

Risk Preferences in Households and Families

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Abstract

In many microeconomic applications and program evaluations, the household is the unit of observation. However, the economic characteristics on which individuals are selected into coresidence remain poorly understood. This paper investigates whether and how adults are selected into coresidence on a specific aspect of preferences—*viz.*, risk aversion. Drawing on new data from studies fielded on population-representative samples in rural Mexico, I find that coresident household members have similar willingness to take financial risk. This within-household similarity reflects resemblance within the broader extended family, but I demonstrate that it is also affected by preference-specific selection in the family’s living arrangements. My analysis explicitly relates the observed pattern of selection to existing models of informal intrafamily risk sharing. Specifically, I find that adult children who are less risk averse are more likely to be selected into coresidence with their parents than their more risk averse siblings. This may be because spatial separation between more risk averse family members is a more effective strategy for diversifying weather-related agricultural risk, since more risk averse individuals are able to make a broader range of credible commitments in informal self-enforcing risk sharing arrangements. These findings have important implications about economic welfare. The family resemblance in economic preferences which I report may be a source of within-family correlations in economic outcomes. Furthermore, the dynamics of risk-preference-specific selection into coresidence reflects the important sense in which living arrangements themselves can be understood as a form of economic exchange among family members.

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The household is the unit of analysis in many microeconomic applications and program evaluations. Households, however, are collectives of individuals, and there are challenges inherent to applying principles of individual decision making at the level of a collective.¹ Some of these challenges arise because the economic characteristics on which individuals are selected into coresidence remain poorly understood. Do coresident adults resemble each other with regard to their preferences? If so, to what extent is this a reflection of broader family resemblance, as opposed to the dynamics by which extended families organize their living arrangements? How does the nature of preference-specificity in living arrangements itself reflect informal economic transactions within the family? This paper focuses specifically on willingness to take financial risk, and provides answers to these questions using new data on this rarely observed characteristic in households and families in rural Mexico.

The analysis in this paper proceeds in two steps. First, I describe patterns of intrahousehold correlation in risk preferences; second, I move beyond the household to examine preference-specific patterns of change over time in the family's living arrangements.

In the first step, I find that adults in the same household tend to have similar risk preferences. To the extent that this similarity reflects the transmission of risk preferences within the family, it may indicate one source of within-family correlations in socioeconomic outcomes. For example, socioeconomic status has been observed to correlate between parents and children; some of this may be a reflection of the fact that individuals have similar preferences to their parents, and so take similar economic choices. Furthermore, if there is assortative matching on this characteristic in marriage markets, then transmission of risk aversion—and hence socioeconomic outcomes—may persist over generations.

However, *intra*household correlations do not necessarily reflect *intra*family correlations; the household is a selected subset of the extended family. The second set of analyses in this paper demonstrate that living arrangements are selective on risk preferences. In settings outside the family,

¹Pioneering efforts to model household behavior as an aggregation of individual decisions include Manser and Brown [1980], McElroy and Horney [1981], and Chiappori [1988; 1991]. Reviews of aspects of the burgeoning literature since then are in Haddad, Hoddinott, and Alderman [1997]. Theoretical extensions since then include Haller [2000] and Basu [2006].

the aggregation of individuals on the basis of complementarities in their economic characteristics is commonplace; firms sort people according to their productive capacities, while other types of clubs sort them according to their tastes.² Households may form analogously to these latter types of clubs, with family members sorted into coresidence in part on the basis of their tastes.

Families are unique in their ability to move resources and people between households in order to improve the welfare of their members even when incomplete markets occlude similar exchanges among strangers. This is likely to be especially true in developing countries, where institutions and markets are especially likely to fall short. However, there has been little empirical investigation of intrafamily transactions which involve adjustments in living arrangements in response to economic incentives. These transactions, however, may well represent important aspects of the welfare-enhancing role played by families in a context of institutional and market imperfection. Much of the empirical analysis in this paper is motivated by the implications of existing models about the ways that a family may respond to imperfections in the market for income insurance. The patterns which I report here highlight the potential value of extending these models to take explicit account of household formation and partition as part of a family-wide income insurance strategy.

The paper proceeds in five parts. The next section discusses in greater detail the distinction between households and families, and draws on the existing literature to discuss how risk preferences might come to be correlated within each of them. It discusses the potential welfare implications of these correlations. The subsequent section describes the two datasets used in the analysis. Section three provides some descriptive statistics about household composition and risk preferences in the study population. Section four outlines the empirical approach I employ to characterize the nature and extent of intrahousehold correlation, and to distinguish intrafamily correlations from preference-specific changes in living arrangements. Results are presented and discussed in section five.

²The classical exposition of the theory of clubs (Buchanan [1965]) makes no reference to tastes, and represents agents as homogeneous. However, most modern treatments of this theory explicitly model heterogeneity in individual characteristics, including preferences. These include Cole and Prescott [1997], Conley and Wooders [1997], and Ellickson, Gonal, Scotchmer, and Zame [1999; 2001]. The latter note that, depending on the characteristics under analysis, the theory of clubs could be interpreted to describe the formation of firms, schools, or many other groups. For the relevant type of club may be what Scotchmer [2005] calls “purchase clubs” or “rental clubs,” where the tastes of potential group members determine the potential surplus which could be gained from joint consumption, and therefore determine the nature and composition of the clubs.

1 Background

This paper explores evidence regarding whether and how adult family members are sorted into households on the basis of a typically unobserved characteristic—*viz.*, willingness to take financial risk. *A priori*, theory provides no clear prediction as to whether intrahousehold correlation in this characteristic ought to be expected to be positive, negative, or zero; this remains an empirical question, to which this paper is one of only a tiny handful to provide an answer. This section discusses two classes of mechanisms by which intrahousehold correlations in risk preferences might arise. The first relates to *family* formation, while the second relates specifically to *household* formation.

To solidify the distinction between a household and a family, define an extended family to consist first of an individual, his parents, and siblings; next, if the individual is married, include his spouse and in-laws into the extended family, and finally add any children of the couple or their siblings. Obviously by this definition, entire families rarely coreside in a *single* household; however, by this definition all the households observed in the data for this paper are *subsets* of extended families. There may be important non-market economic relationships among family members, even if they do not live together. Extended family members may be able to sustain transactions which would be unsustainable outside the family. These would include risk sharing arrangements, which are the focus of this discussion.

In light of these special economic ties, family members may have incentive to establish living arrangements which are selective on economic characteristics. This section will draw on existing literature to discuss how such selection might relate specifically to risk aversion. In this sense, living arrangements themselves may reflect economic transactions among family members; as with any other transaction, understanding them may provide important insights regarding welfare. This section will conclude with a brief discussion of some of these potential insights.

1.1 Risk Preferences and Family Formation

1.1.1 Potential Mechanisms

Extended families are formed through fertility and marriage. Either or both of these processes may result in correlations in risk preferences between new additions to the family and those whom they join. Willingness to take financial risk may be one of many characteristics which children inherit from their parents through genetics and upbringing. Dohman, Falk, Huffman, and Sunde [2006] report that in Germany, willingness to take financial risk is positively correlated between parents and their coresident and noncoresident children.³

The marriage market may also sort people according to risk preferences. Willingness to take financial risk has been observed to be correlated with other personal characteristics including health status and educational attainment (Eckel and others [2006]). Assortative matching on these characteristics may indirectly produce spousal correlations in risk preferences. Risk preferences themselves may also play a more direct role in spousal selection, because marriage allows for risk-sharing among spouses and their families and in-laws. Kotlikoff and Spivak [1981] describe the annuity role which marriages can play; potential spouses facing uncertainty about their longevity can share income in order to smooth their consumption over their lifetimes. Hess [2004] focuses on spouses' joint consumption and savings as a means of insuring against idiosyncratic fluctuations in labor income. Rosenzweig and Stark [1989] focus on weather-related agricultural risk; exogamy may be used by the family as a form of income insurance.

In all of these models, marriage binds the parties into risk sharing arrangements which would otherwise be unsustainable. In the absence of the marriage, parties would be less able to overcome the well-known barriers inherent to efficient insurance, including moral hazard and adverse selection. By binding them into a relationship of repeated interactions and providing the parties with a mechanism to monitor each other, the marriage lowers these barriers. In these models, potential

³However, they do not explicitly address the question of whether the risk preferences of children and parents are related to the likelihood that they coreside.

spouses and their families take account of the value of these arrangements in their decisions about the marriage. However, these studies do not explicitly examine how these decisions are affected by individuals' own risk aversion, and the risk aversion of their potential spouses. These characteristics would be among those determining the payoffs to a potential match. To the extent that they can be observed, spouses may select each other in part on the basis of this characteristic.

1.1.2 Potential Consequences

Understanding relationships between family formation and preferences may help to elucidate the dynamics of intergenerational transmission of economic well-being. If there is positive assortative matching in the marriage market with regard to risk preferences or if these characteristics tend to be transmitted intergenerationally, then within-family correlations in these characteristics may persist or even become increasingly pronounced over generations. Many economic outcomes correlate between parents and their children. These include not only asset holdings (Charles and Hurst [2003]) and earnings (Mazumder [2005]), but also educational attainment (Han and Mulligan [2001]; Black, Devereux, and Salvanes [2005]), occupational choice (Solon [1999]), birth weight (Currie and Moretti [2005]), and other behaviors including drug use and crime.⁴ Some of this correlation may be due to similarities in economically relevant preferences between parents and children, including risk attitudes.⁵ Therefore, uncovering whether such similarity exists is an important first step in characterizing this potential channel for the perpetuation of economic inequality.

1.2 Risk Preferences and Household Formation and Partition

Even if there is no correlation in risk preferences among members of an extended family, these characteristics may nonetheless be correlated within households. For example, if family members

⁴Much of this literature is reviewed in Bowles, Gintis, and Groves (eds.) [2005].

⁵Charles and Hurst [2003], using the Panel Study on Income Dynamics, report evidence that attitudes toward risk are correlated between generations in the United States. They find that this correlation does not account statistically for much of the observed similarity in the savings behavior of parents and children. However, as they note, the survey only elicited risk preferences for parents and children who were currently employed; if risk preferences as well as expectations and other unobserved characteristics are believed to be related to joint decisions about employment and savings, this finding is difficult to interpret.

were homophilous in their choices about living arrangements, then these characteristics would be observed to correlate positively among adults within a household, whether or not such a correlation prevailed in the broader extended family.

1.2.1 Potential Mechanisms

Why might extended family members' choices regarding living arrangements be related to risk preferences? A long literature, inspired in part by Townsend [1991; 1994] and Mace [1991], contains evidence that households in a variety of contexts—and especially in developing countries—are unable to fully share their idiosyncratic risk.⁶ This evidence demonstrates the importance of well-understood barriers to complete insurance, including imperfect information, imperfect monitoring, and imperfect commitment. In contexts where formal institutions do not allow individuals to fully insure themselves against income risk, extended family networks can complete the market. Family members are particularly likely to be altruistic toward each other, to have detailed information about each other, and to rely on each other for repeated interactions over time; therefore, it may be relatively easier for them to establish and sustain implicit or explicit arrangements for contingent resource transfers in order to share financial risk. Of course, individuals also share risk within networks of friends and neighbors by transferring resources and credit. But the family network affords them the additional margin of adjusting living arrangements.⁷

One mechanism which might influence the assignment of family members to households relates to the fact that intrafamily risk-sharing arrangements are not enforced by formal institutions. An emerging literature is focused on the role and limits of self-enforcing insurance arrangements. Generally in models of this type, a problem derives from the fact that if one party in an insurance network experiences a sufficiently large income realization, he may opt to renege on his *ex ante* implicit or

⁶The literature on this topic was reviewed in Paxson and Alderman [1992]. Further contributions since then include Udry [1994], Ravallion and Chaudhuri [1997], and Dercon and Krishnan [2003]. Hayashi, Altonji, and Kotlikoff [1996] provide evidence that even within an extended family, households are not fully insured against idiosyncratic fluctuations in their own income.

⁷Evidence that families in Indonesia actually used *ex post* adjustments in living arrangements to manage an income shock is reported by Frankenberg, Smith, and Thomas [2003]. The discussion here, however, is about families' *ex ante* adjustments in living arrangements in order to minimize income risk.

explicit agreement to share. Therefore, parties cannot credibly commit to an arrangement which would give sufficient incentive to renege at any time or in any state of the world. Recent theoretical contributions include Kocherlakota [1996], Fafchamps [1998], Ligon, Thomas, and Worrall [2002], and Ray and Genicot [2003]. Inspired by this literature, Foster and Rosenzweig [2001] present a similar model to incorporate characteristics specific to families. Their results provide theoretical and empirical evidence indicating that although problems associated with imperfect commitment are ameliorated within families, they are not eliminated.

In deciding to renege, an individual may take into account the welfare impact this action will have on the other parties in the insurance network, and the likelihood that others in the network would support him in the future if the situation were reversed. This illustrates why individual characteristics including risk preferences and altruism play critical roles in these models. Under most conditions, relatively more risk averse individuals would make more trustworthy partners in a risk sharing arrangement, since they would stand the most to lose from a deterioration in cooperation.⁸

In these models, it is assumed implicitly that factors which determine the family's living arrangements are unrelated to these individual characteristics. However, family members may be able to expand the set of implementable arrangements if they take each others' risk preferences into account when deciding their living arrangements. Income realizations are often spatially correlated. Agricultural production depends on local weather and soil conditions; more generally, markets may be segregated, so that wage and price fluctuations are localized. In that case, the family's living arrangements would determine its profile of *ex ante* risk exposure; family members living in the same community would be exposed to positively correlated income shocks. Therefore, family members in *different* communities would have the greatest insurance value to each other. (if they could credibly commit to sharing income after the realization of these shocks). This may produce incentives for family members to match profiles of risk exposure to profiles of risk preferences.

For example, consider the choice over living arrangements faced by parents and their adult children

⁸Fafchamps [1998] provides a counterexample in a case of near-subsistence poverty, where it is the relatively less risk averse who would make more trustworthy partners.

in agricultural households. These family members may have incentive to diversify their living arrangements spatially, thereby diversifying the income risks that they face. Furthermore, parents may have incentive to selectively induce their most risk averse children to establish households in communities different from their own, since they would be the ones who would make the more trustworthy partners in any explicit or implicit risk sharing arrangement. This would explain an empirical pattern which I report in this paper, that more risk averse children are more likely to depart their parents' households than their less risk averse siblings.

1.2.2 Potential Consequences

Understanding the role played by risk preferences in determining living arrangements is critical for two reasons. First, because it has methodological implications for the empirical analysis of household and family behavior, and second, because it can provide insights into the role and capacity of the family to improve individuals' welfare. The more general methodological implications arise from the fact that in many empirical analyses, the unit of observation is the household. If individuals' selection into households is itself a reflection of economic transactions within the broader extended family, then the interpretation of empirical results must take this into account.

More specifically in the context of this discussion, understanding the incentive to match risk exposure to risk preferences may shed light on welfare consequences of the constraints imposed by imperfect commitment. Consider the problem faced by individuals who are not very risk averse, and who are particularly likely to experience high income realizations—for example, because they may be in better health, or make better workers. These individuals would be *least* able to credibly commit to an informal risk sharing arrangement; therefore, in the absence of a commitment technology, they may be induced to forgo opportunities for labor-related migration which they would otherwise pursue, to the overall benefit of the family. In this paper, I report empirical evidence that this potential welfare-reducing consequence of imperfect commitment is observed among real families in rural Mexico.

2 Data

The data used in the analysis are taken from two sources—first, the Mexican Family Life Survey-Preferences Pilot (MxFLS-PP), and second, the broader survey of which it is an extension—the Mexican Family Life Survey (MxFLS). MxFLS is a large scale nationally representative longitudinal socioeconomic survey. The goal of MxFLS-PP was to assess the feasibility and effectiveness of approaches to eliciting attitudes and preferences. It was fielded in 2005, in parallel with the second wave of MxFLS.

By itself, neither dataset could be used to fully address the questions underlying this analysis—specifically, whether willingness to take financial risk is shared within households, and whether this usually unobserved characteristic is related to household formation and partition in a manner which is empirically and economically relevant. However, they complement each other such that when they are used together, they represent a unique and valuable resource. This section will describe the relevant aspects of both datasets.

2.1 Mexican Family Life Survey, Preferences Pilot

MxFLS-PP is the first study of its kind. It was designed to pilot approaches to eliciting attitudes and preferences, in order to determine whether and how this could be done cost-effectively within a large sample, population representative socioeconomic survey. It was conducted in 13 rural communities in the states of Michoacán and Guanajuato.

2.1.1 Survey Instruments

MxFLS-PP consisted of two instruments. First, respondents were asked to make decisions in five separate incentivized tasks with real money stakes; payoffs typically amounted to about the daily wage for a median worker in the sample. After the incentivized task instrument, a structured

interview was conducted by a trained survey enumerator. The interviews *always* followed the completion of the incentivized tasks.

Incentivized Tasks Most respondents completed the incentivized tasks in controlled small group sessions. Sessions were conducted in a central location within the community (usually the village schoolhouse). Each session was led by one of three trained Ph.D. students, and consisted of 6-18 participants. On average, sessions lasted about 90 minutes. At the beginning of each task, the session leader carefully explained the decision being taken, and took participants through an example. Instructions and examples were tightly controlled so that they were identical across sessions.

Each of the five tasks was designed to elicit indicators of a different domain of preferences. In addition to willingness to take financial risk, these also included willingness to share income with strangers and family, willingness forgo money in the present in favor of more money in the future, attitudes regarding fairness, and attitudes regarding trust and trustworthiness. The tasks were completed in the same order at every session, with the risk task coming first. After all five tasks had been completed, each participant was paid in a private setting for one of his or her decisions. The decision for which a participant was paid was determined by a random draw executed by the participant himself or herself. In addition to the payment associated with their decisions, all respondents received a show up fee of 50 pesos (about a third of the median daily wage among workers in the sample).

Some respondents (less than 10 percent of the sample) were deemed incapable of participating in the group sessions. Some of these were individuals who had low levels of literacy or numeracy and therefore needed individualized attention. Others had health conditions or time commitments which precluded their attendance at any of the group sessions. Many of this latter type of respondents were men employed in nearby towns who would be away from the village for up to 18 hours each day. Rather than eliminating these respondents from the sample, we recruited each to participate through an individualized session with one of the three trained task leaders. The instructions and

examples, the order of the tasks, and the procedure for payments in these sessions were identical to those used in the group sessions. In order to determine the validity of this approach in eliciting preferences, we conducted *only* individualized sessions in two communities. Responses did not differ between participants in individualized sessions and those of similar age and sex who participated in group sessions (Eckel and others [2006]).

Structured Interviews After completing the incentivized tasks, participants completed a structured interview. The interview lasted about 20-40 minutes, and included modules aimed at eliciting respondents' expectations of their economic environment and their own near and medium term future, a brief summary of their household's consumption patterns over the previous month, and their feelings and impressions regarding the task sessions. Other modules included questions aimed at eliciting the same preferences as were elicited in the tasks. Many of these involved hypothetical decisions similar to those which had been taken with real money stakes in the task sessions.

2.1.2 Eliciting Willingness to Take Financial Risk

Of the five types of preferences elicited in the survey, this paper focuses on willingness to take financial risk.⁹ Therefore, only the task and interview questions which deal with financial risk are described in detail here.¹⁰

Incentivized Tasks The task was modeled on an instrument first employed by Binswanger [1981], and is very similar to one employed by Barr [2003]. This specific instrument was designed by Eckel and Grossman. Participants were presented with six bisected circles, as shown in figure 1a. Their task was to choose one of these six circles. Payment for the task would be based on a coin flip; with 50% probability, a participant would be paid the amount written in the left half of the circle he or she had chosen (otherwise, he or she would be paid for the amount written in the right half).

⁹In other ongoing work I examine within-household and within-family patterns in willingness to share income with strangers and family (altruism), and willingness to forgo money in the present for more money in the future (financial patience).

¹⁰For more detail on the study and the other tasks, see Eckel and others [2006], and Hamoudi and Thomas [2006].

One circle represents a zero-risk option, with the same number (180 Mexican pesos, or about US\$18)¹¹ written in both halves. Moving clockwise from there, gambles grow increasingly risky, with the expected value and variance increasing linearly until the penultimate circle. The ultimate circle provides the same expected payoff as the penultimate, but with higher variance; just under 7% of respondents chose this gamble, even though they could have had the same expected payoff at lower risk. The expected payoff in the two highest risk/highest expected reward choices was 260 pesos, which represents about 1.5 times the daily wage for a median worker in these communities.

Post-task Interview The post-task interview included two measures of respondents' willingness to take financial risk. These measures were taken well after the completion of the incentivized tasks—and in many cases, not on the same day as the incentivized tasks. They also differed from the task measure in that respondents did not stand to be paid for their choice.

One of these measures, represented in figure 1b, was very similar to the task, except with much broader variation in expected payoffs and variances. The second, represented in figure 1c, spread the task over a series of binary choices between a sure amount and a series of increasingly risky gambles with decreasing expected payoffs. Respondents' certainty equivalent associated with each successive gamble ought to be declining; once it has declined below the sure amount on offer, the respondent will take the sure amount over the gamble, and that section of the interview will terminate. The most risk averse respondents, therefore, would be those who decline the gamble earliest in the sequence.

One further property notable in the sequence of questions represented in figure 1c is the fact that in the first choice, the *lower* payoff in the gamble is equal to the sure amount, and the higher payoff considerably more. Even in that choice, nearly a quarter of respondents chose the sure amount and declined to change their minds even after they were reminded that the probability-based opportunity assured them at least as much as the sure amount, with a chance at more. This response may indicate that these individuals are hyper-risk averse, or gamble averse, since they

¹¹Note that in Mexico, the symbol “\$” is used to represent pesos, as it is used to represent dollars in the United States. Therefore, in figure 1a, the “\$” symbol is used to indicate pesos, as it is used in respondents' daily lives.

would have declined a probability-based payoff opportunity, even when it was *costly* to do so. More generally, they may differ in unobserved ways from those who indicated they were *willing* to take on risk, but who chose safer gambles when they did. The phrase “gamble averse” will be used to describe these respondents henceforth.

How useful are hypothetical questions as a means to elicit respondents’ attitudes and preferences which affect their willingness to take on financial risk in other contexts? In the absence of real money stakes, respondents would face no costs to systematically misrepresenting themselves, and they may have less incentive to expend the sort of cognitive effort they take when they make decisions in their daily lives. Either of these is a source of concern. The former would represent the greater challenge, because it implies that indicators elicited by hypothetical questions would be biased. By contrast, the latter problem implies merely that hypothetical questions elicit noisy indicators. Noise is an easier problem to overcome than bias—for example, by collecting information from a larger number of respondents, or collecting more independent indicators for each respondent.

Preferences like altruism, trust, and trustworthiness carry normative value—for preferences like these, respondents face clear incentives to misrepresent themselves; hypothetical questions would likely elicit indicators which are biased. For example, it is likely that some respondents would answer falsely to the question, “if you experienced a large cash windfall, how much would you give to charity?” It is unclear the extent to which willingness to take on financial risk is similar in this respect. There may be normative expectations associated with it—for example, in some cultural contexts men may wish to appear bolder than they truly are. In the extreme case, the indicators elicited by hypothetical questions would reflect an entirely different construct from those elicited by incentivized tasks. Specifically, hypothetical questions would elicit respondents’ beliefs about these normative expectations (e.g., “how much financial risk *ought* you to be willing to take on?”) whereas incentivized tasks would elicit respondents’ actual preferences. The next section will report empirical evidence that these indicators reflect the same underlying construct.

2.1.3 Sample

Target participants in the study were all MxFLS respondents aged 15-70 who resided in these communities—in total, about 1500 people. The analysis in this paper is restricted to persons aged 20 years or older, since adults of these ages arguably have more choice regarding their living arrangements; these comprise 1097 respondents, of whom 1061 were successfully recruited to participate (the other 36 refused to participate). The sample is representative of the adult population of these communities, and spans the diversity of socioeconomic status and life experiences.

I matched each of these 1061 respondents pairwise with each individual aged 20-70 who resided in the household contemporaneously (in 2005), or during the first wave of MxFLS (in 2002), or both. This produces a total of 2401 adult pairs; such a pair represents the unit of observation for much of the empirical analysis.

2.2 Mexican Family Life Survey

The other source of data for this study is the Mexican Family Life Survey. MxFLS includes detailed information on residents of 8200 households and their extended families (Rubalcava and Teruel [2004]). It is representative at the national level.

The first wave of the study was conducted in 2002, and the second wave in 2005.¹² All adult residents of target households in 2002 were target respondents; the questionnaire was to be administered to each of them. Each of these individuals was also a target respondent for the 2005 questionnaire, even if he or she had moved; respondents who had moved anywhere in Mexico *or the United States* were tracked and reinterviewed. Therefore, this survey provides detailed information on family members, including those who do not coreside.

A set of questions designed to elicit attitudes toward risk was introduced into the 2005 questionnaire. The questions are represented in figure 1d. In each question, the respondent is presented with a

¹²A third wave is being planned for 2008.

pair of hypothetical gambles, and asked which he or she would prefer.¹³ There was no real money at stake in their choices. The first question distinguishes respondents fairly coarsely; it leads into an unfolding tree of increasingly fine tradeoffs. The most risk averse respondents will end at the terminal point represented in the lower left corner of figure 1d (labeled category 1). The least risk averse will end at the terminal point represented at the lower right (labeled category 5). Note that one terminal point—the one labeled category 6—should never be reached, because choosing it means forgoing a weakly dominant option. Nonetheless, a handful of respondents (less than 5%) did reach this terminal point. These respondents may have been confused by the questions, or they may have misreported their choice, or they may be risk *seeking*. In the empirical analysis, these individuals are always categorized separately from the rest.

As with the MxFLS-PP data, the empirical analysis which uses the MxFLS data is restricted to persons aged 20 or older in 2005, and to respondents in rural areas. The restriction on age is based on the fact that these individuals arguably have more choice regarding their living arrangements, and the restriction to rural respondents is based on the fact that much of the foregoing discussion on spatial diversification as a mechanism for risk diversification is likely to be especially relevant in rural areas.

There are three key complementarities between these datasets which are identified in the foregoing discussion. First, MxFLS-PP provides indicators of financial risk aversion using both real-stakes and hypothetical instruments on the same respondents. This allows the hypothetical questions to be validated as instruments for eliciting risk preferences. By contrast, MxFLS elicits these preferences only through hypothetical questions. Second, MxFLS provides information about family members whether or not they live together, whereas MxFLS-PP provides information only on coresidents. Third, MxFLS provides a broader range of information on a larger number of respondents.

¹³Specifically, the respondent was shown an illustration of two bags. In each bag were two chips, and the respondent was told to imagine that he or she could reach blindly into one of the bags and draw a chip. He or she would be paid the amount written on the chip. The respondent was then asked into which of the two bags he would opt to reach.

3 Descriptive Statistics

This section will outline some basic descriptive statistics to motivate the subsequent analysis. It will use evidence from the 13 MxFLS-PP communities to illustrate that household composition is fluid over time, and that there is substantial heterogeneity in the structure of households. It will illustrate that there is substantial heterogeneity among respondents in terms of the risk preferences elicited by each of the four instruments described in the previous section. Finally, it will provide some evidence that the three indicators elicited in MxFLS-PP reflect the same underlying construct.

3.1 Household composition

Not all of the adult pairs in the MxFLS-PP sample were coresident. Call the two individuals in a pair i and j , where i is the respondent. It necessarily follows from the fact that i participated in the study that he or she lived in the community in 2005; however, he or she did not necessarily live there in 2002. Therefore, depending on when j joined or departed the household, the pair may have been coresident in 2002, in 2005, at both times, or never. Table 1 breaks out the pairs on the basis of when each party resided in the household. Household membership is fluid; of those who had been coresident in 2002, only about four fifths were still coresident as of 2005. Similarly, of those coresident in 2005, about a fifth had not been coresident in 2002.

In one module of the post-task questionnaire, individuals were asked to identify the nature of the familial relationship in each of these pairs. A tabulation of their responses is given in table 2. The first column includes all pairs, and the second column includes pairs coresident in the same household. A small number of people who moved out of their households remained in the same community; therefore, the third column includes pairs coresident in the same community, which are slightly more numerous than pairs coresident in the same household.¹⁴ The prevalence of extended family relationships among coresident pairs is notable. Only a third of coresident pairs of adults

¹⁴In the empirical analysis reported throughout the rest of the paper, “coresidence” refers to coresidence in the same community, and not necessarily the same household. Redefining “coresidence” to refer only to the household does not affect the results.

were spouses; most of the rest were parent-adult child pairs or adult sibling pairs. About one-tenth were more extended family pairs, including in-laws, uncle/aunt-niece/nephew pairs, and so on.

The distribution of households on the basis of the number of adult respondents is given in figure 2. About half of households had four or more adult respondents, and a quarter had five or more.

3.2 Elicited Indicators of Willingness to Take Financial Risk

The distribution of respondents' choices in the incentivized task is presented in figure 3a. About 16% of respondents chose the safe option, and about 22% chose either of the two highest risk options.

The distribution of choices in the hypothetical six-way choice from the interview¹⁵ is presented in figure 3b. The proportion who took the safest option in this question was substantially larger than it was in the task. This is likely because the available options in these two instruments are different. The expected payoffs of the available options in the task range from 180 pesos to 260 pesos, whereas in the survey question they range from 200 pesos to 350 pesos. The riskiness of the available options also differs; the standard deviation between the high payoff and low payoff ranges from 0 to 396 pesos in the incentivized tasks, and 0 to 919 pesos in the survey questions.¹⁶

For the series of hypothetical binary choices, recall from figure 1c that the respondent is presented with the choice between a safe option and a series of increasingly risky gambles, until he or she takes the safe option. Therefore, the number of gambles which the respondent would be willing to take is an indicator of his or her willingness to take on financial risk. On the basis of this metric, figure 3c presents the distribution of risk preferences as elicited by this instrument. As discussed in

¹⁵That is, the question represented in figure 1b.

¹⁶One way to express these options in the form of a common metric so that they can be more directly compared would be to use the coefficient of variation of each gamble, which simply divides the standard deviation between the high payoff and low payoff by the expected payoff. That is, for each gamble indexed by i , denote the high payoff as π_i^h , the low payoff as π_i^l , and the average of the two as $\bar{\pi}_i$:

$$CV_i = \frac{\sqrt{(\pi_i^h - \bar{\pi}_i)^2 + (\pi_i^l - \bar{\pi}_i)^2}}{\bar{\pi}_i}$$

Then, for example, the coefficient of variation of the highest risk choice in the task is $\frac{396}{260} \approx 1.5$, whereas in the survey question the highest risk gamble is considerably riskier, with a coefficient of variation of $\frac{919}{350} \approx 2.6$.

the previous section, about a quarter of respondents were “gamble averse”—they would have opted to forgo a probability based payoff, even when it was costly to do so. These are represented in the leftmost bar of the histogram.

Finally, figure 3d represents the distribution of responses to the MxFLS instrument. As noted in the previous section, a small number of respondents ended at the terminal point labeled category 6 in figure 1d, even though doing so involved choosing a weakly dominated option.

Do These Indicators Reflect the Same Underlying Construct?

A priori, it may not be obvious that these responses should necessarily reflect respondents’ risk preferences. For example, in the task sessions great care was taken to ensure that every respondent understood the task before making his or her choice. However, if they nonetheless found the instructions confusing, then the validity of the measure may be compromised.¹⁷ Similarly, as discussed in the previous section, hypothetical questions may reflect individuals’ beliefs about the risks they *ought* to be willing to take, rather than those which they would in fact take if real money were at stake.

A formal assessment of the degree to which these measures correlate is presented in table 3, which regresses a respondent’s choice in the incentivized task against his or her responses to the hypothetical questions in the post task interview. Since the dependent variable in the regressions throughout this paper is categorical, an ordered logit specification is used; the reported coefficients are odds ratios.¹⁸ The results indicate that the odds of taking higher risk gambles in the task among those

¹⁷Most likely, this would generate noise, since confused respondents would essentially choose at random from among the gambles on the page. However, if one gamble is especially salient (for example, the zero-risk gamble, which is unique in that it contains the same number written twice, or the highest risk gamble, which is unique in that there is a negative sign), then confused respondents might be especially likely to choose it. Then, associations between choice of that gamble and any outcome—including household structure—may reflect associations with characteristics like numeracy, and not risk preferences.

¹⁸The odds ratio represents the odds of taking higher risk in the incentivized task relative to lower risk, conditional on the choice taken in the survey. Specifically, number the gambles in the task 1 through 6, with 1 being the zero-risk (180/180) choice, and 6 being the highest risk (540/-20) choice. Then, denote the probability that a respondent chose gamble j or higher in the task, conditional on making choice x in the hypothetical question, as $p_{j,x}$. The reported odds ratio associated with x is $OR_x = \left(\frac{p_{j,x}}{1-p_{j,x}} \right) \left(\frac{1-p_{j,o}}{p_{j,o}} \right)$, where o represents the omitted category in the regression.

who took the highest risk gambles in the hypothetical six way choice were 30 percent greater than the odds among those who took moderate risks in the hypothetical choice. Similarly, the odds of taking higher risk gambles in the task were about 40 percent lower among those who took the lowest risk option in the hypothetical choice, relative to those who took moderate risk in the hypothetical choice. A similar pattern is observed when comparing respondents' responses in the series of hypothetical binary choices to their responses in the incentivized task. Overall, individuals who reported higher willingness to take risk in the hypothetical questions also took higher risk when real money was at stake. These results indicate that the three independent indicators of financial risk aversion which were elicited in MxFLS-PP—including one involving real money stakes—reflect the same underlying construct. Therefore, they validate the use of these specific hypothetical questions to elicit financial risk aversion.¹⁹

4 Empirical framework

This section will lay out my approach to using the real-stakes tasks and hypothetical questions from both MxFLS-PP and MxFLS to assess the questions of central interest—*viz.*, whether and how willingness to take financial risk is correlated within households, and whether this characteristic is related to household formation and partition in a manner which is empirically and economically relevant.

4.1 Household Level Data (MxFLS-PP)

Since MxFLS-PP provides information only on family members who live together, it is primarily useful for assessing the nature and extent of *intrahousehold* correlations in financial risk aversion.

If an individual's response to the hypothetical question provides no information about his behavior in the incentivized task, then it would be true that $p_{j,x} = p_{j,o}$ for all choices x , and therefore all the odds ratios would therefore be equal to 1. For a discussion of the interpretation of odds ratios in the ordered logit model, see Powers and Xie [2000].

¹⁹Dohmen and others [2005] also reported that answers to hypothetical questions about willingness to take financial risk reliably predicted actual risk taking behavior in a representative sample in Germany.

Assessing Intrahousehold Resemblance

Individuals in the same household have selected themselves into coresidence, either directly through a decision to move into the same living quarters (or not to move out), or indirectly through a decision to marry or have a child. Suppose that these selection dynamics were unrelated to risk attitudes. In that case, the risk attitudes of one person in the household should provide no information about the risk attitudes of any other person in the household. A regression of a respondent's choices against those of a coresident adult should produce the same coefficient as a regression between any two randomly chosen individuals in the sample—*viz.*, zero. If it does not, this indicates either that risk preferences are shared within families, or that living arrangements are selective on these preferences, or both.

Therefore, I match coresidents pairwise (as described in the data section, above). Then, I regress each individual's choice in the risk task against that of each of his coresidents. Denote one party in the pair j , and the other one i . Number each of the gambles in the task in ascending order from lowest to highest risk, and denote person j 's choice $U_j = \bar{u}$ if he or she took the \bar{u}^{th} riskiest choice. Furthermore, include a vector of j 's demographic characteristics as \mathbf{x}_j , and signify the fact that i and j coreside with the expression $c_{ij} = 1$. Then, I estimate the following:

$$p_{ji}^{\bar{u}} := \Pr \{U_j > \bar{u} \mid \mathbf{x}_i, \mathbf{x}_j, U_i, c_{ij} = 1\}$$

Suppose that coresidence is unrelated to risk preferences. This would imply that

$$\Pr \{U_j > \bar{u} \mid \mathbf{x}_i, \mathbf{x}_j, U_i, c_{ij} = 1\} = \Pr \{U_j > \bar{u} \mid \mathbf{x}_i, \mathbf{x}_j, U_i\} = \Pr \{U_j > \bar{u} \mid \mathbf{x}_j\}$$

Therefore, a test as to whether the odds that $U_j > \bar{u}$ are related to the choice taken by person i is equivalent to a test as to whether coresidence is determined independently of risk preferences. The regressions use an ordered logit specification. In order to do away with any assumptions of log-linearity in these probabilities, all covariates are expressed as vectors of indicators. Demographic

characteristics are expressed as a vector of binary variables indicating sex and single year of age up to age 25, and then sex and five year age group thereafter. In each regression, odds ratios are reported rather than ordered logit coefficients. If the odds ratio associated with i 's choice is 1, then overall, risk preferences are unrelated within a household.

Of course, in addition to the overall correlation in risk preferences within the household, there may be additional information in relationship-specific correlations. The familial relationships between individuals provide information on the mechanisms by which they came to coreside—if different mechanisms are differentially selective in terms of risk preferences, then the nature and degree of within-pair resemblance will be relationship specific. Therefore, I explore whether observed patterns differ by familial relationship type.

4.2 Family Level Data (MxFLS)

Since MxFLS-PP does not provide any information about noncoresident kin, it is of only limited usefulness in answering whether and how living arrangements specifically are selective on risk preferences. Therefore, for this part of the analysis I use the indicator of financial risk aversion elicited by the hypothetical questions in MxFLS. However, it is not possible to directly verify this instrument by comparing it against respondents' behavior in an incentivized task, since MxFLS did not include any such task. Therefore, first in order to confirm the validity of this instrument, I examine whether patterns observed using the MxFLS-PP data are also observed using these data.

Furthermore, since MxFLS provides a broader range of information on its respondents, I can use it to shed further light on the results from the previous section. One potential concern regarding the use of these instruments to categorize individuals on the basis of risk aversion is that the choices individuals take may be related *not only* to their preferences, but also to their income and wealth. Then, if individuals within families have similar asset levels or income prospects, these similarities may give rise to similar choices, masking the effects of preferences themselves. To explore the empirical importance of this concern, I use information from MxFLS on the value of household

assets and individuals' educational attainment in order to control flexibly for these characteristics.

Relationship Specific Likelihood of Pair Partition

Since individuals who left their households after 2002 completed the MxFLS questionnaire, and can be linked back to their origin households, I use these data to examine pair partitions, which are one important process determining living arrangements. I begin by considering all types of pairs who were coresident in 2002, and estimate the probability that they were still coresident in 2005 as a function of their preferences and other characteristics. In these analyses, a pair consists of a potential mover and a stayer. The pair is said to have partitioned if, in 2005, the potential mover is observed to be a member of a new household and the stayer is still resident in the origin household. The analysis is restricted to those pairs in which the potential mover was aged 17-37 in 2002—since these constitute those “at risk” of establishing residence in a new household—while the stayer is aged 17-67 in 2002, and observed to be living in the same household in both periods.

I next restrict the analysis to those pairs in which the potential mover is the child of the stayer. Thus, the analysis focuses on whether risk preferences play a role in a particularly salient type of pair partition— an adult child's departure from his parents' household. This approach allows me to restrict comparisons within sibling groups; it allows me to explore empirically the questions—in cases where different siblings have different risk preferences, *which* sibling is the one most likely to establish a separate household from his parents? And, does this differ on the basis of the parents' preferences?

5 Results and Discussion

5.1 Household-Level Data (MxFLS-PP)

Assessing Intrahousehold Resemblance

The first set of results is presented in table 4, which reports the nature and degree of within-pair sorting in willingness to take on financial risk. In each regression, an observation is a pair of coresident adults (aged 20-70 years).²⁰ Column 1 indicates that risk preferences overall are positively correlated within households; the odds that an individual took a higher risk option were on average 30 percent lower if he or she lived with an adult who was in the most risk averse category, as compared with if he or she lived only with adults who were not risk averse. Similarly, the odds of taking a higher risk option were about 30 percent higher among respondents who lived with individuals in the least risk averse category. The results in column 2 represent the same regression, except that those respondents who were “gamble averse” in the sense described in the data section above are excluded.²¹ The results are similar; therefore, since these individuals cannot easily be incorporated in the regression in column 3—which uses the measure of risk preferences elicited by the binary questions—they are excluded from this regression as well. Finally, the last column uses the measure of risk preferences elicited using the hypothetical 6-way choice. The results using the indicators based on the hypothetical questions also indicate positive sorting, albeit imprecisely estimated.²²

The fact that overall, risk preferences are similar within households suggests either that risk prefer-

²⁰As discussed in the previous section, the dependent variable is an ordinal classification of the riskiness of the chosen gamble—a higher number represents a riskier choice. In addition to the covariates reported in the tables, each regression includes indicators of gender and age of both parties in the pair; age indicators are by gender and single year of age from 20-25 years, and then by gender and five year age groups thereafter. Indicator variables are also included in these regressions to identify whether one or both members of the pair are gamble averse, in the sense represented in figure 1c, and described in the data section above. Standard errors are computed by jackknifing coefficients while resampling households.

²¹Specifically, these were individuals who, in the series of hypothetical binary choices represented in figure 1c, indicated that they would forgo a probability-based payoff, even when it was *costly* to do so.

²²Note the available options in the series of binary choices are not as different from each other in terms of riskiness and expected payoff as in the other instruments. This may explain why the pattern of positive sorting is observed to be less pronounced using this measure than the other two.

ences are shared within the broader family, or that family members are homophilous in their living arrangements, or both. To explore whether different mechanisms of household or family formation are differentially selective, table 5 tests if these patterns differ on the basis of familial relationship. The evidence is that they do not; it is impossible to reject the hypothesis that the degree of resemblance (as represented by the magnitudes of the estimated odds ratios) is the same for all pair types. This could be related to low power—bin sizes are small, standard errors correspondingly large. An individual’s risk aversion may provide more information about the risk aversion of his or her coresident parents than his or her coresident siblings, and assortative matching in the marriage market may be less pronounced than intergenerational transmission of preferences. It is notable that even among pairs of non-nuclear family members,²³ there is positive sorting on preferences. This suggests that the overall positive sorting observed in the household is unlikely to be based solely on either intergenerational transmission of preferences or assortative matching in the marriage market. Rather, some combination of these, as well as homophily in living arrangements, may play a role.

5.2 Family Level Data (MxFLS)

The indicators of financial risk aversion available through MxFLS-PP are elicited using incentivized tasks, but are available only for coresident family members. In order to extend the analysis beyond the household, I turn next to the indicator elicited in MxFLS. Since this indicator is elicited only through hypothetical questions, I first restrict the analysis to household members, and examine whether this indicator predicts similar patterns to those observed in the incentivized task data. Then, I extend the analysis beyond the household.

5.2.1 Assessing the Validity of the Indicator

The results in the first two columns of table 6 replicate the patterns observed in table 4; overall, preferences are shared within households. The dependent variable in these regressions is the ordinal

²³The bulk of these are in-law pairs.

risk category into which one member of the pair is classified on the basis of his responses to the MxFLS questions.²⁴ The results in column 1 indicate that the odds that an individual would be less risk averse were 60 percent lower if he or she lived with someone in the most risk averse category, relative to if all of his or her coresidents were not risk averse; they were over twice as high if the person lived with someone who was in the least risk averse category.

One concern discussed in the previous section is that individuals' decisions in the incentivized task, and their responses to the hypothetical questions, may reflect both preferences and constraints. Specifically, since wealth and income are likely to be similar within families, individuals may make similar choices not because they have similar preferences, but rather because they face similar constraints.²⁵ This would affect the interpretation of the observed results, because it would suggest that if the same individual were reassigned to a different family, his classification in terms of risk aversion would change. In this sense, within-family correlations in willingness to take financial risk may be a *result*—rather than a *cause*—of within-family correlations in other economic outcomes. Since MxFLS provides more detailed data on respondents, I am able to assess directly whether similarities in terms of wealth and permanent income play a significant role in driving the observed similarities within households. I add to the regression a spline of the total (log) value of household assets, with notches at the quartiles, along with indicators of educational attainment (to capture permanent income); the results are indicated in column 3. They are virtually identical. The evidence suggests that over the range of stakes represented by these tasks, the income expansion path of demand for risk is not very steep; the observed variation in choices is likely driven in very large part by variation in preferences.

Table 7 replicates the patterns observed in table 5; positive sorting is observed within all relationship types. Since the MxFLS sample is much bigger, the odds ratios are estimated much more precisely,

²⁴The mapping of responses to categories is shown in figure 1d. In addition to the covariates reported in the tables, all regressions also include age and sex indicators. These are by single year of age and sex from 20-30, and five year age group thereafter.

²⁵Generally in decisions about financial risk, choices would be jointly determined by the odds of the outcomes, by income and wealth, and by preferences. In the setting of the surveys, we determined the odds, which were the same for all respondents; therefore, only income and wealth and preferences are left as potential sources of variation in respondents' choices.

and yet it is still impossible to reject that they are the same for all relationship types. Therefore, it appears that the mechanisms which give rise to within household correlations in willingness to take financial risk are not relationship-specific in their net effect.²⁶ The results in the first column indicate that preferences are similar within coresident married couples.²⁷ This may reflect assortative matching in the marriage market, or it may reflect the fact that over time spouses tend to converge in their preferences, or that homophilous marriages are more likely to endure. Table 7b lends further evidence that there is assortative matching; it compares the degree of within-couple correlation in preferences for those who had been married for at least three years, relative to those married more recently. The degree of positive sorting in these couples is similar.

In the analyses in the next section, I will explore the relationship between risk preferences and pair partition. In order to further validate the MxFLS indicator of risk aversion, table 8 relates this outcome to participants' responses in the MxFLS-PP incentivized task. Since no information is available in MxFLS-PP on those who left the household, the analysis using this indicator can only include the risk preferences of the stayer. Column 1 indicates that more risk averse stayers were 10 percentage points less likely than less risk averse ones to be left behind by a potential mover. Column 2 replicates this pattern in MxFLS—those in the three most risk averse categories by this indicator were 3 percentage points less likely to be left behind by a potential mover. As column 3 shows, this effect is invariant to flexible controls for pre-partition household wealth and the educational attainment of both the potential mover and the stayer.

5.2.2 Preference-Specific Likelihood of Pair Partition

The previous section confirmed the validity of the MxFLS indicator of willingness to take financial risk, by demonstrating that it predicts similar patterns and behavior to a real-stakes incentivized

²⁶The information on familial relationships in MxFLS is less detailed than that in MxFLS-PP in one important sense—siblings can only be identified if they coreside with at least one of their parents; therefore, the last column of table 7 includes sibling pairs who do not coreside with a parent, as well as non-nuclear family pairs like in-laws. Therefore, the last two columns do not compare straightforwardly between table 7 and table 5.

²⁷Slightly more than 95% of married couples in the sample were observed to be resident in the same household. Couples who do not coreside are likely to be separated because of labor-related migration.

task. This section proceeds to exploit the information on noncoresident family members in order to examine directly the relationship between preferences and changes in living arrangements.

Table 9 classifies pairs of movers and stayers into one of four categories—both relatively risk averse, both not risk averse, and the two discordant categories.²⁸ Column 1 indicates that pairs in which the stayer is not risk averse are equally likely to partition; therefore, to increase bin sizes and improve power, these two categories are combined in the regression in column 2. The results indicate that pairs in which both parties are relatively risk averse are 4 percentage points less likely to partition than pairs in which at least the stayer is not risk averse. One empirical implication of this is shown in table 10, which indicates that overall, comparing risk preferences among only *coresident* family members would result in an overestimation of the extent to which these preferences correlate within families, since overall risk averse family members are homophilous in their living arrangements.

As discussed in the background section, an important mechanism which may drive preference-specific selection in living arrangements arises from the fact that informal risk sharing arrangements must be self-enforcing. Since the incentive to renege in such an arrangement is likely to be related to risk aversion, the family may have incentive to match risk exposure to risk preferences. A pattern which would be consistent with this mechanism is represented in its simplest form in table 11. Included in this table are all sibling pairs in which both siblings were aged 17-37 and coresident with at least one of the parents in 2002. I classify these pairs into four categories on the basis of the risk aversion of each sibling, and define one of them as the potential mover. The risk aversion of the potential mover is represented down the rows, and the risk aversion of the potential mover's sibling is represented across the columns. Each pair appears twice—once with i as the potential mover and j as the mover's sibling, and once the other way around. Each cell reports the proportion of pairs in which the potential mover departed the parents' household.

As the patterns reported in the previous two tables would suggest, an individual was least likely to depart the origin household if both he and his sibling were risk averse—11 percent of individuals

²⁸Throughout this section, the phrase “relatively risk averse” is used to identify respondents who respond in the categories labeled 3 or lower in figure 1d.

in these pairs departed the household. Especially interesting, however, is the comparison between the discordant pairs. In cases where one sibling is relatively risk averse and the other sibling is not, it is the relatively risk averse one who is more likely to depart. The first column of table 12 reproduces this pattern in a regression format. The omitted category is the top left cell of table 11. Therefore, for example, the first coefficient indicates that when both siblings are relatively risk averse, the mover is 4 percentage points (0.15-0.11) less likely to depart the household than when both siblings are not risk averse. The second column adds age and sex indicators for both siblings, and estimates the difference between the two types of discordant pairs. Among these pairs, the relatively risk averse sibling is 9 percentage points more likely to depart the household than the non-risk averse sibling. Since the more risk averse sibling would likely make a more trustworthy partner to his parents in an informal risk sharing arrangement, the parents may have incentive to selectively induce him or her to depart the household. Table 13 repeats this analysis, with fixed effects at the sibling-group level.²⁹ The pattern is the same: when there is variation in the risk preferences among siblings, it is the relatively more risk averse siblings who are more likely on average to depart their parents' households.

If imperfect commitment generates incentives for family members to take account of each others' preferences in deciding their living arrangements, then the family's choices of living arrangements may contain evidence of the constraints imposed by this market imperfection. Table 14 explores such evidence, by relating adults' stature and risk preferences to the probability they departed their original household. Adult stature reflects health status and human capital accumulation in early life, and has been observed to be a predictor of wage prospects in many developing country contexts (Schultz [2005]; Strauss and Thomas [1997]). Taller adults have higher expected wages, and thus may be more likely to experience income realizations which are sufficiently high to induce them to renege in an informal insurance arrangement; therefore, these individuals may find it particularly difficult to credibly commit to such an arrangement. Although the expected returns to labor-related migration would likely be highest among this group, the family's incentive to support this

²⁹About 65% of these were sibling pairs, although there were also a handful of sibling groups with four or more siblings of eligible age.

undertaking may be limited by the absence of a commitment technology which would ensure that these gains could be shared. Among relatively more risk averse family members, however, this constraint may be relaxed by the fact that they value insurance arrangements sufficiently highly that even relatively high income realizations may not be sufficient to induce them to renege. As a result, high human capital individuals who are not risk averse would be less likely to depart their origin households than similar individuals who are more risk averse. Table 14 demonstrates that this pattern is observed in the data. Among those who are not risk averse, increasing human capital *reduces* the probability of departure from the household—each additional centimeter of stature is associated with a 0.1 percentage point decline in this probability. This pattern is not observed among those who are relatively risk averse, and the difference between the two groups is statistically significant.

6 Conclusion

Drawing on new data about the preferences of population-representative samples of households and families in Mexico, the analysis reported here describes a pattern of intrahousehold resemblance in terms of willingness to take on financial risk. This pattern reflects resemblance in terms of risk aversion among family members, but it is also affected by risk preference-specific selection in the family’s living arrangements. The findings indicate that overall, relatively risk averse adults are more likely to remain coresident over time; the correlation in risk preferences among adult family members who live together is likely greater than in the family as a whole.

Furthermore, the results indicate that the risk preferences of adult children are related to the probability that they remain coresident with their parents. This pattern is in keeping with what would be predicted by a model of imperfect commitment in income insurance, which gives families incentive to match individuals’ risk preferences and risk exposure. Specifically, parents may use their resources to induce the more risk averse among their children—who would make more trustworthy partners in an informal risk sharing arrangement—to establish households elsewhere, in order to

diversify risk and maximize potential gains of an insurance arrangement. In this sense, the family may use living arrangements to facilitate welfare-improving transactions which would otherwise be unsustainable due to the absence of commitment technology. However, the results also indicate that there are limits to how far families can go to this end. Individuals with relatively high human capital but low risk aversion may not be able to take advantage of the high expected returns to labor-related migration, because they would be unable to credibly commit to a program of state-contingent transfers which would allow them to share the gains with their family members.

Taken together, these results highlight the potential value of explicitly incorporating living arrangements in the theoretical and empirical analysis of the economic behavior of households and families.

References

- Barr A [2003] “Risk Pooling, Commitment, and Information: An experimental test of two fundamental assumptions” mimeo, Centre for the Study of African Economies
- Basu K [2006] “Gender and Say: A Model of household behavior with endogenously determined balance of power” *Economic Journal* 116(4): 558-580
- Behrman J, A Foster and M Rosenzweig [1997] “Dynamic Savings Decisions in Agricultural Environments with Incomplete Markets” *Journal of Business and Economic Statistics*, 15(2), 282-92
- Binswanger HP [1981] “Attitudes Toward Risk: Theoretical implications of an experiment in rural India” *The Economic Journal* 91(364): 867-90
- Black SE, PJ Devereux, and KG Salvanes [2005] “Why the Apple Doesn’t Fall Far: Understanding intergenerational transmission of human capital” *American Economic Review* 95(1): 437-449
- Bourguignon F and P Chiappori [1992] “Collective Models of Household Behavior: An Introduction” *European Economic Review* 36(1992): 355-64
- Bowles S, H Gintis, and MO Groves, eds. [2005] *Unequal Chances: Family background and economic success* Princeton University Press
- Buchanan, JM [1965] “An Economic Theory of Clubs,” *Economica* 32(125): 1-14
- Chiappori PA [1988] “Nash Bargained Household Decisions: A Comment” *International Economic Review* 29(4): 791-796
- Chiappori PA [1991] “Nash Bargained Household Decisions: A Rejoinder” *International Economic Review* 32(3): 761-762
- Charles KK and E Hurst [2003] “The Correlation of Wealth Across Generations” *Journal of Political Economy* 111(6): 1155-1182

- Coate S and M Ravallian [1993] “Reciprocity Without Commitment: Characterization and Performance of Informal Insurance Arrangements” *Journal of Development Economics* 40(1993): 1-24
- Cole HL and EC Prescott [1997] “Valuation Equilibrium with Clubs” *Journal of Economic Literature* 74: 19-39
- Conley JP and MH Wooders [1997] “Tiebout Economies with Differential Genetic Types and Endogenously Chosen Crowding Characteristics” *Journal of Economic Theory* 98(2001): 261-94
- Currie J and E Moretti [2005] “Biology as Destiny? Short and long-run determinants of intergenerational transmission of birthweight”, mimeo, National Bureau of Economic Research
- Dohmen T, A Falk, D Huffman, and U Sunde [2006] “The Intergenerational Transmission of Risk and Trust Attitudes” mimeo, Institute for the Study of Labor (IZA)
- Dercon S [2002] “Income Risk, Coping Strategies, and Safety Nets” *World Bank Research Observer* 17(2): 141-66
- Dercon S and P Krishnan [2003] “Risk Sharing and Public Transfers” *Economic Journal* 113(3): C86-C94
- Eckel C, A Hamoudi, VJ Hotz, C Johnson, C Martinelli, S Parker, L Rubalcava, S Sanders, G Teruel, D Thomas, and H Valdes-Conroy [2006] “Attitudes toward Risk, Time Preferences, and Socioeconomic Status: Experimental and survey evidence” mimeo, UCLA.
- Ellickson B, B Grodal, S Scotchmer, and WR Zame [1999] “Clubs and the Market” *Econometrica* 67(5): 1185-1217
- Fafchamps M [1998], “Risk Sharing and Quasirent” *J. Int. Trade and Economic Development* 8(3): 257-278
- Fafchamps M and S Lund [2000] “Risk Sharing Networks in Rural Philippines” mimeo, University of Oxford Department of Economics

- Foster AD [1993] "Household Partition in Rural Bangladesh" *Population Studies* 47(1): 97-114
- Foster AD and MR Rosenzweig [2001] "Imperfect Commitment, Altruism, and the Family: Evidence from transfer behavior in low-income rural areas" *Review of Economics and Statistics* 83(3): 389-407
- Foster AD and MR Rosenzweig [2002] "Household Division and Rural Economic Growth" *Review of Economic Studies* 69(4): 839-69
- Frankenberg E, JP Smith, and D Thomas [2003] "Economic Shocks, Wealth, and Welfare" *Journal of Human Resources* 38(2): 280-321
- Genicot G and D Ray [2003] "Group Formation in Risk-Sharing Arrangements" *Review of Economic Studies* 70(2003): 87-113
- Gerbach H and H Haller [2001] "Collective Decisions and Competitive Markets" *Review of Economic Studies* 68(2): 347-68
- Grimard F [2000] "Rural Labor Markets, Household Composition, and Rainfall in Cote d'Ivoire" *Review of Development Economics* 4(1): 70-86
- Haddad L, J Hoddinott, and H Alderman [1997] *Intrahousehold Resource Allocation in Developing Countries* Johns Hopkins University Press
- Haller H [2000] "Household Decisions and Equilibrium Efficiency" *International Economic Review* 41(4): 835-847
- Hamoudi A and D Thomas [2006] "Do You Care? Altruism and intergenerational exchange in Mexico" mimeo, California Center for Population Research
- Hayashi F, J Altonji, and L Kotlikoff [1996] "Risk Sharing Between and Within Families" *Econometrica* 64(2): 261-294
- Han S and CB Mulligan [2001] "Human Capital, Heterogeneity, and Estimated Degrees of Intergenerational Mobility" *Economic Journal* 111(470): 207-243

- Hess GD [2004] “Marriage and Consumption Insurance: What’s love got to do with it?” *Journal of Political Economy* 112(2): 290-318
- Kocherlakota NR [1996] “Implications of Efficient Risk Sharing without Commitment” *Review of Economic Studies* 63(4): 595-609
- Kotlikoff LJ and A Spivak [1981] “The Family as an Incomplete Annuities Market” *Journal of Political Economy* 89(2): 372-391
- Ligon E, JP Thomas, and T Worrall [2002], “Informal Insurance Arrangements with Limited Commitment: Theory and evidence from village economies” *Review of Economic Studies* 69(2002): 209-44
- Mace BJ [1991] “Full Insurance in the Presence of Aggregate Uncertainty” *Journal of Political Economy* 99(5): 928-956
- Manser M and M Brown [1980] “Marriage and Household Decision-Making: A bargaining analysis” *International Economic Review* 21(1): 31-44.
- Mazumder B [2005] “The Apple Falls Even Closer to the Tree than We Thought: New and revised estimates of the intergenerational inheritance of earnings” in Bowles, Gintis, and Groves, *eds.*
- Mazzocco M [2004] “Saving, Risk Sharing, and Preferences for Risk” *American Economic Review* 94(4): 1169-1182
- McElroy MB and MJ Horney “Nash Bargained Household Decisions: Toward a generalization of the theory of demand” *International Economic Review* 22(2): 333-349.
- McElroy MB “The Joint Determination of Household Membership and Market Work: The Case of young men” *Journal of Labor Economics* 3(3): 293-316
- Paxson CH and H Alderman [1992] “Do the Poor Insure? A Synthesis of the literature on risk and consumption” mimeo, World Bank Agriculture and Rural Development Department

Powers DA and Y Xie [2000] *Statistical Methods for Categorical Data Analysis* Academic Press, San Diego.

Ravallion M and S Chaudhuri [1997] “Risk and Insurance in Village India: Comment” *Econometrica* 65(1): 171-184

Rosenzweig MR and O Stark [1989] “Consumption Smoothing, Migration, and Marriage: Evidence from rural India” *Journal of Political Economy* 97(4): 905-26

Rubalcava L and G Teruel [2005] “The Effect of Oportunidades on Demographic Dynamics of the Beneficiary Households” mimeo, National Institute of Public Health, Mexico

Schultz TP [2005] “Productive Benefits of Health: Evidence from low income countries” mimeo, Economic Growth Center, Yale University

Scotchmer S [2002] “Local Public Goods and Clubs” in: AJ Auerbach and M Feldstein, eds *Handbook of Public Economics* Vol 4. Elsevier Science B.V.

Scotchmer S [2005] “Consumption Externalities, Rental Markets, and Purchase Clubs” *Economic Theory* 25(2005): 235-53

Solon G [1999] “Intergenerational Mobility in the Labor Market” in O Ashenfelter and D Card eds., *Handbook of Labor Economics* v.3A; Elsevier Science, North Holland.

Thomas D and J Strauss [1997] “Health and Wages: Evidence on men and women in urban Brazil” *Journal of Econometrics* 77(1):159-185

Townsend RM [1994] “Risk and Insurance in Village India” *Econometrica* 62(3): 539-591

Townsend RM [1991] “Risk and Insurance in Village India” mimeo, University of Chicago

Udry C [1994] “Risk and Insurance in a Rural Credit Market: An empirical investigation in Northern Nigeria” *Review of Economic Studies* 61(3): 495-526

Table 1. Pairs of Family Members, by Timing of Household Residence

		Years that the respondent resided in the household...		
		2005 only	2002 & 2005	Total
Years that the other member in the pair resided in the household	2002 only	34	369	403
	2005 only	69	156	225
	2002 & 2005	147	1,626	1,773

Units of observation are pairs of adults within the same family unit. Pairs are constructed as described in the text.

Table 2. Pairs by Relationship Type

Relationship type	Total pairs	Pairs coresident in the same household	Pairs coresident in the same community
Spouse-spouse	740	691	692
Child-Parent	586	403	433
Parent-Child	412	394	395
Sibling-Sibling	407	324	339
Other	256	186	204
Total	2,401	1998	2063

Notes: Units of observation are pairs of adults within the same family unit. Pairs are constructed as described in the text.

Table 3. Relationship Between Responses in Incentivized Task and Hypothetical Questions

<i>Dependent variable: riskiness of choice in incentivized task. Ordered logit regressions; odds ratios reported</i>	Hypothetical 6-way	Hypothetical binary
Individual took the lowest risk choice in the hypothetical questions	0.7 [3.3]	0.8 [1.9]
...the highest risk choice	1.3 [2.0]	1.3 [1.5]
# of individuals	1061	1061

Z-statistics (computed by jackknife) reported in brackets.

Table 4. Willingness to Take Financial Risk within Coresident Pairs (MxFLS-PP)

<i>Dependent variable: risk category of one member of the pair. Ordered logit regressions; odds ratios reported</i>	Incentivized Task	Incentivized Task (excluding gamble averse)	Hypothetical binary choices	Hypothetical 6- Way
Other person is in the most risk averse category	0.7	0.6	1.0	0.8
	[1.6]	[1.8]	[0.2]	[1.4]
...in the least risk averse category	1.3	1.4	1.2	1.1
	[1.5]	[1.7]	[1.2]	[0.5]
# of pairs	1984	1189	1189	1984

Z-statistics (computed by jackknifing while resampling households) reported in brackets.

Table 5. Relationship-Specific Correlations in Willingness to Take Financial Risk (MxFLS-PP)

<i>Dependent variable: risk category of first person in the pair. Ordered logit regression; odds ratios reported.</i>	Spouses	Child-Parent	Parent-Child	Siblings	Others
Second person in pair: zero risk option	0.7 [1.1]	0.6 [1.6]	0.7 [1.2]	0.7 [0.7]	0.3 [1.7]
Second person in pair: highest risk options	1.4 [1.4]	1.2 [0.7]	1.3 [1.1]	1.1 [0.8]	1.1 [1.0]
# pairs	667	414	383	328	192

The reported odds ratios are computed in a single regression; they are represented across multiple columns for ease of exposition. Regression also includes age/sex indicators for both parties in the pair. Z-statistics (computed by jackknifing while resampling households) reported in brackets.

Table 6. Comparing Willingness to Take Financial Risk within Coresident Pairs (MxFLS)

Dependent variable: risk category of one member of the pair. Ordered logit regressions; odds ratios reported

	Column 1	Column 2	Column 3
Other person in the pair is in risk category 1 (most risk averse)	0.4 [5.7]	0.5 [4.9]	0.5 [4.8]
Category 2		0.8 [1.7]	0.8 [1.5]
Category 4		1.1 [1.4]	1.1 [1.5]
Category 5	2.4 [13.4]	2.6 [9.8]	2.6 [9.8]
Category 6 (risk seeking)	1.6 [3.5]	1.7 [3.5]	1.7 [3.5]
Age/Sex Indicators included	Y	Y	Y
Educ, wealth indicators included	N	N	Y
# Pairs	13588	13588	13588

Z-statistics (computed by jackknifing while resampling households) reported in brackets

Table 7. Relationship-Specific Correlations in Willingness to Take Financial Risk (MxFLS)

<i>Dependent Variable: Risk category of first person in the pair. Ordered logit regression; odds ratios reported</i>	Spouses	Child-Parent	Parent-Child	Siblings (with a parent)	Others
Second person in pair in category 1 (most risk averse)	0.4 [5.8]	0.5 [3.1]	0.4 [3.4]	0.3 [2.5]	0.6 [1.5]
Category 5	2.5 [11.7]	2.3 [8.2]	2.4 [8.7]	2.2 [5.1]	2.5 [7.1]
Category 6 (risk seeking)	1.7 [5.8]	1.8 [2.0]	1.4 [1.4]	1.2 [0.6]	1.6 [1.8]
# of pairs	4806	2482	2479	1473	2348

The reported odds ratios are computed in a single regression; reported in multiple columns for ease of exposition. Regression also includes age/sex indicators for both parties in pair, educational attainment indicators, and household wealth.

Table 7b. Risk Preferences among Spouses in Recent vs. Enduring Marriages

<i>Dependent Variable: Risk category of one spouse in a married couple. Ordered logit regressions; odds ratios reported</i>	Married more than 3 years	Married 3 years or less	significant difference?
Spouse in category 1 (most risk averse)	0.3 [5.7]	0.5 [1.3]	No [0.6]
Category 5	2.6 [11.3]	2.3 [3.4]	No [0.5]
Category 6 (risk seeking)	1.5 [2.1]	3.3 [2.4]	No [1.5]
# Pairs	4287	537	4824

The reported odds ratios were estimated in a single regression; they are reported across 2 columns for ease of exposition. The regression also includes age/sex indicators of each spouse, as well as indicators of educational attainment, and household wealth. Z-statistics (computed by jackknifing while resampling households) reported in brackets.

Table 8. Risk Attitudes and Probability of Pair Partition (MxFLS-PP & MxFLS)

<i>Dependent variable: 1 if mover departed the household after 2002. Probit regression; marginal effects reported</i>	MxFLS-PP (task) indicator	MxFLS indicator	MxFLS indicator	MxFLS indicator
Stayer is risk averse	-0.10 [2.5]	-0.03 [1.7]	-0.03 [1.7]	-0.03 [1.7]
Mover is risk averse				-0.01 [0.3]
Age/sex indicators included	Y	Y	Y	Y
Wealth & education included	N	N	Y	Y
# of pairs	1000	6715	6715	6715

Z-statistics (computed by jackknifing while resampling households) reported in brackets

Table 9. Combining Information on Stayer and Mover (MxFLS)

Dependent variable: 1 if mover departed the household after 2002. Probit regression; marginal effects reported

	Column 1	Column 2
both risk averse	-0.04 [1.4]	-0.04 [1.8]
stayer risk averse, mover not	-0.01 [0.8]	-0.01 [0.8]
mover risk averse, stayer not	0.00 [0.0]	
# of pairs	6715	6715

Both regressions also include age/sex and educational indicators, and household assets. Z-statistics (computed by jackknifing while resampling households) reported in brackets

Table 10. Risk Aversion in Coresident and Non-coresident pairs

<i>Dependent variable: 1 if one person in the pair is relatively risk averse. Probit regression; marginal effects reported.</i>	Column 1
other person is relatively risk averse, and coresident	0.24 [11.2]
...relatively risk averse, and not coresident	0.14 [2.5]
difference: coresident-not	-0.07 [1.7]
# of pairs	6715

Both regressions also include age/sex and educational indicators, and household assets. Z-statistics (computed by jackknifing while resampling households) reported in brackets

Table 11. Risk aversion and siblings' coresidence with parents

		<i>Sibling</i>	
		Less Risk Averse	More Risk Averse
<i>Fractions reported in cells are the proportion of potential movers who departed their parents' household</i>			
<i>Mover</i>	Less Risk Averse	0.15	0.11
	# sibling pairs	946	188
	More Risk Averse	0.19	0.11
	# sibling pairs	188	134

Table 12. Comparing propensity to move within sibling pairs

<i>Dependent Variable: 1 if mover departed household. Probit regression; marginal effects reported</i>	Column 1	Column 2
Both risk averse	-0.04 [0.9]	-0.02 [0.6]
Only mover risk averse	0.05 [1.0]	0.05 [1.2]
Only sibling risk averse	-0.04 [1.1]	-0.04 [1.4]
Difference: only mover-only sib		0.09 [2.1]
Age/sex indicators included	N	Y
# sibling pairs	1456	1456

Z statistics (computed by jackknifing while resampling sibling groups) reported in brackets

Table 13. Comparing Propensity to Move within Sibling Groups (Fixed Effects)

*Dependent variable: 1 if the potential mover departs the household.
Linear probability model, with fixed effects by sibling group*

	Column 1	Column 2
Mover is risk averse	0.09 [2.3]	0.09 [2.2]
Age/Sex indicators included	N	Y
# of individuals	939	939

Asymptotic T-statistics (estimated by jackknifing while resampling sibling groups) reported in brackets

Table 14. Stature and Departure from the Household

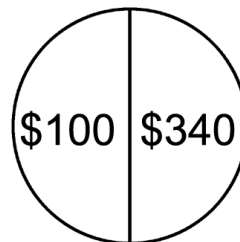
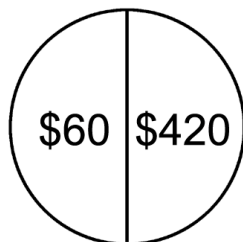
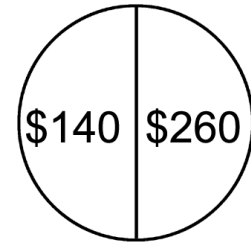
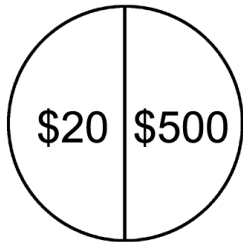
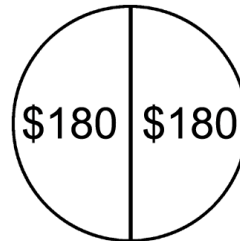
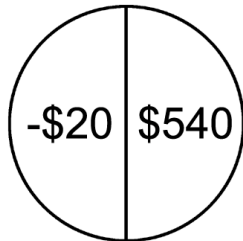
<i>Dependent variable: 1 if the individual departed the household. Probit regression; marginal effects reported</i>	Ages 20-40	Ages 20-40	Ages 20-30
Height (100cm) for the more risk averse	0.1 [1.1]	0.1 [1.3]	0.3 [1.9]
Height (100cm) for the less risk averse	-0.1 [1.8]	-0.1 [1.9]	-0.2 [1.5]
Difference: More risk averse-less risk averse	0.3 [2.4]	0.3 [2.6]	0.6 [2.8]
Age/sex indicators included	Y	Y	Y
Initial household assets/household size included	N	Y	Y
# individuals	2865	2865	1159

Z-statistics (computed by jackknifing while resampling households) reported in brackets

Figure 1a. Real-stakes Risk Task, MxFLS-PP*

Actividad 1

- *Marque sólo una.*
(Mark only one)



*NOTE: In Mexico, the symbol "\$" is used to represent pesos, as it is used to represent dollars in the United States. Therefore, in this figure, the "\$" symbol is used to indicate pesos, as it is used in respondents' daily lives.

Figure 1b. Hypothetical Six-Way Choice (Post-task Interview)

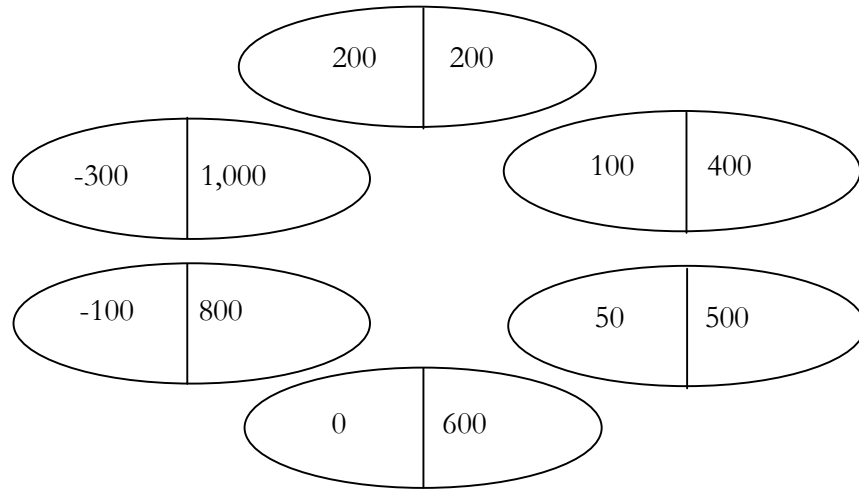


Figure 1c. Series of Binary Choices over Hypothetical Gambles (Post-Task Interview)

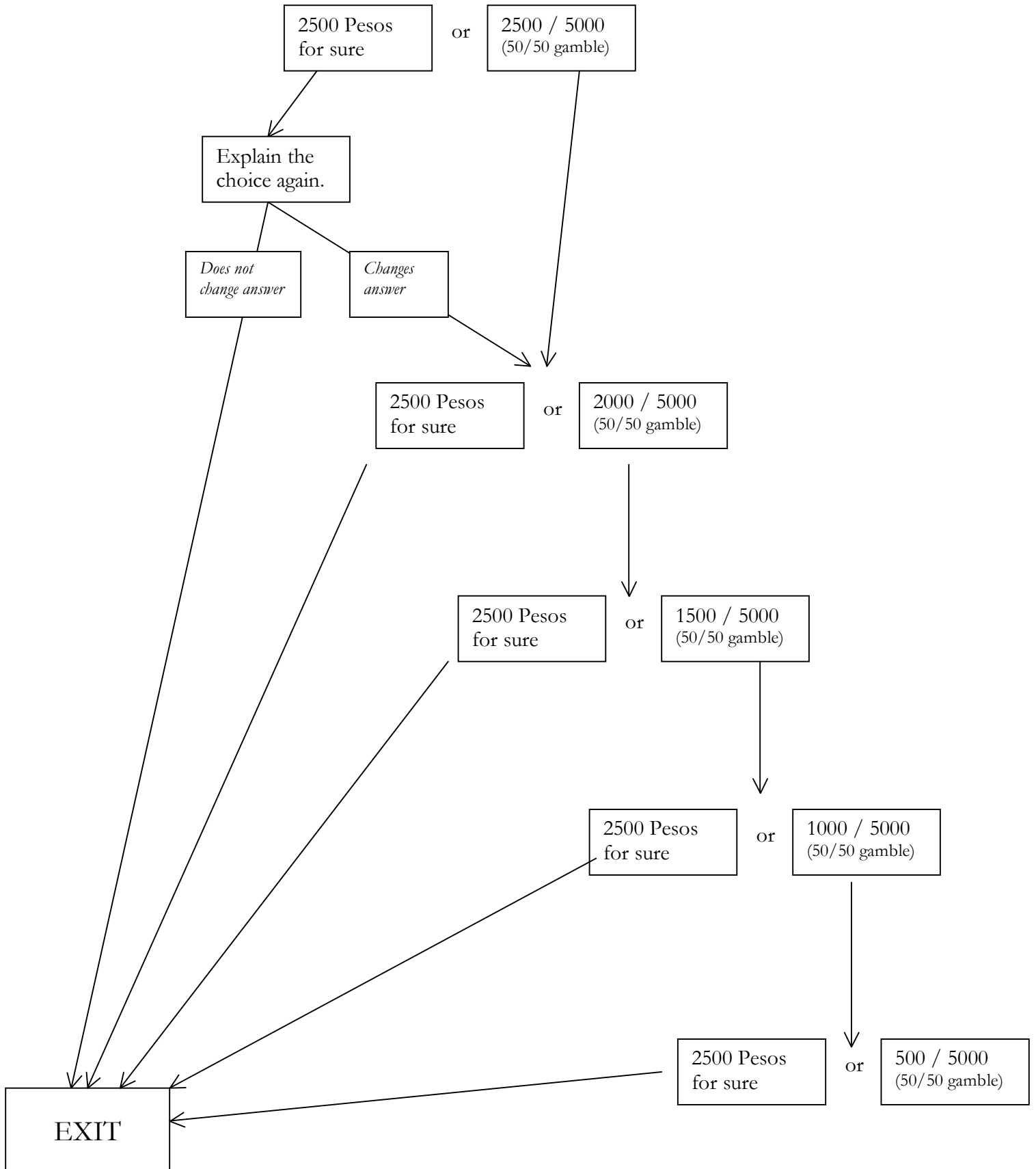


Figure 1d. Binary Choices over Hypothetical Gambles (MxFLS questionnaire)

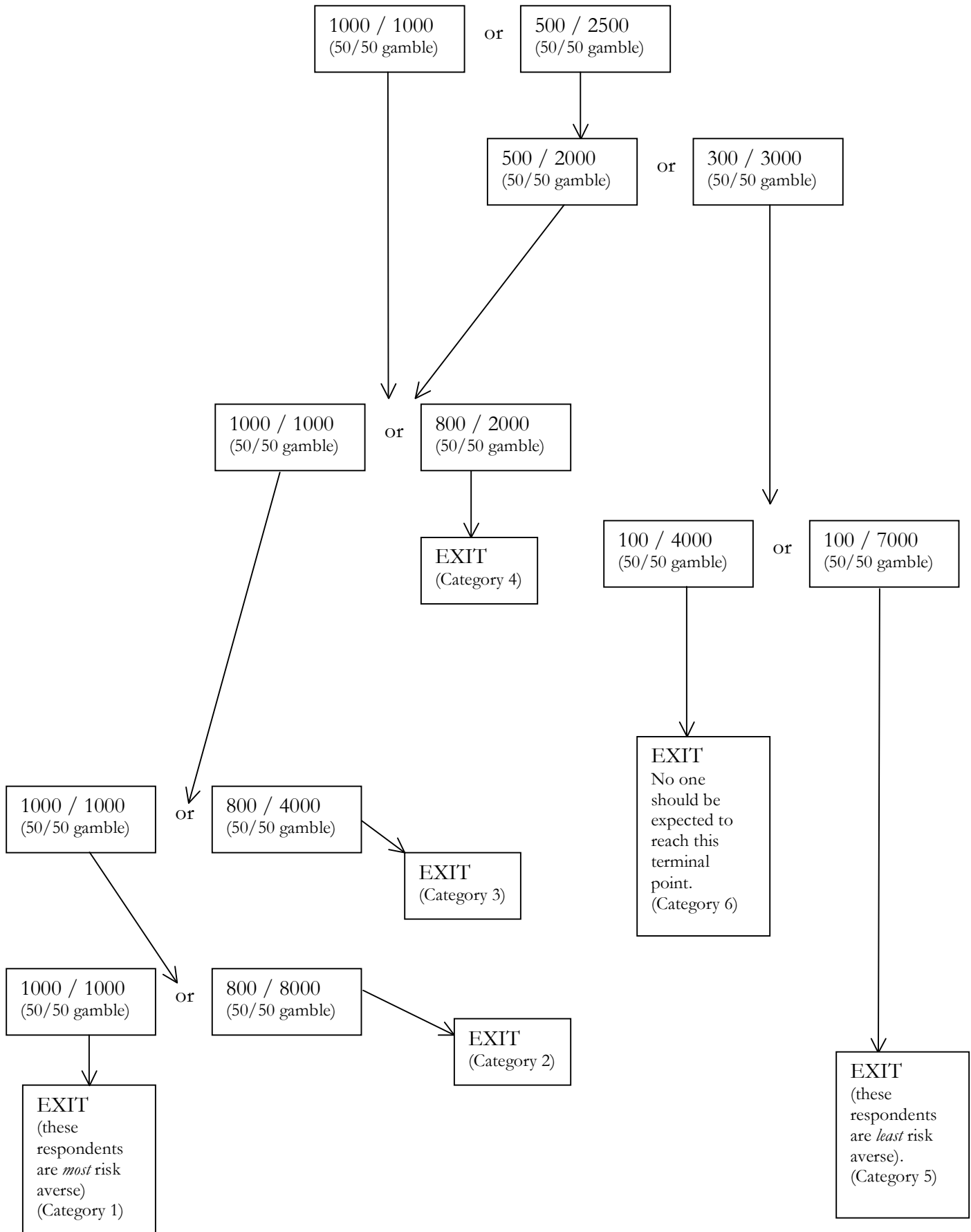


Figure 2. Distribution of Adult Respondents per Household

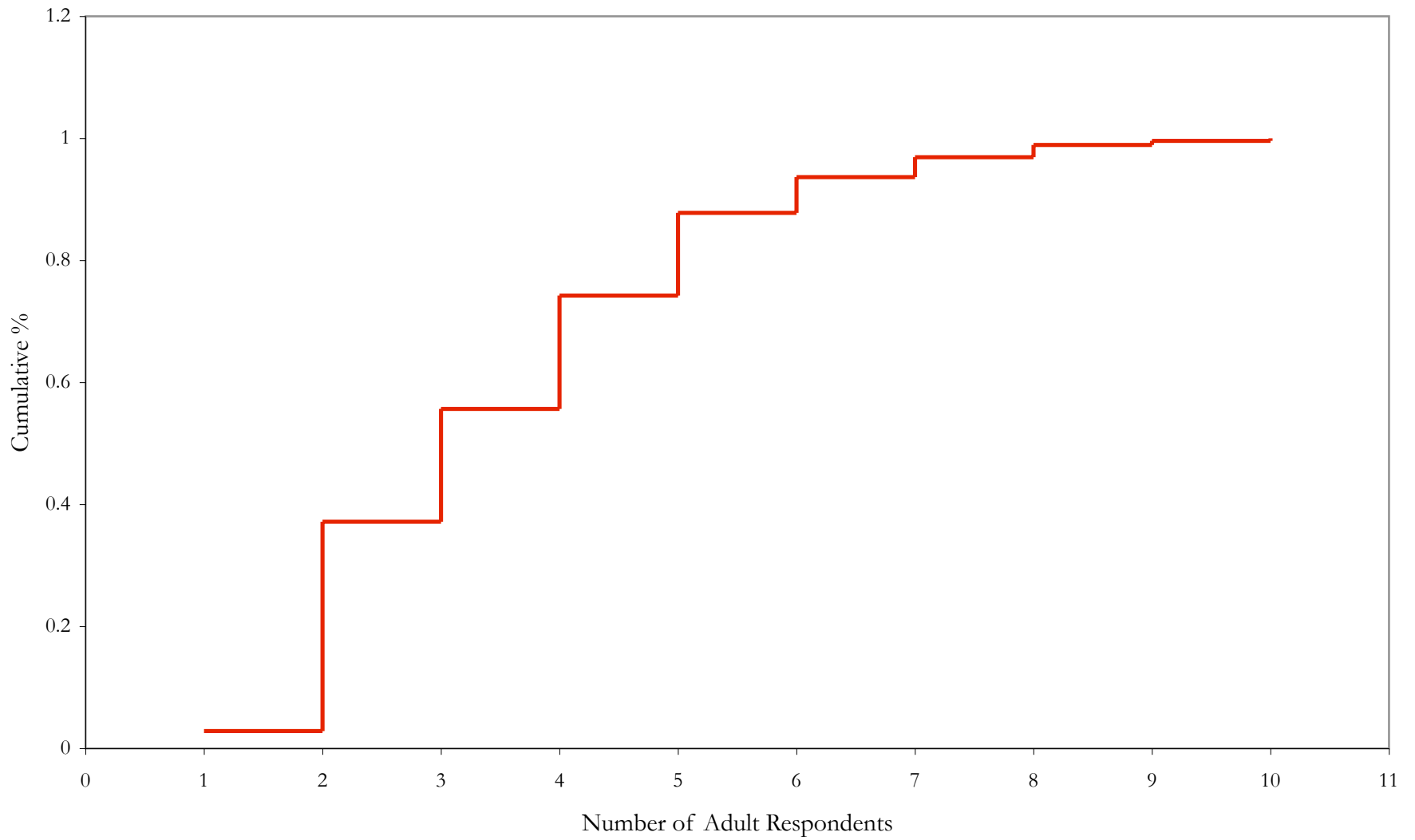


Figure 3a. Distribution of Responses in Incentivized Task

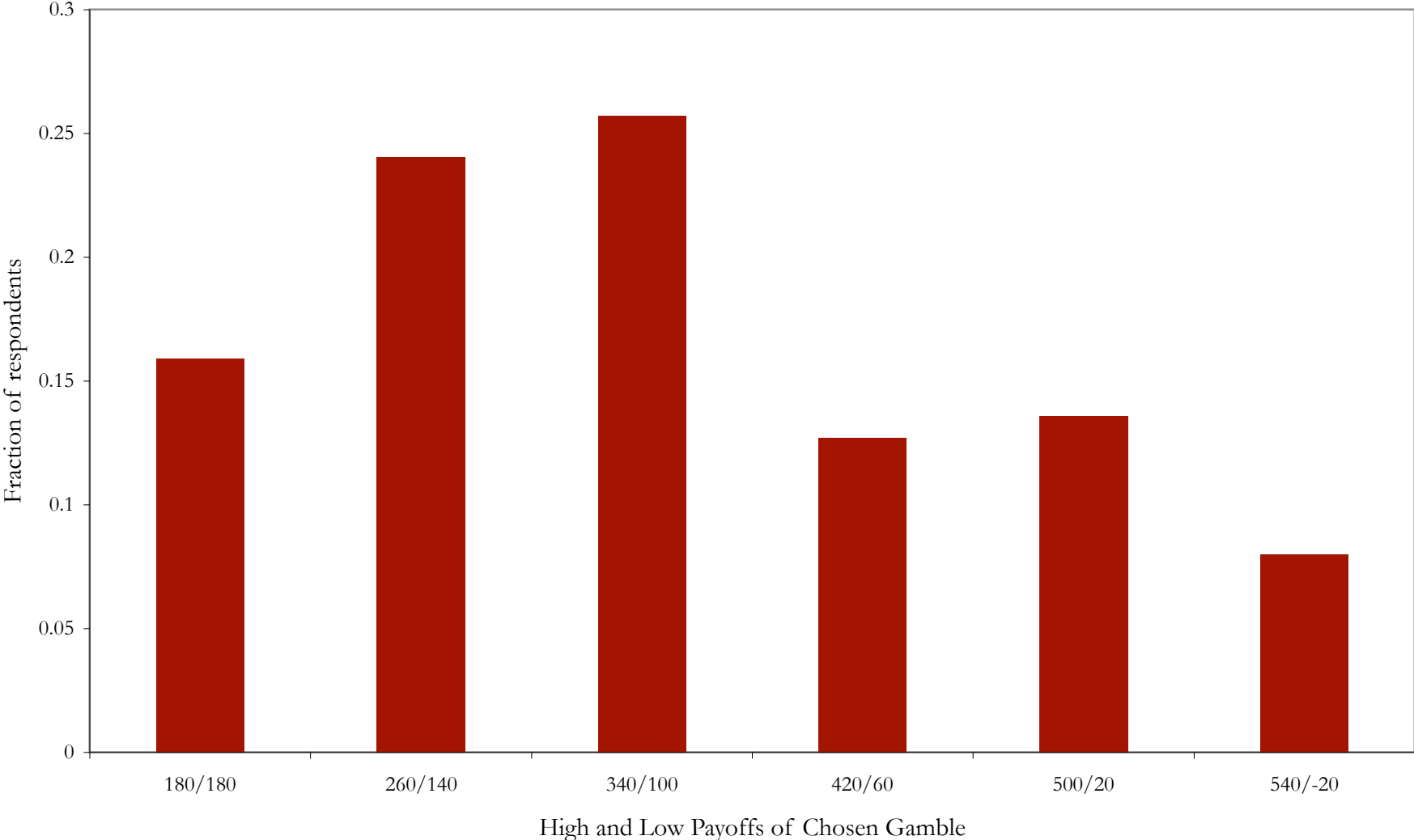


Figure 3b. Distribution of Responses in Six-way Choice (Post-Task Interview)

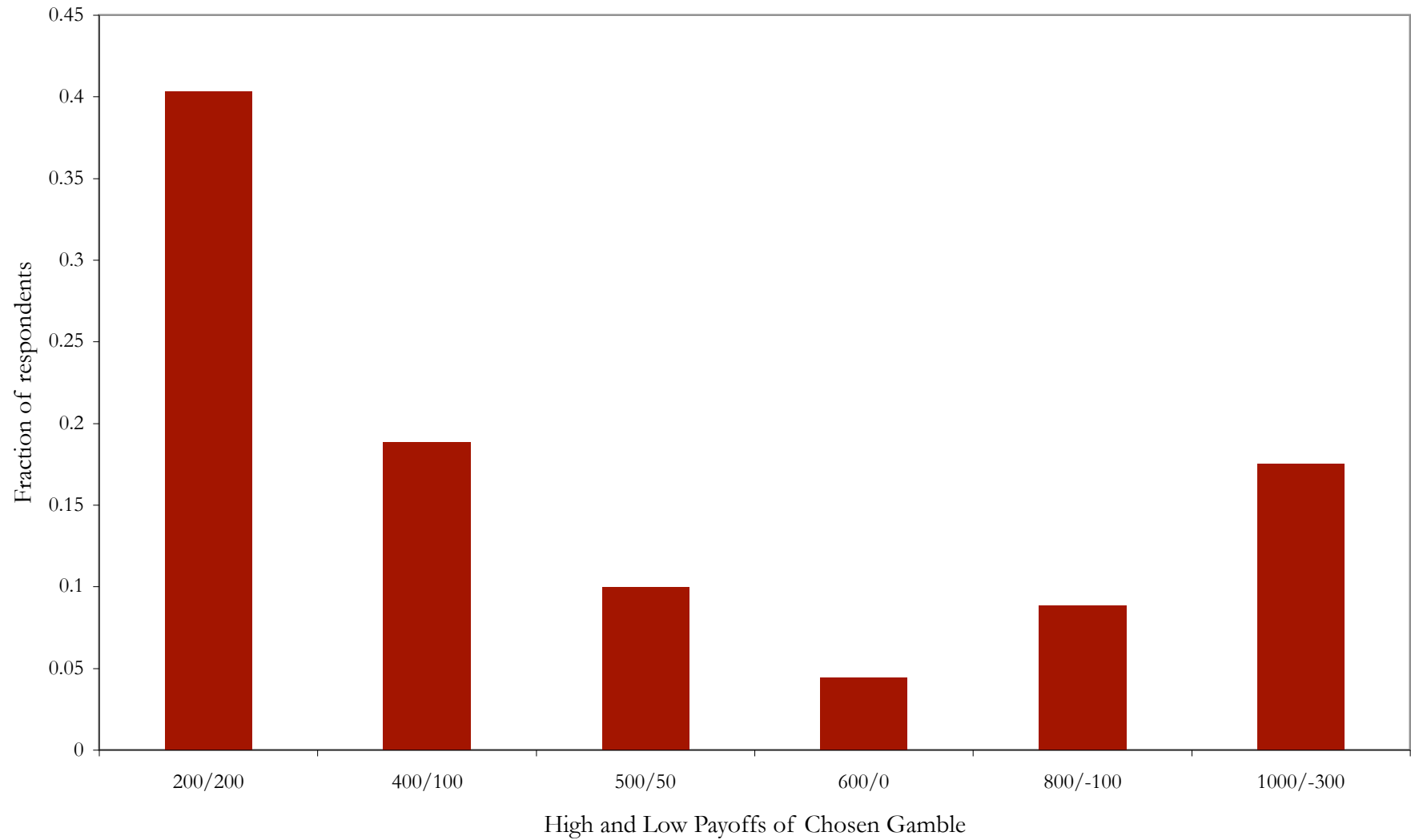


Figure 3c. Distribution of Responses in Series of Bilateral Choices (post-task interview)

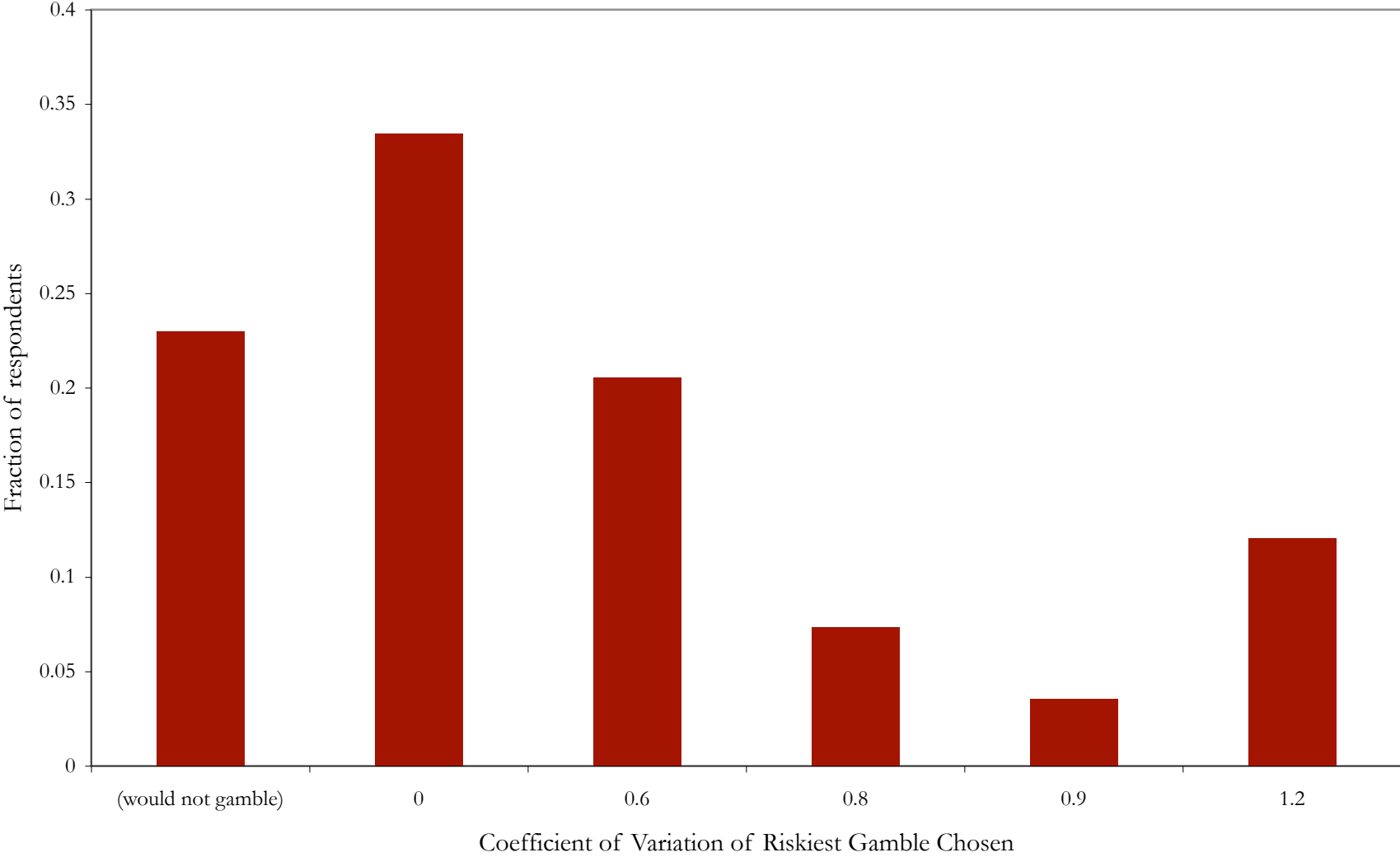


Figure 3d. Distribution of Responses to MxFLS Risk Questions

