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Assortative matching and risk sharing ☆

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Abstract

This paper explores the sorting patterns in a two-sided matching market where agents facing different risks match to share them. When preference belongs to the class of harmonic absolute risk aversion (HARA), the risk premium is perfectly transferable within each partnership; thus a stable match minimizes the social cost of risk. In the systematic risk model, where agents are ranked by their holdings of a common risky asset, the convexity of the joint risk premium in joint risk size leads to negative assortative matching (NAM). In the idiosyncratic risk model, where agents are ranked by their independent riskiness in the sense of second-order stochastic dominance (SSD), NAM arises when preference exhibits decreasing absolute risk aversion (DARA) in the sense of Ross and riskier background risk leads to more risk-averse behavior. However, NAM may fail to arise when riskier background risk leads to more risk-tolerant behavior.

JEL classification: C78; D31; D81; J12

Keywords: Matching; Risk sharing; Transferable utility

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1. Introduction

When insurance and financial markets are incomplete, individuals often form partnerships to diversify their risks. For instance, families – mainly in developing countries – often arrange for long-distance marriages for the purpose of sharing production shocks, manufacturing employers often cushion temporary shocks on profit by sharing with their workers, and different parties in related businesses sometimes develop joint ventures to share resources and revenues for mutual benefit (Rosenzweig and Stark, 1989; Townsend, 1994; Fafchamps and Lund, 2003; Bigsten et al., 2003). When risk sharing is a primary concern in forming partnerships, it is legitimate to ask how the agents should match to insure against risks. Do the evidences in the marriage market or the financial market reflect the mitigation of an incomplete insurance market, or are they boosted by other concerns at the cost of efficiency in risk sharing?

In this paper, we examine the sorting patterns in a two-sided matching market where agents facing different risks match to share them. It is known that when agents have different degrees of risk aversion, negative assortative matching (NAM) arises because risk bearings are generally substitutes: a very risk-averse female is a demanding buyer for insurance and a very risk-tolerant male is a ready seller for it (Chiappori and Reny, 2006; Schulhofer-Wohl, 2006; Legros and Newman, 2007). Rather than employing different degrees of risk aversion, our paper focuses on different risks that each agent faces. Since the Pareto frontier in a given match does not have constant slope, standard type-complementarity conditions (Becker, 1973) cannot be used in general. However, with respect to risk-sharing problems, it is known that when preference belongs to the class of harmonic absolute risk aversion (HARA), the Pareto frontier in the monetary-equivalent space is a straight line, or, in other words, the total surplus summarized by the certainty equivalent is independent of how risk sharing is performed. In this case, the matching game permits a transferable expected utility representation and the type-complementarity condition translates into minimizing social risk premium.

We then consider two applications: one where risks are perfectly correlated and one where risks are independent. In the systematic risk model, agents are ranked by their percentages of ownership of a common risky asset. Because joint risk premium is a convex function of the joint size of the common risk, it is extremely costly to pair two highly risky agents together. Hence, negative sorting is socially preferable and stable. One may wonder to what extent the result of negative sorting depends on the HARA assumption. As a robustness check, we show that, with general utility functions, NAM still arises if the supports of all risks are not too large compared with agents' risk-free incomes and/or if risk tolerance is sufficiently linear.

In the idiosyncratic risk model, agents are ranked by their independent riskiness in the sense of second-order stochastic dominance (SSD). NAM arises if the preference exhibits decreasing absolute risk aversion (DARA) and if riskier background risk leads to more risk-averse behavior, but may fail to arise when riskier background risk leads to more risk-tolerant behavior. There are four key points to note here. First, the conditions for NAM have clear economic implications and are supported by empirical evidence. Guiso et al. (1996) concluded from Italian survey data that a consumer's perception of a riskier distribution of uninsurable human-capital wealth is negatively related to the proportion of risky assets held in his/her investment portfolio. Second, the seemingly strong conditions for NAM to arise come from the fact that we are looking for the equilibrium sorting patterns for *any* SSD-ordered risks. For a special case of the SSD order where risks are ranked in the sense of SSD by taking the form of adding independent noise, we only need HARA and DARA to guarantee NAM. Third, when risks are large with respect to agents' risk-free incomes, an SSD deterioration in the background risk may lead to more risk-tolerant