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Heterogeneity in response to incentives: Evidence from field data

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Citation for published version (APA):

Czibor, E. (2015). *Heterogeneity in response to incentives: Evidence from field data.*

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Chapter 1

Introduction

*“Underneath all, individuals,
I swear nothing is good to me now that ignores individuals...”*

Walt Whitman

This dissertation explores whether *observable* individual characteristics such as gender, level of education and occupation are good predictors of people’s response to competitive and cooperative incentive schemes. This inquiry is motivated by the belief that such characteristics can serve as proxies for the *unobservable* personality traits and attitudes that actually influence the reaction to incentives. The idea that there are systematic differences in behavior between individuals has been extensively researched. Several dimensions of heterogeneity have been identified, for instance gender (Croson and Gneezy, 2009), age (Harbaugh et al., 2002), field of study (Frank et al., 1993), racial identity (Burns, 2012), religion (Noussair et al., 2013), etc. These results, however, have primarily been obtained from laboratory experiments, and their relevance for field outcomes has been scantily researched (Bertrand, 2011). This dissertation adds to the existing literature by using field data to assess the relationship between certain observable personal characteristics and the response to incentives in natural or realistic settings.

To be more specific, the three core chapters of this dissertation aim to answer the following research questions: (1) Do male and female students respond differently to competitive grade

incentives? (2) Does the gender gap in risky and competitive choices hinder the success of women? (3) How do individual characteristics influence the decision to sort into team incentive schemes?

The first research question is addressed in Chapter 2. This chapter is based on the paper “Does relative grading help male students? Evidence from a field experiment in the classroom”, co-authored with Sander Onderstal, Randolph Sloof and Mirjam van Praag (IZA Discussion Paper, No. 8429). It is inspired by the growing literature on gender differences in response to competition (Croson and Gneezy, 2009; Niederle and Vesterlund, 2011). Following the seminal paper of Gneezy et al. (2003), several studies have replicated the finding that men react more positively to tournament-style incentives than women. However, much less attention has been devoted to the implications of this result for incentive provision in education. While there is some evidence that grade incentives can increase student learning (Grove and Wasserman, 2006), it is unclear what type of grading practices induce the highest performance, and whether the response is heterogeneous by student characteristics such as gender. The two most commonly used grading schemes, absolute (i.e. criterion-referenced) and relative (i.e. norm-referenced) grading differ in the level of competition they generate. Relative grading by design creates a rank-order tournament in the classroom, while absolute grading is analogous to a piece-rate scheme (Becker and Rosen, 1992; Landeras, 2009). There is no consensus about the grading scheme that should be preferred: in continental Europe, absolute grading prevails, while in the US grading on a curve is more popular, especially in higher education.

Chapter 2 of this dissertation reports results from a framed field experiment that provides a direct empirical comparison of the impact of absolute and relative grading on male and female students' preparation effort and exam performance. Students following a Bachelor course at a Dutch university are randomly assigned to one of the two treatment conditions that differ only in the grading scheme used to translate exam scores into exam grades. The data collected in the experiment include exam scores, different proxies for preparation effort as well as a rich set of individual characteristics such as demographic information, preferences, confidence and ability

measures. The results show no clear difference either in effort provision or exam performance under the two grading schemes. There is no evidence for heterogeneity in response by gender, ability or competitive preferences, either. These findings are likely explained by an overall lack of ambition and a general disinterest in obtaining high grades, a manifestation of the often criticized “just-pass” attitude of Dutch students. This explanation is supported by the analysis of those students who are conjectured to care most about the way their exam scores are mapped into grades, i.e. students close to the pass-fail threshold. While this subgroup is relatively small, so inferences should be made with caution, there is a strong indication for a gender gap in response to relative grading among such “marginal” students. The results reported in Chapter 2 thus relate to the discussion on tackling the problem of unmotivated students, a challenge that educators and policymakers are confronted with worldwide (OECD, 2015).

Chapter 3 of this dissertation is based on the paper “Women do not play their aces - The consequences of shying away”, co-authored with Jörg Claussen and Mirjam van Praag. It studies the second research question, namely the consequences of gender differences in entering tournaments. It is provoked by the massive and persistent underrepresentation of women at the top of organizational hierarchies worldwide (Catalyst Org., 2015). Anecdotal and survey evidence from competitive firms suggests that women’s more cautious approach to promotion contests contributes to their slower career advancement (Barsh and Yee, 2012; Institute for Leadership and Management, 2011; Sandberg, 2013). There is indeed robust scientific evidence showing that women are more averse towards risk and uncertainty than men (Charness and Gneezy, 2012; Eckel and Grossman, 2008) and that women tend not to enter tournaments they could win (Niederle and Vesterlund, 2007). However, these findings originate predominantly from laboratory experiments. Notable exceptions are the studies by Buser et al. (2014) and Zhang (2013) who show that laboratory measures of competitiveness can predict real life outcomes. Flory et al. (2014) demonstrate in a field experiment that competitive remuneration schemes deter female applicants.

Chapter 3 of this dissertation complements the above-listed studies by analyzing in a natural setting whether female players continue to take less risk and initiate less contests than men even after self-selecting into an uncertain and competitive environment. It is based on a large set of naturally occurring data from an online card-game community that contains information from over 4 million games, generated by more than fifteen thousand individual players. The data include players' choices regarding the level of risk and competition they prefer to bear in each round, and also their subsequent playing performance in the resulting tournaments. The data show that even though players sort into the community, this self-selection does not close the gender gap in choices related to risk taking and competition. Female players are still less likely than males to increase the stakes of the given round or to actively initiate games. We argue that female players' differential choices are to a large extent attributable to gender differences in risk and competitive preferences. As a result of their selection choices, women end up more often in the difficult opponent position, and even when they initiate and win games, their earnings are lower due to the smaller stakes. Consequently, women accumulate lower scores in the game than men do. This gender gap in scores is not a reflection of differences in card playing ability: controlling for the type of the game and their role, women are as good as men in winning games. In sum, this study demonstrates the negative consequence of "shying away": despite no gender differences in on-task performance, women end up lagging behind men as a result of their lower propensity to take risk and to initiate tournaments.

Chapter 4 of this dissertation is based on the paper "Risks, gains and autonomy: An experimental analysis of sorting into teams", co-authored with Martin Koudstaal and Laura Rosendahl Huber. It explores the third research question, namely the role of individual characteristics in the decision to participate in team incentive schemes. This chapter is motivated by the pervasiveness of team-based remuneration offered by firms (Lazear and Shaw, 2007). While the effectiveness of team incentive schemes has been extensively researched (e.g. Bandiera et al. (2013); Hamilton et al. (2003); van Dijk et al. (2001)), less attention has been devoted to the sorting decision into such schemes. The success of team incentives, however, crucially depends

on the characteristics of individuals who decide to select into companies offering team pay. While a handful of papers have looked into the participation decision of individuals, certain important aspects have not yet been addressed. First, a key feature of real-life team production is the possibility of synergies arising from complementarities between the teammates. Most empirical papers that analyze the selection into teams have thus far ignored this aspect and modeled teamwork as a simple revenue sharing contract, e.g. an equal split of the pooled total output of the members (Bäker and Mertins, 2013; Dohmen and Falk, 2011; Herbst et al., 2015), or added an arbitrary, pre-defined mark-up on top of the joint output (Cooper and Saral, 2013; Kuhn and Villeval, 2014). Furthermore, existing literature on sorting into teams has analyzed the issues of team production and team decision making separately. The study we discuss in Chapter 4 combines these two aspects of teamwork in a single framework and thus allows us to assess the impact of shared decision rights on the willingness to join teams. It therefore informs the discussion on the value of authority and control (Bartling et al., 2014; Owens et al., 2014).

Chapter 4 is based on a large-scale, incentivized online survey conducted among Dutch entrepreneurs, managers and employees. The survey elicits respondents' preferences for joining a team in two treatment conditions: in the Baseline treatment, the team option only entails joint production, while in the Joint Decision treatment it includes *both* joint production and a joint investment choice. In both treatments, team production is modeled to allow for synergies arising from complementarities between teammates. Results from the survey replicate several findings from related lab studies on sorting into team incentive schemes, such as the relevance of confidence and risk preferences. A novel finding presented in this chapter is the importance of education for individuals' participation decision in teams. Controlling for differences in task performance, confidence and risk preferences, higher education is associated with a greater willingness to pay for the team option. There is suggestive evidence that this heterogeneity is explained by differences in evaluating the team option: while participants with higher levels of education tend to primarily consider the potential gains from team pay, lower-educated respondents focus more on the risks associated with teams. As a consequence, lower educated

people miss out on the sizable efficiency gains that the team option entails. Participants are also found to be heterogeneous in their response to a potential compromise in decision making. In particular, entrepreneurs are shown to be averse to joint decision making when they predict that it moves them away from their individual optimal choice, while no such effect is observed for managers or employees, surprisingly.

Importantly, this dissertation does not try to suggest that the behavioral differences we demonstrate are necessarily *caused* by the observable individual characteristics we have analyzed. In case of self-employment, it is likely that the same underlying traits that make people self-select into entrepreneurship also explain their different choices in our survey. The finding that education affects team choices is consistent with the reasoning that schooling changes the way individuals evaluate situations involving strategic risk, but our setting does not rule out the alternative explanation that those who self-select into higher education are inherently different from others in this aspect. While differential sorting is not of concern in case of gender, it is still debated whether women's lower tolerance of risk and competition is due to nature or nurture (Buser, 2012; Gneezy et al., 2009). To sum up, we find it useful to study differences in response to incentives by observable characteristics not because we believe these factors drive people's choices but because they are correlated with the unobservable traits that do so. Consequently, by taking observable dimensions of heterogeneity between individuals into account we can improve our predictions of people's responses to incentives and thus design more efficient incentive schemes.