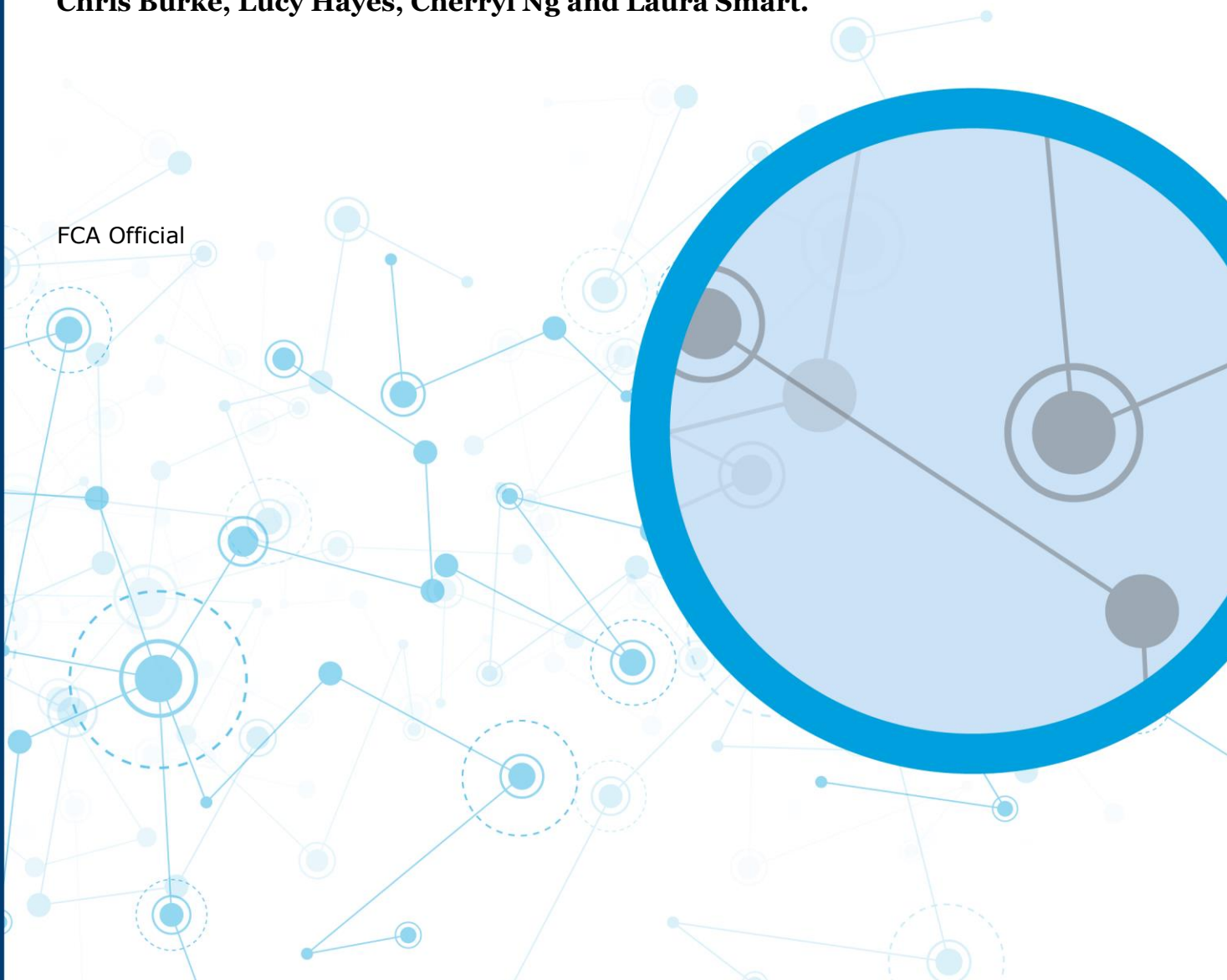
Occasional Paper

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Fair exchange: presenting foreign exchange quotes to improve consumer choice

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Executive Summary

Research question

The market for currency transfer services (that is, sending money or making payments abroad) is used by retail customers and businesses alike. It involves foreign currency conversion and is often called foreign exchange, or simply FX. In order to find the best deal, a participant should ideally understand and compare the costs and exchange rates that firms offer. Until new Europe-wide regulation was introduced in April 2020 ([Cross Border Payments Regulations – CBPR2](#)), there was a lack of consistency in how this information was presented across the market. For example, some firms highlighted transaction costs and others highlighted commission as a percentage of the amount being transferred. Exchange rates offered to customers were also presented differently, either as real-time fluctuating rates or rates that were fixed for a period of a day or more. Some market practices, for example, requiring consumers to register with the firm before seeing quotes, may be seen as an example of ‘sludge’ – harmful friction, which leads to bad consumer outcomes (Thaler, 2018). Overall, this complexity means that customers may end up with a poor deal.

Previous research has found that presenting transaction costs in a consistent way across FX firms can significantly increase the chances of consumers shopping around and finding the best deal (Behavioural Insights Team, 2018). The same research also found that simplifying the information presented, by summarising costs and exchange rate information in terms of the monetary cost helped consumers choose the best deal. We built on this research by testing the presentation of information in ways that were being considered by market participants and regulators in advance of CPBR2 (in order to be consistent with CPBR2). We measured which of these presentations best helped - or hindered - consumers.

Approach

Following discussion with industry bodies, consumer and small business stakeholders,¹ we chose 3 practices for presenting cost and exchange rate information that we understood would have significant effects on consumers’ propensity to shop around and subsequent choices. We tested their impact in an online hypothetical choice experiment. The 3 practices we tested were:

Fixed vs. a real-time, dynamic exchange rate. The ‘fixed’ exchange rate condition emulated firms which offer the same exchange rate for a whole day, whereas the ‘moving’ exchange rate emulated firms which offer real-time fluctuating exchange rates (which can change from second to second). Our hypothesis was that a moving exchange

¹ The FCA discussed transparency of currency transfer services with a working group of trade associations and consumer and small business representatives during 2019. The FCA’s Principles for Businesses and general information rules in its [Banking Conduct of Business sourcebook](#), Chapter 2, apply to the payment services and e-money services sector in relation to currency transfer services.

rate may be confusing for consumers and may make shopping around more difficult. The rate may change during the time spent shopping around, and it may be difficult to tell if differences in the received amount are due to changes in the exchange rate or the different costs charged by providers. At times of particularly volatile exchange rates, behavioural biases such as loss aversion, and risk attitudes may inhibit people from shopping around, for fear of losing out on a particular rate.

Requirement to pre-register Some providers require consumers to register online before accessing a currency calculator or quote. This introduces significant friction in the shopping around process (Vora, 2003), potentially causing consumers to compare quotes from fewer providers, or stick with a suboptimal provider due to sunk-effort costs. Impatient consumers (ie those with higher present bias or temporal discounting) may be more highly affected by friction in the consumer process and less likely to minimise their costs when making FX transactions.

Showing a timestamp and a risk warning. Some providers that present a real-time fluctuating exchange rate place a time stamp next to the rate so that consumers have a reference time for the rate offered. We hypothesised that this practice could either help or hinder shopping around and choice. It could help consumers notice that the exchange rate was changing over time, and therefore may make them more vigilant to different providers' costs and to potentially try to minimise them. Alternatively, it may make the consumer focus on the time-limited nature of the offer and induce them to more quickly accept the quote and shop around less. We combined the timestamp with the following statement: 'exchange rates can go up or down', with the aim of enhancing the former possible effect of the timestamp. Previous research has shown that providing more information about financial products doesn't necessarily help consumers make better decisions (for example Adams et al., 2018), so it is vital to test the efficacy of such interventions.

Participants in the experiment were asked to choose 1 of 4 providers (all of which differed in their transaction costs) to process a transfer of £1000 to Euros. They could choose to click through to view up to 4 browsing tabs containing offers from these providers. Figure 1 gives an example of how information was presented on the tabs. This presentation was consistent with CBPR2, which requires firms to present the absolute amounts of the currencies to be sent and received and the percentage margin this represents over a published reference exchange rate (a consistent measure of cost).

Figure 1: The presentation of information used in the experiment

The interface shows a transaction flow for Provider 1. At the top, there are tabs for 'Provider 1' and 'Provider 2'. The main transaction details are as follows:

Label	Amount	Currency
You send	1,000	GBP ▼
- Total cost of service: £20 (2%)		
Cost breakdown		
You receive	1,102	EUR ▼

Below the transaction details, the interface displays the following information:

- Your rate: 1.1020
- Market exchange rate for reference: 1.1234

At the bottom of the interface is a green button labeled 'Accept this offer'.

All 3 conditions outlined above were tested in combination, resulting in 8 different treatment groups (see Table 1 below). The baseline condition ('control group'), was with a stable exchange rate, not requiring registration and without the timestamp and disclosure. We hypothesised that this baseline would result in the best outcomes.

Table 1. The treatment groups used in the experiment, made up from the three conditions.

Treatment	Same vs moving exchange Rate (Fixed vs. a real-time dynamic exchange rate)	Registration (Requirement to pre-register)	Timestamp (Showing a timestamp and a risk warning)
1 (Control group)	Same	No	No
2	Same	No	Yes
3	Same	Yes	No
4	Same	Yes	Yes
5	Moving	No	No
6	Moving	No	Yes
7	Moving	Yes	No
8	Moving	Yes	Yes

We measured 2 primary outcomes:

1. The number of offers each participant viewed (out of 4), (shopping around) and
2. Whether they chose the offer that gives the highest amount of Euros received (likelihood of choosing the best deal).

Shopping around can help consumers make better choices by allowing them to compare options, which in turn also drives better competition. The experiment was designed in such a way that participants must shop around to get the best offer. In real life, it is possible consumers could get the best offer by chance if they happen to pick it first, but shopping around in general increases the chance of a consumer finding the best deal. Therefore choice of deal is the ultimate goal and outcome.

Following the experiment, we asked participants some questions, which allowed us to measure their behavioural biases: (i) loss aversion – the tendency to prefer avoiding losses to acquiring equivalent gains, (ii) discounting – the tendency for people to increasingly choose a smaller-sooner reward over a larger-later reward further out in time, and (iii) present bias – the tendency to prefer a smaller present reward than wait for a larger future reward. We also asked about their level of experience with FX and measured their financial literacy, and also asked why they had made their choice. We were interested to know whether there were any interactions of our treatments with

these measures, to help us understand potential variations of the impact in real-world settings. For example, might consumers with certain behavioural biases or with lower financial literacy react more strongly to our interventions?

Findings

The control group outperformed all of the other treatments. To summarise, the treatment which showed a fixed exchange rate, had no requirement for registration and no warning about moving exchange rates led to the most shopping around and a higher likelihood of choosing the best deal.

This result is driven by the finding that, on average, people are more likely to shop around across the treatments where no registration is required and on average, people are more likely to choose the highest received amount across the treatments where the market exchange rate is the same across all offers (stable). The timestamp and statement has no statistically significant effect across our treatments.

Our behavioural measures showed us that people who are more loss averse are more likely to shop around and choose the best offer, whereas people with higher discounting and present bias measures are less likely to shop around and choose the best offer.

We also find that people with more FX experience and those with higher financial literacy are more likely to choose the best deal.

When asked about how they made their choice, participants said that the most important factor was the received amount.

Implications

Our results suggest that people make better choices when they can compare offers across providers that are fixed during the time they are searching. However, in line with previous research (Australian Securities and Investments Commission/Dutch Authority for the Financial Markets, 2019), adding further information in the form of a timestamp and disclosure about exchange rates changing did not improve participants' choices. Participants told us that the key piece of information they focussed on was the received amount (ie the amount of one currency they would receive for a stipulated amount of the other). This underlines the value of testing disclosures when they are considered as a main policy instrument and demonstrates that more information isn't necessarily better.

The friction introduced by requiring people to register causes worse outcomes for consumers, as they shop around less and are therefore less likely to find the best deal. This finding could apply to other financial products that are first accessed online, such as insurance quotes, either directly or indirectly via price comparison websites. Consumers may be put off from searching for the best deal in many online settings if they are required to pre-register in order to see offers. The introduction of friction into consumer journeys can be detrimental to decision making² but there is an additional effect when it interacts with behavioural biases (such as present bias). Because behavioural biases are heterogeneously distributed across individuals, it may be the case that certain people are

² For example, in searches for consumer credit (Argyle, Nadauld & Palmer, 2020), but in some cases, slowing consumers down through friction can help them make better decisions (for example Hayes, Lee & Thakrar 2018).

more (or less) susceptible to friction in the shopping around process, which may need to be considered by firms and regulators in their attempts to treat consumers fairly.

1 Background

The scale of payments and transfers to foreign countries from the UK is very large. An estimated \$26.8bn was transferred in 2017 alone as remittances (transfers by non-UK nationals to their home country; Pew Research, 2018) and it has been estimated that Small- and Medium-sized Enterprises (SMEs) paid approximately £4 billion in hidden transfer costs in 2015 (Money Mover, 2016a; 2016b). In the retail foreign exchange (FX) market, the Behavioural Insights Team (2018) showed that the way currency transfer information (and the degree of transparency in the way costs associated with a transfer are presented to consumers) influences their ability to compare different firms and their ability to minimise their costs. A key finding was that a lack of transparency and a low degree of standardisation in how costs for sending money abroad are presented leads to poorer (higher cost) choices by consumers by impairing their ability to compare and contrast different FX providers.

A particular issue in the retail FX market is the complexity and amount of information that a consumer needs to understand when deciding whether or not to transact with a particular firm. For example, firms can operate different transaction cost structures, use different exchange rates and can deduct costs from the monetary amount to be converted or from the amount of the new currency to be received. In general, attempts to improve consumers' abilities to compare and contrast different providers in the financial services sector, especially where information is complex and could be presented in diverse ways, often involves standardisation or defining the minimum amount of information that needs to be presented at the point of sale. Examples of where this has previously been implemented include packaged retail investments and insurance-based products (PRIIPs), where firms are required to provide key information documents (KIDs) to consumers prior to the point of sale. Indeed, traditional economic models assume that providing more information to consumers is always beneficial and should improve decision-making. However behavioural research has shown that more information does not necessarily improve decision-making and may even impair it due to information overload (Persson, 2018).

Until new EU-wide regulations came into force in April 2020 there was a lack of consistent information available across the market on the costs of foreign exchange (FX). Currency transfer providers presented payment and transaction information to consumers in a wide variety of ways. For example, some firms highlighted absolute transaction costs and others highlighted commission (or margin) charged as a percentage of the amount being transferred, while exchange rates were presented in multiple ways, or not at all. A 2016 survey (Money Mover, 2016b) found that some providers did not even provide exchange rates and margins before confirming a payment, meaning the customer had no information about how much they would be charged for the transaction. When providers do display exchange rates to consumers prior to the transaction being confirmed, there is considerable variability in the way they are presented. Some providers offer customers a real-time fluctuating exchange rate, and others offer the customer an exchange rate fixed for that day, or the ability to 'lock-

in' rates for a limited time period. These differences make it difficult for consumers to compare the rates that they would achieve through different providers.

In the case of displaying real time fluctuating rates, comparing providers sequentially could be problematic as the rate could potentially change over the time spent shopping around. From a consumer behaviour point of view, it may be the case that when markets are moving up and down over a period of time and consumers are sequentially shopping around (rather than using a price comparison website, for example), fluctuating rates could be confusing. For example, it could be the case that when there are movements in the underlying market rate, it is difficult to tell if changes in the received amount are due to changes in the exchange rate or the differences in the costs charged by different providers. Finally, a consumer's risk attitude or loss aversion could cause them to stop shopping around (if for example they see or perceive that rates are volatile and seek to transact as soon as possible).

Some providers also require consumers to register online to gain access to quotes, transaction costs and exchange rate information. This may be seen as an example of 'sludge' – harmful friction, which affects choices (Sunstein, 2018; Thaler 2018). Sludge is typically defined as aspects of a decision-making process or consumer journey that discourage behaviour that is in the user's best interest or encouraging behaviour that may be self-defeating. Although not directly related to the disclosure or transparency issues raised above, this registration process introduces friction into the shopping around and quote comparison process. Previous research from other markets suggests that adding a requirement to register before transacting introduces significant friction in the shopping around process (Cook et al., 2002; Vora, 2003; Hann and Terwiesch, 2003), potentially causing consumers to compare fewer providers, or stick with a suboptimal provider due to sunk-effort costs. Impatient consumers (ie those with higher present bias or temporal discounting) may be more highly affected by friction in the consumer process and less likely to minimise their costs when making FX transactions.

Finally, some providers also bring the fact that exchange rates are inherently unstable to a consumer's attention by adding a timestamp or statement to a foreign exchange quote. This implies that the rate displayed is only valid at that time, although some providers allow consumers to "lock-in" rates for a certain period before the quote expires. This practice may have two behavioural implications – it could reduce the weight consumers place on fluctuating market rates when looking for a deal, by disclosing that the quoted rate is only valid for a particular time when the quote was received (and potentially enhancing the salience of the costs associated with the transaction). Alternatively, it could also pressurise consumers into accepting the quote and using that provider to make the transaction by introducing scarcity into the decision-making process (inducing the consumer to believe that the quoted rate will only be available for a limited time).

The diversity of presentation standards, registration requirements and the amount of information relevant to consumer decision making for each retail FX transaction make it complex for individuals or small businesses to compare providers on costs alone. Although in the present market a consumer may get a good deal without shopping around by chance (for example by obtaining a beneficial exchange rate by chance in a rapidly moving market), the consumer would have no way of knowing this without the ability to compare across providers which could hamper competition. This suggests that policies that standardise parts of the information provided to consumers may be

beneficial. If providers can be compared on the basis of the amounts that will be received by the recipient and the mark-up the provider makes on a reference exchange rate, consumers effectively only have to optimise over two strategies – choose the lowest costs or the best exchange rate for that particular transaction.

The new European regulations (CBPR2) which came into force in April 2020 require that consumers and small businesses should be presented with certain information prior to the initiation of the transaction (for example at the point of sale like at an ATM or online). Specifically, they require providers to be transparent about the charges that customers will pay, and present these costs as a percentage mark-up over a reference exchange rate which is published daily. They also specify that the amount being paid by the payer and the amount being received by the payee should be presented in their respective currencies. This research tested presentations which are consistent with CBPR2, but it was carried out before providers had begun to publish the new disclosures.

The aim of research presented in this paper was to investigate the impact on consumer decision making of different ways of implementing in practice the new required disclosures in the context of the current retail FX market and how these may interact with participant characteristics such as behavioural biases or prior experience. Specifically, we hypothesized that some practices highlighted above would reduce people's ability to choose lower cost providers, and decrease the amount of shopping around before people chose a provider to transact with. To test this hypothesis, we designed an incentive-compatible online experiment where participants were tasked with converting a hypothetical £1000 into Euros, and were able to select one out of four possible providers to make the conversion. The participants could sequentially view quotes from the four different providers and go back and forth between quotes as many times as they liked, before choosing the provider.

We designed a standardised FX transaction presentation, and then systematically manipulated this presentation to reflect different ways market providers could comply with CBPR2 and the FCA's related requirements, following discussion with industry, consumer and small business stakeholders³. The standardised condition provided participants with the amount of money that they were sending in their own currency (£1000) and the amount that would be received by the recipient in the new currency (Euros). In addition to this information, the costs associated with the transfer were presented as a percentage mark-up against a market reference rate, with this percentage cost also expressed in a monetary amount. The effective exchange rate (the ratio between sent amount in £ and received amount in €) was also presented. The market practices that we investigated relative to the standardised presentation were: 1. 'Same vs. a moving market exchange rate'; changing the underlying exchange rate through time, to simulate the presentation of mid-market or interbank rates seen at present 2. 'Registration'; introducing a requirement for participants to register before receiving any quote information from providers and 3. 'Timestamp'; a statement/timestamp to inform participants that exchange rates may fluctuate and bring to their attention that the quoted exchange rate was valid at the particular time it was retrieved. In addition to measuring the effects of these manipulations on people's ability to choose better offers and the degree to which they shopped around, we performed

³ The FCA discussed transparency of currency transfer services with a working group of trade associations and consumer and small business representatives during 2019. The FCA's Principles for Businesses and general information rules in its Banking Conduct of Business sourcebook, Chapter 2, apply to the payment services and e-money services sector in relation to currency transfer services.

exploratory analyses based on a post-task survey designed to measure participants attitudes, motivations and experience with retail FX, and investigated the impact of behavioural measures (risk and time preference parameter values) on how respondents made their choices in the online experimental task.

2 Research Design

Sample selection

We selected a sample of 6,968 participants from a UK-based online panel. The sample was nationally representative based on quotas for geographic region, age, gender and social grade. After data cleaning (removal of missing data and those participants whose task instructions viewing time was below 30% of the average instruction viewing time), 5,717 participants remained for analysis. Descriptive statistics of the sample and how they compare to our nationally representative quota can be found in Table A1 in Annex 1. Counts remaining in each group after data cleaning are in Table A2.

Experimental environment

The experiment simulated an online environment where participants could shop around for a currency transfer provider. After giving informed consent participants answered a number of demographic questions for quota control (age, geographic region, gender and socioeconomic status). Quota management continued in real-time as participants arrived on the experiment page and any participants that were over quota were screened out. Allocation of participants to one of the experimental conditions was performed using a random number generator.

After passing through the quota controls and instruction pages, all participants landed on an initial FX quote from Provider 1 (Figure 2). Participants had the option of selecting this provider to process their transaction, or open another quote from Provider 2 by clicking on a tab at the top of the screen. Participants could then continue to shop around by opening quotes from Providers 3 and 4. At every stage participants could compare updated quotes from providers that had already been viewed and select one of the providers to make the transaction. Participants could take as long as they required to choose a provider to make their transaction.

We based our experimental design on a previous study of foreign exchange transactions conducted by the Behavioural Insights Team (2018). This study investigated the impact of increasing the transparency of fee information on customer behaviour and found that more information doesn't necessarily improve consumer decision making. Based on their results and in consultation with the FCA's stakeholder working group, we decided that our baseline condition contained the key pieces of information necessary to facilitate consumer decision making.

Similar to the BIT study, the first offer that participants viewed was the second best option, and the best offer was always the third option irrespective of the treatment group. The baseline condition, which all other conditions build on, consisted of providers displaying a 'send amount' (the amount of GBP to be exchanged), a total cost of service expressed as a percentage mark-up and GBP, a received amount (the amount of EUR

that will be transferred), the effective exchange rate achieved by the consumer and a mid-market reference rate. In addition, clicking a 'cost breakdown' button resulted in a pop up that showed a payment service cost and currency conversion cost (which together made the total cost of service). For the purposes of this experiment, payment service costs were fixed across providers and only the currency conversion cost differed).

Figure 2. Example baseline provider presentation.

The screenshot shows a user interface for selecting a currency exchange provider. At the top, there are two tabs: 'Provider 1' (active) and 'Provider 2'. The main content area is blue and contains the following elements:

- 1.** A box labeled 'You send' with the value '1,000' and a dropdown menu showing 'GBP'.
- A minus sign icon followed by the text 'Total cost of service: £20 (2%)'. To the right of this text is a button labeled 'Cost breakdown' with a circled '2.' next to it.
- A box labeled 'You receive' with the value '1,102' and a dropdown menu showing 'EUR'.
- Below the 'You receive' box, the text 'Your rate: 1.1020' is displayed with a circled '4.' next to it.
- Below the 'Your rate', the text 'Market exchange rate for reference: 1.1234' is displayed with a circled '5.' next to it.
- At the bottom of the interface is a green button labeled 'Accept this offer'.

1) GBP to be exchanged 2) Total cost and cost breakdown popup button 3) EUR that will be received 4) Effective consumer rate 5) Mid-market or interbank reference rate. Participants could choose to accept this offer or receive another quote from providers by opening the tabs at the top of the page.

Experimental task

Participants were instructed that the purpose of the study was to investigate how they made hypothetical choices when exchanging and sending currency across borders. They were asked to imagine they needed to change £1,000 to Euros and send it to an overseas account, and they would need to select one of the providers to send the payment.

Additionally, participants were told that in addition to their participation fee, they could receive a further monetary incentive if they chose the best offer. To this end, one provider across all experimental conditions offered the best deal, in terms of the lowest total costs associated with the transaction, and if participants chose this provider they

would receive the additional monetary bonus in addition to their standard fee for taking part in the experiment.

Treatments

We tested the impact of three experimental conditions on how providers displayed the transaction to participants. These three conditions were combined in a full 3x2 factorial design to allow the testing of both main effects and interactions, resulting in 8 experimental treatments (Table 2). We did not implement a 'mixed market' condition that mixed different presentations, as this was previously demonstrated to result in poor choices that were not significantly different from a low transparency treatment (Behavioural Insights Team, 2018). The received amounts for each provider in each condition are listed in the Annex in Table A3.

Table 2. Experimental treatments

Condition	Exchange Rate	Registration	Statement + timestamp
1 (Control group)	Same	No	No
2	Same	No	Yes
3	Same	Yes	No
4	Same	Yes	Yes
5	Moving	No	No
6	Moving	No	Yes
7	Moving	Yes	No
8	Moving	Yes	Yes

Participants were randomly assigned to each treatment and performed the task only once. We chose a between-subjects design to minimise learning effects and reduce the experimental time per participant. Our conditions were:

Same vs. moving exchange rate

In this condition, the market exchange rate (GBP/EUR) for reference was either fixed at 1.1234 while participants viewed offers from the different providers, or moved up or down by 22 basis points between each offer viewed (pre-determined by experimental design and updated as participants opened new offers, up to a maximum of 4 times).

Since the costs of different providers differed only in their % mark up on the interbank rate, the effective rate ("your rate") for the participant also changed equivalently.

This manipulation allowed us to compare whether participants were better able to select the best offer when exchange rates changed between viewing offers from providers (e.g. if providers display the real-time interbank rate or a fixed daily rate to consumers). If real-time changing rates are displayed, the strategy for selecting the best deal could shift from maximising the received amount in EUR to minimising the total cost of service. Desk research estimated that at the time of writing up to 75% of FX and remittance providers display exchange rates that are regularly updated when providing quotes to consumers.

Pre-quote registration

This condition simulated the effect of registering online before gaining access to any quotes from providers. Participants were required to create and enter a username and password and complete a "captcha" verification process before viewing quotes from providers (Figure A1). Once participants had registered with a particular provider, it was not necessary to enter these details again to access an updated quote.

This manipulation allowed us to compare the effect of introducing friction into the user experience of shopping around. Currently up to 30% of firms require consumers to create an account before receiving quotes or accessing an online currency conversion calculator.

Statement and rate timestamps

This condition added the statement "Exchange rates can go up and down" and a real timestamp (HH:MM, DD:MM:YYYY format) next to the effective and mid-market reference rates to the baseline offer presentation. This timestamp updated whenever participants opened a new quote from a provider.

This condition was designed to focus participant's attention on the costs of the transaction rather than the received amount or presented rates. Desk research suggested that up to 15% of firms in the market contain some statement or feature that may draw a consumer's attention to the fact that exchange rates move over time e.g. by alluding to the fact that the rate is not guaranteed or that the quote is only valid for a period of time.

The treatment that served as our baseline (control group) was consistent with the new CBPR2 regulations and contained a fixed exchange rate, didn't require registration and did not have the statement and timestamp disclosure.

Post Experiment Survey

Once participants had selected a provider to make their transfer, they proceeded to a survey (Annex 2) to determine qualitatively the reasons participants had for making their choices. These questions were designed to provide insights on:

- Whether there was any effect of experiment manipulations/treatment groups and other factors on consumer confidence.
- The importance of the different features of the provider offer presentation on how they made their choice

- how rushed the participants felt when making their choice
- Whether participants had ever used a foreign exchange provider to send foreign currency to an account or make a payment across borders
- How often participants used foreign exchange providers
- The financial literacy of participants (Agnew and Szykman, 2005; Lusardi & Mitchell, 2009; Lusardi and Tufano, 2009; van Rooij, Lusardi and Alessie, 2011; Fernandes, Lynch & Netemeyer, 2013).

In addition, participants took part in two extra tasks to elicit their time and risk preferences (according to cumulative prospect theory and quasi-hyperbolic discounting models). Risk preferences were measured by presenting participants with 12 trials where they made hypothetical choices between two risky options presented at the same time on the screen. All decisions were between two compound lotteries of the form p chance of magnitude x , $1-p$ chance of magnitude y . Lotteries were constructed on a trial-by-trial basis, with x and y denominated in GBP. After each choice, the task adaptively presented a new pair of lotteries that optimised the sequence of possible trials to recover the participants true risk preferences (modelled according to cumulative prospect theory) according to the adaptive Bayesian method described by Toubia et al. (2013). The same method was used to recover participant's time preferences (modelled according to quasi hyperbolic discounting), with choices of the form magnitude x received in days t . This allowed us to recover the utility curvature, probability distortion and loss aversion parameter values for each participant in the case of prospect theory and the present bias and discounting factor parameter values in the case of quasi-hyperbolic hyperbolic discounting.

3 Results

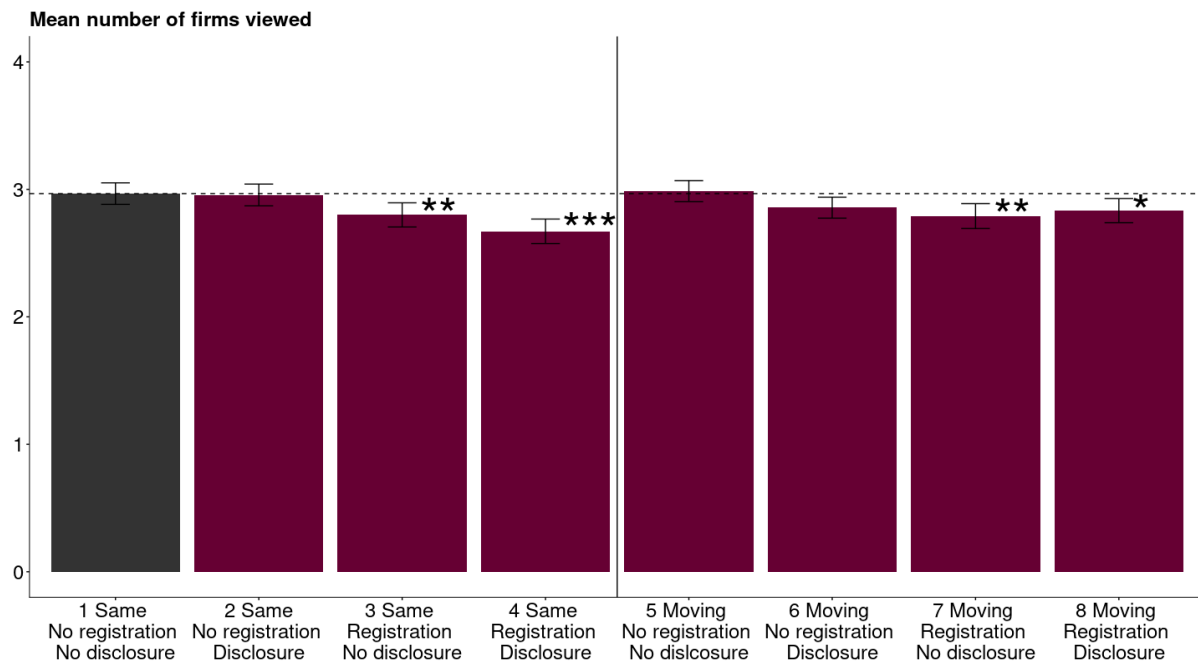
Our primary outcome measure was the proportion of participants choosing the best deal (the highest received amount). We also look at the amount of shopping around participants did (the number of firms viewed out of 4, before selecting a deal), as an important step towards choosing a deal. Shopping around can help consumers make better choices, by allowing them to compare options, which in turn also drives better competition. Therefore, shopping around can be a step towards the ultimate goal of choosing the best offer. We designed our experiment such that consumers must shop around to find the best deal.

We measured the effect of our treatments on these outcomes, compared to the control group. We also present some further exploratory analysis, where we look at the difference in our outcome measures depending on the level of financial literacy, past experience with foreign exchange services and some behavioural characteristics (loss aversion, discounting rate and present bias). Finally, we also look at self-reported reasons for the choices made. We report regressions with and without controls for the demographic and behavioural variables available.

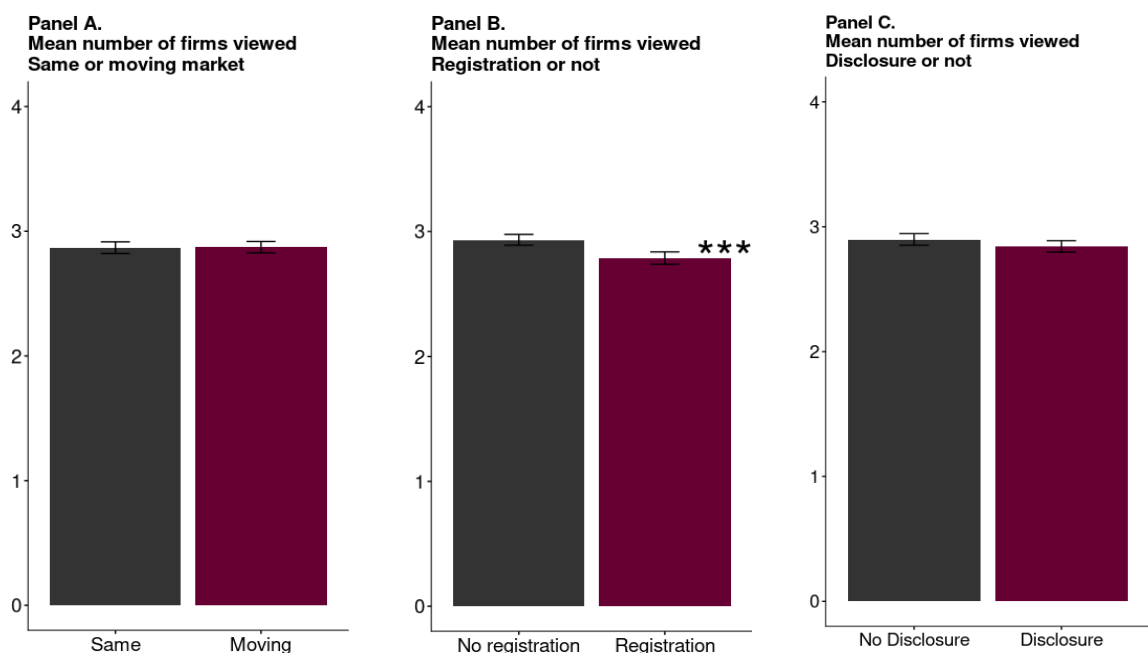
Shopping around

Figure 3 shows the mean number of tabs opened before selecting a deal (number of firms viewed out of 4), across all treatment groups, based on estimated treatment effects in Table A5. For ease of interpretation, we also present the average effects of the three conditions (1. Stable vs. moving market 2. No registration vs. registration and 3. No disclosure vs. disclosure) separately in Figure 4. That is, for example, the mean for all participants receiving the 'moving market' condition, aggregated over all levels of the registration and disclosure conditions. Regression outcomes are reported in Tables A7 and A8. We also report the results of t-tests, to negate any concerns regarding unbiased estimates due to our between-subject experimental design (Table A9).

As Figure 3 shows, our baseline condition (control group), along with treatment 5, result in the highest average number of firms viewed. The difference between treatment 5 and the control group is not statistically significant. A statistically significant reduction in the average number of firms viewed can be seen in treatments 3, 4, 7 and 8. Overall, requiring people to register before viewing any offers causes them to shop around less (Figure 4 Panel B), with an average of 2.79 firms viewed compared to 2.93 where no registration is required - a difference of 3.5 percentage points [$t = -4.35$, $p = 1.38e-05$]. Neither of the other conditions have any effect on our shopping around measure [moving market: $t = 0.113$, $p = 0.91$] (figure 4, Panel A), [disclosure: $t = 0.113$, $p = 0.91$] (figure 4, Panel C). See tables A6 and A7 for details.

Figure 3: Mean number of firms viewed (out of 4) per treatment group

N = 5689, P-values: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 4: Mean number of firms viewed (out of 4) per condition, averaged over other conditions.

N = 5689, P-values: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

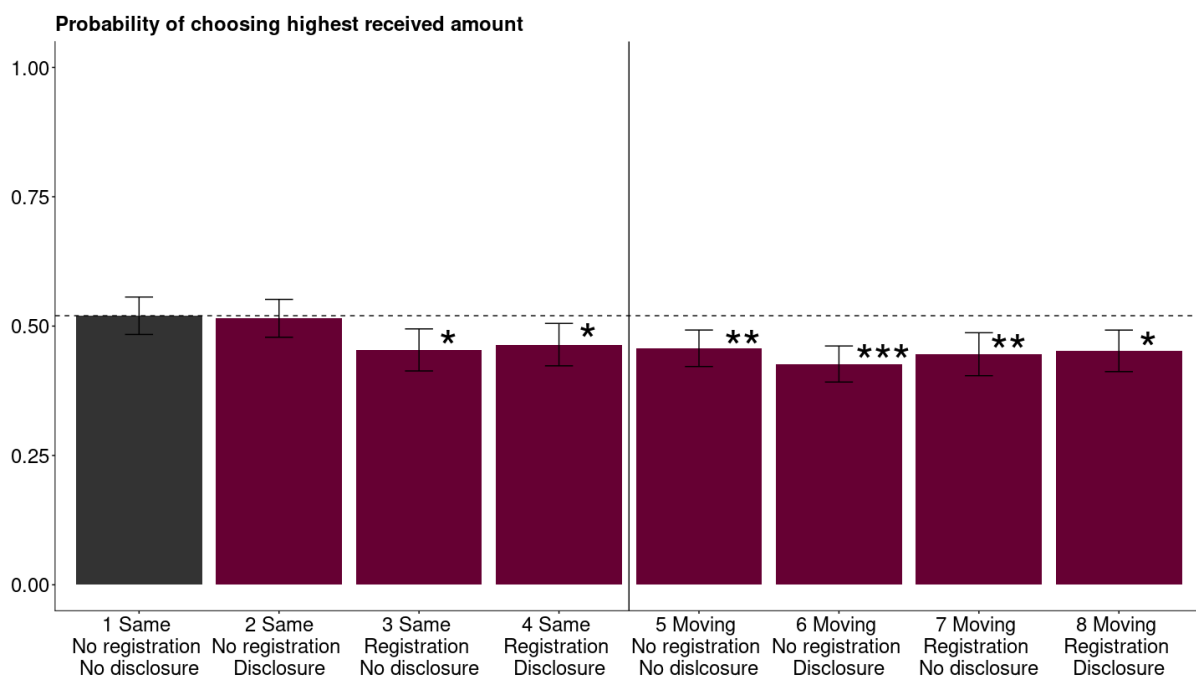
Choice of deal

Figure 5 shows the proportion of participants choosing the best deal (the highest received amount) across all 8 treatment groups, based on our estimated treatment effects as reported in Table A6. Again, we also present the estimated average effects of

our three conditions (1. Stable vs. moving market, 2. No registration vs. registration and 3. No disclosure vs. disclosure) on choice, separately, (again, aggregated over all levels of the other two conditions), in Figure 6. Regression outcomes are reported in Tables A7 and A10. Again, we also report the results of t-tests, to negate any concerns regarding unbiased estimates due to our between-subject experimental design (in table A11).

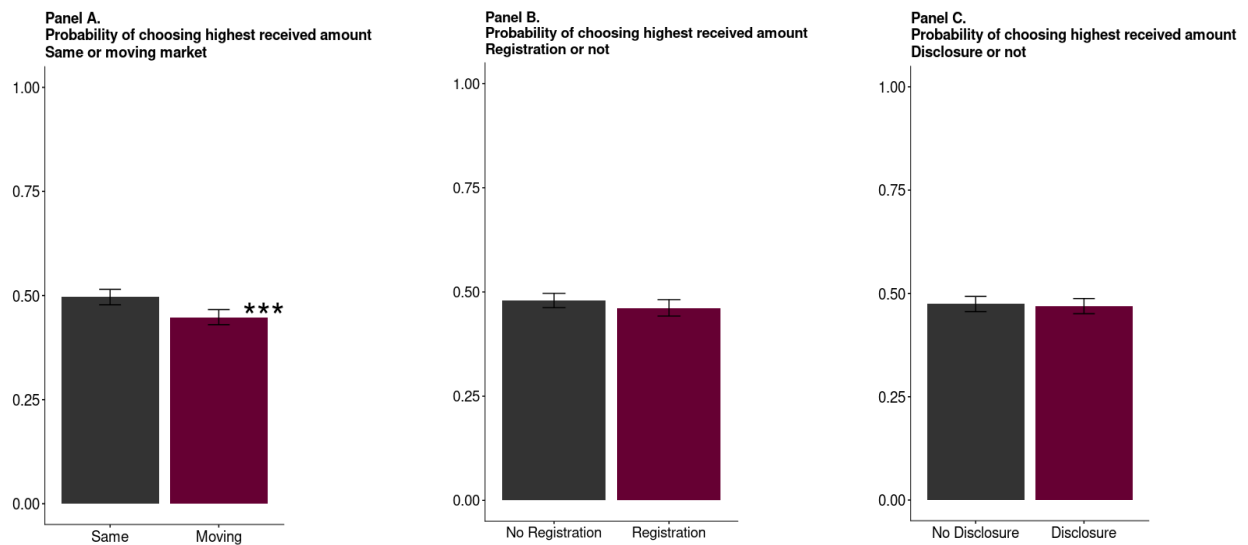
As Figure 5 shows, our baseline condition (control group) results in the highest probability of choosing the highest received amount. A statistically significant reduction in this probability can be seen in treatments 3 to 8. Overall, the moving market condition causes people to be less likely to choose the highest received amount compared to the static market (Figure 6, Panel A), with average predicted probabilities of 0.496 and 0.448 respectively, a 4.8 percentage point decrease [$z = -3.648$, $p = 0.000265$] Neither of the other conditions (registration and disclosure) had any impact on the probability of choosing the highest received amount, when we measure the average treatment effects [registration: $z = -1.315$, $p = 0.1884$] (Figure 6, Panel B), [disclosure: $z = -0.375$, $p = 0.70739$] (Figure 6, Panel C). See Tables A6 and A8 for details.

Figure 5: probability of choosing highest received amount by treatment group



N = 5689, P-values: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 6: Average treatment effects - probability of choosing highest received amount per condition, averaged over other conditions.



N = 5689, P-values: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Unsurprisingly, due to the way our experiment is set up, we also find that shopping around is related to a higher probability of choosing the highest received amount [$z = 40.11$, $p = < 2e-16$] (Table A12).

Robustness checks

We conducted some further analysis and found that the results above were robust to different ways of measuring our outcomes and to different regression specifications. We measured the treatment effects on the rank of the choice of deal as a new outcome measure, where 1 is the best deal and 4 is the worst (ordinal regression 5, Table A4). This measure allows us to see any improvement in the deal chosen, compared to our main outcome (a binary measure of whether the best deal was chosen or not). We also include other demographic and behavioural measures in the model (gender, age, financial literacy, experience of foreign exchange, loss aversion, discounting and present bias), to improve model precision (see regressions 2 and 4, Table A4). As can be seen from Table A4, the coefficients and statistical significance follow very similar patterns across treatments for these different specifications.

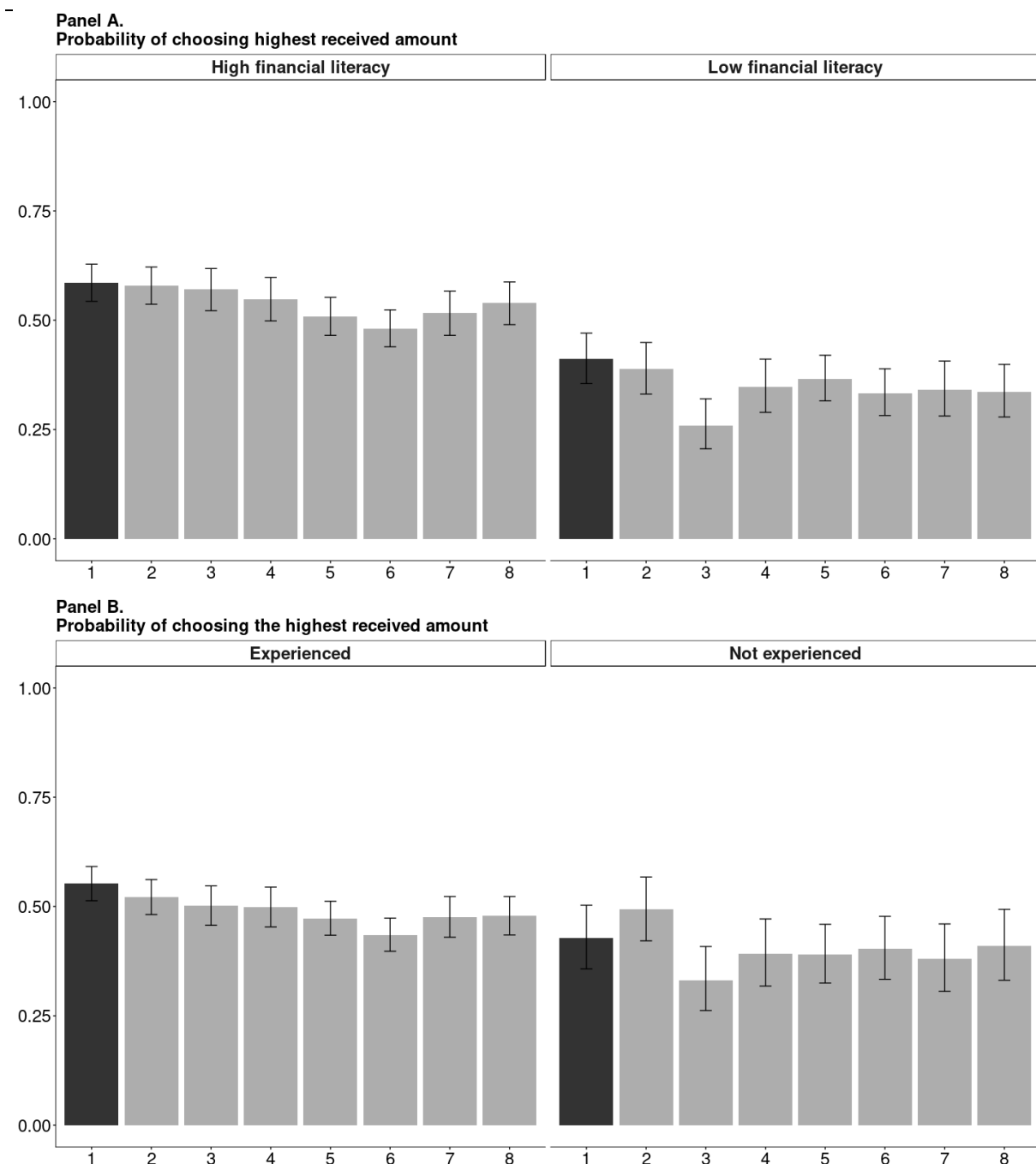
Exploratory analysis

Financial literacy and foreign exchange experience

Participants' financial literacy and experience with foreign exchange influenced their decision making. For example, those with high financial literacy had a mean probability of 54% of choosing the best deal, whereas those with low financial literacy had a mean probability of 35% of choosing the best deal (high financial literacy was determined by a score of 3 out of 5 or above in the financial literacy questions listed in Annex 2). Those

with past experience of foreign exchange had a mean probability of 49% of choosing the best deal, compared to 40% for those without (experienced users of foreign exchange were those who said they occasionally or frequently send payments abroad (Annex 2)). Figures 7A and 7B shows the difference between these groups, for all treatment groups.

Figure 7: Probability of choosing highest received amount split by financial literacy and foreign exchange experience, for all treatment groups.



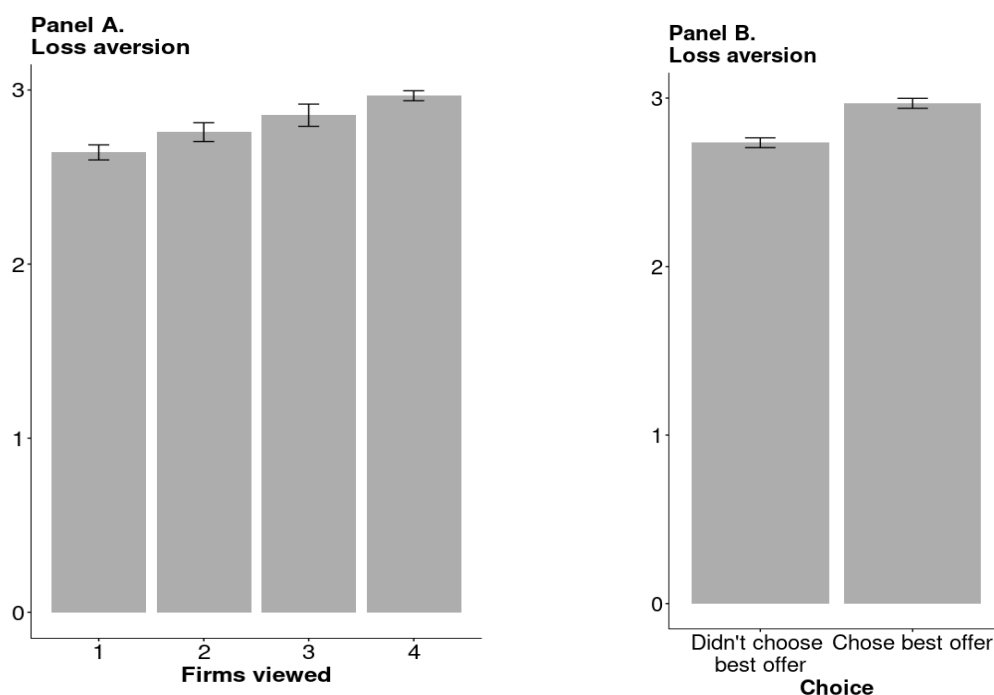
Behavioural measures

We investigated the relationship between our behavioural measures (loss aversion as estimated by the cumulative prospect theory model and present bias and discount rate as estimated by the quasi hyperbolic discounting model, as described in Annex 3 and in the research design section above) and the outcome measures, as well as interactions with the three conditions. We find that loss aversion, discounting and present bias each influence our outcome measures. We also find our behavioural measures are correlated with one another.

Loss aversion

Participants who are more loss averse are more likely to shop around (Figure 8 Panel A) [anova: $f = 42.65$, $df = 5687$, $p = 7.13e-11$] and to choose the best offer (Figure 8 Panel B). [t-test: $t = -5.634$, $df = 5651.6$, $p = 1.846e-08$]. We investigated interaction effects with loss aversion and the three conditions (1. Stable vs. moving marked, 2. No registration vs. registration and 3. No disclosure vs. disclosure) and found none.

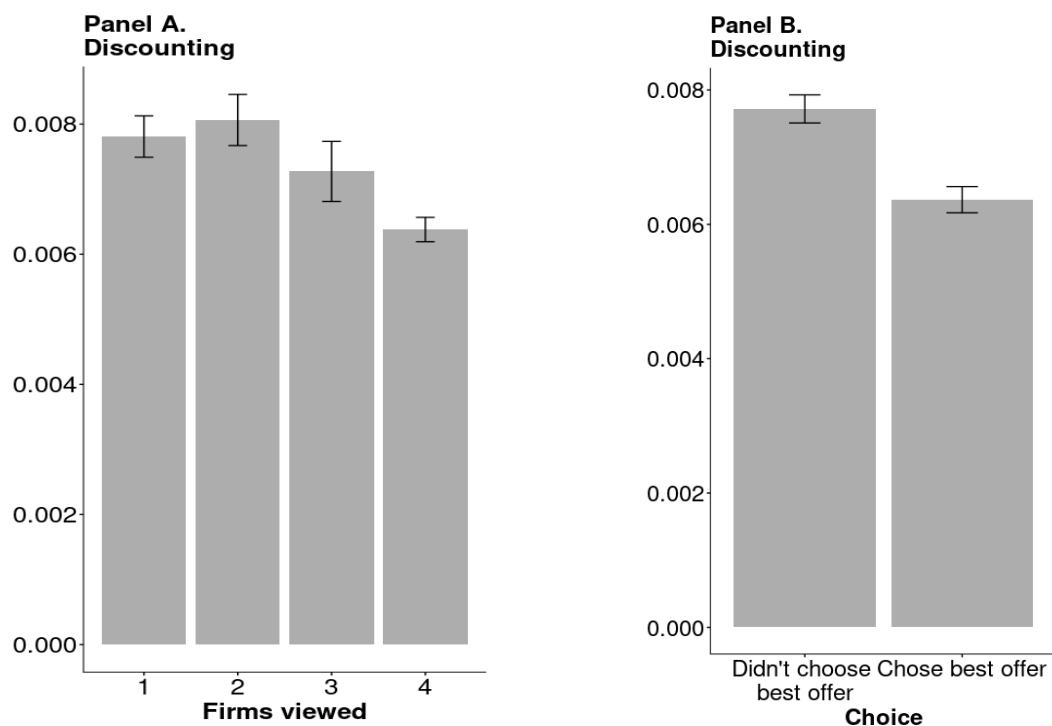
Figure 8: Loss aversion by the outcome measures; mean number of firms viewed (out of 4) and probability of choosing highest received amount



Discounting

Participants with higher discount rates are less likely to shop around (figure 9 Panel A) [anova: $f = 22.12$, $df = 5687$, $p = 2.62e-06$] and less likely choose the best offer (figure 9 Panel B) [t-test: $t = -4.7194$, $df = 5686.1$, $p = 2.422e-06$]. We investigated interaction effects with discounting and the three conditions (1. Stable vs. moving marked, 2. No registration vs. registration and 3. No disclosure vs. disclosure) and found none.

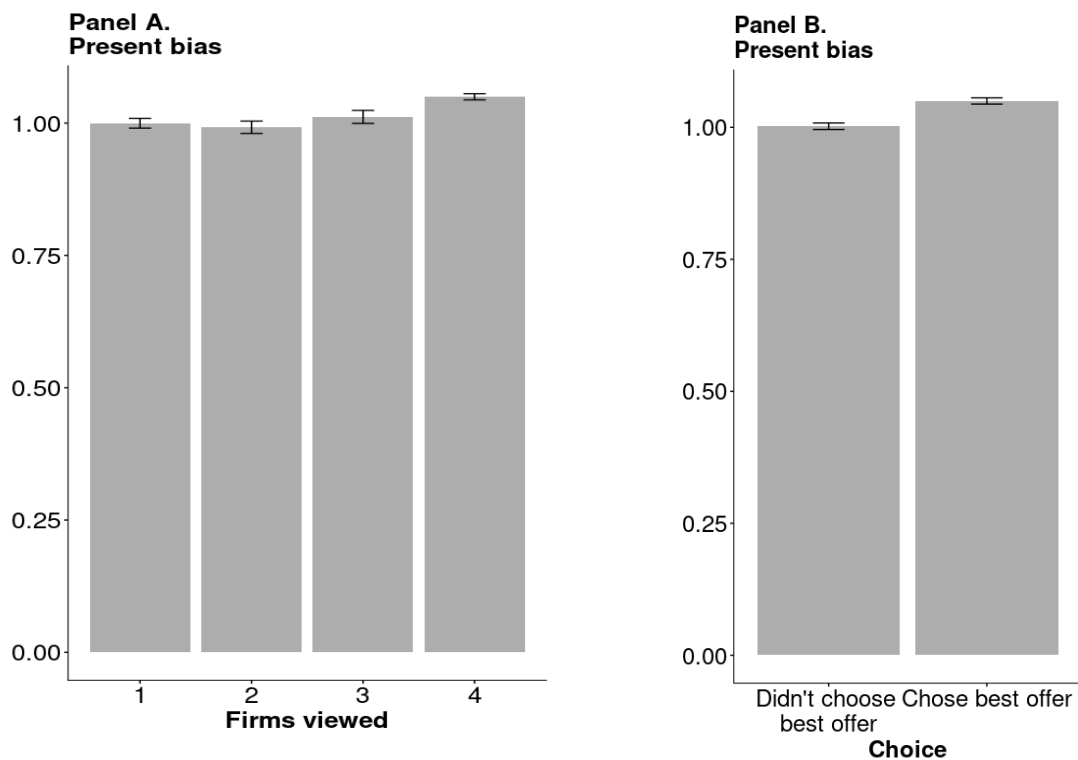
Figure 9: Discounting by the outcome measure; mean number of firms viewed (out of 4) and probability of choosing highest received amount.



Present bias

Participants who are less present biased are more likely to shop around (figure 10 Panel A – higher values on the y axis correspond to lower present bias) [anova: $f = 29.91$, $df = 5687$, $p\text{-value} = 4.71e-08$] and choose the best offer (figure 10 Panel B) [t-test: $t = -5.5881$, $df = 5685.8$, $p\text{-value} = 2.403e-08$].

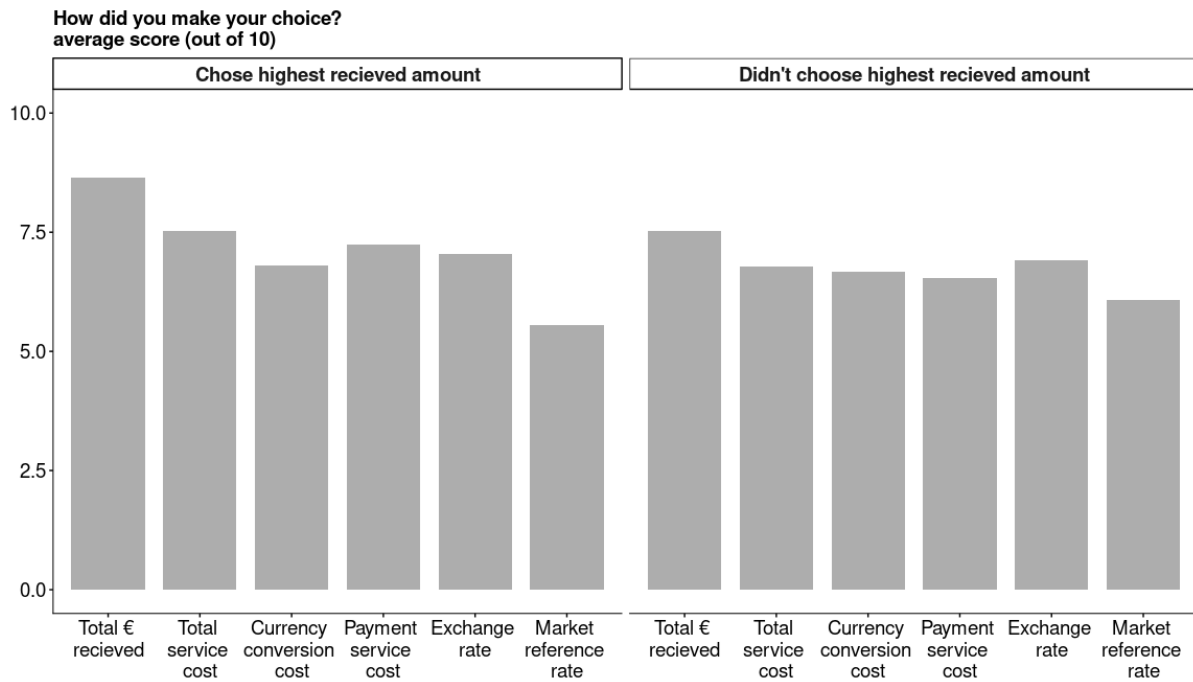
Figure 10: Present bias by the outcome measures; mean number of firms viewed (out of 4) and probability of choosing highest received amount. Higher values on the y axis correspond to lower present bias.



Stated reasons for choice

Finally, we explored participant's stated reason for their choice of deal (with a score out of 10). For all individuals, the most important factor was the received amount, with an average score of 8.65 for those who chose the highest received amount and 7.52 for those who didn't. The market reference rate was the least important factor across both of these groups.

Figure 12: Stated score (out of 10) for importance of different characteristics, in participant's choice



4 Discussion

As expected, customers were less able to choose the best deal when exchange rates were simulated to be changing (and the participant moved around obtaining quotes sequentially). Dynamic exchange rates can more closely reflect the true underlying market price for a currency. Comparing to a daily fixed rate, and depending on how that fixed rate is set, this may mean dynamic prices offer the best pricing. However, behaviourally, our investigation shows that dynamic prices can also make it difficult for consumers to compare and contrast quotes across different firms. New regulations introduced in 2019 require some firms operating in the FX and cross border payments market to present the total amount to be received in the purchased currency by the payee account prior to the point of sale. In this case, a simple strategy for a consumer would be to maximise this total. However, when consumers shop around sequentially in a dynamic market (with the underlying exchange rate changing between receiving quotes) it could be difficult to determine whether changes in the received amount from different providers are due to differences in the costs charged by the firm, or fundamental changes in the underlying exchange rate. In these situations, a better strategy is for consumers to minimise the costs in order to select the best available deal. As such, the new regulations require that in addition to presenting the total received, costs should be presented as a mark-up against a published reference exchange rate, such as daily rates published by the European Central Bank.

Requiring participants to register with a provider before receiving quote information reduced the degree to which consumers shopped around, but did not significantly reduce the probability of choosing the best deal. This result is supported in the literature that shows introducing friction into consumer journeys can cause people to drop-out of the process early. The fact that the reduction in shopping around did not manifest in a significant decrease in the probability of choosing the best deal is probably an artefact of our experimental design due to the different scales of the outcome measures (with shopping around measured on a scale of 1-4 and choosing the best deal represented as binary variable). The effect would likely be more pronounced if participants had more than 4 providers to choose from. Adding a timestamp next to quoted exchange rates and a statement alerting participants that exchange rates could go up and down had no significant effect on either of our outcome measures.

As mentioned previously, 2 simple strategies for consumers to get the best deal could be to maximise received amounts or minimise the costs associated with the transaction (if they are presented as a mark-up on a standard reference rate). When exchange rates vary within a wide range it would be better to use the second strategy. We hypothesised that the timestamp and statement may draw consumers' attention to focus on transaction costs. However, the fact that this intervention had no impact on decision-making is corroborated by previous behavioural evidence (Adams et al., 2016; Smart, 2016; Adams et al., 2018). A study in the same foreign exchange setting found that providing consumers with more information does not necessary improve decision-making above a certain threshold (Behavioural Insights Team, 2018). One possibility is

that consumers' limited attentional resources cause them to focus on more salient information (such as received amount or the exchange rate), limiting the effect of any potential statement drawing attention to the fact exchange rates may change. Previous research has demonstrated that the effect of providing more information to customers may not necessarily improve decision making (Australian Securities and Investments Commission/ Dutch Authority for the Financial Markets, 2019) and further research may be required to address this point.

A surprising finding was that the baseline probability of choosing the best deal was reasonably low (although significantly above chance level) in the online task. In a previous online behavioural study of the FX market (Behavioural Insights Team, 2018), increasing transparency and standardisation of transaction costs increased the probability that participants were able to get the best deal from 46.7% in the current market condition (where providers showed different cost presentations) to 68.8%. The increased chance of making better choices seen in that experiment is substantially larger than the differences we report in our experiment. However, it is possible that the interventions tested in the 2018 study that dramatically improved decision-making, were extremely salient and would be unlikely to be utilised by providers in the market (for example, one of the most impactful improvements was to frame transaction costs as losses to participants). However, the probabilities of people making correct choices in the other transparency interventions and current market conditions in the 2018 study were remarkably similar to what we recorded in this experiment.

A key hypothesis was that the practices we tested would interact with behavioural biases to influence consumer decision-making. As such, in addition to the main experimental task, we also captured participant's risk and time preference parameters to investigate if these could affect our 2 outcome measures. We found that the more loss averse a person is (ie the degree to which they are asymmetrically more sensitive to incurring losses than gains) was positively correlated with the number of offers viewed by participants and the probability of choosing the best deal. Surprisingly, we did not find any significant interaction between loss aversion and our moving exchange rate treatment – we had originally expected that loss averse participants may cut their losses when seeing lower received amounts when exchange rates are not moving in their favour during the shopping around process. Conversely, this result suggests that those people that shop around and subsequently choose the best available option may be utilising a loss minimisation strategy as opposed to maximising the received amount.

As expected, participants' time preferences (as measured using the quasi-hyperbolic discounting model) also showed a significant relationship with our outcome measures. Participants that viewed more offers from providers had significantly lower discount rates, as did those that eventually went on to choose the best deal. In addition, those choosing the best deal also exhibited significantly lower present bias.

Our qualitative responses also provided insights on how participants made their decisions. Encouragingly, of those participants that chose the best deal, the received amount and total transaction costs were ranked as having the highest impact on their choice. Of those that didn't choose the best deal, the total received amount was still ranked the highest of all attributes but the exchange rate received was rated as being slightly higher than the total service costs.

5 Conclusions

New regulatory requirements for providers of currency transfer services across Europe from April 2020 give consumers and small businesses consistent new information on how much currency they will receive and what the firm will effectively charge them against a standard exchange rate. Retail FX and cross border payments markets had previously exhibited a wide variety of practices and a lack of transparency. Currency transfer services are inherently difficult for customers to navigate, since costs structures include both commission and the exchange rate spread, while market exchange rates fluctuate over time. Approximately £4bn was estimated to be 'lost' in hidden charges paid by small and medium sized enterprises in 2015. The new regulations are designed to increase the transparency of costs, but they do not impose changes in underlying market practices, such as in costs structures or how long an exchange rate offer remains available to the customer.

Following dialogue with representatives of consumers, small businesses and currency transfer provider businesses preparing to implement the new disclosures, we designed an online experiment to test the effects of variations in what was presented, to see what impact this had on consumers' decision-making. We found that showing a moving market exchange rate reduced shopping around and the likelihood of choosing the best deal, when compared to a stable exchange rate. Requiring registration reduced shopping around but not the likelihood of choosing the best deal. A message showing a timestamp and stating that rates may change had no effect.

Taken together, our findings suggest that offering moving (real time) exchange rates to consumers, and requiring them to register before receiving online cost information or quotes, may reduce shopping around, and make it more difficult to compare offers. As a result, consumers may make poorer choices. The results also confirm the role of standardising the minimum amount of information presented to consumers prior to the point of sale as specified in new regulations, and inform guidance to reduce practices which negatively impact competition.

These results could also inform other markets where the standardisation of large amounts of complex information at the point of sale might benefit consumer decision-making. Taken together with the previous BIT study, the results highlight the importance of behaviourally testing different presentations and practices to inform effective implementation of policy decisions. In addition, the fact that introducing sludge-like friction in the form of registration before obtaining quotes resulted in less shopping around, has implications for online consumer journeys seen in other markets - for example online registration before obtaining insurance quotes or accessing price comparison websites.

Annex 1: Tables & Figures

Figure A1: Registration condition

To get a quote from provider 1, you need to register. Please choose a username and password.

You won't need to register again to get quotes from this company.

DO NOT use your real name, or a username or password that you use in real life. You should just make these up. We will not save any data from these registrations.

Choose a username:

Choose a password:

Click the box below:

☐ I'm not a robot



reCAPTCHA
[Privacy](#) - [Terms](#)



Table A1: Target and attained sample population

This table provides the target population for our research. This was designed to be representative of the UK population.

Demographic		Target	Attained	Sample size
Age	18-24	14%	12.52%	712
	25-34	17%	16.00%	910
	35-44	17%	16.93%	963
	45-54	17%	19.60%	1001
	55-64	14%	14.77%	840
	65+	21%	22.20%	1263
Gender	Male	49%	49.18%	2798
	Female	51%	50.82%	2891
Social grade	ABC1	53%	51.75%	2944
	C2DE	47%	48.25%	2745
Region	North	34%	35.51%	2030
	Midlands	30%	29.40%	1681
	South	35%	35.07%	2005

Table A2: Numbers per treatment group after removing slow responders

Treatment group	Counts
1. Control: Stable, No registration, No disclosure	792
2. Stable, No registration, Disclosure	774
3. Stable, Registration, No disclosure	627
4. Stable, Registration, Disclosure	614
5. Volatile, No registration, No disclosure	830
6. Volatile, No registration, Disclosure	831
7. Volatile Registration, No disclosure	589
8. Volatile, Registration, Disclosure	632

Table A3: Received amounts (EUR) for each provider in each condition

Bold numbers indicate the best available option after fully comparing all providers. For moving exchange rate conditions, received amounts are shown for each provider at each stage of the comparison process.

Condition	Provider			
	1	2	3	4
1	1102	1095	1107	1089
2	1102	1095	1107	1089
3	1102	1095	1107	1089
4	1102	1095	1107	1089
5 – Rising	1102/ 1123/ 1144/ 1166	1117/1137/1160	1150/ 1172	1154
6 – Rising	1102/ 1123/ 1144/ 1166	1117/1137/1160	1150/ 1172	1154
7 – Rising	1102/ 1123/ 1144/ 1166	1117/1137/1160	1150/ 1172	1154
8 – Rising	1102/ 1123/ 1144/ 1166	1117/1137/1160	1150/ 1172	1154
5 – Falling	1166/ 1144/ 1123/ 1102	1137/1117/1095	1128/ 1106	1089
6 – Falling	1166/ 1144/ 1123/ 1102	1137/1117/1095	1128/ 1106	1089
7 – Falling	1166/ 1144/ 1123/ 1102	1137/1117/1095	1128/ 1106	1089
8 – Falling	1166/ 1144/ 1123/ 1102	1137/1117/1095	1128/ 1106	1089

Table A4: Regression outputs for treatment effects (all 8 treatments)

	<i>Dependent variable:</i>				
	Number of firms viewed		Chose best offer		Chose better offer (rank)
	<i>OLS</i>		<i>logistic</i>		<i>ordered logistic</i>
	(1)	(2)	(3)	(4)	(5)
Constant	2.977*** (0.045)	2.403*** (0.098)	0.101 (0.071)	-1.227*** (0.173)	
2. Stable No registration Disclosure	-0.025 (0.063)	-0.010 (0.061)	-0.039 (0.101)	-0.020 (0.105)	-0.029 (0.098)
3. Stable Registration No disclosure	-0.175** (0.067)	-0.167** (0.065)	-0.264* (0.107)	-0.266* (0.112)	-0.247* (0.103)
4. Stable Registration Disclosure	-0.287*** (0.067)	-0.295*** (0.065)	-0.212* (0.108)	-0.225* (0.112)	-0.168 (0.103)
5. Volatile No registration No disclosure	-0.011 (0.062)	0.020 (0.060)	-0.290** (0.100)	-0.253* (0.104)	-0.300** (0.096)
6. Volatile No registration Disclosure	-0.135* (0.062)	-0.110 (0.060)	-0.389*** (0.100)	-0.377*** (0.104)	-0.329*** (0.095)
7. Volatile Registration No disclosure	-0.178** (0.068)	-0.176** (0.066)	-0.295** (0.109)	-0.300** (0.114)	-0.279** (0.104)
8. Volatile Registration Disclosure	-0.121 (0.067)	-0.133* (0.065)	-0.247* (0.107)	-0.274* (0.111)	-0.219* (0.102)
Age		-0.209*** (0.034)		-0.388*** (0.060)	-0.299*** (0.054)
Gender (male)		-0.114*** (0.010)		-0.136*** (0.018)	-0.110*** (0.017)
FX experience		0.058*** (0.017)		0.128*** (0.030)	0.099*** (0.027)

Financial literacy		0.218*** (0.013)		0.408*** (0.023)	0.297*** (0.020)
Loss aversion		0.054*** (0.010)		0.075*** (0.018)	0.053** (0.016)
Discounting		-3.546* (1.515)		-4.268 (2.668)	-4.349 (2.345)
Present bias		0.137** (0.051)		0.216* (0.088)	0.169* (0.079)
Observations	5,689	5,689	5,689	5,689	5,689
R ²	0.005	0.078			
Adjusted R ²	0.004	0.076			
Log Likelihood			-3,922.255	-3,701.578	
Akaike Inf. Crit.			7,860.510	7,433.156	
Residual Std. Error	1.255 (df = 5681)	1.208 (df = 5674)			
F Statistic	4.389*** (df = 7; 5681)	34.390*** (df = 14; 5674)			
<i>Note:</i>			*p<0.05, **p<0.01, ***p<0.001		

Table A5: Estimated mean number of firms viewed – treatment effects based on regression (2) from table A4 above

Treatment group	Mean number of firms viewed	Standard Error	Lower Confidence Interval	Upper confidence interval	P- value
1. Control: Stable, No registration, No disclosure	2.97	0.04	2.88	3.05	2e-16 ***
2. Stable, No registration, Disclosure	2.96	0.04	2.87	3.04	0.870089
3. Stable, Registration, No disclosure	2.80	0.05	2.71	2.89	0.009883 **
4. Stable, Registration, Disclosure	2.67	0.05	2.58	2.77	5.92e-06 ***
5. Volatile, No registration, No disclosure	2.99	0.04	2.90	3.07	0.738628
6. Volatile, No registration, Disclosure	2.86	0.04	2.77	2.94	0.067173
7. Volatile Registration, No disclosure	2.79	0.05	2.69	2.89	0.007449 **
8. Volatile, Registration, Disclosure	2.83	0.05	2.74	2.93	0.038876 *

N = 5689, P-values: *p<0.05, **p<0.01, ***p<0.001

Table A6: Estimated probability of choosing highest received amount – treatment effects based on regression (4) from table A4 above

Treatment group	Probability of choosing highest received amount	Standard Error	Lower Confidence Interval	Upper confidence interval	P- value
1. Control: Stable, No registration, No disclosure	0.52	0.02	0.48	0.56	2e-16
2. Stable, No registration, Disclosure	0.52	0.02	0.48	0.55	0.69883
3. Stable, Registration, No disclosure	0.45	0.02	0.41	0.49	0.01340*
4. Stable, Registration, Disclosure	0.46	0.02	0.42	0.51	0.04831*
5. Volatile, No registration, No disclosure	0.46	0.02	0.42	0.49	0.00354**
6. Volatile, No registration, Disclosure	0.43	0.02	0.39	0.46	9.24e-05 ***
7. Volatile Registration, No disclosure	0.45	0.02	0.40	0.49	0.00665 **
8. Volatile, Registration, Disclosure	0.45	0.02	0.41	0.49	0.02046 *
N = 5689, P-values: *p<0.05, **p<0.01, ***p<0.001					

Table A7: Regression outcomes for average treatment effects

	<i>Dependent variable:</i>					
	Number of firms viewed			Chose best offer		
	<i>OLS</i>			<i>logistic</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Moving market	0.004 (0.033)			-0.194*** (0.053)		
Registration		-0.146*** (0.034)			-0.071 (0.054)	
Disclosure			-0.056 (0.033)			-0.020 (0.053)
Constant	2.869*** (0.024)	2.934*** (0.022)	2.899*** (0.024)	-0.015 (0.038)	-0.082* (0.035)	-0.103** (0.038)
Observations	5,689	5,689	5,689	5,689	5,689	5,689
R ²	0.00000	0.003	0.0005			
Adjusted R ²	-0.0002	0.003	0.0003			
Log Likelihood				-3,927.593	-3,933.388	-3,934.183
Akaike Inf. Crit.				7,859.187	7,870.776	7,872.366
Residual Std. Error (df = 5687)	1.257	1.255	1.257			
F Statistic (df = 1; 5687)	0.013	18.924***	2.824			
<i>Note:</i>				*p<0.05, **p<0.01, ***p<0.001		

Table A8: Estimated mean number of firms viewed – average treatment effects based on linear regressions from table A7 above

Moving market	Mean number of firms viewed	Standard Error	Lower Confidence Interval	Upper Confidence interval	t-value	P-value
Stable	2.87	0.02	2.82	2.92	120.88	<2e-16
Volatile	2.87	0.02	2.83	2.92	0.11	0.91

Registration	Mean number of firms viewed	Standard Error	Lower Confidence Interval	Upper Confidence interval	t-value	P-value
None	2.93	0.02	2.89	2.98	132.77	<2e-16
Yes	2.79	0.03	2.74	2.84	-4.35	1.38e-05 ***

Disclosure	Mean number of firms viewed	Standard Error	Lower Confidence Interval	Upper Confidence interval	t-value	P-value
None	2.90	0.02	2.85	2.94	122.85	<2e-16
Yes	2.84	0.02	2.80	2.89	-1.68	0.0929

Table A9: Number of firms viewed - t-tests for average treatment effects (Welch Two Sample t-test)

Moving market	Mean number of firms viewed	t-value	P-value
Stable	2.87		
Volatile	2.87	-0.113	0.91

Registration	Mean number of firms viewed	t-value	P-value
None	2.93		
Yes	2.79	4.362	1.314e-05

Disclosure	Mean number of firms viewed	t-value	P-value
None	2.90		
Yes	2.84	1.681	0.0929

Table A10: Probability of choosing highest received amount – average treatment effects based on logistic regressions from table A7 above

Moving market	Probability of choosing highest received amount	Standard Error	Lower Confidence Interval	Upper Confidence interval	z value	P-value
Stable	0.50	0.01	0.48	0.51	-0.396	0.69184
Volatile	0.45	0.01	0.43	0.47	-3.648	0.00027 ***

Registration	Probability of choosing highest received amount	Standard Error	Lower Confidence Interval	Upper Confidence interval	z value	P-value
None	0.48	0.01	0.46	0.50	-2.341	0.0193
Yes	0.46	0.01	0.44	0.44	-1.315	0.1884

Disclosure	Probability of choosing highest received amount	Standard Error	Lower Confidence Interval	Upper Confidence interval	z -value	P-value
None	0.47	0.01	0.46	0.49	-2.739	0.0062
Full	0.47	0.01	0.45	0.49	-0.375	0.70739

Table A11: Probability of choosing highest received amount - t-tests for average treatment effects (Welch Two Sample t-test)

Moving market	Probability of choosing highest received amount	t-value	P-value
Stable	0.50		
Volatile	0.45	3.65	0.00026

Registration	Probability of choosing highest received amount	t-value	P-value
None	0.48		
Yes	0.46	1.32	0.188

Disclosure	Probability of choosing highest received amount	t-value	P-value
None	0.47		
Yes	0.47	0.375	0.708

Table A12: Relationship between shopping around and probability of choosing the highest received amount

<i>Dependent variable:</i>	
	Probability of choosing highest received amount
Firms viewed	1.778*** (0.044)
Constant	-5.655*** (0.156)
Observations	5,689
Log Likelihood	-2,229.825
Akaike Inf. Crit.	4,463.649
<i>Note:</i> *p<0.05, **p<0.01, ***p<0.001	

Table A13: Regression outputs for interaction between present bias and a moving market on number of firms viewed

	<i>Dependent variable:</i>
	Number of firms viewed
Present bias (higher values correspond to lower present bias)	0.389*** (0.073)
Moving market	0.223* (0.110)
Present bias*Moving market	-0.217* (0.102)
Constant	2.472*** (0.078)
Observations	5,689
R ²	0.006
Adjusted R ²	0.005
Residual Std. Error	1.254 (df = 5685)
F Statistic	11.471*** (df = 3; 5685)
<i>Note:</i>	*p<0.05, **p<0.01, ***p<0.001

Table A14: Regression outputs for interaction between loss aversion and a moving market on probability of choosing highest received amount.

	<i>Dependent variable:</i>
	Probability of choosing highest received amount
Loss aversion (higher values correspond to lower loss aversion)	0.662*** (0.119)
Moving market	0.202 (0.179)
Loss aversion*Moving market	-0.392* (0.166)
Constant	-0.689*** (0.127)
Observations	5,689
Log Likelihood	-3,909.044
Akaike Inf. Crit.	7,826.088
<i>Note:</i>	*p<0.05, **p<0.01, ***p<0.001

Annex 2: Post task survey

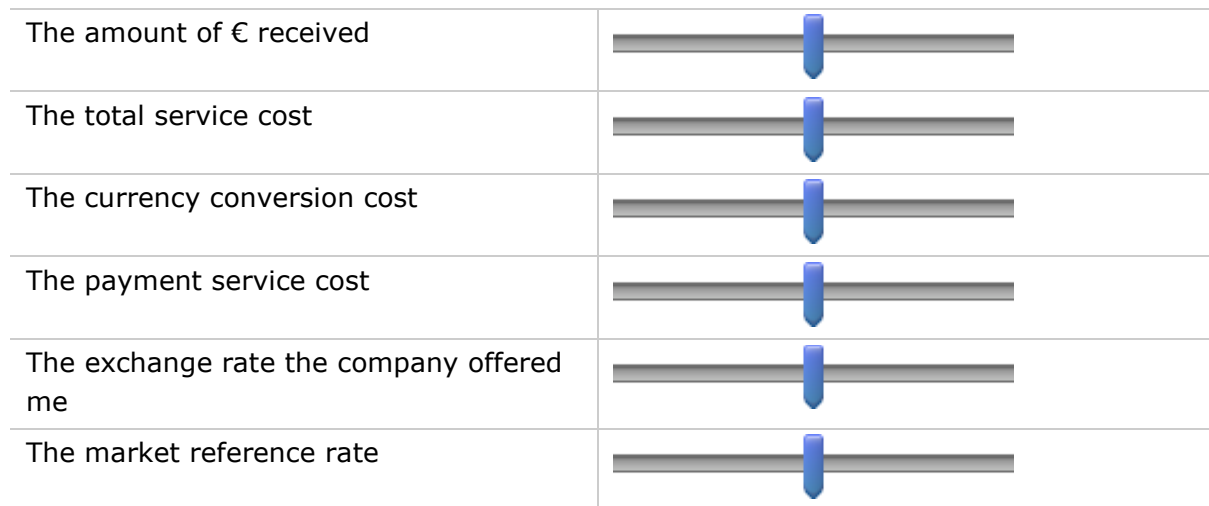
How confident are you that you chose the best deal? 0= not confident at all; 100=fully confident

0 10 20 30 40 50 60 70 80 90 100



How did you make your choice of provider? Please score the list below from 0-10, where 10 was the most important factor and 0 was the least important.

Low importance High importance
0 1 2 3 4 5 6 7 8 9 10



POST_4 Did you feel rushed when making your choice?

Definitely not Definitely yes
0 1 2 3 4 5 6 7 8 9 10



Have you ever used a foreign exchange service to send foreign currency or make payments abroad?

- Yes
- No

How often do you send payments abroad?

- Frequently (at least once a month)
- Occasionally (at least once a year)
- Infrequently (less than once a year)
- Never

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy:

- More than today with the money in this account
- Less than today with the money in this account
- I do not know

Normally, which asset described below displays the highest fluctuations over time?

- Savings accounts
- Stocks
- Bonds
- I do not know
- Refuse to answer

Do you think the following statement is true or false? "If you were to invest £1000 in a stocks and shares ISA, it would be possible to have less than £1000 when you withdraw your money."

- True
- False
- I do not know
- Refuse to answer

Suppose you owe £3000 on your credit card. You pay a minimum payment of £30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

- Less than 5 years
- Between 5 and 10 years
- Between 10 and 15 years
- Never
- I do not know
- Refuse to answer

Suppose you had £100 in a savings account and the interest rate is 20% per year and you never withdraw money. After 5 years, how much would you have in this account in total?

- More than £200
- Exactly £200
- Less than £200
- Refuse to answer
- I do not know

Annex 3: Time and risk preference models

To assess participants' risk and time preferences we used cumulative prospect theory as proposed by Kahneman & Tversky (1992) to explain decision making under risk and quasi-hyperbolic temporal discounting (Angeletos et al. 2001; Benhabib et al. 2010; Frederick et al. 2002; Laibson 1997; Phelps and Pollak 1968) to explain decision making with delayed outcomes.

Specifically, for risk preferences participants chose between gambles defined by $\{x, p; y\}$ where the outcome of the gamble x is received with probability p and y is received with probability $1-p$. The cumulative prospect theory model was defined as follows, where:

$$U(x, p, y, \alpha, \sigma, \lambda) = \begin{cases} v(y, \sigma) + \pi(p, \alpha)(v(x, \sigma) - v(y, \sigma)) & \text{if } x > y > 0 \text{ or } x < y < 0 \\ \pi(p, \alpha)v(x, \sigma) + \pi(1 - p, \alpha)v(y, \sigma) & \text{if } x < 0 < y \end{cases}$$

$$\text{where } v(x, \sigma) = \begin{cases} x^\sigma & \text{for } x > 0 \\ -\lambda(-x)^\sigma & \text{for } x < 0 \end{cases}$$

$$\text{and } \pi(p, \alpha) = \exp[-(\ln p)^\alpha]$$

And for quasi-hyperbolic temporal discounting, participants chose between delayed outcomes defined by $\{x, t\}$ where x was an outcome in GBP to be received in t days from now. The model was defined as follows:

$$U(x, t, \beta, r) = xd(t, \beta, r)$$

$$\text{where } d(t, \beta, r) = \begin{cases} 1 & \text{for } t = 0 \\ \beta \exp(-rt) & \text{for } t > 0 \end{cases}$$

Annex 4: Task instructions and incentivisation

In this study, we are interested in how you make hypothetical choices when exchanging and sending foreign currency across borders. You will see simulated foreign exchange transaction offers by different foreign exchange providers from Pounds Sterling (£) to Euros (€).

Imagine you need to change £1000 to Euros and send it to an account overseas.

You have to transfer £1,000 to Euros by selecting one of the providers to send the payment.

You can view offers from different providers as many times as you want. When you are ready to make a choice, press the ‘Accept this offer’ button, then click ‘Confirm’. Please be aware that the market rates provided aren’t necessarily in line with real life current rates.

You can receive an extra payment of up to £1 in the currency of your panel for making a good decision.

Sometimes, you may be asked to register (by typing a username and password) with a provider before seeing an offer. If you are asked to register, DO NOT use your real name, or a username or password that you use in real life. You should just make these up. We will not save any data from these registrations.

We will then ask you some questions about your choice and some additional questions about yourself.

Thank you for taking part in this study.

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