Bribing to queue jump: Experiments on negative time externalities and legal alternatives

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January 21, 2021

Abstract

With petty corruption being widespread in many countries, this paper uses simple experiments to explore some of the behavioural determinants of bribery. Specifically, we look at bribes that allow people to "jump the queue" and receive service delivery sooner. In the experiments we use, this corresponds to participants receiving their payment today rather than waiting up to 22 days for payment. As in the real world, such as bribe may have a negative time externality in the sense that others are "pushed down the queue" and must wait even longer for service delivery. Two experiments are conducted online using a broad sample from countries with medium to low incomes and we find that both citizens and officials choose/accept a bribe less when there is a negative time externality. Citizens are also less likely to choose a bribe when a more costly (legal) "fast track fee" is available that delivers the service/payment in the same time as when paying a bribe but has no negative time externality. In addition, incentivised beliefs are found to be strongly correlated with behaviour.

Keywords: bribery, queue jumping, negative time externality, service delivery, fast track fee, online experiment

1 Introduction

Corruption and associated bribery comes in many different forms, one of which being bribes to receive services faster than they would normally be delivered. In the many cases where services would normally be delivered on a "first come, first served basis" or in some other pre–specified order (as with some vaccine rollout programmes, for example) these can be seen as a "queue jump bribes". Examples include paying a bribe to receive a vaccination faster or to receive faster processing of applications, such as those for passports, visas and construction planning permission. Such bribery could however exist in any area of public or private service delivery where some kind of queuing system is in place. Anecdotal evidence suggests that such bribes to speed up service delivery are relatively widespread in societies with high corruption norms.

It could be the case that officials[1] are threatening to delay services if a bribe is not paid, in this case, such bribes would come under the class of harassment bribes where officials cannot (legally) deny services but instead threaten to aggravate delivery or delay the service if a harassment bribe is not paid (Abbink, Dasgupta, Gangadharan, & Jain, 2014). The harassment could however also be caused by systemic corruption itself and citizens needing to bribe to avoid being pushed down the queue by others who are paying a queue jump bribe (Drichoutis, Grimm, & Karakostas, 2020). This is however only possible when there is a negative time externality on others associated with the bribery, i.e. the bribe (when acted upon) causes at least one other person to wait longer for service delivery. Such negative time externalities may however not be present if officials instead just take the bribe without impacting the service delivery of others, if they work extra hours and/or with more effort to speed up service delivery of those paying the bribe, for example.

One aim of this study is to investigate the effect of such a negative time externality where paying a bribe causes someone else's service delivery to be delayed (pushed down the queue). This is looked at through two bribery experiments with different between subject treatments. As far as we are aware, we are the first to use experiments to look directly at the effect of negative time externalities through

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[1]The term "officials" will be used throughout the paper but this can refer to those delivering either public or private services.

the timing of service delivery being manipulated as part of the experiment itself. This being done by varying the time that "citizen" participants must wait before they receive their payoff for a real effort task. By paying the bribe, payment will be made the same day as they take part in the experiment rather than after 11 or (in certain treatments) 22 days.

Past studies looking at harassment bribery (e.g. (Abbink et al., 2014; Banerjee, 2016b; Banerjee & Mitra, 2018; Banerjee, 2016a; Ryvkin, Serra, & Tremewan, 2017; Ryvkin & Serra, 2018)) concentrate on harassment bribery where delivery of the service itself is threatened and experimentally this is modelled by differences in monetary payoff. Drichoutis et al. (2020) use a "queue jumping game", however, in their experiment the time spent "waiting" also just affects the final monetary payoff, not the time of payment itself.

Harassment bribes, in general, can increase the effective price of (public) services and can arguably reduce social welfare (Abbink et al., 2014). Queue jump bribes of the type we look at also introduce additional inequalities that would otherwise not exist. For example, if a group of people have been pre–specified to receive a vaccine at a certain point in the future (possibly after other groups of people), inequalities in the timing of service delivery amongst this group would be introduced if some people are able to pay bribes to receive the vaccine sooner.

For some services in the real world there are also legal alternatives that act similarly to bribes in speeding up service delivery but are legal. We call these "fast track fees" and an example would be an additional fee for faster passport application processing. We will assume that such fees do not push "others down the queue", i.e. they do not introduce a negative time externality when chosen. This would be the case if the fees pay for greater investment in service delivery (e.g. hiring more officials) to allow those paying the fee to receive a faster service with no impact on others. As far as we are aware, no previous studies exist that look at the impact of such a legal alternative on bribery and this is therefore the other main novelty of this study.

Our experimental design does not include any probability of bribery being caught and punished. Previous studies have looked at this but as our study focuses on negative time externalities and legal alternatives to bribery, by not having any probability

of being caught we eliminate a potential source of heterogeneity in behaviour and our design is also simplified.

Unlike most past bribery experiments we do not use a typical lab setting but instead the experiments are conducted online with a broad sample from countries with medium to low incomes. This sample was selected in order to exclude those from countries that are less likely to have higher corruption norms. Although lab corruption/bribery games are generally seen as having external validity (Armantier & Boly, 2013; Banerjee, 2016b), the online nature of the experiments is an argument in support of external validity as more and more citizen–official interactions are happening online, filling applications online, for example.

As alluded to before, this work is most similar to those using bribery experiments to look at the effect of negative externalities, even if all other work we are aware of only uses monetary negative externalities. The results of these are somewhat mixed with Abbink, Irlenbusch, and Renner (2002) and Büchner, Freytag, González, and Güth (2008) finding no evidence of negative externalities having an effect on bribery behaviour but Barr and Serra (2009) and Guerra and Zhuravleva (2019) finding evidence for such effects. This paper, therefore, also aims to contribute to this body of literature.

2 Experimental design and procedures[2]

We use two different, but related, experiments to look separately at the choices of those who are able to offer bribes, the citizens, and those who are able to accept bribes, the officials.[3] This meaning that for citizens, bribes are always accepted when they offer them. For officials, they accept bribes knowing that they do not need to consider how many citizens are offering bribes.

We did this to eliminate a source of heterogeneity in the behaviour of citizens and officials as citizens do not need to consider how likely it is that bribes will be accepted, similarly, officials do not need to consider how likely it is that citizens choose to bribe. This therefore allowing a more precise interpretation of the results. This also simplifies the design, instructions and choices for the subjects. If we had instead used a single experiment with both citizens and officials then the experiment would have had to be rather more complicated and concerns about subjects' comprehension would be more of a concern. Especially when considering the fact that the experiment was run online with no ability for subjects to ask questions to the experimenters in real–time.

Although not elaborated on in the experiment, one can see each experiment as a situation where a citizen offering a bribe knows that they will easily be able to find an official willing to take their bribe. Conversely, officials willing to accept bribes know that they can easily find a citizen who is offering bribes.

2.1 Experiment One (E1) – Citizens

The first part of the experiment is a real effort task [4] where subjects have 10 minutes to correctly type 20 four-character letter/number sequences with multiple attempts allowed on each sequence. The 10 minute time limit was intended to give ample time to complete the task. Subjects were not aware of the nature of the later parts of the experiment and were told that they "will earn £1.50 for completing this section of the experiment". The intention of the real effort task and this framing of the earnings was to give subjects more of a sense of ownership over the endowment of

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[2]Note that the experimental instructions are given in the Appendix.

[3]These labels are however not used in the actual experiment but are just used here to aid the discussion.

[4]Adapted from a typing task developed by Kephart (n.d.)

£1.50 that will be relevant in the main part of the experiment.

The main part of the experiment is where participants are offered the choice to pay (from their £1.50 real effort task earnings) a "bribe" or, in some treatments, a "fast track fee" to receive payment[5] today instead of in 11 or 22 days. The treatments are described in more detail in the next section.

Immediately after this choice, participants complete the 10 item personality measure (TIPI) which provides measures for the Big Five personality traits whilst being quick to complete (Gosling, Rentfrow, & Swann Jr, 2003).

In order to elicit beliefs, next is a prediction screen where participants are asked for their first order belief or beliefs about the choices of the other participants. In E1–T1/2/3 the question is "What percentage (%) of participants do you think will choose to pay the bribe/fast track fee?" but different wording is used in the willingness to pay treatment (E1–WTP) with this being given below. Beliefs are incentivised through participants knowing that "one prediction for one participant taking part in the study today will be randomly chosen. If your prediction is chosen, you will earn an additional £10 for predicting correctly to within 10% in either direction." Participants were unaware of the number of participants taking part. For reference, a copy of the instructions from the main choice screen are available on screen for participants.

The final screen is a quick questionnaire that asks participants "is there any reason why you would not be able to cash out your payment shortly after completing this study? For example, the payment would not take you over the minimum threshold of £5 if you are currently below this." This is asked as (at the time of the study) the Prolific platform required a minimum of £5 to be in a participant's account before earnings could be withdrawn. This might therefore impact decisions related to receiving payment sooner. Participants are also asked to explain how they came to their choices, what they thought the experiment was about and if they have any other comments.

The willingness to pay treatment (E1–WTP) was run before the other three treatments and used to inform some of the design choices for those treatments, namely, the costs of the bribe and fast track fee. These treatments One, Two and

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[5]This payment was made into their online account on the Prolific recruitment platform which they are then able to withdraw to Paypal

Three were run simultaneously with each participant being randomly allocated to one of the three treatments with equal probability.

2.1.1 Willingness to pay treatment (E1 – WTP)

In all treatments participants know that "by default you will be paid in 11 days" and " you do however have an option to pay a bribe where you will be paid today but someone else taking part in the experiment today will have to wait 22 days to be paid." There is therefore a negative time externality to the bribe through another participant having to wait longer to be paid.

In addition, there is the alternative option of a fast track fee which has the same private benefit (payment today) but with no negative externality; "Alternatively, you have an option to pay a fast track fee where you will be paid today with no effect on when others are paid."

The Multiple Price List method (Andersen, Harrison, Lau, & Rutström, 2008) is used with participants selecting "Yes" or "No" to the question "I will pay for the bribe/fast track fee at the given cost?" for the same list of prices for both the bribe and fast track fee. The list of prices used is 2p to 20p in 2p increments and then 25p to 50p in 5p increments. Participants know that one of the costs for the bribe or fast track fee will be chosen at random and their corresponding choice implemented.

The choices for the bribe and fast track fee are shown on two different pages of the experiment. To check for order effects the baseline order has the bribe presented first, the alternative order has the fast track fee presented first. The ordering is determined randomly for each participant with equal probability.

The prediction screen asks for two predictions related to first order beliefs regarding the bribe and fast track fee; "What do you think was the average cost (in pence) that other participants chose to switch from taking up the bribe/fast track fee to declining to take up the bribe/fast track fee?"

2.1.2 Treatment One (E1 – T1)

As in all the treatments, participants know that "by default you will be paid in 11 days." The only option in this treatment is to choose whether or not to pay "a bribe of 6p (£0.06) where you will definitely be paid today but someone else taking part

in the experiment will have to wait 22 days to be paid." This wording being very similar to the WTP treatment but with a set cost of 6p. This cost was chosen as it corresponded to the mean first switching point for the bribe in the willingness to pay treatment (E1 – WTP).

2.1.3 Treatment Two (E1 – T2)

The only difference with T1 is the addition of a fast track fee matching that of the WTP treatment but with a set cost of 9p; "Alternatively, you have an option to pay a fast track fee of 9p (£0.09) where you will definitely be paid today with no effect on when others are paid."

Participants therefore choose between choosing the bribe, the fast track fee or neither. This cost was chosen as it was 50% higher than the bribe.[6] We wanted the fast track fee to be more expensive than the bribe as otherwise the choice would be trivial given that the fast track fee always had the same private benefit as the bribe but never any negative externality.

2.1.4 Treatment Three (E1 – T3)

The only difference with T2 is that there is no negative externality associated with the bribe, i.e. the bribe and fast track fee have exactly the same effect but just differ in their cost and the wording/framing used.

2.2 Experiment Two (E2) – Officials

The second experiment is very similar to the first but involves a choice by an "official" (not referred to as such in the experiment) regarding whether or not they accept a bribe. By accepting the bribe, participants earn an additional 6p and a passive participant who makes no choices themselves will receive their payment "today" instead of in "11 days". There is also a second passive participant who may also receive their payment in 22 days rather than in 11 days when the treatment involves a negative externality. These two passive participants per "active" participant are recruited separately and receive 9p for less than a minute of their time, they just

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[6]The results may of course be sensitive to this design choice (e.g. what is the fast track fee was double the cost of the bribe?) and it would be useful for future work to explore this.

see a screen confirming that they make no choices but will be paid 9p as they also knew when choosing to take part. As the passive participants made no choices they are not part of the analysis and we will only talk about the active participants in the rest of this paper.

There is no real effort task in this experiment (as there was in E1) and instead participants knew that they would receive a minimum fee of 34p when they chose to take part, as presented to them by the Prolific recruitment platform.

With no real effort task, the first screen after the consent page is that of the main choice of the experiment. In all treatments participants are told that "Several people taking part in this study earned £1.50 for completing a task. They then chose to pay a bribe of 6p (£0.06) to be paid on the day they took part rather than waiting 11 days to be paid." This referring to the participants choosing to pay a bribe in E1.

Also identical between treatments is the wording related to the choice with the only difference being the length of time the second passive participant has to wait ("X" in the copy below):

> Your choice today is whether you accept such a bribe.
>
> If you accept then 6p will be added to your earnings. There are also two other participants who are not making decisions today. By accepting the bribe, one will receive their participation payment today and the other will wait X.
>
> If you reject then the two other participants will both be paid in 11 days and you will not receive the additional 6p.
>
> Do you choose to accept the bribe?

As in E1, payments are made into participants' Prolific account and the same 10 item personality measure is performed on the screen after the main choice. The screen after this asks for one prediction "What percentage (%) of participants do you think will choose to accept the bribe?" with the same incentive scheme and wording as in E1. The final screen presents the same questionnaire as used in E1.

All four treatments were run simultaneously with each participant being randomly allocated to one of the treatments with equal probability.

2.2.1 Treatment One (E2 – T1)

This treatment mirrors E1–T1 so the instructions on the choice screen state the negative externality associated with citizens choosing to pay the bribe: "They also knew that paying the bribe would cause someone else in the study to wait 22 days to be paid instead of 11 days."

With the above simply being framing, the impact of the official's choice to accept the bribe is on the second passive participant who must, if the bribe is accepted by the official, "wait 22 days" (this is in place of X in the copied instructions above) payment instead of 11 days. This introducing a negative time externality when bribes are accepted by officials.

2.2.2 Treatment Two (E2 – T2)

This treatment mirrors E1–T2 so, in addition to what is said in E2–T1, the instructions on the choice screen state the fast track fee and how by citizens choosing the bribe they did not choose the fast track fee: "They also had the option to pay a fast track fee of 9p (£0.09) to be paid on the day they took part with no effect on when others are paid. They did however not pick this fast track option and paid the bribe instead."

The rest of the instructions, namely the implications of choosing to accept a bribe are the same as E2–T1. The only difference between E2–T1 and E2–T2 is therefore just the framing related to the choices of the citizens who chose to bribe in T2–E1.

2.2.3 Treatment Three (E2 – T3)

This treatment mirrors E1–T3 so, unlike in E2–T1/T2, there is no negative externality associated with citizens choosing to pay the bribe: "They also knew that paying the bribe would have no effect on when others are paid."

The fast track fee is still stated as in E2–T2 but instead of the 22 days that the second passive participant has to wait if the official chooses to accept the bribe (as in E2–T1/T2) they now "wait 11 days." This therefore being the same as if they do not accept the bribe, i.e. there is no negative externality.

2.2.4 Treatment Four (E2 – T4)

This treatment does not mirror any of the treatments in E1 but instead introduces randomness in whether or not there is a negative externality associated with choosing the bribe, each being equally likely. The instructions related to the second passive participant therefore state: "The other will wait 22 days with 50% chance and will wait 11 days with 50% chance (i.e. they are equally likely)." To check for order effects we also have an alternative version of this sentence that has the 22/11 days swapped. Each version being chosen at random for each participant with equal probability.

Regarding the wording relating to the choice of the citizens who accepted the bribe, there is no mention of any negative externality or lack of any externality. The fast track fee is mentioned as it is in E2–T2/T3.

2.3 Experimental procedure

All parts of the experiments were preregistered on the Open Science Framework (OSF) website before data collection. The E1–WTP is preregistered here: https://osf.io/43sy9. E1–T1/2/3 is preregistered here: https://osf.io/5ty93. E2 is preregistered here: https://osf.io/k3dp9.

The experiments were computerised, being programmed and run using oTree (Chen, Schonger, & Wickens, 2016). The experiments were run online with the experiment hosted on Heroku (https://www.heroku.com) and participants were recruited and paid privately using Prolific (https://prolific.ac).

Self reported demographic information such as age, gender, current country of residence, nationality and student/employment status is recorded before recruitment by the Prolific platform and hence available for analysis without having to be asked during the experiment.

As the study looks at bribery we chose to exclude those from countries that are less likely to have higher corruption norms. To do this we selected a sample limited to those who report being resident in a country that has a GDP PPP below around \$35,000 (from 2019 IMF data), this being done automatically by Prolific using information participants have already provided. The exact list of countries/regions included is given in Appendix B.

At the time the first participants were recruited there were around 6,500 people registered on the recruitment platform that satisfied this one inclusion criterion. As E1–WTP was conducted first, in later recruitment rounds those previously taking part in any of the previous recruitment stages were automatically excluded from being invited. This includes those in E2 necessarily not having taken part in E1. From those eligible, subject were invited randomly until the desired number of participants was reached. Recruitment was carried out at regular intervals over 24 hour periods in order to account for the subject pool being from all over the world.

The recruitment and experiment was started on 7th November 2019 for E1–WTP, 21st November 2019 for E1–T1/2/3 and 30th March 2020 for E2.

3 Results

3.1 Citizens – Willingness to pay (within–subject)

In the E1–WTP (willingness to pay) treatment there are exactly 100 observations (as was preregistered). To look at the within–subject difference in the willingness to pay for the bribe and fee, the lowest price at which "No" is chosen for being willing to pay the given price (i.e the first switching point) is used in the analysis. If "No" is never chosen then a "switching point" of 51 (the maximum price being 50) is assumed.[7]

The difference between the bribe and fee is not significant at the 5% level when using the non–parametric exact probability Wilcoxon signed-rank test ($p = 0.055$).

However, two versions of the treatment were used, one that presented the bribe choices first and one that presented the fast track fee choices first. In each, participants did however know that the next screen asked about the other choices. The same exact probability Wilcoxon signed-rank test for the 56 participants that had the bribe choices presented first is significant at the 5% level ($p = 0.026$). 14 have a higher WTP for the fast track fee, 4 have a higher WTP for the bribe and 38 have equal WTPs. For the 44 participants that had the fast track fee presented first the same test is not significant ($p = 0.673$).

Figure 1 shows the actual WTPs (computed as described above and with added jitter) for the two orderings used. It is clear that many participants are at the lower bound of two pence for both WTPs (the mass at the bottom left of the graphs). As this was the lowest price in the multiple price lists used it is likely that some of these participants would have a WTP even lower than two pence, namely, zero pence corresponding to those that are not willing to pay anything to receive faster service/payment. This is also supported by many of the written answers to the question asked at the end of the experiment asking participants to explain how they made their choices.

The above might also help explain why the difference between the WTPs is only significant when the bribe choices are presented first; a minimum (computed) WTP

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[7]As non–parametric tests are used, the results are identical for any assumed switching point above 50.

of two pence when the bribe choices are presented first still allows a higher WTP to be chosen when the fast track fee choices are presented next. However, when the fast track fee is presented first, those with the lowest WTP of two pence are not able to choose an even lower WTP for the bribe when it is presented next.
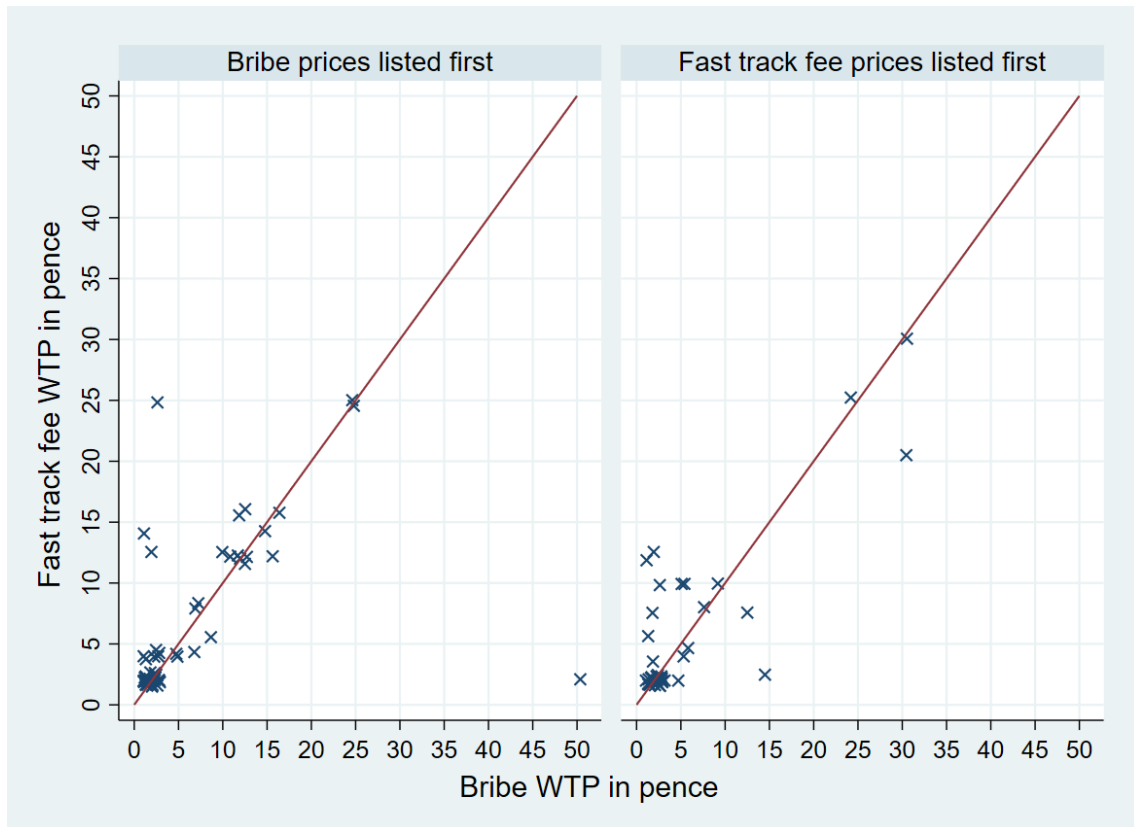

Figure 1: Scatter graph of fast track fee WTP and bribe WTP as calculated in the main text. Note: Jitter and 45 degree line added for clarity.

3.2   Citizens – Between–subject

In total there were 600 participants in the E1–T1/2/3 treatments (as was preregistered) with 203 in T1, 192 in T2 and 205 in T3.

Finding 1: *Fewer people choose the bribe when there is a fast track option.*

In Figure 2 and subsequent bar graphs the grey bars show the 95% confidence intervals computed/generated using the CIBAR package for STATA (Staudt, 2019).

Support: Figure 2 reports the proportion of participants choosing the bribe in the T1, T2 and T3 treatments of E1. T1 being where a bribe with a negative externality is the only option and T2 being where, in addition to this bribe, there is a more

expensive fast track fee available as an alternative option with the same (private) benefit to the participant in being paid today but no negative time externality.

The Figure shows a significantly lower proportion choosing the bribe in T2 than in T1 with this difference being significant at the 1% level when using a two–sided Fisher's exact test ($p < 0.001$).
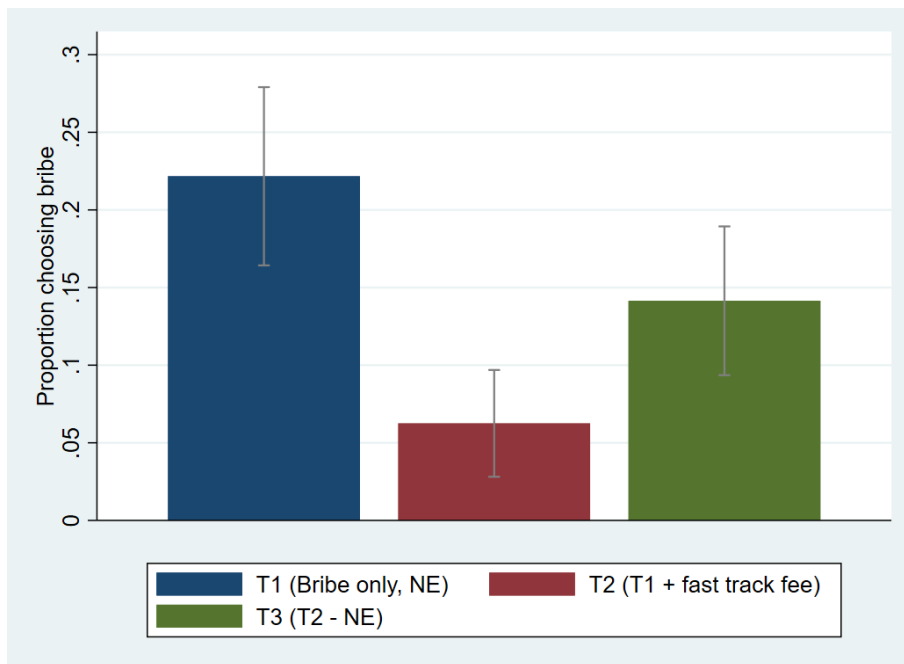

Figure 2: Proportion choosing the bribe (with 95% confidence intervals)

Finding 2: *Fewer people choose the bribe when there is a negative time externality.*

Support: Looking again to Figure 2 we can see the difference between the proportion of participants choosing the bribe in T2 where there is negative time externality attached to the bribe and T3 where the only difference is that there is no such negative externality. The proportion being lower in T2 than T3 is significant at the 5% level when using a two–sided Fisher's exact test ($p = 0.013$).

Finding 3: *More people choose the fast track fee when there is a negative time externality attached to the bribe.*

Support: Figure 3 reports the proportion of participants choosing the fast track fee in the T2 and T3 treatments of E1. As outlined before, in T2 there was a negative time externality associated with the alternative option of the bribe but there was none in T3. The Figure shows a significantly higher proportion choosing the fast track fee in T2 than in T3 with this difference being significant at the 1%

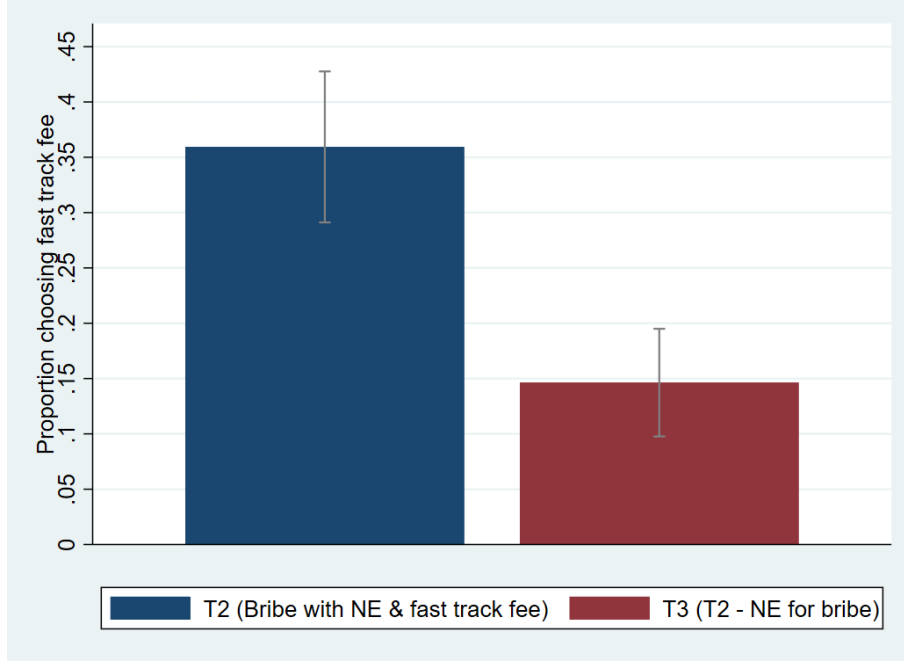level when using a two–sided Fisher's exact test ($p < 0.001$).

Figure 3: Proportion choosing the fast track fee (with 95% confidence intervals)

Finding 4: *Those choosing the bribe have higher beliefs about the proportion of others choosing the bribe.*

Support: Figure 4 reports box and whisker plots[8] for this first order belief by each treatment in E1 and if participants chose the bribe or not. The Figure shows higher beliefs in those choosing the bribe and this difference is significant at the 1% level when using a two–sided non–parametric Mann–Whitney–Wilcoxon (MWW) test in each treatment an overall ($p < 0.001$ in each case).

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[8]Figures 4 and 5 are generated using Stata's "box" command. The boxes showing the median and 25th/75th percentiles, and the whiskers extending to the lower and upper adjacent values.
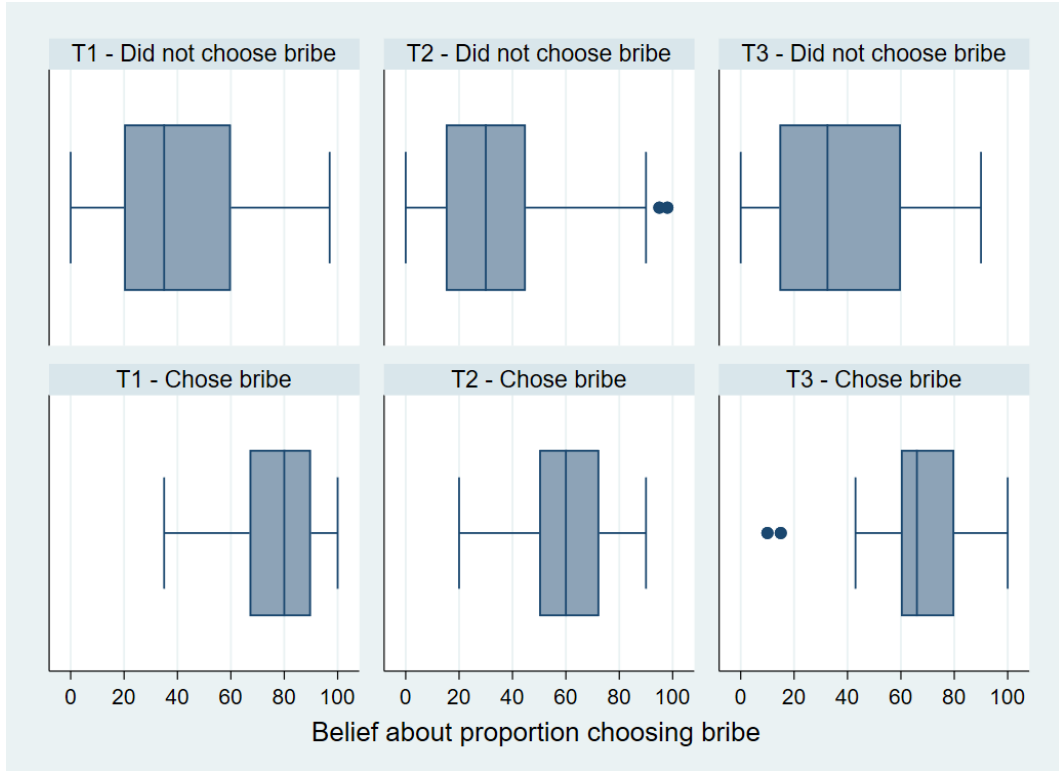
Figure 4: Beliefs about the proportion choosing the bribe

Finding 5: *Those choosing the fast track fee have higher beliefs about the proportion of others choosing the fast track fee.*

Support: Figure 5 reports box plots for this first order belief by T2 and T3 in E1 (where the fast track fee was an option) and if participants chose the fast track fee or not. The Figure shows higher beliefs in those choosing the fast track fee and this difference is significant at the 1% level when using a two–sided non–parametric Mann–Whitney–Wilcoxon (MWW) test in each treatment and overall ($p < 0.001$ in each case).

Figure 5: Beliefs about the proportion choosing the fast track fee

Table 1 uses logistic regressions to control for and include other variables in the analysis of the binary dependent variable of choosing the bribe. All models include a dummy variable for participants answering "yes" to there being a reason for why they would not be able to withdraw payment from their Prolific recruitment account immediately (see experimental design section for more details) and the big 5 measures from the TIPI questions. These are never significant but are still included as controls.

The number of observations in Models 3 and 4 is slightly reduced due to the age and gender demographics being collected by the Prolific recruitment platform before the experiment and this containing some missing data.

The significant ($p < 0.01$) coefficient for the treatment T2 dummy variable in Model 1 supports the earlier Finding 1 (fewer people choose the bribe when there is a fast track option). This coefficient remains significant at the 5% level once additional controls and first order beliefs are included in Model 3.

Similarly, the significant ($p < 0.01$) coefficient for the treatment T3 dummy variable in Model 2 supports the earlier Finding 2 (fewer people choose the bribe when there is a negative externality). The significance does however fall to the 10%

level when first order beliefs and controls are included in Model 4.

This reduction in significance can be partly explained by the inclusion of the statistically significant first order beliefs ($p < 0.01$) which is endogenous and itself affected by the treatments. The significance of the belief is in support of Finding 4 (those choosing the bribe have higher beliefs about the proportion of others choosing the bribe).

Table 1: Logistic regressions for choosing the bribe

	(1)	(2)	(3)	(4)
T1	*Baseline*	1.438*** (0.343)	*Baseline*	1.272** (0.522)
T2	-1.438*** (0.343)	*Baseline*	-1.272** (0.522)	*Baseline*
T3	-0.549** (0.264)	0.889** (0.355)	-0.328 (0.357)	0.944* (0.540)
First order belief			0.060*** 0.006	0.060*** 0.006
Reason for non–immediate withdrawal	-0.032 (0.250)	-0.032 (0.250)	-0.049 (0.300)	-0.049 (0.300)
Age			-0.155* (0.090)	-0.155* (0.090)
Age × Age			0.002* (0.001)	0.002* (0.001)
Gender and Gender × Treatment controls	No	No	Yes	Yes
Big 5/TIPI controls	Yes	Yes	Yes	Yes
N	600	600	597	597

Dependent variable: Chose bribe
Note: Logistic regressions. Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 uses similar logistic regressions to Table 1 but use choosing the fast track fee as the dependent variable and therefore only look at T2 and T3.

The significant ($p < 0.01$) coefficient for the treatment T3 dummy variable in both models supports the earlier Finding 3 (more people choose the fast track fee when there is a negative externality attached to the bribe). Model 3 showing that the difference remains strongly significant even after controlling for first order beliefs about the proportion of participants choosing the fast track fee.

As was the case for the bribe, the first order belief about the proportion of others choosing the fast track fee is significant ($p < 0.01$) and supports Finding 5

(those choosing the fast track fee have higher beliefs about the proportion of others choosing the fast track fee).

As before, the number of observations in Model 2 is slightly reduced due to the age and gender demographics being collected by the Prolific recruitment platform before the experiment and there being some missing data.

A higher score on the agreeableness big 5 measure is associated with a higher likelihood of choosing the fast track fee with this being significant at the 1% level in Model 1 but only at the 10% level in Model 2 with additional controls. When the additional controls are included there is evidence ($p < 0.05$) that those with a higher score for emotional stability (lower neuroticism) are less likely to choose the fast track fee.

Table 2: Logistic regressions for choosing fast track fee

	(1)	(2)
T2	*Baseline*	*Baseline*
T3	-1.166***	-1.001***
	(0.252)	(0.314)
Extraversion	0.072	0.091
	(0.089)	(0.110)
Agreeableness	0.314***	0.269*
	(0.120)	(0.143)
Conscientiousness	-0.094	-0.068
	(0.103)	(0.111)
Emotional stability	-0.115	-0.230**
	(0.089)	(0.107)
Openness to experiences	-0.175	-0.075
	(0.121)	(0.132)
First order belief		0.040***
		(0.005)
Reason for non–immediate withdrawal	0.301	-0.032
	(0.255)	(0.250)
Age		-0.021
		(0.079)
Age $\times$ Age		0.000
		(0.001)
Gender and Gender $\times$ Treatment controls	No	Yes
N	397	396

Dependent variable: Chose fee

Note: Logistic regressions. Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.3 Officials

In total there were 600 participants in E2 (as was preregistered). This being made up of 132 in T1, 168 in T2, 147 in T3 and 153 in T4.

Finding 6: *Citizens having a fast track option does not significantly affect the proportion of officials choosing to accept a bribe.*

Support: Figure 6 reports the proportion of participants choosing to accept the bribe in the four treatments of E2. The only difference between T2 and T1 is that in T2 participants know that those who chose to pay a bribe in the earlier experiment also had the option to instead pay a fast track fee with no negative externality associated with it, they did however not take this option and still chose the bribe. The Figure shows no significant difference between T2 and T1 (two–sided Fisher's exact test: $p = 0.726$).
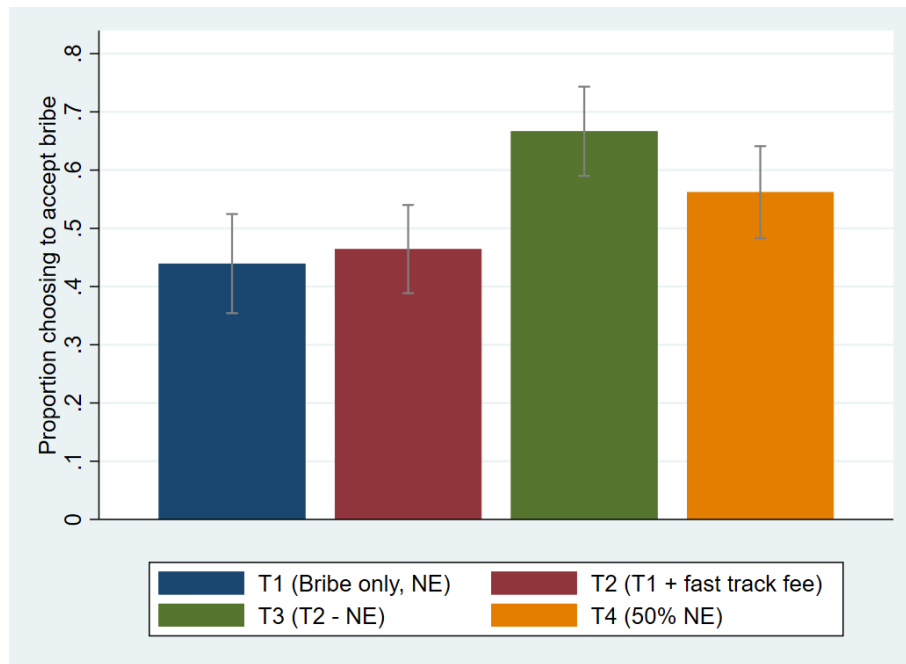

Figure 6: Proportion accepting bribe (with 95% confidence intervals)

Finding 7: *Fewer people accept the bribe when there is a negative time externality.*

Support: Looking again to Figure 6 we can see the difference between the proportion of participants accepting the bribe in T2 where there is negative time externality attached to the bribe and T3 where the only difference is that there is no such negative externality. The proportion being lower in T2 than T3 is significant at the 1%

level when using a two–sided Fisher's exact test ($p < 0.001$).

Finding 8: *Those choosing to accept the bribe have higher beliefs about the proportion of others accepting the bribe.*
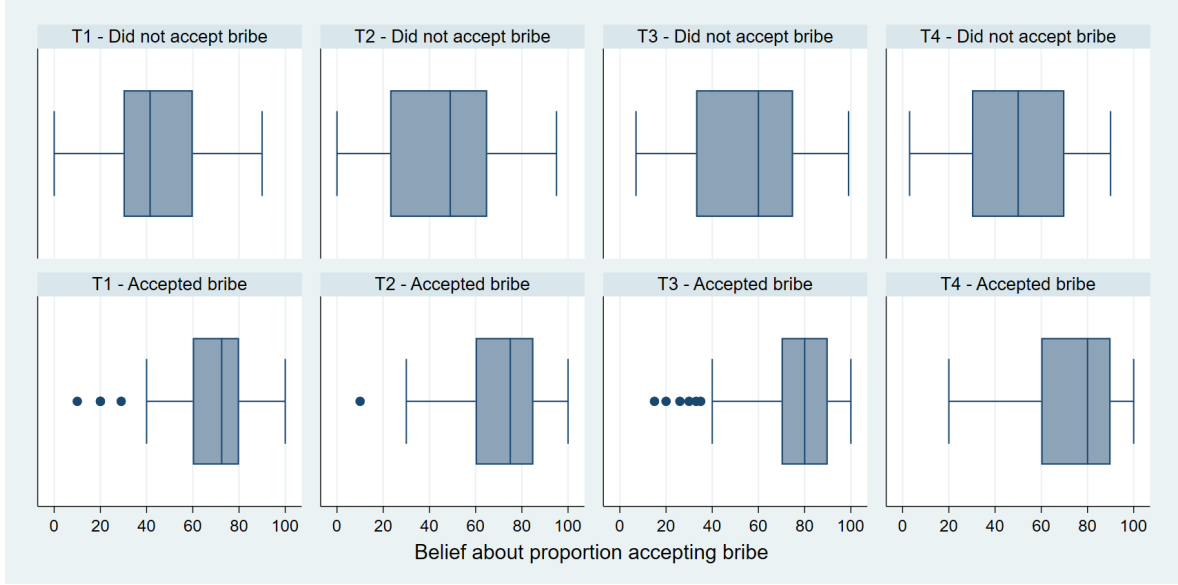

Figure 7: Beliefs about the proportion accepting the bribe

Support: Figure 7 reports box plots for this first order belief by each treatment in E2 and if participants chose to accept the bribe or not.

The Figure shows higher beliefs in those accepting the bribe and this difference is significant at the 1% level when using a two–sided non–parametric Mann–Whitney–Wilcoxon (MWW) test in each treatment and overall ($p < 0.001$ in each case).

Finding 9: *The proportion accepting the bribe when it has a 50% probability of incurring a negative time externality is higher than when there is a certain negative externality and lower than when there is no negative externality.*

Support: Figure 6 shows that the proportion accepting the bribe in T4 is between that in T2 and T3. This is however only significant at the 10% level using two–sided Fisher's exact tests (T2/T4: $p = 0.094$, T3/T4: $p = 0.075$)

Table 3 uses logistic regressions to control for and include other variables in the analysis of the binary dependent variable of accepting the bribe. Model 3 uses a baseline of T4 and the coefficients for the T2 and T3 dummy variables show significant differences from T4 ($p < 0.05$). These differences only become significant at this level when including the Female $\times$ Treatment interaction terms. These terms are however not significant individually.

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If first order beliefs about the proportion of participants choosing to accept the bribe are included (Models 2 and 4) then the treatment coefficients become less significant. This being explained by the fact that the belief is endogenous and itself affected by the treatments (as was the case in the analysis of E1).

The significant ($p < 0.01$) coefficient for the first order belief in Models 2 and 3 supports the earlier Finding 8.

The number of observations in Models 3 and 4 is slightly reduced due to the age and gender demographics being collected bu the Prolific recruitment platform before the experiment and there again being some missing data.

Table 3: Logistic regressions

	(1)	(2)	(3)	(4)
T1	-0.087	0.063	-0.461	-0.321
	(0.236)	(0.264)	(0.295)	(0.335)
T2	Baseline	Baseline	-0.548**	-0.544*
			(0.276)	(0.321)
T3	0.861***	0.512*	0.679**	0.386
	(0.237)	(0.273)	(0.308)	(0.334)
T4	0.399*	0.345	Baseline	Baseline
	(0.226)	(0.263)		
First order belief		0.050***		0.048***
		(0.005)		(0.005)
First order belief × Female				0.016
				(0.012)
Reason for non–immediate withdrawal	-0.060	-0.164	-0.158	-0.271
	(0.171)	(0.199)	(0.177)	(0.207)
Age			-0.134**	-0.216***
			(0.060)	(0.073)
Age × Age			0.001	0.003**
			(0.001)	(0.001)
Female			-0.223	-1.357
			(0.383)	(0.922)
Female × T1			-0.099	0.132
			(0.551)	(0.676)
Female × T2			0.364	0.429
			(0.507)	(0.604)
Female × T3			-0.357	-0.328
			(0.547)	(0.664)
Big 5/TIPI controls	Yes	Yes	Yes	Yes
N	600	600	590	590

Dependent variable: Bribe acceptance

Note: Logistic regressions. Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Finding 10: *Age has a non–linear effect on the likelihood of accepting the bribe.*

Support: Model 4 in Table 3 reports significant coefficients for the Age and Age–squared terms. Age is also significant in Model 3 but Model 4 is preferred as it also includes the significant effect of the first order beliefs so is a more complete model.

Increasing age decreases the likelihood of choosing to accept the bribe until about age 40 when this effect reduces and potentially reverses although this analysis is limited by the number of observations at higher ages. This effect is more easily seen in Figure 8 which shows the predictive margins for Model 4 at different ages along with 95% confidence intervals.
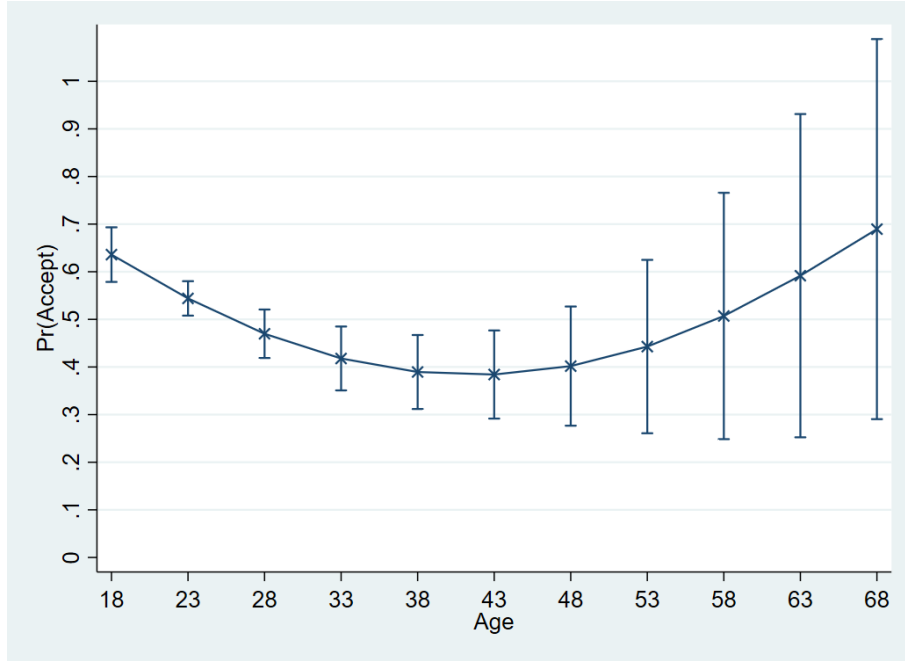

Figure 8: Predictive margins for accepting the bribe from Model 4 in Table 3 at different ages with 95% confidence intervals

None of the big 5 personality measures from the TIPI questions are significant but are included in all Models in Table 1 as controls.

Also not significant but included as a control is a dummy variable for participants answering "yes" to there being a reason for why they would not be able to withdraw payment from their Prolific recruitment account immediately (see experimental design section for more details).

4 Conclusions

This study has shown that there is experimental evidence for a negative time externality (that "pushes others down the queue") reducing both the number of bribes offered by citizens and bribes accepted by officials. We therefore contribute to the literature presenting mixed results on the effects of negative externalities, especially previous work looking at harassment bribery experiments (Abbink et al., 2002; Büchner et al., 2008; Barr & Serra, 2009; Guerra & Zhuravleva, 2019).

Citizens are also less likely to choose a bribe when a more costly "fast track fee" is available that delivers the service/payment in the same time as when paying a bribe but has no negative time externality. Citizens having such an option does not appear to affect the behaviour of officials when choosing to accept or reject an offered bribe.

A limitation of us using two separate experiments is that in the officials experiment (E2), citizens have already made their choice and it is not the case, for example, that by officials rejecting a bribe, citizens then have a choice between the bribe and fast track fee. An experiment with both citizens and officials playing simultaneously and with the fast track fee being presented to officials in a less abstract way might find different results. Using two separate experiments does however allow us to be more precise in the interpretation of behaviour as we are not concerned with any mechanisms related to the anticipated behaviour of the other side of the "bribe market" (e.g. citizens considering how likely it is that officials will accept bribes).

Our results are found in a relatively low stakes, one–shot, online setting where there is complete anonymity, and hence, no potential for any kind of reputation or reciprocal relationship to be formed. The online nature of the experiment is an argument in support of external validity with more and more citizen–official interactions taking place online (e.g. online application filling). It would be useful for future work to explore how the effects found work in other settings, when officials and citizens have multiple interactions or the negative externality of "pushing others down the queue" is more observable, for example.

5   Appendix A. Experiment Instructions

Introduction

This experiment has received approval from the University of Exeter's research ethics committee. No deception is involved: all of our instructions are accurate and we will pay exactly as stated.

No personally identifiable information is collected and everyone will remain anonymous. We will process personal data in accordance with the EU General Data Protection Regulation (GDPR). You consent to the publication of the study results. No data will be personally identifiable. Anonymised data may be stored for an indefinite period of time and/or made available online to other researchers. Any published data will have your Prolific ID removed. You will not be able to withdraw consent after completing the study as there will be no way to link you to your data but you are free to withdraw at any time during the study without giving a reason.

The study must be completed in one go so please only continue if you have at least 10 minutes to complete it. By entering your Prolific ID and clicking next you agree that you understand the above information and give your consent to taking part in the study.

Instructions (for real effort task in Experiment One but not used/shown in Experiment Two)

In this part of the experiment you will be presented with a series of randomly selected letters and numbers. You will need to type 20 sequences correctly to be able to continue.

Once you have entered the string, click the Next button or press the Enter key.

You will earn £1.50 for completing this section of the experiment.

You will have a maximum of 10 minutes to complete the task which should be plenty of time.

When you are ready, please click "Next" below to start.

First real effort task screen (for real effort task in Experiment One but not used/shown in Experiment Two)

Transition screen (no title shown to participants, not used/shown in Experiment Two))

Thank you for correctly entering the 20 strings. You have been awarded £1.50 for this.

Experiment One, Willingness to pay treatment (T1.WTP), screen one of baseline order

Choice

Time left to complete this page: **9:35**

By default you will be paid in **11 days**.

You do however have an option to pay a bribe where you will be paid **today** but **someone else taking part in the experiment today will have to wait 22 days** to be paid.

Alternatively, you have an option to pay a fast track fee where you will be paid **today** with **no affect on when others are paid.**

The table below lists a series of costs for the bribe. The next page will ask about the fast track fee. Please use the table below to indicate at what price you would switch from paying the bribe to declining to pay the bribe. Any cost would be deducted from your earnings of £1.50.

One of the costs for the bribe or fast track fee will be chosen at random and implemented by the computer.

Cost of the bribe in pence	I will pay for the bribe at the given cost?	
2p	○ Yes	○ No
4p	○ Yes	○ No
6p	○ Yes	○ No
8p	○ Yes	○ No
10p	○ Yes	○ No
12p	○ Yes	○ No
14p	○ Yes	○ No
16p	○ Yes	○ No
18p	○ Yes	○ No
20p	○ Yes	○ No
25p	○ Yes	○ No
30p	○ Yes	○ No
35p	○ Yes	○ No
40p	○ Yes	○ No
45p	○ Yes	○ No
50p	○ Yes	○ No

Experiment One, Willingness to pay treatment (E1.WTP), screen two of baseline order (options continue as on first screen)

Choice

> Time left to complete this page: **8:37**

By default you will be paid in **11 days**.

You do however have an option to pay a bribe where you will be paid **today** but **someone else taking part in the experiment today will have to wait 22 days** to be paid.

Alternatively, you have an option to pay a fast track fee where you will be paid **today** with **no affect on when others are paid.**

The table below lists a series of costs for the fast track fee. Please use the table below to indicate at what price you would switch from paying the fast track fee to declining to pay the fast track fee. Any cost would be deducted from your earnings of £1.50.

One of the costs for the bribe or fast track fee will be chosen at random and implemented by the computer.

Cost of the fast track fee in pence	I will pay for the fast track fee at the given cost?	
2p	○ Yes	○ No
4p	○ Yes	○ No

Experiment One, Treatment One (E1.1)

Choice

> Time left to complete this page: **9:47**

By default you will be paid in **11 days**.

You do however have an option to pay a **bribe of 6p (£0.06)** where you will definitely be paid **today** but **someone else taking part in the experiment will have to wait 22 days** to be paid.

Do you choose to pay the bribe?

○ No
○ Pay the bribe

[Next]

Experiment One, Treatment Two (E1.2)

Choice

By default you will be paid in **11 days**.

You do however have an option to pay a **bribe of 6p (£0.06)** where you will definitely be paid **today** but **someone else taking part in the experiment will have to wait 22 days** to be paid.

Alternatively, you have an option to pay a **fast track fee of 9p (£0.09)** where you will definitely be paid **today** with **no effect on when others are paid.**

Do you choose to pay the bribe or fast track fee?

- ○ No
- ○ Pay the bribe
- ○ Pay the fast track fee

[Next]

Experiment One, Treatment Three (E1.3)

Choice

By default you will be paid in **11 days**.

You do however have an option to pay a **bribe of 6p (£0.06)** where you will definitely be paid **today** with **no effect on when others are paid.**

Alternatively, you have an option to pay a **fast track fee of 9p (£0.09)** where you will definitely be paid **today** with **no effect on when others are paid.**

Do you choose to pay the bribe or fast track fee?

- ○ No
- ○ Pay the bribe
- ○ Pay the fast track fee

[Next]

Experiment Two, Treatment One ET2.1)

Choice

Time left to complete this page: **9:57**

Several people taking part in this study earned £1.50 for completing a task. They then chose to pay a **bribe of 6p (£0.06)** to be paid **on the day they took part** rather than waiting **11 days** to be paid.

They also knew that paying the bribe would cause **someone else** in the study to wait **22 days** to be paid **instead of 11 days.**

Your choice today is whether you accept such a bribe.

If you **accept** then **6p will be added** to your earnings. There are also **two other participants** who are not making decisions today. By accepting the bribe, **one** will receive their participation payment **today** and the **other will wait 22 days.**

If you **reject** then the **two other participants** will both be paid in **11 days** and you will not receive the additional 6p.

Do you choose to accept the bribe?

◯ Reject the bribe
◯ Accept the bribe

Next

Experiment Two, Treatment Two (E2.2)

Choice

Time left to complete this page: **9:49**

Several people taking part in this study earned £1.50 for completing a task. They then chose to pay a **bribe of 6p (£0.06)** to be paid **on the day they took part** rather than waiting **11 days** to be paid.

They also knew that paying the bribe would cause **someone else** in the study to wait **22 days** to be paid **instead of 11 days.**

They also had the option to pay a **fast track fee of 9p (£0.09)** to be paid **on the day they took part** with **no effect on when others are paid.** They did however **not pick this fast track option** and **paid the bribe instead.**

Your choice today is whether you accept such a bribe.

If you **accept** then **6p will be added** to your earnings. There are also **two other participants** who are not making decisions today. By accepting the bribe, **one** will receive their participation payment **today** and the **other will wait 22 days.**

If you **reject** then the **two other participants** will both be paid in **11 days** and you will not receive the additional 6p.

Do you choose to accept the bribe?

◯ Reject the bribe
◯ Accept the bribe

Next

Experiment Two, Treatment Three (E2.3)

Choice

Several people taking part in this study earned £1.50 for completing a task. They then chose to pay a **bribe of 6p (£0.06)** to be paid **on the day they took part** rather than waiting **11 days** to be paid. They also knew that paying the bribe would have **no effect on when others are paid.**.

They also had the option to pay a **fast track fee of 9p (£0.09)** to be paid **on the day they took part** with **no effect on when others are paid.** They did however **not pick this fast track option** and **paid the bribe instead.**

Your choice today is whether you accept such a bribe.

If you **accept** then **6p will be added** to your earnings. There are also **two other participants** who are not making decisions today. By accepting the bribe, **one** will receive their participation payment **today** and the **other will wait 11 days.**

If you **reject** then the **two other participants** will both be paid in **11 days** and you will not receive the additional 6p.

Do you choose to accept the bribe?

○ Reject the bribe
○ Accept the bribe

[Next]

Experiment Two, Treatment Four (E2.4)

Choice

Several people taking part in this study earned £1.50 for completing a task. They then chose to pay a **bribe of 6p (£0.06)** to be paid **on the day they took part** rather than waiting **11 days** to be paid.

They also had the option to pay a **fast track fee of 9p (£0.09)** to be paid **on the day they took part** with **no effect on when others are paid.** They did however **not pick this fast track option** and **paid the bribe instead.**

Your choice today is whether you accept such a bribe.

If you **accept** then **6p will be added** to your earnings. There are also **two other participants** who are not making decisions today. By accepting the bribe, **one** will receive their participation payment **today**. The **other will wait 11 days** with **50% chance** and will wait **22 days** with **50% chance** (ie. they are equally likely).

If you **reject** then the **two other participants** will both be paid in **11 days** and you will not receive the additional 6p.

Do you choose to accept the bribe?

○ Reject the bribe
○ Accept the bribe

[Next]

6 Appendix B. Included regions in selection criteria regarding question: "In what country do you currently reside?"

Afghanistan, Aland Islands, Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antarctica, Antigua and Barbuda, Argentina, Armenia, Aruba, Azerbaijan, Bahamas, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bonaire, Bosnia and Herzegovina, Botswana, Bouvet Island, Brazil, British Indian Ocean Territory, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Christmas Island, Cocos (Keeling) Islands, Colombia, Comoros, Congo, Congo the Democratic Republic of the, Cook Islands, Costa Rica, Cote d'Ivoire, Croatia, Cuba, Curacao, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Ethiopia, Fiji, French Guiana, French Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Ghana, Greece, Grenada, Guadeloupe, Guam, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Heard Island and McDonald Islands, Holy See (Vatican City State), Honduras, Hungary, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Liberia, Libya, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Islands, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Mongolia, Montenegro, Montserrat, Morocco, Mozambique, Myanmar, Namibia, Nauru, Nepal, New Caledonia, Nicaragua, Niger, Nigeria, Niue, Norfolk Island, Northern Mariana Islands, Pakistan, Palau, Palestinian Territory, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Pitcairn, Poland, Portugal, Reunion, Romania, Russian Federation, Rwanda, Saint Barthelemy, Saint Helena, Saint Kitts and Nevis, Saint Lucia, Saint Martin (French part), Saint Pierre and Miquelon, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Senegal, Serbia, Seychelles, Sierra Leone, Solomon Islands, Somalia, South Africa, South Georgia and the South Sandwich Islands, South Sudan, Sri Lanka, Sudan, Suriname, Svalbard and Jan Mayen, Swaziland, Syrian Arab Republic, Tajikistan, Tanzania, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos

Islands, Tuvalu, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Bolivarian Republic of, Vietnam, Wallis and Futuna, Western Sahara, Yemen, Zambia, Zimbabwe

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