Note

Inequality and risk-taking behaviour

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A R T I C L E   I N F O

A B S T R A C T

This paper investigates social influences on attitudes to risk and reanalyses how risk taking varies with relative position and inequality. Individuals with low initial wealth, about to participate in a tournament with richer opponents, may take fair gambles even though they are risk averse in both consumption and tournament rewards. It is shown that this risk taking decreases in the inequality of initial endowments, but in contrast it increases in the inequality of tournament rewards.

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1. Introduction

There is a long tradition of treating risk attitudes as exogenous and fixed. However, there is now much empirical evidence that choices under uncertainty are subject both to systematic variation and to social influence. For example, recent research by Falk et al. (2015) finds that risk taking is higher in countries with higher inequality. Further, there is substantial evidence that risk taking is influenced by relative position, with those who are behind others in tournament situations willing to take on more risk, both in sports (Genakos and Pagliero, 2012) and in finance (Brown et al., 1996; Dijk et al., 2014).[2]

Theoretical explanations of social influence on risk attitude are scarce but include Robson (1992, 1996), Becker et al. (2005), Ray and Robson (2012). However, one of the central predictions of the existing literature is that risk taking is increasing in wealth equality. This is both counter-intuitive and lacks empirical support. Existing models also suggest that the highest level of risk taking should be by those in middle of the wealth distribution. Again this runs against the evidence noted above for risk taking by those at the back of the field.

This paper tries to reconcile theory with the evidence by analysing the role of reward inequality in a tournament setting. A large population starts with different levels of wealth and compete for multiple, ranked rewards. These can be interpreted as representing different levels of status or different matching outcomes. In this strategic situation, an individual's indirect utility function can be convex in initial wealth and thus for standard theoretical reasons he will be willing to take fair

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gambles before the tournament. Importantly, these implied risk attitudes are not fixed but rather vary with the degree of competition, which itself is determined by two different forms of inequality – inequality in initial endowments and inequality in the tournament rewards. For example, the gap between the best and worst rewards could be small or large. This is the first study to study systematically the effect of reward inequality on risk taking.

Specifically, I show that under a simple symmetry condition the lowest ranked in society will be risk loving. Thus, it can explain why those who are behind others would be willing to take on more risk. Further, under appropriate regularity assumptions on the utility function related to the concept of prudence, I find that risk-taking behaviour is increasing in inequality of final *rewards*, even though it is decreasing in the inequality of initial wealth.

Finally, I consider the maximum level of sustainable wealth equality. Robson (1992) introduces the concept of a stable distribution of wealth, a distribution such that there is no incentive to gamble. Concentrating on the most equal stable distribution, I show that it depends on the distribution of rewards, with more equal distributions of rewards supporting a more equal distribution of wealth. Thus, in contrast to earlier findings by Becker et al. (2005) and Ray and Robson (2012), the most equal stable distribution of wealth can be arbitrarily equal, if rewards are sufficiently equally distributed.

The basic intuition for risk taking is that an individual who has an endowment that is low relative to his rivals can expect only a low reward from participating in the tournament, even if his initial wealth is high in absolute terms. Thus, the marginal value of doing better in the tournament can be arbitrarily high – the individual is "desperate". Consequently, the individual's indirect utility will be convex in present wealth, giving an incentive to gamble. More generally, either an increase in inequality of rewards or a decrease in inequality of endowments will increase the competitiveness of the tournament and increase the incentive to gamble.

This model can provide a theoretical mechanism which would support the apparent positive empirical relationship between inequality and risk-taking behaviour, but the causation flows in a different way than is normally assumed. High reward inequality induces greater risk-taking behaviour which increases the minimum level of wealth inequality that is compatible with stability. Thus, wealth inequality and risk taking are jointly caused by another factor – reward inequality. It remains true that, as with the previous literature, greater wealth inequality, considered in itself, reduces risk taking. Nonetheless, the overall relationship between risk taking and inequality of wealth can be positive if differences in reward inequality across societies are greater than cross-country differences in initial wealth inequality.

This paper is certainly not the first to consider the relationship between risk taking and relative concerns. However, while there a wider literature on status and relative concerns, the number of works considering the effect on risk taking is quite small, including Robson (1992, 1996), Harbaugh and Kornienko (2000), Cole et al. (2001), Becker et al. (2005), Ray and Robson (2012). This paper differs from this existing literature in two main ways. First, as noted above, existing models suggest that risk taking should be increasing in equality, a result that seems to run counter to intuition and to evidence. In particular, a recent and comprehensive cross-country study of risk attitudes is found in Falk et al. (2015) who examine data on 80,000 subjects from 76 countries surveyed using a common methodology. Risk taking was elicited both by a mixture of quantitative questions, a series of five binary choices between a fixed lottery and varying sure payments, and a self-assessment question. They find that such risk taking is higher in more unequal countries. Second, previous theoretical work considers only inequality in wealth but not inequality in rewards.

Fang and Noe (2016) also consider how tournaments affect risk taking but in a somewhat different framework. Hopkins and Kornienko (2010) introduces the distinction between endowment and reward inequality but, as with the vast majority of work on relative concerns, do not consider risk taking. The previous study closest to the current work is Robson (1996). He considers a model where men care about relative wealth because of the possibility of polygyny: high relative wealth means that a man can attract multiple partners. This gives men an incentive to gamble. In current terminology, men face greater reward inequality than women. But the general relationship between reward inequality and risk taking is not explored.

2. A status tournament

The base model is similar to that found in Frank (1985), Hopkins and Kornienko (2004) and Becker et al. (2005), but here is modified to allow for reward inequality to vary. A large population of agents compete in a tournament with a range of ranked rewards that could represent either different levels of status or of marriage opportunities. Agents make a strategic decision over how to allocate their endowment between performance in the tournament and private consumption. As BMW first discovered, this situation can lead to individuals being willing to take fair gambles if they are offered before the tournament. This is because the utility function implied by equilibrium behaviour in the tournament can be convex in initial endowments, even though an individual has preferences that are concave in both consumption and rewards. The model is solved backwards. This section analyses the tournament stage of the game. The next section looks at the implied incentives to take gambles prior to the tournament.

I assume a continuum of agents. The game begins with each being allocated a different endowment of wealth z with endowments being allocated according to the publicly known distribution $G(z)$ on $[\underline{z}, \bar{z}]$ with $\underline{z} > 0$. The distribution $G(z)$ is twice differentiable with strictly positive density $g(z)$.

Next, and before the tournament, individuals may have an incentive to gamble with their wealth. It is assumed that a range of fair gambles are offered each in the form of a continuous density over a bounded interval. As Ray and Robson (2012) suggest, these gambles could be lotteries in the common meaning of the term or, more generally, entry into risky occupations or making risky investments.