Fickle groups: A field experiment on time preferences

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- Intertemporal choices – decisions for which costs and benefits are spread out over time – are important for households, policymakers, and managers. However, most of the literature on this topic focuses on individual decision-making, even though many dimensions of intertemporal choice are better modelled at the group level.
- This policy brief considers the following question: are randomly formed groups biased towards the present, and how do their constituent members' time preferences determine their group time preferences?
- To answer this question, we conducted a field experiment with 425 female community health workers in Pakistan to measure the time preferences of individuals and groups through an effort-allocation task over three weeks.
- Our findings suggest that the degree of time inconsistency and the present bias estimate are lower for individuals than groups. We also find that group present bias is mostly driven by the individual with the greatest present bias and that variance in the group members' discount rates and bargaining power explains group present bias.
- Based on our research, we recommend that government departments measure the intertemporal behaviour of their employees and create contracts with individually tailored incentives.

POLICY BRIEF PAK-20184

MARCH 2024

This project was funded by IGC Pakistan

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Introduction

Intertemporal choices – decisions for which costs and benefits are spread out over time – are important for households, policymakers, and managers. These intertemporal choices are relevant to different areas of economic life, such as consumption, saving, and investment. Many important real-life outcomes are strongly associated with individuals' time preferences, including health status (Chabris et al., 2008), educational attainment (Cadena and Keys, 2015), savings (Laibson, 1997), physical exercise (DellaVigna and Malmendier, 2006), and labour-market earnings (Golsteyn et al., 2014). Due to these far-reaching effects, intertemporal choices lead not only to divergent individual-level outcomes but also differences at the macroeconomic level (Rae, 1905; Sunde et al., 2022), as consumption and savings are important determinants of economic growth (Mankiw et al., 1992). Therefore, economists have placed a central focus on using theory and data to understand intertemporal choice (Samuelson, 1937; Koopmans, 1960; Laibson, 1997).

A rich theoretical and empirical literature has substantially advanced our understanding of intertemporal decision-making since the early work of Samuelson (1937).[1] However, most of this literature focuses on individual decision-making, even though many dimensions of intertemporal choice are better modelled at the group level. For instance, partners within households typically make education, health, and savings decisions together, while finance committees within firms and legislatures allocate budgets over time. These groups often have heterogeneous time preferences, leading to tension in important collective decision-making.[2] The existence of preference heterogeneity within most groups is evident – for example, women and men have different life expectancies, and some partnerships have age gaps, which means that partners have different horizons. Similarly, other decision-making groups, such as committees in firms, exhibit substantial differences in gender, age, and cognitive ability. All these factors have been shown to be determinants of time preferences (Dohmen et al., 2010; Bortolotti et al., 2021; Frederick, 2005; Andreoni et al., 2019), which suggests that such groups would have within-group differences in discount rates.

[1] A few seminal examples from the empirical literature, which mostly use structural models to estimate the level and shape of discounting, are Hausman (1979), Lawrance (1991), Warner and Pleeter (2001), Laibson et al. (2007), Harrison et al. (2002), Andersen et al. (2008), Andreoni and Sprenger (2012a), and Andreoni and Sprenger (2012b). For a comprehensive review of the literature, see Ericson and Laibson (2019) and Frederick et al. (2002).

[2] Even in the context of individual choice, one can consider the existence of multiple selves with distinct personalities rather than a single homogeneous decision-making unit. Thaler and Shefrin (1981) contrast the longsighted "planner" within us to the shortsighted "doer," while Metcalfe and Mischel (1999) contrast our "hot" and "cool" systems. More recent work also models multiple selves with competing sets of interests, such as Fudenberg and Levine (2006, 2011), Brocas and Carrillo (2008a,b), and Noor and Takeoka (2022). Such evidence supports the application of collective-choice models to characterize the behavior of individuals.

This paper goes beyond the assumption that groups act as a single representative agent and asks: are randomly formed groups biased towards the present, and how do their constituent members' time preferences determine their group time preferences?

To answer this question, we conducted a field experiment with 425 female community health workers in Pakistan to measure the time preferences of individuals and groups through an effort-allocation task over three weeks. We asked the health workers to allocate effort, conducting a chosen number of household visits for data collection on family planning (a typical part of their job). They made the allocation either individually or in a group (a pair). We randomised group formation and the order of individual or group allocations.

On the first day of the experiment (t=0), each individual (and similarly random group) made the following decisions: allocation of effort for precisely one week (t=1) and two weeks (t=2) later. These advanced decisions were made before the time the task had to be performed. Each decision was made for 15 different task rates: R ∈ {0.4, 0.5 1.7, 1.8}. A task rate of 1:0.8, for example, would mean that every task the participant allocated to the present reduced the number of tasks allocated to the future by 0.8. One week later (t=1), we asked the health workers to make the same choice again – allocate effort to t=1 (now the very same day) and t=2 (one week later) before they attempted the task for that day. These immediate decisions were taken on the same day as the first day of task performance. Hence, we elicited these effort-allocation decisions from every individual and group. We probabilistically chose one of the 30 decisions made by each health worker to be implemented in the field based on a rule. We informed the health workers of this design element, incentivising truthful allocations.

Theoretically, time inconsistency in groups can arise simply from aggregating heterogeneous preferences even when individuals alone are time-consistent. This inconsistency may occur because of variations in individual discount rates and innovations in the Pareto weight summarising the collective decision-making process (Marglin, 1963; Feldstein, 1964; Jackson and Yariv, 2015; Gollier and Zeckhauser, 2005). Further, for a uniform distribution of discount rates in an otherwise homogeneous population, maximising group utility in a nondictatorial way generates aggregate behaviour that corresponds to hyperbolic discounting (Jackson and Yariv, 2015). As a result, all else equal, it is optimal to favour impatient group members in early periods and patient members in later periods.

We analyse our data using reduced-form and structural estimation methods and document three main results.

First, using a two-limit Tobit regression, we find that individuals making immediate (same-day choices) allocate around 9% fewer tasks to the earlier task day than those making the same decision a week before the first task day. The corresponding figure for groups is 13%. These reduced-form results suggest that the degree of time inconsistency is lower for individuals than groups.

Second, we estimate a structural model in which we assumed quasi-hyperbolic discounting and a power cost of effort function. Our structural estimate is close to our reduced-form result, which shows that the theoretical model under consideration is a good fit for the experimental data and corroborates the finding that groups are time-inconsistent. Further, we compare decisions by individuals and groups. While the estimate for the present bias parameter shows the existence of present bias in effort choice for both individuals and groups, the present bias estimate is lower for individuals compared to groups. This contradicts previous work that used monetary methods to elicit time preferences and had non-random groups.

Third, to understand the connection between individual and group time preferences, we regress the group-decision estimated time preference parameter (βG) on the parameters and characteristics of the individuals in the group. Unlike previous work, we can connect individuals to groups by collecting data at both levels. We show that, as theorised, the heterogeneity in the weekly-discount-factor of individuals affects group present bias. We find that group present bias is mostly driven by the individual with greater present bias and that variance in the group members' discount rates and bargaining power explains group present bias.

Our results are important because we present both nonparametric and parametric characterisations of individual and collective intertemporal choice for the same set of participants under experimentally controlled environments based upon intertemporal allocations of effort.[3] We begin with an approach free of functional form using experimentally induced exogenous variation, then move to the theory-based parametric analysis of time inconsistency on the individual and group levels. By adopting this approach, our subsequent parametric estimates thus result from restrictive parametric assumptions rather than from a failure of the underlying theoretical framework, which is free of functional form and related to an assessment of the degree of differences between these two kinds of decision environments. In the structural part of our empirical analysis, the preference structure associated with the discounted-utility approach is applied

[3] This occurs in the consumption-choice rather than monetary-choice domain. The monetary methods typically confront several confounding factors in identifying and estimating the shape of time preferences, which we will explain later in this section.

(without modification) to model group behaviour. This is in line with the representative-agent modelling structure mostly used in macroeconomics. This unitary approach assumes the collective acts as a single decision-making unit and, therefore, can be treated as a rational individual.

While a few important papers have empirically tested group-level intertemporal choice (Schaner, 2015; Glätzle-Rützler et al., 2021; Mazzocco, 2007), these papers use monetary-choice methods for measurement, study endogenously formed groups such as spouses (and thus have no exogenous variation in intertemporal preferences at the group level), or elicit intertemporal preferences at the individual or group level but not both.

Our contribution to this literature is threefold. First, we explore intertemporal choice with a better measurement: we measure time inconsistency based on the intertemporal allocation of effort (negative consumption), which is a better method of eliciting time preference (Sprenger, 2015; Cohen et al., 2020; Augenblick et al., 2015). Second, we study exogenously formed groups because endogenously formed groups, such as couples, may self-select on time preference, risk preference, income level, and other personality traits. Further, as researchers usually collect data long after couples form, learning effects over time may have caused the individuals' preferences to become more aligned. If couples match on an assortative basis, there may also be no real differences in time preferences: the data may only show differences because of measurement errors correlated with cognitive ability and financial literacy (Schaner, 2015). Third, we do not just measure time preferences for individuals or groups but both individuals and groups, which allows us to understand how individual behaviour drives group behaviour.

Finally, we use consumption-based measures of intertemporal choice because the assumptions necessary for using time-dated monetary payments to measure intertemporal choice are rarely satisfied (Sprenger, 2015; Cohen et al., 2020). For example, in violation of usual assumptions, participants may think of external financial decisions (that is, arbitrage opportunities outside the experiment) (Cubitt and Read, 2007; Chabris et al., 2008), they may think of their external consumption choices, or they might not trust the research team enough to neglect future transaction costs and assume payment reliability.[4] Andreoni and Sprenger (2012a), Giné et al. (2018), and Andersen et al. (2008) document that when closely controlling for transaction costs and payment reliability, dynamic inconsistency in choices over monetary payments is virtually eliminated in the

[4] The main idea was originally raised by Thaler (1981), who, when considering the possibility of using incentivised monetary payments in intertemporal choice experiments, noted, "Real money experiments would be interesting but seem to present enormous tactical problems. (Would subjects believe they would get paid in five years?)."

aggregate. All these challenges can create spurious dynamic inconsistencies, as suggested by the fact that this literature has elicited an extremely wide variety of discount rates, ranging from less than 1% (Thaler, 1981) to more than 1,000% (Holcomb and Nelson, 1992).

Policy recommendations

Based on this research, we make the following recommendations to government departments in general, not just health departments:

- Understand the intertemporal behaviour of your employees. Measure employees' intertemporal choice parameters once a year in a data collection exercise. Use structural models to estimate every employee's present bias and discounting parameters.
- Ascertain your goal; for example, do you want the highest quality or the highest quantity of work? This allows you to create optimal contracts that deliver your precise goal.
- Use the intertemporal choice parameters to create individual contracts for each employee depending on the chosen goal. The contracts will provide individually tailored incentives.
- Measure outcomes holistically. You can only improve what you measure. By measuring outcomes incorrectly or only a few select outcomes, you will miss out on potential trade-offs.

Acknowledgements: We are grateful to Michael Callen, Asim Khwaja, Aprajit Mahajan, Charlie Sprenger, Henrik Orzen, Peter Duersch, and participants in seminars and conferences in Heidelberg, NEUDC, Pacific Conference in Development Economics (PacDev), Naples Workshop on Networks and Development, Advances in Field Experiments (AFE) for their feedback. We are grateful to the Center for Economic Research Pakistan (CERP), Sohaib Athar, Zara Salman, and Mehroz Alvi for excellent logistical support. We are indebted to Dr Turab Hussain and Muhammad Hussain for championing this project. Rao Hashim, Danish Raza, and Shanila Parveez provided excellent research assistance. We received Institutional Review Board approvals from Harvard and UC San Diego.

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