The Role of Trust in Intertemporal Choice:
The Case of Brazil*

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Abstract

In this note we propose a new theoretical framework to study intertemporal choice that relies on explicit modeling of social norms and trust. Intertemporal choice is conceptualized as an interaction between two players, a decision maker, who chooses to invest in the future or not, and an institution that manages the investment and pays money back to the decision maker. When the decision maker does not trust the institution, she chooses not to invest, which from the traditional economic perspective may seem to be caused by a high discount rate. The specification of social relationships between the decision maker and the institution thus suggests how to account for the unreliability of standard measures of discount rates in different contexts. We use the representative Ipsos survey run in Brazil to test the hypotheses related to the new framework. We find that trust influences both intertemporal choices and various beliefs about the future (e.g., optimism) in the direction predicted by the theory. We discuss policy implications of these results and the potential economic consequences of low trust in the society.

1 Introduction

Intertemporal choices are ubiquitous in our daily lives. We often make decisions to put some money aside or to invest it with the goal to increase consumption in the future. People need to save money for their own education and education of their children, pay for health insurance, make pension payments, etc. Business decisions often involve some investments today with the idea to generate profit in the future. Paying taxes that are spent on specific projects, for example protecting the environment, can be seen as a form of future investment. In a sense, any economic transaction that does not involve an immediate exchange of goods or services always contains some element of intertemporal choice.

Given that future-oriented decision-making is playing such a big role in so many types of economic relationships, it is not surprising that economists developed models to better understand intertemporal choice. The main element of such models is the discount rate that multiplies utility in the future periods so that this future utility can be treated as discounted utility today for the purpose of making the choice. Traditionally, intertemporal choice modeled in this way is considered an *individual decision problem* where one person or firm with a fixed discount rate trades-off consumption utility today and in the future. The literature has acknowledged that discount rates may depend on various external factors like inflation, state of the economy, or the predictability of the environment (e.g., Arrow et al., 2020). These relationships have been taken into account in many studies, contexts, and policy decisions and are extensively used for project evaluation (e.g., Harrison, 2010). The approach taken in these applications is to incorporate various factors into an estimate of a discount rate for a country, an investment project, or a personal budget and then use this estimate in decision-making.

While this approach makes sense for various types of decisions that are concerned with estimates of profitability of certain projects or investments, for other kinds of decisions—especially those made by individuals—the estimates of discount rates were found to be volatile and dependent on the context of the decision problem, experimental design, and the social group of interest (Percoco and Nijkamp, 2009; Matousek et al., 2022). Within the paradigm of intertemporal choice as individual decision problem, the source of these differences is not easy to pin down. This creates various problems with evaluating discount rates for the purpose of predicting people's behavior or designing a successful policy (e.g., a pension reform) that would change people's choices and improve their well-being.

In this concept note, we propose a new theoretical framework to study intertemporal choice that can provide a possible solution to the problem of context dependence of discount rates and can be particularly helpful for applications in developing countries. We depart from the traditional notion of discount rate described above by observing that *any intertemporal decision involves at least two economic actors:* one who is choosing whether to make an investment in the future or not (e.g., an individual who decides to put some money on a savings account in a

bank) and another who holds or uses the invested money before paying it back in the future (e.g., the bank). In the developed countries, the almost universal abidance by the rule of law makes financial sector so reliable that the contingency where a bank chooses to keep the money of its clients is inconceivable. In such case, explicitly modeling a situation where a government, a pension fund, a bank, or any other institution unlawfully keeps someone's money may seem superfluous. However, in the developing world, where laws are not perfectly enforceable and informality is an important economic factor, the chances of losing the investment become very real. In this case, it is reasonable to think that *interpersonal trust* and *trust in institutions* start to play a big role in economic transactions in general and intertemporal choice specifically.

Imagine that an individual wants to save some money for the future consumption in a country where trusting the money to an institution can be risky due to corruption, weak rule of law, etc. Then, the individual should first consider the reliability of the institution before making an investment. This can often lead to the decision to not invest and to increase the present consumption instead. Notice the importance of this observation for measuring the individual discount rates in a traditional way (e.g., through simple survey questions or individual decision-making experiments). If the level of trust in the institution managing the money is not explicitly taken into account, we will obtain very high estimates of future discounting (everyone seems to want to consume only today). This can point to bizarre conclusions, for example, that people do not care about the future at all. Consequentially, including such estimates in evaluations of policies or projects may lead to undesirable outcomes.

In order to model such situations and to better understand intertemporal choice in the context of weak institutions and informality, we use fresh insights from behavioral and experimental economics, specifically from the burgeoning new subfield that studies the role of social norms in decision-making (Bicchieri, 2016; Fehr and Schurtenberger, 2018). The new theoretical framework of Kimbrough and Vostroknutov (2020), which models the injunctive norms arising in arbitrary strategic interactions, provides us with the means to explicitly introduce trust in other people or institutions into the game-theoretic analysis of intertemporal choice with two players: the agent who decides on the investment and the institution that promises to pay the money back to the agent in the future. This analysis, presented in Section 2, shows that trust in an institution plays a crucial role in the decision to invest money in it even after accounting for the standard discount rate that can depend on exogenous economic factors.

In Section 3 we take the model to the data collected by the representative Ipsos survey in Brazil. The survey contained questions related to interpersonal trust and trust in institutions as well as various questions and tasks about intertemporal choice like, for example, individual planning horizon, beliefs about the appropriate planning horizon of Brazil's public policies, and optimism about the future. We find that our measures of trust influence all of these intertemporal choices and beliefs about the future and that the results of regression analysis are qualitatively in line with the theory of Kimbrough and Vostroknutov (2020). The effects of trust on choices

and opinions related to the future are large when compared to other influences like education, race, or geographic region. All this evidence supports our original idea that *social relationships* between agents involved in intertemporal choice are a defining feature of such interactions in developing countries.

With these results at hand, in Section 4 we discuss policy implications and make some suggestions about the specific situation in Brazil. Here, we point out that if trust plays such an important role in intertemporal choice, then we need to take into account the *identity* of the institution that proposes a new policy and its corresponding trustworthiness in the eyes of the population. Following the results of the survey, we also observe that interpersonal trust (in family, friends, neighbors, etc.) can have a spill-over effect on economic interactions in general and suggest that maintaining high levels of trust in the population can be a policy goal in its own right, as high levels of trust can potentially stimulate economic activity across the board (Berlinski et al., 2021). For Brazil specifically, we point out the importance of education as a facilitator of various forms of trust, the particular importance of trust in government, and the dangers of polarization of opinions, especially with regard to environmental issues (e.g., climate change). The latter problem can not only lead to low levels of trust (and consequently bad intertemporal choices), but can also instigate the division of the society into separate and informationally isolated strata.

2 Intertemporal Choice

2.1 The Problem

Consider a classic intertemporal optimization problem with two periods. The decision maker can choose between a sure payoff now (in the first period) or a higher payoff later (in the second period). If the former option is chosen, then the decision maker gets some utility normalized to 0, which may corresponds to "doing nothing." If the latter option is chosen, then the decision maker invests some amount $c > 0$ in the first period and receives some return $a > c$ in the second period. The first-period utility from the investment is $\gamma a - c$, where $\gamma \in [0, 1]$ represents some form of future discounting. For example, it can be that $\gamma = e^{-\delta}$, where δ is the standard discount factor. Alternatively, γ can also include additional objective factors that can decrease the return from investment in the future: e.g., γ can account for inflation. This is a typical intertemporal choice problem, where the prediction is that only a decision maker with high enough γ, who cares about the future enough, will choose to invest. Specifically, this happens when $\gamma a - c > 0$, or when $\gamma > \frac{c}{a}$. The decision makers who do not put enough weight on the future payoffs (or have low $\gamma \leq \frac{c}{a}$) will not invest.

This prediction suggests that people who have high individual parameter γ will want to invest in the future and will accordingly support future-oriented government policies, whereas

people with low γ will not invest in the future and not support future-oriented policies. This is an important model of intertemporal decision-making that has been used in economics for decades. In development applications, individual discount factors were used extensively to compute the profitability and desirability of environmental and other kinds of future-oriented projects (e.g., Percoco, 2008). The famous Ramsey formula (Kraay, 2018) features individual discount rate as one of the two factors influencing future discounting (together with the correction for decreasing future marginal utilities due to growth in wealth).

It may seem that this theory of intertemporal decision making is flexible enough to incorporate most concerns that people have about the future, and thus the estimates of γ can be obtained from some data, experiments, or surveys and plugged it into the computations of future discounting in, say, the Ramsey formula. However, the estimation of γ is not very straightforward. Various studies have pointed out that these estimates are highly volatile; depend on the experimental design; change with context; and suggest that many people are completely indifferent to what will happen to them in the future (γ close to zero).[1] These problems are not very good news, since, given such a wide range of estimates, it becomes unclear which γ should be used in the calculations of desirability of some policy or project. Moreover, if researchers and policy-makers take literally the low estimates of γ that suggest indifference about the future, then they should cast doubt on the whole idea of trying to make the future better. Indeed, if people do not want to invest in the future, and this is their basic preference, then governments (at least in democratic societies) should not push them to invest in it. This point is especially relevant for Brazil where the low estimates of γ were obtained (e.g., Issler and Piqueira, 2000).

These conclusions seem strange, if not outright wrong when we know intuitively that people do care about their future well-being. However, this implicit future-orientedness is not what researchers observe when they try to measure γ by conventional economic means. Why is this happening? Why don't people express more consistent and higher degrees of caring about the future? The answers to these questions are important as many policies and projects depend on estimates of the discount rate in the Ramsey formula and other applications.

2.2 A Potential Solution

One potential reason why the problems with discount-rate estimates occur is that the intertemporal optimization problem as stated above is *misspecified*. In the model described above, the agent simply "receives" the money in the future. This happens with probability 1, there are no concerns about not getting the money or about someone else deciding to keep it.[2] It is not

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[1]See, for example, the meta-analyses by Percoco and Nijkamp (2009) and Matousek et al. (2022).

[2]Some authors believe that the discount factor itself is a way to deal with uncertainties of this kind (e.g., Halevy, 2008). From this perspective, γ already accounts for the probability of not receiving the money and any other factors. This is not wrong and constitutes a legitimate way of thinking about it. However, under this approach, γ is supposed to be a fixed individual parameter that is applicable to any decision context, and this is the point where the approach taken here diverges from the standard one. In what follows, we will see that future discounting is

difficult to imagine why economists, who originally studied developed Western economies, formulated the intertemporal choice problem in this way. Indeed, if you live in the US or another developed country and you try to do some intertemporal choices using your bank, for example, as a keeper of your money (who should give it to you in the future), then you do not need to think about the contingency in which you do not get your money back. This is simply because the banking sector is developed to the point where stealing your money is not profitable for the bank or anyone else managing your investments. Most future-oriented transactions made in the Western countries are secure. Thus, not too much attention has been paid to the problems that can arise when banks or other financial institutions are unreliable, which is often the case in the developing world.

To make this point clearer, suppose you are a poor person in Brazil, who does not have access to American banks, and suppose that you would like to make an intertemporal choice. By definition, such choice implies that there is a contingency in which you get some money in the future. But here is a question: *Who* keeps your money for you and gives it to you in the future? People who do not have access to developed banking sector might not be able to find a reliable person or institution that would fulfill this role. This can result in low levels of investments in the future even when people want to do such investments.[3]

The simple observation that intertemporal choice involves two actors (the decision maker and the institution that manages the investments), already starts to clarify the picture with volatility of experimental estimates of the discount rates. Indeed, once a transaction involves more than one person, we need to consider at least a *game* that they play (as opposed to an individual decision problem). More realistically, if we want to understand the causes of the seeming discount rate volatility, we should consider *social relationships* between the two players and how these relationships influence the optimal strategies in the game they play. It is not inconceivable that Brazilians, who exhibit low γ in surveys, do so because they do not believe that they will get any money in the future even if the experimenter promises it. The reason is simple: if in your day-to-day activities you normally do not trust anyone, then you may also not trust an experimenter, whom you will never encounter after the experiment is over. Thus, *low estimates of γ can be the result of low levels of trust in the society.*

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not fixed and may depend on the *social context* of intertemporal choice. Thus, the "discount rate as an individual characteristic" approach might be missing on important context-specific social factors that influence intertemporal decisions.

[3]In our current economic reality, intertemporal choice necessarily involves *at least two people*: the decision maker and the person who is in charge of getting the money to her in the future. The decision maker herself cannot fulfill both roles, because then she would have access to her money all the time, thus making it possible to spend it before the future arrives. So, any intertemporal choice *necessarily* involves an additional actor, who is supposed to actually give the decision maker the money in the future.

2.3 A Reformulation of the Problem

Given the idea that trust can influence the estimates of the discount rates in experiments and surveys, we can try to represent the intertemporal choice problem as a game to explicitly take into account the effects of the interaction between the decision maker and the institution or person who promises to give the money back to the decision maker in the future. The left panel in Figure 1 shows the classic intertemporal choice problem with one player, P1, who chooses between doing nothing and investing the amount c. As we discussed above, in this "game" P1 chooses to invest if $\gamma a - c > 0$, or when $\gamma > \frac{c}{a}$. In the right panel of Figure 1, we assume that if P1 decides to invest, then there is some player P2 who promises to give the amount $\gamma a - c$ to P1 in the second period. P2 can be a bank, a government, a business partner, a vaccine provider, or anyone else depending on the situation. Notice that P2 can also break his promise and keep the money, in which case P2's utility is γa and P1's utility is $-c$. This game is rather remarkable when considered in a standard economic framework where P1 and P2 only care about their material payoffs. Backward induction gives us one unambiguous Subgame-Perfect Nash Equilibrium: P2 breaks the promise and P1 does nothing (this holds whenever $c > 0$ and $\gamma a > 0$, which is always true by definition). So, even in the standard economic framework, the behavior in the two games is expected to be very different simply because we introduced the possibility of someone who is in charge of P1's investment to renege on his promise to give the money back to the decision maker.
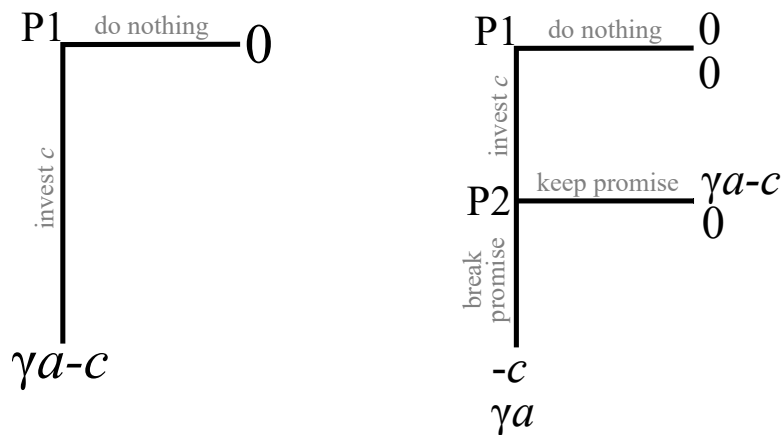

Figure 1: Individual (left panel) and social (right panel) representations of the intertemporal choice problem.

Let us work out the implications of the assumption that P2 can break his promise. Suppose we study the discount rates in individual choice problems as in the left game in Figure 1. Suppose we try to measure the discount rate in this task where experimenter is giving the money to the subjects in the future. So, experimenter is P2 and subjects are P1. Now imagine that we observe that no one is investing, so all P1's are choosing to do nothing. How should we interpret this from the perspective of individual intertemporal choice (the left game)? If we believe that

subjects are playing the left game, then we must conclude that the discount rate γ is very low (so that $\gamma a - c < 0$). However, if we think that the same players are playing the right game, then the conclusions are completely different. In the right game, P1 does nothing *not because the discount rate is low*, but because P2 is breaking his promise to deliver the money. So, any P1 with arbitrary γ will do nothing in the right game as long as she *believes* that P2 cannot be "trusted" (that P2 will break his promise). Therefore, depending on the perspective (the left or the right game), we can either come to the conclusion that γ is very low or that it is unidentifiable through this experiment at all and that the behavior depends on the trust of P1 to P2.

This suggests that eliciting discount rates under the assumption that subjects automatically get the money in the future can lead to wrong conclusions about the discount rates because subjects might simply believe that there is some P2 (e.g., the experimenter) who can keep their money. Moreover, if P1 *believes* that P2 cannot be trusted (P2 does not care about P1 at all), then there is no reason for P1 to invest, because the money will be lost.[4]

This argument suggests why many studies find very different estimates of the discount factor. The reason might lie in different beliefs about the chances of actually receiving the money in the future in different experimental contexts. But then the questions arises: How do people realistically invest in the future when the standard economic theory suggests that they should never do that (because presumably P2 will always keep the money)? Many stylized facts coming from experimental economics support the idea that in real life people actually *do* trust others, so they *do* believe that P2 will return the money and, as a result, they invest (and P2 does actually return the money in many cases). However, this prospect is difficult to conceptualize within the standard economic theory that does not operate with social notions like trust. Therefore, in order to properly measure and understand the factors that enter intertemporal choice we need a theory that takes into account human pro-sociality.

2.4   Intertemporal Choice with Norms

The problem with the notion of trust in economic theory is not new, and intertemporal choice problems are not the only ones suffering from the absence of such notion (e.g., public goods provision, Ostrom et al., 1994). Luckily, one definition (or rather definitions) have appeared recently in a theory of norm-abiding behavior in behavioral economics (Kimbrough and Vostroknutov, 2020, further KV). It was not the ultimate goal of KV to operationalize trust. They rather strived to understand how norms *emerge* in different strategic situations. As a byproduct, the theory produced several different parameters that correspond to different flavors of trust. This allows

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[4]Notice an important feature of this argument: everything that happens in the right game does not actually depend on the real behavior of P2. The decision to invest or not comes from the *beliefs of P1 about P2*. These beliefs may or may not be consistent with reality. For example, in the Ipsos data discussed below, we observe different factual beliefs about what government does. This suggests that taking beliefs into account is important to fully understand intertemporal choice.

us to look closer at the intertemporal choice problem and try to understand what modulates investment decisions in the right game in Figure 1 when looked at through the lens of social norms.
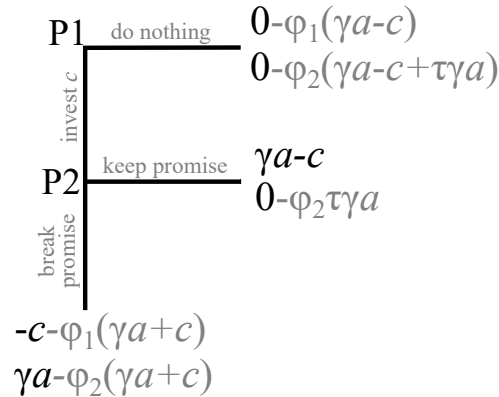

Figure 2: Intertemporal choice problem from the perspective of a theory of social norms.

Figure 2 shows the same game as in the right panel of Figure 1 only with payoffs modified to represent *norm-dependent utility*, or utility that, apart from the standard consumption term (in black), includes the normative term (in grey) that reflects how *socially appropriate* a given outcome of the game is. The idea here is that people care not only about their individual consumption, but also about social appropriateness of the outcomes of the game (Kessler and Leider, 2012; Krupka and Weber, 2013). In other words, the main tenet of this new strand of literature is that *people trade-off consumption and morality* (see Vostroknutov (2020) for an overview).

Let us walk through the various normative terms in Figure 2 to understand how they are constructed. The theory of KV postulates that social appropriateness of an outcome is determined by the *sum of dissatisfactions* of all players in that outcome. If the sum of individual dissatisfactions of all players is high, then the outcome will be deemed socially inappropriate and vice versa: an outcome will be considered socially appropriate if the sum of dissatisfactions is low. Dissatisfaction of the players, in its turn, comes from the presence of better outcomes. A player (P1 or P2) is dissatisfied about some outcome if there are other outcomes in the game that bring this particular player higher consumption utility.

To illustrate, let us take the normative perspective of P1 and notice straight away that, in this perspective, P2 should not feel any dissatisfaction in any outcome at all, since P2 operates with her, P1's, money. P2 should not be dissatisfied with not having something that does not belong to P2 (imagine that P2 is a bank). So, as far as P1 is concerned, only her dissatisfactions matter for social appropriateness of the outcomes in this game.[5]

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[5]This argument connects the theory of norms with the *strength or respect for property rights* in a society. For intertemporal problems this implies that strong respect for property rights should stimulate investments in the future, because then P1's will be more confident that P2 will keep his promise. If property rights are weak, then P1 might consider a possibility that P2 will break his promise, which would decrease investments in the future.

To see how P1's dissatisfactions are computed, consider first the outcome that happens after P2 chooses to give P1 her money, which results in P1 getting $\gamma a - c > 0$ and P2 getting 0. In this outcome, P1 is not dissatisfied at all because, in all other possible outcomes of the game, P1's consumption utility is smaller (0 or $-c$). Thus, P1 believes that the sum of dissatisfactions in the outcome $(\gamma a - c, 0)$ is zero (P1 thinks that P2's dissatisfaction is zero everywhere). In Figure 2, this is reflected in the absence of a normative term in the utility of P1 at $(\gamma a - c, 0)$. Now, consider the outcome $(0, 0)$, after P1 does nothing. In this outcome, P1 is dissatisfied because there is one other outcome that gives her higher consumption utility, namely the outcome $(\gamma a - c, 0)$. The dissatisfaction of P1, thus, is equal to $\gamma a - c - 0$, or the difference between the consumption utilities of P1 in $(0, 0)$ and in $(\gamma a - c, 0)$. The social appropriateness of $(0, 0)$ is then equal to $-(\gamma a - c)$. The minus sign reflects the idea expressed above that social appropriateness is *inversely* proportional to the sum of dissatisfactions. In Figure 2 we can see this term in the utility of P1 at $(0, 0)$ multiplied by a constant $\phi_1 \geq 0$, which represents P1's *propensity to follow norms* (Kimbrough and Vostroknutov, 2016, 2018). This coefficient defines how much P1 cares about following norms relatively to selfish desire to have more consumption. In general, high values of ϕ_1 will imply very norm-abiding and selfless behavior and values close to zero will produce selfish behavior. Finally, in the outcome $(-c, \gamma a)$, P1 is dissatisfied even more, because here there are two other outcomes where she gets higher consumption utility. P1 is dissatisfied because instead of $-c$ she could have gotten 0, *and* she is dissatisfied because instead of $-c$ she could have gotten $\gamma a - c$. So, the dissatisfaction of P1 at $(-c, \gamma a)$ consists of two parts, the dissatisfaction $0 - (-c) = c$ due to the presence of an outcome where P1 gets 0 and the dissatisfaction $\gamma a - c - (-c) = \gamma a$ due to the presence of an outcome where P1 gets $\gamma a - c$. Summing these up, we get $\gamma a + c$, the combined dissatisfaction of P1 at $(-c, \gamma a)$. We can see this term with a minus and multiplied by ϕ_1 in the utility of P1 in Figure 2.[6]

Let us now perform the same exercise for P2. Notice first that if P2 indeed "respected" P1 (as P1 would like to believe) and did not feel dissatisfied when not keeping P1's money, then P2's dissatisfactions would be zero everywhere, and we would obtain the same sums of dissatisfactions for all outcomes as computed above (this corresponds to the case when $\tau = 0$ in Figure 2). However, P1 can figure out that P2 might not be so respectful and that P2 might feel dissatisfied when giving P1's money back to her (because P2 could have kept it instead). So, in the mind of P1, P2 might feel dissatisfaction equal to $\tau(\gamma a - 0) = \tau \gamma a$ in the two outcomes where P2 gets 0. The new coefficient $\tau \geq 0$ defines the degree of "disrespect" of P2 towards P1. When $\tau = 0$, P2 fully respects P1; when τ is high, P2 feels that it is *appropriate* to keep P1's money. So, the sums of dissatisfactions in the outcomes where P2 gets 0 are now changed: they consist of the dissatisfactions of P1 as computed above plus the term $\tau \gamma a$ that represents the dissatisfaction of

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[6]All these calculations may seem ad hoc and having nothing to do with real human behavior. However, KV demonstrate that this model is capable of organizing experimental observations in many different classes of games. The theory has been successfully tested in several other studies (e.g., Merguei et al., 2021; Panizza et al., 2021).

P2. In the outcome $(-c, \gamma a)$, even disrespectful P2 does not feel any dissatisfaction because this is the outcome where P2 gets the highest consumption utility. Notice as well that the (negative) sums of dissatisfactions, in case of P2, are multiplied in P2's utility by the coefficient ϕ_2 that represents the belief of P1 about P2's propensity to follow norms. This parameter is important as we will see below: for example, we already know from Section 2.3 that if $\phi_2 = 0$, then P2 will act selfishly and always keep the money.

To summarize, "trust" in KV's framework (as well as in reality) is a complex notion. In case of the game in Figure 2, there are at least two parameters, τ and ϕ_2, that determine how much P1 can trust P2 or how much P2 can be trusted. In order for P1 to trust P2 with her money, she needs to make sure first that P2 follows norms in general (as determined by ϕ_2), for if this is not so, P2 will simply take P1's money. Second, P1 needs to make sure that P2 respects her enough to not want to take her money (even when P2 is norm-following), which is represented by the parameter τ.

2.5 Implications of the Model

In this section we will consider the main question that the theory above was supposed to answer, namely, Under which conditions will P1 invest? This is rather straightforward. P1 will invest if she believes that P2 will give her the money in the future. This happens when P2's norm-dependent utility of giving the money back is higher than the utility of keeping it:

$$-\phi_2 \tau \gamma a > \gamma a - \phi_2 (\gamma a + c),$$

which can be rewritten as

$$\tau + \frac{1}{\phi_2} < 1 + \frac{c}{\gamma a}. \tag{1}$$

This condition describes how the trust parameters on the left-hand side—that represent the beliefs of P1—should be related to the "material" parameters c, a, and γ that define the consumption utility in the game.

Suppose first, for the sake of the argument, that c, a, and γ are fixed and represent the "immutable physical reality" of this interaction, whereas τ and ϕ_2 represent beliefs of P1 that can change depending on circumstances, subjective perception of the environment, and attitudes towards P2. Then, we can easily see that in order for P1 to choose to invest, ϕ_2 needs to be high, so

that $1/\phi_2$ is small. Notably, when $\phi_2 \to 0$ the inequality (1) never holds no matter the values of other parameters. Therefore, we can state our first result.

Theoretical Result 1. *When ϕ_2 is low, or when P1 believes that P2 does not follow norms in general, P1 will never invest regardless of the values of other parameters. Believing that P2 is a (sufficient) norm-follower is a* necessary condition *for investment.*

The result above says that P1 will invest only if she believes that P2 is a sufficiently dedicated norm-follower. Therefore, to understand the influence of other parameters on the choice to invest, we will assume from now on that ϕ_2 is high enough. For this case, inequality (1) tells us what the value of τ needs to be for P1 to want to invest. Notice that when τ is close to 0, which describes the case when P2 considers it inappropriate to take P1's money, the inequality always holds (assuming high enough ϕ_2). We formulate this as a result.

Theoretical Result 2. *Low value of τ or high trust in the society (and sufficiently high ϕ_2) should stimulate decisions to invest in the future.*

Low τ and high ϕ_2 are the desirable conditions that permeate many investment decisions in the developed Western countries. Indeed, many economists, philosophers, and policy-makers noticed that trust of this kind is one thing without which democratic form of social organization does not function very well (Sen, 1967; Putnam et al., 1993; Fukuyama, 1995; Berlinski et al., 2021). According to our model, as long as business interactions follow a simple norm of decency—in the sense that the involved parties consider it morally wrong to take each other's wealth—all kinds of investments into the future should be made *regardless* of other factors related to the investment (e.g., the cost of investment c relative to the benefit a, or economic/political instability captured by γ) as long as $\gamma a - c > 0$.

In the developing countries the situation is different. Here people might not want to invest into the future simply because they do not feel that the party responsible for giving them back the returns from their investments (P2) can be trusted. In the model this is represented by high value of τ (and possibly low value of ϕ_2) such that inequality (1) does not hold. In such cases, the values of the material parameters c, a, and γ become important. When the benefits from investments represented by a grow, pressure is exerted on the possibility of a successful investment as increased a creates more incentive for disrespectful P2 with $\tau > 0$ to keep the money. This implies that highly lucrative forms of business—like developing new technologies or investments in infrastructure and/or public goods—demand high levels of trust and respect between involved parties. This might at least partially explain why technological progress is primarily happening in the developed world. Similar conclusions can be drawn for other parameters. The value of γ, that might represent uncertainty about the economy, high inflation, or high chances of political unrest, will also influence the success rate of investments into the future in countries

with low trust (or high τ). This suggests that the investment climate in the conditions of low trust is precarious and depends heavily on the (expected) state of the economy and the political system.[7]

Theoretical Result 3. *When τ is high (and/or ϕ_2 is low), or when there is low trust in the society, the decision to invest in the future will heavily depend on other factors like the potential benefits from the investment, the state of the economy, or political stability. In such conditions there will be low levels of investments that will also change depending on many factors.*

To summarize, the analysis of a very simple investment game in Figure 2 within the framework of KV, allows us to see many relationships between various forms of trust and the prospects of investment by P1. This model can be used in many ways. Through inequality (1), it can produce general hypotheses about the direction of change of the behavior of P1 depending on her beliefs and the physical environment. It is also possible to estimate the "investment climate" in a country by directly measuring the beliefs of P1's. This can be done by means of experiments and surveys. There exist tested methodologies to elicit τ (Chen and Li, 2009) and ϕ_2 (Kimbrough and Vostroknutov, 2018).

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[7]Increase in the costs of investment c can also harm the chances of successful investment. Remember that one condition, under which all the conclusions above hold, is $\gamma a - c > 0$, or that the investment is in principle profitable. If c is high, so that $\gamma a - c < 0$, P1 will decide not to invest regardless of the trust to others.

3 The Ipsos Survey

In this section, we will try to connect the results of the Ipsos survey (specifically, questions about attitudes towards the future) to the theoretical implications of the model above (trust questions). It should be noted that the survey questions do not directly reflect the parameters τ and ϕ_2 that play an important role in the model. The survey questions related to trust were deliberately simple (e.g., a Yes/No question Do you trust the government?), which was dictated by the breadth of the study and the desire to collect information about trust in different domains. Therefore, it is hard to tell whether these questions represent τ, ϕ_2 or some mixture of the two.[8] Despite this however, as inequality (1) demonstrates, we can think of the answers to the trust questions in the current Ipsos survey as representing some proxy for $\tau + 1/\phi_2$, a quantity that summarizes the overall "trust" that P1 has for P2, which includes P1's beliefs about how much P2 follows norms and about how much P2 respects P1.

3.1 Individual Planning for the Future

We start with looking at two questions related to the individual planning horizons and future discounting. The first question (FP1-t) is a version of the individual decision to get some money today or more money in the future exactly as described in the previous section. The question asks: *What is the minimum amount of money you would agree to receive in a year instead of R\$100 today?* This is the question that was mentioned above in the context of the problems that emerge when eliciting future discount rates: many people state unrealistically high amounts that they would like to receive in a year (e.g., R\$200,000), which in standard approach translates to a very high discounting of the future (low γ in the model).

We look at the relationship between the answers to this question and the six measures of trust elicited in interpersonal trust questions C2. These six Yes/No questions ask if you trust Brazilians in general, your family, your neighbors, your friends, people of other religions, and people from other countries. A simple regression analysis of answers to FP1-t on these questions does not provide anything meaningful. However, grouping people into "trust categories" does show something interesting.

Figure 3 shows the average answers to FP1-t for five categories of subjects: those who trust no one ("No" answers to all six C2 questions); those who trust only family; those who trust only family and friends; those who trust everyone; and the rest. The first four categories were chosen because these are the ones with the largest number of subjects: each category has more than 100 people and there are no other categories with that many. We can clearly see that people who trust no one have the highest and most unrealistic demands for the amount they want in one

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[8]We are developing more sophisticated techniques to elicit specific parameters of the model. However, such techniques require multiple questions for each "entity" (e.g., government, entrepreneurs, etc.). Therefore, more specific questions necessarily limit the scope of the survey.
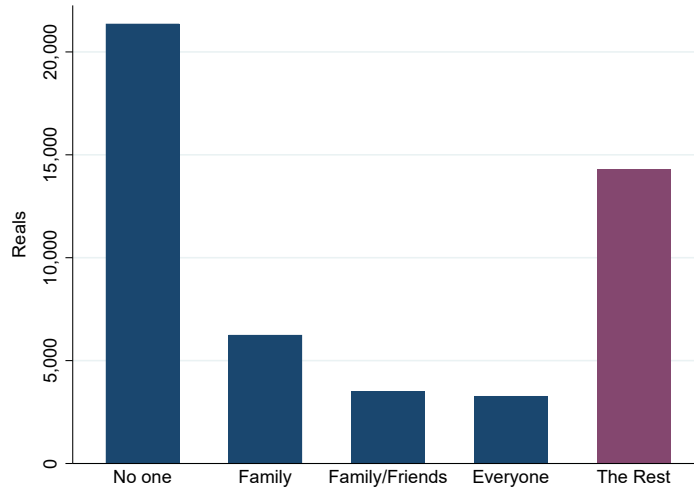
Figure 3: Mean answers to question FP1-t by trust category of subjects.

year. People who trust family or family and friends have much lower demands, and people who trust everyone ask for the lowest amount. Ranksum tests of pairs of categories show significant differences between each of the first three categories and the category "Everyone" ($p < 0.03$). So, we can see the connection to the theory described above: the wider is the group of people subjects trust, the more they care about the future, which is evident from the lower demand for money in a year.

Of course, question FP1-t is not the exact replica of the game in the previous section. However, we can think of subjects' answers to it in terms of the probability they assign to meeting a person who will not return the money. If a subject thinks that this probability is high (because they do not trust most other people) then she would ask for more money in the future to compensate for possible losses. Thus, on a general level, these answers make sense in terms of the theory.

Next, we turn to question FP2: *When planning how you are going to use your money, what time frame do you take into account?* Possible answers include: the next week, the following month, next six months, ..., more than 20 years. These are ordered discrete responses, so we use the ordered logit regression with endogenously determined cutoffs. The independent variables are grouped into three subsets: DEMO1 – standard demographics (age, income, education, sex); DEMO2 – additional demographics (region, race, and the formal/informal job status; and TRUST – 12 trust questions divided into interpersonal trust (C2) and trust in institutions (C3). The C2 questions were described above and C3 questions are also Yes/No questions in relation to trust to the government, judiciary, entrepreneurs, banks, press, and social media. We divide demographics into DEMO1 and DEMO2 categories, because the former contains "physical" characteristics that might have a direct effect on the variables of interest below, whereas the latter includes variables that might have an effect but for more "social" reasons.

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FP2	1	2	3	4	5
University	0.386***	0.391***	0.395***	0.412***	0.423***
	(0.141)	(0.139)	(0.141)	(0.141)	(0.144)
Male	0.281**	0.300**	0.370***	0.356***	0.356***
	(0.128)	(0.125)	(0.127)	(0.127)	(0.130)
Log(Income)	0.155*	0.164*	0.113	0.130	0.133
	(0.087)	(0.084)	(0.085)	(0.084)	(0.089)
Age	−0.008*	−0.009*	−0.009*	−0.009*	−0.008
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TRUST					
Friends			−0.572***	−0.517***	−0.544***
			(0.155)	(0.138)	(0.157)
Foreigners			0.462***	0.445***	0.454**
			(0.179)	(0.156)	(0.182)
Government			0.353*	0.330*	0.358*
			(0.185)	(0.180)	(0.186)
Judiciary			0.377**	0.337**	0.400**
			(0.156)	(0.150)	(0.158)
Press			−0.336**	−0.385**	−0.360**
			(0.157)	(0.153)	(0.160)
Social Media			−0.323*	−0.349*	−0.356*
			(0.191)	(0.188)	(0.193)
Other			Yes	No	Yes
DEMO2					
Race	Yes	No	No	No	Yes
Region	Yes	Yes	No	No	Yes
Job (In)formality	Yes	No	No	No	Yes
N independent	861	861	861	861	861
Degrees of freedom	20	14	22	16	32
BIC	2,913	2,877	2,903	2,866	2,958

Table 1: Ordered logit regressions of FP2 on DEMO1, DEMO2, and TRUST. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

Table 1 shows five regressions of the answers to FP2 on different specifications of the independent variables. To provide an idea of the robustness and the importance of the trust variables in explaining the planning horizon, we consider DEMO1 questions in all regressions together with either DEMO2 or TRUST questions. So, regression 1 has all DEMO1 and DEMO2 variables, but not TRUST variables. Regression 3 has all DEMO1 and TRUST variables, but not DEMO2. The reason for this division is severalfold: first, we wanted to keep this general regression format for the analysis of all questions that follow in the next sections; second, the DEMO1 variables seem to influence all questions about the future independently of other variables; and third, we wanted to demonstrate the superior explanatory power of the TRUST questions as compared to DEMO2 questions that fare worse in almost all specifications. Regressions 2 and 4 are the same as regressions 1 and 3 with the difference that insignificant variables in the DEMO2 and TRUST categories are removed. This is done to check for the robustness of the results. Finally, regression 5 contains all variables (DEMO1, DEMO2, TRUST). This same structure will be maintained throughout the further analysis.

From the regressions in Table 1, we can see that the dummy *University*, which is 1 if the subject attempted to obtain a university degree and 0 otherwise is significant and positive. This means

that university-educated people have longer planning horizon than those who never went to the university. This same result can be glimpsed also in most of the regressions considered below and constitutes a strong factor influencing the planning horizon. Interestingly, replacing the dummy *University* with dummies for lower levels of education (e.g., *Colegial*) makes education variable insignificant in all specifications (not reported), which suggests that only university degree changes the future planning but not lower education degrees. The dummy variable *Male*, that is 1 if the subject is male and 0 if female, similarly increases the planning horizon. The signs of the coefficients on logged income and age also make sense.

Regression 3 in Table 1 shows that six TRUST variables have significant impact on the planning horizon. We will not discuss all of them, and will focus only on those that appear in multiple other regressions below. The most important such variable is *Trust in Government*. In regressions 3 and 4, we see a positive, 10% significant coefficients. This means that people who trust the government also report longer planning horizons, which makes sense in light of the theory in the previous section. People who trust the government believe that they can rely on it to make plans for the future, thus the effect on the planning horizon. Interestingly, the size of the effect of the trust in government is roughly the same as the effect of getting a university education: the coefficients on the two dummies are similar. This demonstrates that trust can play a big role in determining planning horizons. *Trust in Judiciary* increases the planning horizon by the same amount as trust in government. The two versions of trust, therefore, have an effect double in size of that from a university degree.

Finally, let us compare the explanatory power of the DEMO2 and TRUST variables. For that we employ Bayesian Information Criterion (BIC) reported in the last row of Table 1. We see that in both regressions 1/3 and 2/4 BIC of the regressions with TRUST variables is lower, which indicates a better fit to the data (any difference in BICs above 6 signifies a large increase in the goodness of fit). Thus, we can conclude that TRUST variables explain the planning horizon better than race, region, and job status, which overall do not show much significant effect on the planning horizon. Moreover, regression 5 that includes all variables has a much higher BIC than either regression 1 or 3 that have only subsets DEMO2 or TRUST. This also suggests that DEMO2 does not really add much explanatory power to this analysis. All these findings demonstrate that the theory above has some merit in the sense that its suggested connection between trust and attitudes towards the future seem to hold in reality.

On a final note, some TRUST variables, e.g., trust in friends, press, and social media have negative effect on the planning horizon. This might look strange, however, it is not hard to imagine that people who trust, say, press and social media, might be those who are not very good at planning for themselves. We are not completely sure why trust in friends has a negative effect on the planning horizon (which also appears with a negative sign in other regressions below), but one idea would be that those who trust their friends are involved in informal sector

of the economy, where planning for the future is limited. In Section 3.4, where the determinants of trust are discussed, we try to shed some more light on these issues.

Empirical Result 1. *Interpersonal trust influences the responses to the individual intertemporal choice questions. Low interpersonal trust makes people less future-oriented (they demand more money in a year). The planning horizon is longer for males and people with attempted university degree (but not lower degrees) as well as people who trust Government and Judiciary.*

3.2 Brazil's Planning Horizon

In this section, we use the same format of the regressions to analyze the influence of trust on the opinions about Brazil's planning horizon as a country. Question PP3-1 asks: *Thinking about the future of the country, what period of time do you think Brazil should take into account when carrying out the planning of public policies?* The possible answers range from this year to more than 20 years, again in discrete categories.

PP3-1	1	2	3	4	5
University	0.494***	0.490***	0.436***	0.451***	0.464***
	(0.140)	(0.140)	(0.142)	(0.139)	(0.144)
Male	0.292**	0.284**	0.254**	0.275**	0.278**
	(0.127)	(0.126)	(0.128)	(0.126)	(0.130)
Log(Income)	0.040	0.030	0.023	0.019	0.057
	(0.083)	(0.080)	(0.079)	(0.078)	(0.084)
Age	0.006	0.006	0.003	0.004	0.004
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TRUST					
Brazilians			0.388**	0.462***	0.417**
			(0.181)	(0.153)	(0.183)
Friends			−0.277*	−0.289**	−0.308*
			(0.157)	(0.137)	(0.159)
Other			Yes	No	Yes
DEMO2					
Race	Yes	Yes	No	No	Yes
Region	Yes	Yes	No	No	Yes
Job (In)formality	Yes	No	No	No	Yes
N independent	876	876	876	876	876
Degrees of freedom	18	16	20	10	30
BIC	2,606	2,592	2,629	2,569	2,668

Table 2: Ordered logit regressions of PP3-1 on DEMO1, DEMO2, and TRUST. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

Table 2 shows the results. As above, we see very significant effects of university education and sex on the opinion about the Brazil's planning horizon. Also as before, only attempted university degree but not lower levels of education significantly affect this result. In terms of trust, the TRUST variables that are significant here are different from those above (except *Trust in Friends*). Specifically, *Trust in Brazilians* seems to have an effect on this opinion. This makes sense

in terms of the theory: people, who trust other citizens in Brazil, also think that it is easier to plan for a longer future than those who distrust other Brazilians in general. It is somewhat surprising that trust in government is not significant here. We do not have an answer why, so maybe more investigations are needed to clarify this. Finally, notice that BIC is lower in regression 4 than in regression 2, which signifies better fit of the trust regression (though not in regressions 1 and 3). This is not a strong evidence of the superiority of trust over standard DEMO2 variables, as the number of degrees of freedom is lower in regression 4. However, it is an indication that trust is not doing much worse than DEMO2. Finally, regression 5 demonstrates again that including all DEMO2 and TRUST variables does not improve BIC, which suggests that they capture the same part of variation in the data.

The next question of interest is PP3: *To what extent do you support the Brazilian government borrowing money from multilateral development banks to implement public policies?* The answers range from "totally dislike" to "fully support" (in ascending order, unlike in the survey). Table 3 shows the results.

PP3	1	2	3	4	5
University	0.379***	0.391***	0.418***	0.425***	0.448***
	(0.142)	(0.141)	(0.144)	(0.142)	(0.146)
Male	0.024	0.002	0.021	0.004	0.107
	(0.128)	(0.127)	(0.129)	(0.127)	(0.132)
Log(Income)	−0.140	−0.132	−0.150*	−0.144*	−0.116
	(0.086)	(0.085)	(0.084)	(0.082)	(0.088)
Age	0.011**	0.011**	0.016***	0.016***	0.015***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TRUST					
Family			−0.437**	−0.416**	−0.482***
			(0.173)	(0.170)	(0.176)
Friends			−0.378**	−0.316**	−0.340**
			(0.157)	(0.144)	(0.160)
Government			−0.331*	−0.327*	−0.361*
			(0.185)	(0.183)	(0.187)
Entrepreneurs			−0.353**	−0.371**	−0.430**
			(0.172)	(0.160)	(0.177)
Other			Yes	No	Yes
DEMO2					
Race	Yes	No	No	No	Yes
Region	Yes	No	No	No	Yes
Job (In)formality	Yes	Yes	No	No	Yes
N independent	875	875	875	875	875
Degrees of freedom	18	10	20	12	30
BIC	2,625	2,576	2,614	2,564	2,666

Table 3: Ordered logit regressions of PP3 on DEMO1, DEMO2, and TRUST. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

Here again we see a strong effect of university education on supporting the involvement of international organizations in Brazil's policy (but not lower levels of education). Unlike in other analyses above, we also see the effect of age: older people seem to be more favorable to borrowing from international organizations. What is interesting though is the *negative* effect of trust

variables on this question. Specifically, people who trust in friends, family, government, and entrepreneurs seem to not like the prospect of the involvement of international organizations. We believe that the reasons might be more political than related to trust per se. It might be the case that people think that international organizations somehow undermine the workings of the government and business. If we look at the goodness of fit, we see that regressions 3 and 4 squarely beat the regressions 1 and 2 in terms of degrees of freedom and the lower values of BIC (trust regressions have more degrees of freedom, which is punished by BIC). This indicates that the negative and significant coefficients on TRUST variables are not a coincidence, but rather something meaningful that asks for further investigation. Finally, as before, regression 5 shows that including both DEMO2 and TRUST variables does not improve BIC, suggesting that TRUST variables are capturing more variation than DEMO2.

Empirical Result 2. *Attempted university degree (but not lower level of education), being a male, and trust in Brazilians increase the opinion about the length of Brazil's planning horizon. Attempted university degree (as well as age) also makes people more favorable to borrowing from international organizations.*

3.3 Optimism about the Future

The final set of questions related to the future asks about optimism. Question CB1 asks: *What is your feeling about the future of Brazil, let's say, for the next 6 months?* The answers range from "very pessimistic" to "very optimistic." Table 4 shows the results.

CB1	1	2	3	4	5
University	−0.193	−0.219	−0.255*	−0.293**	−0.191
	(0.142)	(0.141)	(0.145)	(0.142)	(0.147)
Male	0.108	0.105	0.030	0.022	0.025
	(0.128)	(0.126)	(0.129)	(0.127)	(0.132)
Log(Income)	0.153*	0.164**	0.162*	0.168**	0.164*
	(0.086)	(0.083)	(0.084)	(0.083)	(0.088)
Age	0.004	0.004	0.002	0.001	0.003
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TRUST					
Government			1.333***	1.316***	1.275***
			(0.186)	(0.185)	(0.188)
Entrepreneurs			0.658***	0.590***	0.635***
			(0.175)	(0.162)	(0.178)
Press			−0.612***	−0.671***	−0.616***
			(0.160)	(0.146)	(0.163)
Social Media			0.532***	0.501***	0.554***
			(0.192)	(0.190)	(0.194)
Other			Yes	No	Yes
DEMO2					
Race	Yes	No	No	No	Yes
Region	Yes	Yes	No	No	Yes
Job (In)formality	Yes	No	No	No	Yes
N independent	873	873	873	873	873
Degrees of freedom	17	11	19	11	29
BIC	2,420	2,386	2,353	2,302	2,401

Table 4: Ordered logit regressions of CB1 on DEMO1, DEMO2, and TRUST. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

Here we do not see a significant effect of university degree, which is understandable. Given the current situation in Brazil, it is not hard to imagine that educated people are not very optimistic. Income instead is significant in all regressions, which shows that optimism is related to current well-being, a straightforward psychological connection. We also see an important effects of TRUST variables on optimism: trust in government and entrepreneurs makes people more optimistic, which again follows from the logic of the theory. If a subject trusts the government and entrepreneurs, then she feels that good things can be accomplished in the future, as compared to the person who does not trust the government or entrepreneurs. Trust in press has an opposite effect, maybe because those who listen to it become more anxious with the current situation than those who does not trust it. In terms of BIC, the models with TRUST variables in regressions 3 and 4 again beat the models with DEMO2 variables in regressions 1 and 2 by a large margin. Moreover, regression 5 that includes both DEMO2 and TRUST variables has lower BIC than regression 1 that has only DEMO2 variables. This is a strong indication that in case of optimism TRUST variables have the most explanatory power.

The longer horizon optimism question is CB2 that asks: *What is your feeling about the future of Brazil, let's say, for the next 5 to 10 years?* The possible answers are the same as in CB1. Table 5 shows the results.

CB2	1	2	3	4	5
University	−0.015	−0.030	−0.069	−0.090	−0.033
	(0.145)	(0.144)	(0.147)	(0.143)	(0.150)
Male	−0.194	−0.188	−0.263**	−0.268**	−0.297**
	(0.130)	(0.129)	(0.130)	(0.129)	(0.133)
Log(Income)	0.150*	0.145*	0.209**	0.205**	0.167*
	(0.085)	(0.085)	(0.083)	(0.082)	(0.087)
Age	0.012**	0.012**	0.008*	0.007	0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
TRUST					
Neighbors			0.286*	0.201	0.322*
			(0.164)	(0.140)	(0.165)
Government			0.769***	0.782***	0.717***
			(0.188)	(0.187)	(0.191)
Judiciary			0.281*	0.228	0.252
			(0.159)	(0.147)	(0.161)
Entrepreneurs			0.406**	0.402**	0.359*
			(0.181)	(0.173)	(0.185)
Other			Yes	No	Yes
DEMO2					
Race	Yes	No	No	No	Yes
Region	Yes	Yes	No	No	Yes
Job (In)formality	Yes	Yes	No	No	Yes
N independent	870	870	870	870	870
Degrees of freedom	17	13	19	11	29
BIC	2,308	2,282	2,300	2,253	2,343

Table 5: Ordered logit regressions of CB2 on DEMO1, DEMO2, and TRUST. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

The results here are very similar to CB1: higher income makes people more optimistic in the longer run, as well as trust in government and entrepreneurs. Males seem to be more pessimistic about the medium-run future of Brazil. In terms of BIC, the TRUST models are again better than the DEMO2 models. Regression 5 yet again shows that including both DEMO2 and TRUST variables does not increase explanatory power (thus favoring TRUSt variables overall). So, we can conclude in this section that income, trust in government, and trust in entrepreneurs are important for an optimistic outlook of the future.

Empirical Result 3. *Income and trust in Government and Entrepreneurs increase optimism about the future of Brazil in short and medium run.*

3.4 Determinants of Trust

In this final section, we look at what influences various forms of trust. Apart from the standard candidates, DEMO1 and DEMO2, we consider theory-inspired independent variables that measure the *exposure to different opinions*. Table 6 shows individual logit regressions of each interpersonal trust question (trust to Brazilians, family, neighbors, friends, people of other religions, and people from other countries).

	BRZL	FMLY	NGBR	FRND	OREL	OCOU
Sch.facts SE	2.426	−7.865**	−0.380	−1.942	−2.406	3.346
	(3.253)	(3.907)	(1.913)	(2.202)	(2.293)	(4.336)
Sch.norms SE	−3.372	0.178	0.400	1.344	0.081	−5.003
	(3.147)	(3.491)	(2.074)	(2.268)	(2.314)	(4.295)
Edu.facts SE	−2.236	3.675	2.421*	−0.090	−1.264	−3.197
	(2.158)	(2.506)	(1.265)	(1.345)	(1.486)	(3.074)
Edu.norms SE	1.359	5.005***	−0.532	1.143	1.440	1.226
	(1.437)	(1.803)	(1.144)	(1.214)	(1.155)	(1.843)
Env.facts SE	1.444	0.316	−1.803	1.112	0.986	0.077
	(1.678)	(1.910)	(1.105)	(1.138)	(1.280)	(2.127)
Env.norms SE	−1.344	−4.093**	−0.721	−2.308**	−1.903*	0.024
	(1.291)	(1.764)	(1.068)	(1.092)	(1.094)	(1.630)
University	0.310	0.133	0.264	0.377**	0.315*	0.826***
	(0.198)	(0.229)	(0.181)	(0.187)	(0.175)	(0.205)
Male	0.282	0.017	0.319**	0.509***	−0.204	0.165
	(0.177)	(0.199)	(0.161)	(0.167)	(0.158)	(0.185)
Log(Income)	−0.108	0.223*	0.054	0.110	−0.010	−0.065
	(0.117)	(0.129)	(0.106)	(0.112)	(0.104)	(0.121)
Age	0.023***	0.006	0.027***	0.009	0.002	0.016**
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)
Race						
Black	−0.156	−0.132	−0.044	−0.177	−0.243	−0.740***
	(0.261)	(0.281)	(0.237)	(0.241)	(0.231)	(0.286)
Mixed	−0.250	0.124	−0.195	−0.289	−0.255	−0.607***
	(0.203)	(0.229)	(0.183)	(0.186)	(0.178)	(0.210)
Asian	0.096	−0.184	−0.124	−0.634	−0.108	0.252
	(0.481)	(0.551)	(0.458)	(0.444)	(0.436)	(0.466)
Indigenous	0.097	−0.335	−0.479	−1.553**	−0.840	−0.049
	(0.736)	(0.744)	(0.740)	(0.744)	(0.841)	(0.867)
Region						
South	0.269	0.272	0.902***	0.846**	0.430	0.607*
	(0.310)	(0.420)	(0.283)	(0.333)	(0.282)	(0.318)
South-East	0.458**	0.681***	0.028	0.593***	0.233	0.418*
	(0.212)	(0.257)	(0.194)	(0.202)	(0.189)	(0.232)
North	−0.202	−0.105	−0.031	−0.335	−0.948***	−0.383
	(0.400)	(0.373)	(0.344)	(0.310)	(0.359)	(0.498)
Center-West	0.386	0.750	0.426	0.176	0.262	0.446
	(0.387)	(0.681)	(0.346)	(0.370)	(0.335)	(0.437)
Job Status						
Formal	0.523*	0.523*	0.442*	0.158	0.552**	0.649**
	(0.272)	(0.286)	(0.240)	(0.242)	(0.230)	(0.281)
Informal	0.438*	0.359	0.304	−0.153	0.103	0.348
	(0.241)	(0.237)	(0.212)	(0.204)	(0.201)	(0.255)
Intercept	−1.704*	−1.326	−2.582***	−0.996	−0.025	−1.317
	(0.956)	(1.025)	(0.874)	(0.891)	(0.843)	(0.990)
N independent	793	807	791	784	775	784

Table 6: Logit regressions of C2 trust questions on the exposure to different opinions, DEMO1, and DEMO2. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

The theory of KV that was applied to the case of future discounting in Section 2 has more general implications, which we use in this analysis. Specifically, KV suggest that *normative beliefs* (what should be done) are influenced by *factual beliefs* (what is) about allocations of resources in the society. We used this idea in Section 2.4 where we constructed measures of social appropriateness that come from factual beliefs about payoffs in the game. Since the beliefs about payoffs

generate normative beliefs (the normative terms in the utility in Section 2.4), it is reasonable to think that people with *different* factual beliefs should have different normative views. For example, if someone believes that there is nothing wrong with the environment, this person is more likely to think that the government should not invest in mitigating climate change and instead should spend money on something else. This would contradict the normative beliefs of a person who thinks that climate change is a serious issue. When two people with different factual and/or normative beliefs meet, they might not like each other and not trust each other given that they disagree on what is or should be done. Such situations can lead to decrease of trust in the society.

We test this idea using the set of questions B1, B2, B5, B6, B10, B11 in the survey that ask about factual and normative beliefs related to the building of new schools, about prioritizing education for Black and Mixed people, and about investments into combating global warming. In order to estimate if subjects are exposed to different opinions on these issues, we construct variables *Sch.facts SE*, *Sch.norms SE*, *Edu.facts SE*, *Edu.norms SE*, *Env.facts SE*, and *Env.norms SE*. Prefixes *Sch*, *Edu*, and *Env* stand for the three types of questions; postfixes *facts* and *norms* for factual and normative beliefs; and *SE* stands for standard error. To estimate if subjects are exposed to different opinions, we use the variable CITY in the survey, which codes subject's city of residence. We take all subjects in a given city and compute the standard error of the distribution for each question about beliefs. The higher the value of the resulting variables, the more variability there is in a given city on these issues and, thus, the more chances for a subject to be exposed to different opinions.

The original hypothesis tested here is that these SE variables should have a negative impact on trust. In Table 6, we can see for example that variability in opinions about norms related to environment does have a negative effect on trust in family, friends and people of other religions. This makes sense, as it is well-known that environmental topics are extremely divisive in today's complicated political climate. Some other, more topical, cases also make sense: the differences in factual beliefs about where schools are built (variable *Sch.facts SE*) seem to have a large effect on trust in family. Not all SE variables, however, have negative impact, there are some occurrences of positive and significant coefficients. For now, we do not have a good hypothesis about what this means.

DEMO1 and DEMO2 variables also have some interesting effects on trust. University education seems to increase trust in friends, people from other religions, and people from different countries. There are some positive effects of age. More importantly, we see many trust variables that are influenced by the region: South and South-East have higher trust in almost all columns (the baseline is North-East). Notice that education, income, and race are controlled for in here, so this is a pure regional effect. Finally, having a *formal* job (the baseline is "no answer" to the job status question D5B) seems to significantly increase trust in all but one regression. The effects of race (the baseline is White people) are negative but insignificant almost everywhere. This

weakly suggests that non-whites have more problems with trust (more significance in the race variable can be observed in other regression specifications).

Finally, Table 7 shows similar logit regressions for questions related to trust in institutions (trust in government, judiciary, entrepreneurs, banks, press, and social media).

	GVRT	JDRY	ENTR	BANK	PRSS	SCMD
Sch.facts SE	2.034	−0.418	5.468*	1.030	−0.294	3.797
	(2.694)	(2.242)	(2.974)	(2.345)	(2.315)	(3.617)
Sch.norms SE	−1.048	1.995	−2.108	−1.362	1.992	2.402
	(2.952)	(2.331)	(2.825)	(2.571)	(2.557)	(3.947)
Edu.facts SE	−3.164**	−1.010	−3.805**	0.303	0.827	−0.201
	(1.514)	(1.482)	(1.757)	(1.413)	(1.443)	(2.064)
Edu.norms SE	3.107*	−0.920	1.968	0.069	−1.578	−1.821
	(1.665)	(1.165)	(1.389)	(1.234)	(1.234)	(1.884)
Env.facts SE	−0.449	0.995	0.894	−1.828	0.326	−4.273**
	(1.213)	(1.303)	(1.276)	(1.213)	(1.374)	(1.855)
Env.norms SE	1.017	−0.718	−0.025	1.104	−1.664	1.226
	(1.222)	(1.137)	(1.129)	(1.160)	(1.240)	(1.831)
University	−0.216	−0.085	0.277	−0.362*	0.200	0.512**
	(0.240)	(0.189)	(0.214)	(0.195)	(0.190)	(0.237)
Male	0.505**	0.118	0.272	0.345**	0.323*	0.700***
	(0.207)	(0.166)	(0.193)	(0.169)	(0.167)	(0.209)
Log(Income)	−0.110	−0.178	0.017	−0.133	−0.123	−0.404***
	(0.131)	(0.108)	(0.123)	(0.110)	(0.112)	(0.140)
Age	0.020***	0.002	0.012*	0.006	0.017***	0.007
	(0.007)	(0.006)	(0.007)	(0.006)	(0.006)	(0.007)
Race						
Black	−0.137	−0.506**	−1.004***	−0.138	−0.268	−0.178
	(0.314)	(0.252)	(0.344)	(0.253)	(0.252)	(0.323)
Mixed	0.005	−0.271	−0.145	0.004	0.103	0.156
	(0.235)	(0.188)	(0.215)	(0.193)	(0.188)	(0.238)
Asian	0.513	−0.578	0.077	0.239	−0.159	0.133
	(0.514)	(0.509)	(0.510)	(0.447)	(0.500)	(0.597)
Indigenous	0.170	0.046	0.878	−0.063	−1.548	0.431
	(0.845)	(0.731)	(0.793)	(0.738)	(1.089)	(0.861)
Region						
South	0.183	0.371	0.794***	0.105	−0.123	−0.340
	(0.365)	(0.292)	(0.299)	(0.305)	(0.306)	(0.447)
South-East	0.136	−0.058	−0.269	−0.315	−0.116	−0.213
	(0.261)	(0.203)	(0.252)	(0.214)	(0.201)	(0.258)
North	−0.041	−0.782**	−1.313**	0.182	−0.095	−0.276
	(0.425)	(0.374)	(0.567)	(0.334)	(0.342)	(0.459)
Center-West	0.834**	0.589*	0.357	0.841**	0.045	0.520
	(0.382)	(0.344)	(0.380)	(0.357)	(0.372)	(0.502)
Job Status						
Formal	−0.300	−0.337	0.055	−0.095	−0.470**	−0.494*
	(0.300)	(0.239)	(0.289)	(0.238)	(0.235)	(0.299)
Informal	−0.161	−0.271	0.089	−0.438**	−0.683***	−0.525**
	(0.253)	(0.205)	(0.256)	(0.208)	(0.205)	(0.254)
Intercept	−1.831*	0.884	−2.328**	0.289	−0.225	1.597
	(1.079)	(0.871)	(1.018)	(0.884)	(0.889)	(1.102)
N independent	808	796	795	800	790	788

Table 7: Logit regressions of C3 trust questions on the exposure to different opinions, DEMO1, and DEMO2. * - $p < 0.1$; ** - $p < 0.05$; *** - $p < 0.01$.

Here we do not see much relation of trust to the exposure to different factual and normative beliefs (the SE variables). This is reasonable, since the questions themselves are about schools, education of Black people and the environment, which are not that related to government and other entities considered here. There are indications that Blacks trust judiciary and entrepreneurs

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less than whites, and also that North trusts these entities less than North-East. There are some negative effects of having a formal or informal job on trust in press and social media.

Empirical Result 4. *The exposure to different opinions, especially about the environment, seems to decrease certain types of interpersonal trust but not trust in institutions. Living in South or South-East regions increases interpersonal trust. Having a formal job increases interpersonal trust. Non-whites seem to have less trust of both kinds, however these results are not uniform across different types of trust.*

4   Policy Implications

The goal of this concept note was to conduct the theoretical and empirical analysis of the influence of trust on intertemporal choice and beliefs about the future in a representative sample of Brazilian population. In summary, we do find a significant amount of evidence that trust modulates choices (e.g., the demand for an amount of money in a year equivalent to R\$100 today) and beliefs (e.g., optimism) related to future outcomes in a way suggested by the theory of KV. This implies that, in addition to the traditional economic variables that were found to influence discount rates (e.g., state of the economy, inflation, etc.), we need to consider *social relationships* between the actors involved in intertemporal choice. We believe that this is an important step towards a better understanding of institutions and economies of developing countries that incorporates normative and psychological factors. In this section, we discuss what the theory of norms can contribute to this process and how to use it for formulating and predicting the implications of various types of policies.

4.1   General Implications

We would like to begin with a discussion of the theoretical implications related to trust that become important in intertemporal choice. The main message coming from the theory is that *any* interpersonal choice can be seen as a problem involving multiple people since someone (let us call him person B) should be responsible for giving the money in the future to the person who makes the intertemporal choice today (person A). This immediately implies that A may have concerns about the reliability of B and how much B can be trusted with the money or investment. As a result, A might decide not to invest in the future (give money to B temporarily) simply because A does not trust B and not because A has a high rate of future discounting. Similar implication can be made about the beliefs of agents A regarding the outcomes of future interactions with various agents B, which are coded in opinions about future prospects of Brazil, about Brazil's budget planning horizon, measures of optimism, etc.

These ideas lead to several conclusions. First, we cannot treat intertemporal choice as something that depends *solely* on individual characteristics of agents A (like the discount rate). Such choices depend on the *social context* of the interaction. In particular, it is important to know who exactly the agent B is and what is A's attitude (trust) towards him. Even if we take the same set of agents A, they might exhibit different (standard) estimated rates of future discounting in two contexts where they deal with different agents B (e.g., B can be the federal government or the local authorities). This suggests that, in order to make better estimates of the propensity of some agents A to make long-term plans, we need to take into account the identity of agent B and the attitudes of agents A towards him. For example, consider a pension reform where government asks people to put aside certain part of their income today to be received later. In such case, it can be important *who* proposed the pension reform. Right-leaning individuals might not trust leftist parties. Thus, if a leftist party proposes a pension reform, then these individuals might not be willing to participate due to trust issues and not because of different future discounting rates.

Second, the social norms approach to intertemporal choice strongly suggests that *beliefs* (as opposed to fixed individual characteristics) are very important for decision-making that involves multiple actors. This makes a difference for possible policy-making tactics because beliefs, especially those concerned with trust in institutions, are constantly influenced by everything that happens in the society. Thus, keeping track of the specific beliefs related to intertemporal choices becomes an important part of predicting the effects of policies. For example, attitudes towards B (e.g., the government) might change with time for the reasons unrelated to the specific intertemporal choice (e.g., a pension reform). If people are currently upset with the government because it did not fulfill certain past obligations, then it might be not a good idea to start a pension reform simply because at this specific moment in time people do not trust this specific government.

Third, the analysis of the Ipsos survey suggests that not only beliefs about agent B might play a role for the intertemporal choice of agent A but also the state of other social relationships. We see from the analysis in Section 3.1 that people who do not trust anyone seem to have very high standard estimates of discount rates, which suggests that lack of trust prevents them from making a whole variety of different intertemporal choices. One implication of this is that trying to create a society with higher levels of interpersonal trust can be a policy goal in its own right, as higher levels of trust in family, friends, and other citizens can have a broad positive effect on the quality of long-term planning decisions overall.

Fourth, levels of trust in other people and institutions can depend on how similar the beliefs and opinions are in the population. If the society is divided over some political or economic issue and people with different opinions interact often with each other, then the levels of trust can be low because of polarization of opinions and animosity between the ideological camps. This can have an adverse spill-over effects on various intertemporal decisions. The problem with polarized opinions does not go away even if people in a society only interact with those

who have similar beliefs, which is likely due to self-selection and geographical constraints. This, in a sense, is an even worse scenario because when people stop talking to others with different opinions, their *factual beliefs*, or what they believe is happening right now, might start to diverge. The mismatch of factual beliefs (e.g., with respect to the existence of climate change) can have very negative consequences for trust because normative beliefs (what needs to be done) will be formed based on factual beliefs (Should we invest in battling climate change or not?) and thus also will be very different. Such situation can lead to the emergence of echo chambers and parallel realities that with the "help" from social media can even spur a serious political crisis. This argument suggests that polarization of opinions can have very bad consequences for the quality of intertemporal decisions and that deliberate steps should be taken to limit its extent.

Finally, we believe that it is important to point out that the applicability of the norms framework and specifically the game discussed in Section 2.4 is wider than intertemporal choice. Indeed, the game in Figure 2 can be seen as a simplified instance of a principal-agent problem where agent A (player P1 in the figure) trusts agent B (P2 in the figure) with some money and agent B chooses whether to respect the arrangement and give the surplus back to A or not. Various economic and policy-related interactions fall under this category. For example, the government (agent B) wants to collect a new tax from the population (agents A) to fix some societal problem (agents A decide to pay the tax or not); the government wants to enter a joint project with some firms in the industry, who can decide whether to invest in it or not; the government tries to convince people to get vaccinated from Covid-19 (people pay the cost of coming to the vaccination center or not). In all these cases, trust between the government and agents A will play similar role as in intertemporal choice problems. This suggests that the norms framework can be used for any interactions where investments are made today with the goal to rip the benefits in the future. As in the case of intertemporal choice, it is likely that trust between agents A and B will play a significant role in such interactions.

4.2   Specific Implications for Brazil

When we look at the results of the Ipsos survey through the lens of the theoretical implications mentioned above, several factors can be singled out that seem the most important for Brazil at this moment.

The first factor is *education*. Almost all dependent variables that we looked at in the regressions (individual planning horizon, planning period for Brazil, attitude to international organizations) are influenced by the level of education in a positive way (longer planning horizons). Interestingly though, only attempted university degree but not lower levels of education seem to have a significant effect. This somewhat worrisome result suggests that there is a room for improvement of secondary education that currently does not seem to help people to plan for longer time periods. The problems with intertemporal choices in this case might come from

two sources: 1) students in schools do not learn about, encounter, or become friendly with others with somewhat different opinions and/or social identities, so that their levels of trust in strangers is low (this can lead to low investments in the future as discussed in Section 2); 2) students do not possess analytical skills that would allow them to make complicated intertemporal choices (e.g., the choice of a pension fund). Given that not a very large proportion of Brazilian population has a university degree, the effect of educational reform can create large, positive spill-over effects on trust and intertemporal decision-making. Another, more obvious option is to attract more people to the universities.

The second factor that is noticeable in many results in Section 3 is *trust in government*. People who trust the government seem to have longer planning horizons and are more optimistic about the future in general, which can also spill-over to many areas where intertemporal choice is important. This is so simply because government is an omnipresent entity that enters many economic interactions and thus higher trust in it can have a large, positive effect. The most direct way to increase trust in government is to make sure that it fulfills its obligations and does not alienate any social groups. Another possibility, recently investigated by Falconi and Robinson (2021), is to strengthen the national social identity, which can make people more united and trusting in each other and their government (e.g., the unifying effect of the Peruvian cuisine).

Finally, the *differences in beliefs about environmental problems* seem to influence various types of interpersonal trust in a negative way. The presence of divergent opinions on this topic adversely affects trust in family, friends, and people of other religions, which in their turn can decrease the opportunities for profitable investments (as instances of intertemporal decisions). Policies aimed at homogenizing these opinions can have a positive effect that goes beyond specific environmental problems. As was pointed out at the end of Section 4.1, special care should be taken to make sure that people's factual beliefs about the environment are in sync, for otherwise the divergence of these beliefs can polarize the society and decrease trust. The more detailed analysis of the Ipsos survey data (not reported) suggests that factual beliefs in Brazil on topics related to building new schools, education opportunities for Black and Mixed people, and environmental protection are significantly different across geographical regions (with the biggest differences between South/South-East and the rest of the country). This can be a potential source of distrust that can make environmental and other policies harder to implement.

5   Conclusion

In this note, we have considered a new way to look at intertemporal choice that takes into account social relationships between the decision maker and the institution that manages her money. We use the new theoretical framework of Kimbrough and Vostroknutov (2020) that allows to explicitly model trust and social norms. A simple model of the interaction between the

decision maker and the institution suggests that trust plays a crucial role in the decision to invest in the future.

Using the representative Ipsos survey in Brazil, we show that many intertemporal choices and beliefs about the future are influenced by the levels of interpersonal trust and trust in institutions as suggested by the model. We find that education, trust in government, and differences in factual beliefs about climate change have the largest influence on trust and consequent intertemporal decisions.

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