Spending on Daughters Versus Sons in Economic Recessions

KRISTINA M. DURANTE

VLADAS GRISKEVICIUS

JOSEPH P. REDDEN

ANDREW EDWARD WHITE*

*Kristina M. Durante is an Associate Professor of Marketing, Rutgers Business School, Newark and New Brunswick, Piscataway Township, NJ 08854. Vladas Griskevicius is Board of Overseers Professor of Marketing, Carlson School of Management, University of Minnesota, 321 19th Ave S. Suite 3-150, Minneapolis, MN 55455, (612) 626-3793, fax (612) 624-8804, vladasg@umn.edu. Joseph P. Redden is an Associate Professor of Marketing, Carlson School of Management, University of Minnesota, 321 19th Ave S. Suite 3-150, Minneapolis, MN 55455, (612) 626-9170, fax (612) 624-8804, jredden@umn.edu; Andrew Edward White is a Research and Communications Consultant, Arizona State University, 950 S. McAllister, Room 237, Tempe, AZ 85287-1104.

Correspondence: Kristina Durante, kdurante@business.rutgers.edu.

CONTRIBUTION STATEMENT

We use principles of biology to understand how economic conditions alter parental spending on children. This endeavor leads to several important contributions. First, we experimentally show that economic conditions lead people to increase the allocation of resources to daughters at the expense of sons. This novel finding is especially important given that many parents believe they strive to evenly split their resources among their children, suggesting that our findings reflect an unknown persistent bias. Second, we identify when consumers should be most concerned about this tendency for unequal allocation. Specifically, the favoritism emerges only under poor economic conditions, strengthens as a child approaches reproductive age, and weakens for less risk-averse parents and parents who are more monogamous. Third, we provide an underlying theory based on reproductive investment that accounts for these findings, including process evidence in support of our theoretical model. This conceptual underpinning provides a richer understanding of the nature of these effects, as well as a framework to guide future work in this area. Finally, our work provides insight into how parents make decisions about allocating resources among their children. Although this task happens frequently and has great importance, parental decision making has been largely unstudied in the consumer behavior literature. Our work makes a novel initial contribution, and will hopefully spur future work in this area.

ABSTRACT

Although parents often try not to favor one child, we examine whether specific environmental factors might bias parents to favor children of one sex over the other. We draw on theory in evolutionary biology suggesting that investment in female versus male offspring depends on resource availability. Applying this to consumers, we show in a series of experiments that poor economic conditions favor resource allocations to daughters over sons. For example, poor conditions led people to bequeath more assets to girls in their will, and to choose girls to receive a U.S. Treasury bond and a beneficial extracurricular activity. We propose that this happens because spending on children represents a reproductive investment, and that boys' and girls' relative reproductive value varies with economic conditions. Supporting this account, we show that perceptions of which child will have more children statistically mediates the effect of economic conditions on preferences for girls. Consequently, the effect is strengthened as a child approaches reproductive age, and is moderated by individual differences (risk aversion and monogamy) directly related to our theoretical model. This research contributes to the consumer behavior literature by revealing how, why, and when environmental factors influence spending on girls versus boys.

Keywords: parental decision making, family spending, economic recessions, evolutionary psychology

Imagine you have two children – one boy and one girl. Which child would you favor? Most parents strive for balance. When we asked 88 parents with multiple children, "Do you favor one of your children or do you treat them equally?", 91% indicated that they treat their children equally. But consider the question more seriously. What if your resources are becoming increasingly scarce and you find yourself confronted with some tough choices? For instance, what if you can afford to enroll only one child in a beneficial extracurricular activity, or scrape together enough money for only one set of braces from the orthodontist?

Deciding which child to favor is undoubtedly difficult. At the agonizing extreme, such choices can be reminiscent of the unthinkable dilemma in the novel *Sophie's Choice* (also a 1982 film starring Meryl Streep), in which a mother must choose to save the life of either her son or her daughter. But favoring a child of one gender over the other is common practice in many cultures. For example, sons have historically had a claim to the throne in England, while daughters were favored to oversee the domains in the ancient African kingdom of Nubia. Such favortism is also widely found in the animal kingdom. From gorillas and chimpanzees to horses and sheep, animal parents do not always split food or attention equally among their male and female offspring (Boesch 1997; Robbins et al. 2007).

We examine some of the factors that influence spending and resource allocation decisions on sons versus daughters. We draw on theory in evolutionary biology suggesting that investment in male versus female offspring depends on resource availability and on the offspring's reproductive value. Applying this to consumers, we propose that economic conditions alter spending on sons versus daughters, and test this idea by experimentally manipulating perceptions of economic conditions. We show that poor economic conditions favor allocations to daughters. For example, poor conditions led people to increase the allocation of assets to girls in their will,

and to choose girls over boys to receive a U.S. Treasury bond and a beneficial extracurricular activity. We also present process evidence in support of our theoretical model for how economic conditions influence parental spending. Finally, we derive and identify important boundary conditions for this effect, showing that the effect strengthens as a child approaches reproductive age and weakens for parents who are strictly monogamous. Overall, we present a theory and studies showing that a child's reproductive value helps inform how economic conditions influence resource allocation. This research contributes to the consumer behavior literature by revealing how, why, and when environmental factors influence spending on girls versus boys.

CHILDREN, CONSUMPTION, AND GENDER

Considerable research has identified how young consumers are shaped by advertising, family, and peers (Belch, Belch, and Ceresino 1985; Boland, Connell, and Erickson 2012; Chaplin and John 2007; Churchill and Moschis 1979; Foxman, Tansuhaj, and Ekstrom 1989; Goldberg et al. 2003; Goldberg and Gorn 1978; John 1999; John and Whitney 1986; Moschis and Churchill 1978; Peracchio 1992; Rindfleisch, Burroughs, and Denton 1997; Robertson and Rossiter 1974). However, far less research has examined parental decision making, defined here as any decision made by one or more parents about an outcome that directly impacts one's children. When it comes to consumer spending on children, for example, parents often purchase different types of products based on the child's gender. Whereas girls tend to receive feminine products such as dolls, tea party sets, and cosmetics, boys tend to receive masculine products such as action figures, toy trucks, and violent video games (Fisher-Thompson 1993; Fisher-Thompson, Sausa, and Wright 1995). Although parents tend to give children different types of

products, the central question in our research is whether total expenditures might be biased toward one gender. That is, do parents favor their daughters or sons when it comes to spending?

Some stereotypes suggest that parents might favor the child sharing their gender, such as when fathers buy boys expensive sports equipment or mothers have a special bond with their daughters. Yet other stereotypes suggest the opposite, as when people refer to "daddy's little girl" and "mama's boy." However, parents strive to treat each of their children in an equal fashion and rarely report an overt bias favoring one gender over the other (Andersson, Hank, Ronsen, and Vikat 2006; Gronau 1988; Lundberg 2005; Taubman 1991). In aggregate, parents in Western cultures indeed spend similar amounts of money to raise a son or a daughter (Lino 2010; Manitoba Agriculture Study 2004). Even so, we propose in the next section that economic conditions can lead parents to unwittingly bias investment toward one gender over the other.

SPENDING ON CHILDREN AS REPRODUCTIVE INVESTMENT

Spending on children can be viewed as an investment. In a seminal work rooted in economic theory, Becker (1991) argued that parents typically invest resources in children to maximize child quality as defined by the sum of their children's adult wealth. From this perspective, the quality of a child is assumed to be a function of the resources invested in the child coupled with the child's own skills and abilities. Becker's analysis states that parents should generally distribute investment equally among children, as long as the payoff curve is the same for each child. If, however, the abilities of some children are such that increasing the amount of investment in them relative to their siblings leads to greater payoff to parents in overall child quality, then parents should bias investment in favor of those children (Becker and Tomes 1976).

We build on the notion that spending on children is an investment, but instead consider such investment from an evolutionary perspective. Whereas economic analyses view parental spending on children as a way to maximize the parents' utility (often viewed in terms of wealth or sometimes happiness), evolutionary analyses view parental spending as a way to maximize the parents' long-term reproductive success (Bugental and Beaulieu 2004; Geary 2000; Trivers 1972). Evolutionary biologists presume that the behavior of all animals, including humans, is the output of mental mechanisms that have been shaped by natural selection. Because the ultimate goal from this perspective is reproductive fitness, parents are expected to selectively invest in offspring who carry the greatest potential for producing children, thereby enhancing the parents' reproductive success.

A central prediction from an evolutionary model is that investment patterns in offspring should differ depending on the offspring's *reproductive value*, which is the child's ability to convert parental resources into reproductive success by having children of their own (Daly and Wilson 1988). Evolutionary models predict that parents should invest relatively more resources in offspring who possess indicators of future reproductive success such as health. This prediction has been widely supported in animal research (Davis, Todd, and Bullock 1999; Gottlander 1987; Maestripieri and Carroll 1998), as well as in humans. Although in some specific cases human parents might invest more resources in high-risk children (Beaulieu and Bugental 2008), the overwhelming tendency for parents across societies is to invest more resources in children who have higher reproductive value (Costancia, Kelsey, and Reik 2004; Daly and Wilson 1980). For example, mothers provide relatively more care to babies with a healthy birthweight compared to babies with lower birthweights, and mothers similarly provide more breast milk to healthier rather than high-risk infants (Bereczkei 2001; Beaulieu and Bugental 2008; Mann 1992).

This past work shows that parents will sometimes favor one child over another, and has generally focused on the health of the child as a basis for reproductive value – healthier and larger offspring receive a larger investment. Although overall health is not a perfect signal of reproductive value (e.g., some healthy people may not be able to reproduce), it has reliably indicated a higher expected level of reproduction throughout evolutionary history. Of course, health is not the only consideration for assessing reproductive value. We propose that spending might also be selectively diverted to one gender over the other to reflect how economic conditions differentially affect the reproductive prospects of each gender.

GENDER DIFFERENCES IN REPRODUCTION

Theory in evolutionary biology suggests that parents should invest more in one gender over the other depending on whether conditions are currently good or bad – an idea known in biology as the Trivers-Willard hypothesis (Trivers and Willard 1973). The logic for this idea stems from mammalian sex differences in reproduction. Males and females are expected to produce the same number of offspring on average – a fact that must be mathematically true in a sexually reproducing species. But despite producing the same *average* number of offspring, males and females have different *variances* in offspring production. Among mammals, including humans, females have lower variance than males in the number of offspring they produce (Clutton-Brock and Albon 1982; Leimar 1996).

Females have lower reproductive variance than males largely because of structural differences between the sexes. The maximum number of children that a mammalian male can produce is primarily limited by the number of mates he can attract, with the number of children fathered by a male increasing linearly with each act of intercourse with a new female. By

contrast, the maximum number of children a mammalian female can produce is smaller than for a male. Unlike for males, producing offspring for females is limited by the number of available eggs (an average of one egg per menstrual cycle, which occurs only during the years when a female is fertile), a lengthy gestation period (approximately nine months for a single child in humans), and an additional period of nursing (historically lasting 1-4 years for each human child) (Bateman 1948; Wade 1979). The net result is that males have large differences (variance) in the number of offspring they produce, whereas the differences among females are smaller.

Given that producing an offspring requires extensive investment from females, mammalian females tend to be more selective than males about mates (Trivers 1972). As a consequence, males must compete more intensely with each other to attract selective females. Because of this asymmetry between males and females on the mating market, almost all females are able to secure a modest number of mating opportunities, regardless of their own individual desirability as a mate. By contrast, while some males are able to secure many mating opportunities, a portion of males fails to attract any mates. This is critical from an evolutionary perspective because a substantial number of males in each generation are shut out from the mating market and therefore produce zero offspring (Clutton-Brock and Albon 1982; Leimar 1996). Thus, a central consequence of the sex difference in reproductive variance is that male children have been more likely than female children to historically produce no offspring.

SPENDING ON DAUGHTERS VERSUS SONS AND ECONOMIC CONDITIONS

Based on reproductive variance across genders, we propose that poor economic conditions should alter which gender provides the best reproductive return on parental investment. Poor economic conditions make it more difficult for both genders to produce viable

offspring (e.g., child mortality is higher when resources are scarce), meaning that the average number of offspring produced decreases similarly for both males and females in poor conditions.

However, the sex difference in reproductive variance means that poor economic conditions will have a catastrophic consequence for many male offspring. This is because most female offspring will continue to produce at least one child in poor economic conditions (Wade 1979). By contrast, although a small number of highly-desirable males might produce many children, a larger number of males will not reproduce at all because many males will lack access to resources and will be unable to secure a mate when conditions are poor (Clutton-Brock, Albon, and Guinness 1985; Clutton-Brock and Iason 1986; Trivers and Willard 1973). Indeed, as resources become scarce, females increasingly prefer mates who have access to resources (Clutton-Brock 2009; Cotton et al. 2006; Hill et al. 2012; Jennions and Petrie 1997), and the lack of resources is one of the strongest cross-cultural predictors of polygyny with wealthy, high-status men monopolizing multiple women (Barber 2008; Pollet and Nettle 2009). Therefore, as resources become increasingly scarce, parents should view their female children as the safer reproductive option because doing so increases the probability of avoiding the catastrophic evolutionary outcome of producing zero grandchildren.

Put another way, in good conditions, when resources are plentiful, both males and females are likely to reproduce. But in poor conditions, when resources are scarce, reproduction is more difficult, leading males and females to produce fewer offspring. Due to their greater reproductive variance, many males now find themselves unable to produce any offspring when conditions are poor. The result is that while nearly all females will continue to produce at least some offspring even when conditions are poor, an increasingly large number of males will fail to produce any offspring. Given that the possibility of producing zero offspring effectively kills off

the future potential for their genes to propagate, natural selection is likely to have selected parents to seek to avoid this outcome.

From the perspective of spending on children as reproductive investment, allocating scarce resources to an offspring that is at substantial risk of producing zero offspring entails a costly evolutionary risk. Consider a family struggling in hard times to keep their children healthy. The incremental provisioning of extra resources to a son may increase his health, but it is unlikely to bolster his ability to attract a mate without a large investment that is infeasible for a struggling family. However, incremental provisioning of extra resources to a daughter can have large payoffs because almost all healthy women are able to secure at least some mating opportunities, even if they lack wealth or status. Thus, poor economic conditions should favor increased investment in female relative to male offspring.

This gender-specific bias can be viewed as a reproductive risk-management strategy. Investing in male offspring is akin to betting on a longshot in a horse race: males can yield a huge payoff but often they will yield nothing. Investing in female offspring is akin to betting on the heavy favorite: the winning payout is not large, but there is a good chance of some winnings that can subsequently continue to build through bets on future races. As such, resource-scarce conditions should encourage greater investment in girls because investing in female offspring has historically represented a safer and more certain option for continuing one's genetic lineage.

EXPERIMENT 1: ECONOMIC CONDITIONS AND PREFERENCE FOR GIRLS

The first experiment examined whether perceptions of economic conditions influence investment preferences for girls versus boys. Participants first read news articles depicting either an economic boom or an economic recession, and then made two types of decisions. Because our

participants for each study included parents and non-parents, we had participants imagine having two children—one boy and one girl. Thus, we had participants adopt the mindset of a parent of two children before making a decision that impacted the children (Gollwitzer 1990; 1993). First, people made a will that required dividing assets between a girl and a boy. Second, people indicated their preferences for spending money on several types of child expenditures, including a beneficial school program, an extracurricular activity, and braces. In each case people had to choose whether these expenditures would go to a boy or a girl. We predicted that cues to an economic recession would lead people to allocate more resources to a girl versus a boy.

In addition, the study sought to experimentally rule out potential alternative explanations based on general affect. To do so, in addition to the economic upswing and the economic recession conditions, we included two additional control conditions: a neutral control condition and a negative affect control condition intended to match the affective state produced by the economic recession manipulation. Consistent with our theory, we predicted that cues to an economic recession should uniquely lead people to allocate more resources to girls over boys.

Method

Participants. Six hundred and twenty-nine people (306 women and 323 men) were recruited from an Internet panel (MTurk) and paid a small monetary compensation of $0.60. Participants ages ranged from 17 to 82 years (M_{age} = 33.4, SD = 12.8). Neither age nor gender statistically differed across the four conditions (both had $p > .10$), indicating that we had proper randomization on age and gender.

To minimize suspicion, participants were told that the survey contained multiple parts and that the first part of the survey dealt with memory for stories. Consistent with this cover

story, participants were told that they would read a recent news article that was selected because it had an ideal length for memory studies. After reading the article, participants answered questions about allocating resources to a son or a daughter, ostensibly to allow time for their memory of the story to decay. In line with the cover story, at the end of the study participants answered memory questions about the news story.

Economic Condition Manipulation. Participants in the experiment were randomly assigned to read a news article based on one of four conditions: (1) economic recession ($n = 147$), (2) economic upswing ($n = 154$), (3) negative affect control ($n = 173$), and (4) neutral control ($n = 155$). Participants were told that the article recently appeared in a Sunday section of the *New York Times*, and it was formatted to look like a web-article featuring the newspaper's logo, font, and style. The news articles were based on Hill et al. (2012) and Griskevicius et al. (2013), which used a news article to manipulate perceptions of economic conditions.

The economic recession condition article was titled "Tough Times Ahead: The New Economics of The 21st Century." It described the recent economic recession, including job losses, declining access to resources, and how the economic problems are likely to persist in the future. The economic upwing condition article was titled "Happy Days Are Here Again! Economic Growth to Hit New High." It described how the economy is recovering and predicted a foreseeable economic boom (see Appendix A for the text of the articles).

In the neutral control condition, people read a story similar in length to the other conditions, except that it was designed to elicit minimal negative or positive affect. The story detailed the step-by-step process of doing laundry, and has been shown in past research to be affectively neutral by eliticing minimal positive or negative affect (Griskevicius, Shiota, and Nowlis 2010). Finally, the negative affect control article was titled "Technology in the 21st

Century More Unreliable Than Most Think." The article mimicked the length, style, and tone of the recession article, except that instead of talking about economic problems, it described problems with technology, such as computer crashes. Because we hypothesized that our predicted effect should be driven only by information pertaining to poor economic conditions, the intention of this article was to elicit similar levels of negative affect as the economic recession article without any implication regarding economic conditions.

Pretest. To ensure that the manipulations elicited the proper levels of negative affect, we conducted a pretest ($n = 149$) in which participants read one of the four news stories to be used in the experiment. Afterwards, the participants indicated the extent to which the story they read made them feel: (1) tense, (2) negative, and (3) nervous. Responses were provided on 9-point scales with "Not At All" and "Very Much" at the endpoints. Although past research on emotions has typically found separate factors for affect and arousal, we found that our three items could be captured by a single general index of negative arousal ($\alpha = .92$).

Findings showed that both the recession condition and the negative affect control condition elicited a fair amount of negative arousal (using an average of the three items). Importantly, the two conditions elicited similar levels on the negative arousal index ($M_{recession} = 5.56$ vs. $M_{negative\ affect\ control} = 5.49$; $F(1, 75) = .03$, $p > .85$). By contrast, the upswing condition and the neutral control condition elicited similar low levels on the negative arousal index ($M_{upswing} = 2.17$ vs. $M_{neutral\ control} = 1.79$; $F(1, 84) = 1.24$, $p > .26$). And as expected, the recession and the negative affect control conditions both elicited significantly more negative arousal than the upswing condition (both $ps < .001$) and the neutral control condition (both $ps < .001$). Thus, the manipulations successfully elicited the intended levels of negative arousal.

Dependent Measures. For the first dependent measure, participants were asked to imagine that they have two children – one boy and one girl. They were then asked to make a will that involved dividing their assets between their son and daughter based on a measure used in previous work (Price, Arnould, and Curasi 2000). Specifically, participants indicated how they would divide three types of assets: savings, real estate, and valuables (in that order). For each asset, participants indicated their preferences on an 8-point scale with "Definitely Son" and "Definitely Daughter" at the endpoints.

The second dependent measure assessed whether people would choose the girl or the boy to receive costly beneficial expenditures. Specifically, participants viewed three items in the following order: (1) "You have the funds to put one child in a special healthy lunch program at school"; (2) "You have the funds to put one child in an extracurricular activity at school"; and (3) "You have the funds to provide braces for only one child." For each item, participants answered the following question: Which child will get the lunch program [extracurricular activity, braces]? Responses were made on 8-point scales with "Definitely Son" and "Definitely Daughter" at the endpoints.

Results and Discussion

Will. We performed a repeated-measures analysis of variance (ANOVA) with asset type as a within-subject factor and condition as a between-subjects factor. Consistent with predictions, condition had a marginally significant main effect on the will allocation ($F(3, 625) = 2.20$, $p < .09$), and it did not interact with asset type ($F(3, 625) = .58$, $p > .74$). There was a main effect of asset type ($F(2, 624) = 25.64$, $p < .001$), indicating higher resource allocation on real estate toward the son compared to daughter (see Appendix B). More critically, to test the central

hypothesis that girls should be especially favored in the economic recession condition, we conducted a series of planned constrasts that compared preferences in the economic recession condition to each of the other three conditions.

--Figure 1 here--

Figure 1A reports the means for overall allocation of the items in the will (i.e., average of three asset types) by each condition. Participants bequeathed significantly more to the girl in the economic recession condition ($M_{recession}$ = 4.65, SD = .78) compared to the economic upswing condition ($M_{upswing}$ = 4.47, SD = .74; $t(625)$ = 1.99, $p < .05$, d = .24), the negative affect control condition ($M_{negative\ affect}$ = 4.49, SD = .62; $t(625)$ = 1.84, $p < .07$, d = .23), and the neutral control condition ($M_{neutral\ control}$ = 4.44, SD = .92; $t(625)$ = 2.38, $p < .02$, d = .25). Girls also received more assets relative to boys when comparing the recession condition versus the average of the other three conditions ($t(625)$ = 2.50, $p < .02$). In contrast, there were no significant differences between the economic upswing, the neutral control, or the negative affect control conditions (all ps > .61). Means and standard deviations for each item are available in Appendix B.

Beneficial Expenditures. We also performed the same repeated-measures ANOVA for the beneficial expenditures. Consistent with predictions, there was a main effect of condition ($F(3, 625)$ = 3.09, $p < .03$) and asset type ($F(2, 625)$ = 125.64, $p < .001$), with no interaction between the two ($F(3, 625)$ = .82, $p > .55$). Figure 1B reports the overall investment (i.e., average of the three items) with higher numbers representing increased spending on the girl versus the boy. Participants indicated they would invest more resources in the girl in the economic recession condition ($M_{recession}$ = 4.92, SD = .85) compared to the economic upswing condition ($M_{upswing}$ = 4.70, SD = .78; $t(625)$ = 2.14, $p < .04$, d = .27), the negative affect control condition ($M_{negative\ affect}$ = 4.74, SD = .82; $t(625)$ = 1.74, $p < .09$, d = .22), and the neutral control condition ($M_{neutral\ control}$

= 4.63, SD = 1.00; $t(625)$ = 2.97, p < .01, d = .31). Girls also received more resources relative to boys when comparing the recession condition versus the average of the other three conditions ($t(625)$ = 2.76, p < .01). Once again, there were no differences between the economic upswing condition, the negative affect control, or the neutral control (all ps > .22). Means and standard deviations for each item are available in Appendix B.

In summary, Experiment 1 supported our central prediction, showing that perceptions of poor economic conditions led people to increase resource allocation to girls at the expense of boys. Economic recessions led people to increase resource allocation to girls versus boys in a will and in child expenditures. Furthermore, Experiment 1 ruled out potential alternative explanations based on negative affect, lending greater credence to our theoretical account.

EXPERIMENT 2: THE MEDIATING ROLE OF REPRODUCTIVE VALUE

Experiment 2 sought to conceptually replicate and extend the findings from the initial study. First, we sought to replicate the specific pattern from Experiment 1 using a different manipulation of economic condition: rather than reading a news article, participants viewed a slideshow of images and captions. We used this different manipulation to provide greater confidence that some notion of economic condition is driving our effects.

Second, Experiment 2 sought to provide process evidence in support of our theoretical model. According to our model, poor conditions lead people to allocate more resources to girls because such conditions alter the reproductive value of girls relative to boys. Because more males will end up producing zero offspring when conditions are poor, such conditions should lead parents to favor the safer investment in females. Therefore, we tested whether people's perceptions of the reproductive potential of girls relative to boys statistically mediates the effect

of economic conditions on preference for girls versus boys. In addition, we also considered and tested for several alternative possibilities. Specifically, we examined whether economic conditions alter people's perceptions of whether boys and girls differ in their fragility, their financial need, and how much care they require. Although it is possible that economic conditions might affect these perceptions, we did not expect any of these to be the primary mediator of our core predicted effect.

Method

  Participants. One hundred and sixty-two participants (86 female, 72 male, 4 missing; $M_{age} = 39.0$, $SD = 13.5$, $Range = 18$–79 years) were recruited from MTurk and paid $0.75. Neither age nor gender statistically differed across the two economic conditions (both had $p > .59$), indicating that we had proper randomization on age and gender.

  Economic Condition Manipulation. Participants were randomly assigned to view a slideshow about either an economic upswing or an economic recession. The manipulation was based on Hill et al. (2012) and Griskevicius et al. (2013), which used slideshows to manipulate perceptions of economic conditions. The upswing slideshow depicted the U.S. economy as recovering and doing well. It highlighted job growth, an improved housing market, low debt, and positive sentiment about the future of the economy. The recession slideshow depicted the U.S. economy as mired in recession. It highlighted job losses, a poor housing market, increasing debt, and negative sentiment about the future of the economy (see Appendix C for the slideshows).

  Dependent Measure. We assessed giving resources to a girl versus a boy using the 3-item will measure from Experiment 1. Participants again indicated their preferences for each item on an 8-point scale with "Definitely Son" and "Definitely Daughter" at the endpoints.

Reproductive Value Measure. To measure whether economic conditions alter the perceived reproductive value of girls versus boys, participants indicated answers to three questions: "Under today's conditions … (1) Do girls or boys give parents more grandchildren?; (2) Is it easier to imagine a girl or a boy giving parents more grandchildren?; and (3) Is it easier for boys or girls to give parents grandchildren?". Participants provided their responses on scales with endpoints of 1 = "Definitely Boys" and 8 = "Definitely Girls". The three items were aggregated to form a composite measure of perceived reproductive value ($\alpha = .89$).

Other Measures. We also measured whether economic conditions alter people's perceptions of the fragility, financial need, and required care for girls versus boys. Participants provided answers to three questions: "Under today's conditions … (1) Are boys or girls more fragile?; (2) Are boys or girls more financially needy?; and (3) Do boys or girls require more care?". Participants provided responses on scales with endpoints of 1 = "Definitely Boys" and 9 = "Definitely Girls".

Results and Discussion

Will. A repeated-measures ANOVA revealed a main effect of condition ($F(1, 160) = 4.72$, $p < .04$, $d = .34$). We first focused on the overall assets bequeathed (i.e., mean of three items) to a girl versus a boy. This best reflects that our theory makes predictions related to overall allocation without regard to asset types. Participants bequeathed more overall assets to their daughter in the economic recession condition compared to the economic upswing condition ($M_{recession} = 4.79$, $SD = .62$ vs. $M_{upswing} = 4.55$, $SD = .74$; $t(160) = 2.17$, $p < .04$). See Appendix B for the means and standard deviations for each item.

The analyses also revealed a main effect of asset type ($F(2, 159) = 12.63$, $p < .01$) and an unexpected interaction with asset type ($F(2, 159) = 4.24$, $p < .05$). Although the size of this effect varied by asset type, we did not want to over interpret it as this result did not appear in any of the other studies. However, it is notable that the key predicted effect emerged for the very first measure of savings (that was unbiased by later allocations), decreased for the second measure (perhaps in an effort to balance), and clearly manifested in the overall index (that best tests our prediction on overall allocation). Regardless of such considerations, we still found support for our hypothesis in the key test of the overall allocation.

Reproductive Value. An ANOVA also revealed a main effect of condition on the perceived reproductive value of girls relative to boys ($F(1, 160) = 7.43$, $p < .01$, $d = .43$). Consistent with our predictions, participants reported that it would be easier for girls to have children in the economic recession condition ($M_{recession} = 5.53$, $SD = 1.45$) compared to the economic upswing condition ($M_{upswing} = 4.85$, $SD = 1.72$).

Other Measures. An analysis of the other measures indicated that there were no differences between the recession and the upswing conditions. Although people generally viewed that girls were more fragile, more financially needy, and required more care than boys, they did so equally across the two economic conditions. Economic condition did not alter perceptions of whether girls and boys differed in fragility ($M_{recession} = 6.01$ vs. $M_{upswing} = 6.14$; $t(160) = -.56$, $p > .57$), financial need ($M_{recession} = 5.82$ vs. $M_{upswing} = 6.09$; $t(160) = -1.11$, $p > .26$), or required care ($M_{recession} = 5.96$ vs. $M_{upswing} = 5.69$; $t(160) = 1.02$, $p > .30$). As well, there was no effect for an index ($\alpha = .76$) of these three measures ($t(160) = -.19$, $p > .84$). Finally, when each of the three items was analyzed for evidence of moderation of the investment preference, no interaction effects emerged (all ps $> .25$), meaning that none of the items moderated the findings. These

findings all argue against the notion that our effects manifest because male children are better able to meet the challenges of poor economic times.

Mediation Analysis. We predicted that the effect of economic condition on overall preference for girls (as captured by the index of the three items) should be statistically mediated by perceptions of the reproductive value of girls versus boys. A visual depiction of this mediation model is sketched in Figure 2.

--Figure 2 here--

As seen in Figure 2, economic condition predicted perceived reproductive value of girls versus boys (*a* path: $b = -.38$, *SE* $= .14$, $p < .01$), and overall investment preference for girls (*c* path: $b = -.23$, *SE* $= .11$, $p < .04$). Perceived reproductive value also predicted overall investment preference for girls (*b* path: $b = .16$, *SE* $= .06$, $p < .01$). We used the Hayes (2008, Model 4) PROCESS procedure and corresponding SPSS macro to test for an indirect effect of economic condition on overall preference for girls. A 1,000 bootstrap resample revealed an indirect effect of economic condition on overall preference for girls ($b = -.06$, *SE* $= .04$, 95% *CI* [-.15, -.01]. Because the confidence interval did not include zero, this indicated that the effect of economic condition on overall preference for girls was statistically mediated by perceptions of reproductive value. Furthermore, the effect of economic condition on overall preference for girls became non-significant after perceptions of reproductive value was entered in the model (*c'* path: $b = -.18$, *SE* $= .11$, $p > .11$). This pattern of findings confirmed that perceptions of reproductive value mediated the effects of economic conditions on bequeathing assets.

In summary, despite using a different manipulation of economic condition, Experiment 2 found that economic recessions again increased resource allocation to girls rather than boys. In addition, as proposed by our theory, Experiment 2 showed that this effect was statistically

mediated by perceptions of the reproductive value of girls versus boys. In other words, economic recessions led people to prefer girls *because* they perceived girls as more likely to subsequently have children (i.e., their grandchildren) in such conditions. By contrast, economic conditions did not alter perceptions of girls' and boys' vulnerability, how much care they require, or their financial need. Taken together, Experiment 2 provides evidence for our reproductive value account of why economic conditions alter resource allocation toward girls.

EXPERIMENT 3: BOUNDARY CONDITION OF CHILD'S AGE

Experiment 3 tested a theoretically-derived boundary condition of how economic conditions should influence preference for girls. Consistent with our reproductive investment model, we hypothesized that the effect of economic conditions should grow stronger as a girl's reproductive value increases. We tested this hypothesis by considering a variable directly related to reproductive value – the age of the child (Hagen et al. 2001; Sulloway 1995).

We posit that the increase in female investment due to poor economic conditions should strengthen as a child nears the age of reproduction. This is because a parent can be more certain about the reproductive value of older versus very young children. Younger children have a greater chance of injury, illness, or even death before reaching reproductive age, while older children have successfully demonstrated their physical health and ability to survive (Hagen et al. 2001; Sulloway 1995). Even for younger children who survive to maturity, the economic conditions at that future time may drastically differ from the current conditions. For example, although current poor conditions may encourage investing in a daughter right now, this could turn out to be a sub-optimal investment if future conditions greatly improve. Given these uncertainties about future health and prevailing conditions, and their influence on reproductive

value, we hypothesized that the effect of poor economic conditions on resource allocation to girls versus boys should be stronger when the children are closer to reproductive age.

We tested this specific prediction by examining how poor versus good economic conditions influence bequeathing assets to a girl versus a boy as a function of the age of both children (both children are 6 months old vs. both are 15 years old). Based on the idea that older children have a higher and more reliable reproductive value, we predicted that poor economic conditions should have a stronger effect on resource allocation to a girl relative to boy when the child is older and closer to reproductive age.

Method

Participants. One hundred and seventeen people (70 women and 47 men) were recruited from an Internet panel (MTurk) and paid a small monetary compensation of $0.75. Participants ages ranged from 19 to 72 years ($M_{age} = 37.9$, $SD = 12.7$). Neither age nor gender statistically differed across the two economic conditions (both had $p > .14$), indicating that we had proper randomization on age and gender.

Procedure. The study design was a 2 (Economic Condition: Recession vs. Upswing, between subjects) X 2 (Children's Age: 6 months vs. 15 years, within subjects) mixed-factorial design. Participants were randomly assigned to view either the economic recession or the economic upswing slideshow from Experiment 2 (see Appendix C). After viewing the slideshow, participants indicated how they would divide assets in a will.

Dependent Measure. The dependent measure was identical to that in previous studies, assessing how participants divided their assets in a will between their son and daughter across three categories (savings, real esate, valuables). Unlike our previous studies, however,

participants were explicitly given the ages of the children: 6 months old or 15 years old. Specifically, participants read, "Imagine that you have two children 6 months in age [15 years of age]: You have some assets and you have decided to create a will in case something happens. Please indicate whether you would leave the following items for your infant [15 year old] son or your infant [15 year old] daughter." Participants again indicated their preference for each of the three categories on 8-point scales with "Definitely Son" and "Definitely Daughter" at the endpoints. All participants answered questions about the older pair of children and the younger pair of children, and the order of the items was randomized. Order of the randomization (completing a will for the older vs. young children first) produced no main effects nor any interaction effects (ps > .10), so we analyzed and reported the collapsed results.

Results and Discussion

A repeated-measures ANOVA was performed with child age and asset type as within-subject factors and economic condition as a between-subjects factor. There was a marginally significant interaction between economic condition and child age ($F(1, 115) = 3.44$, $p < .07$). Although, consistent with previous studies, there was a main effect of asset type ($F(2, 114) = 12.20$, $p < .01$), none of the other factors reached standard statistical significance levels (all ps > .10). Because the focal hypothesis of the study concerned how economic condition would influence overall outcomes for older versus younger children, we next tested the effect of economic condition separately for older versus younger children.

--Figure 3 here--

Given our key two-way interaction did not further interact with asset type (Fs < 1, ps > .60), we focused on the overall allocation (i.e., average of three items) as in the previous studies.

We predicted that the effect of economic condition would be strongest for older children, and planned contrasts indeed showed this to be true (see Figure 3). There was a significant effect of economic condition for the 15-year old children. Consistent with the findings from the first two experiments, when the children were 15 years old, participants bequeathed significantly more assets to a girl in the economic recession condition compared to the economic upswing condition ($M_{15years\_recession} = 4.85$, $SD = .63$ vs. $M_{15years\_upswing} = 4.61$, $SD = .52$; $F(1, 115) = 5.16$, $p < .03$, $d = .42$). In contrast, economic condition had no effect for infants. When the children were 6 months old, there was no effect of economic condition on bequeathing assets to a girl versus a boy ($M_{infant\_recession} = 4.67$, $SD = .48$ vs. $M_{infant\_upswing} = 4.62$, $SD = .43$; $F(1, 115) = .31$, $p > .57$). Thus, poor economic conditions increased investing in an older 15-year old girl, but had no effect on investing in a younger 6-month old girl. In fact, looking only at the recession condition, participants were significantly more likely to bequeath assets to a girl (rather than boy) when she was 15 years old versus an infant of 6 months ($F(1, 115) = 6.24$, $p < .02$, $d = .33$).

In summary, Experiment 3 once again showed that poor economic conditions increased resource allocation to a girl rather than a boy. Findings also revealed a theoretically-derived boundary condition for this effect. As predicted by our theory, the gender-specific effect of economic condition emerged primarily for children who are older, and hence closer to reproductive maturity. This pattern of results provided additional evidence consistent with the notion that resource allocation to girls in an economic recession is related to parents biasing investment toward the child that is most likely to garner a reproductive return on investment.

EXPERIMENT 4: THE MODERATING ROLE OF RISK AVERSION

Experiment 4 aimed to provide insight into which individuals drive the effect of economic condition on resource allocation to girls rather than boys. Our theoretical model contends that poor environmental conditions favor investment in females relative to males as an evolutionary risk-management strategy. Because investing in girls is akin to investing in the sure thing or odds-on favorite, investment in girls rather than boys represents choosing a safer reproductive outcome rather than gambling on a riskier long shot.

The logic of risk avoidance undergirding our central hypothesis suggests that risk aversion is likely to be related to our effects. Risk aversion is an individual's propensity to accept a sure (or probable) reward rather than choosing an uncertain gamble that may have a higher expected value (Pratt 1964; Rabin and Thaler 2001). By a similar token, whereas investing resources in a female in poor conditions represents a sure (or at least highly probable) reproductive reward, investing resources in a male represents a risky reproductive gamble. Thus, we hypothesized that the effect of poor economic conditions on resource allocation to girls rather than boys should be stronger for individuals with naturally higher trait levels of risk aversion.

We also considered several other individual differences that could potentially be related to which individuals allocate resources to girls versus boys in difficult economic times. We assessed individual differences in beliefs regarding whether (1) daughters are more likely than sons to provide care for family members, (2) daughters are more expensive than sons, (3) sons are more capable of coping financially in difficult economic times, and (4) sons are more vulnerable than daughters in difficult economic times. We did not have any strong predictions for these alternative mechanisms, as they do not relate to the core of our theory, but they could still potentially contribute to any effects in an independent fashion.

Method

Participants. One hundred and ninety-eight participants (118 female, 77 male, 3 missing; $M_{age} = 36.9$, $SD = 13.3$, $Range = 19 – 71$ years) were recruited from an Internet panel (MTurk) and paid a small monetary compensation of $0.75. Neither age nor gender statistically differed across the two economic conditions (both had $p > .93$), indicating that we had proper randomization on age and gender.

Economic Condition. The study used the same manipulation as in the previous two studies, whereby participants were randomly assigned to view an economic recession or an economic upswing slideshow (see Appendix C).

Dependent Measure. The dependent measure assessed preference for giving resources to a girl versus a boy using the 3-item will measure consistent with our previous studies.

Individual Differences in Risk Aversion. To assess individual differences in risk aversion, we used measures based on previous research (Green and Myerson 2004; Hsee and Weber 1999; Kahneman and Tversky 1979). The measure involved a series of 6 gamble-like choices. For example, "Do you want $25 for sure OR a 50% chance to get $40". Participants indicated their preference on a 6-point scale (endpoints 1 = Definitely Option A and 6 = Definitely Option B). Across the 6 gambles, the amount to be received for sure was $25 while the gamble payout was $40, $50, $60, $70, $80, or $90, with a 50% chance of receiving the payout. The dependent measure consisted of a mean-centered composite of the 6 preferences ($\alpha = .92$) coded such that higher numbers reflected a preference for the certain payout and hence higher risk aversion.

Other Individual Differences. We assessed each individual's beliefs about sons and daughters in the following four domains. Financial Independence: (1) When times are tough, do you think it is more difficult for men or for women to make money?; and (2) If a person needs a

job, do you think it's easier for a man or a woman to get a job? (composite α = .64).

Vulnerability: (1) Are men or women more fragile?; and (2) Do men or women require more care? (composite α = .82). *Care of Family Members*: (1) Do you think sons or daughters provide greater help taking care of younger siblings?; and (2) Do you think sons or daughters are more likely to take care of younger siblings? (composite *α* = .86). *Financial Need*: (1) When times are tough, who is more financially needy: daughters or sons?; and (2) When the economy is bad, who will need more help financially: daughters or sons? (composite α = .62). Participants provided responses on 9-point scales with anchors 1 = Definitely Men [Sons]; 5 = Same for Men [Sons] and Women [Daughters]; 9 = Definitely Women [Daughters]. These four indices were each mean-centered prior to analysis.

Results and Discussion

A repeated-measures ANOVA was performed with asset type as a within-subjects factor, economic condition as a between-subjects factor, and a continuous measure of individual differences in risk aversion. The analysis revealed two significant effects. First, the analysis revealed a significant main effect of economic condition on resource allocation to girls versus boys ($F(1, 192) = 5.54$, $p < .03$, $d = .34$). Consistent with all of our previous results, participants significantly increased the allocation of resources to girls at the expense of boys in the economic recession condition ($M_{recession} = 4.70$, $SD = .68$) compared to the economic upswing condition ($M_{upswing} = 4.46$, $SD = .71$). Second, in support of our theory, this main effect was qualified by a significant interaction between economic condition and the individual measure of risk aversion ($\beta = -.29$, $F(1, 192) = 6.33$, $p < .02$). Figure 4 reports the overall resource allocation (i.e., average of three items) to show the nature of the interaction. As our theory predicted, and the sign of the

coefficient indicates, the effect of economic conditions attenuated as people were less risk averse. Although there again was a main effect of asset type ($F(2, 192) = 16.50$, $p < .01$), with higher resource allocation on real estate toward the son compared to daughter ($M_{real\ estate} = 4.19$, $SD = 1.29$ vs. $M_{savings} = 4.62$, $SD = 1.17$ vs. $M_{valuables} = 4.92$, $SD = 1.15$), all of the other factors in the model failed to attain standard statistical significance levels (all had $p > .05$).

--Figure 4 here--

To further test our specific hypotheses in this study, we used the Hayes (2008, Model 1) PROCESS procedure to probe the interaction by examining the effect of economic condition at one standard deviation above and below the mean of risk aversion (Aiken and West 1991; Irwin and McClelland 2001). At high levels of risk aversion (1 SD above the mean), economic recessions (vs. economic upswings) led participants to increase the overall allocation of assets to girls to a far greater degree ($M_{recession} = 4.83$ vs. $M_{upswing} = 4.35$; $t(196) = -3.44$, $p < .001$). However, at low levels of risk aversion (1 SD below the mean), there was no effect of economic condition on bequeathing overall assets to a girl versus a boy ($M_{recession} = 4.56$ vs. $M_{upswing} = 4.58$; $t(196) = .12$, $p > .90$). A floodlight analysis (Spiller et al. 2013) indicated that a risk aversion value of 4.06 is the point at which the effect of economic condition emerges ($t(191)=-1.97$, $p=.05$). This interaction indicates that risk aversion contributed to the magnitude of our effects, as predicted by our theory.

Other Measures. We also tested whether any of the other four individual differences similarly moderated the effect of economic condition. Analyses of the overall preference did not reveal any significant interaction effects for models including financial independence ($F(1, 192) = .15$, $p > .70$), vulnerability ($F(1, 192)= .04$, $p > .85$), care of family members ($F(1, 192) = .03$, $p > .87$), or financial need ($F(1, 192) = 1.43$, $p > .23$). We also individually examined each item

from these constructs (i.e., not averaged into an index). These eight analyses also did not reveal a single significant interaction (all ps > .24). Furthermore, there was no main effect of economic condition on any of the eight items (ps > .20), and an examination of whether any of these eight measures mediated our effect found no evidence for mediation (Sobel ps > .25; Bootstrap 95% *CIs* all overlapped with zero). These results all show that the magnitude of our effects were not dependent on individual beliefs about whether boys would be able to better meet the challenges posed by poor economic conditions.

In summary, Experiment 4 again replicated our core finding that poor economic conditions lead to increased resource allocation to girls over boys. It also demonstrated the important role of risk aversion. We contend that poor economic conditions should favor investment in females relative to males as a reproductive risk management strategy. Because poor conditions make the reproductive value of boys more variable, highly risk-averse individuals should especially prefer the greater certainty of the returns from investing in girls. Indeed, Experiment 4 showed that the preference for investment in girls in poor conditions was stronger for people who were more risk averse. This mirrors behavior found in gambling (Pratt 1964; Rabin and Thaler 2001), presumably because investing in children similarly involves payoffs and risks. No evidence was found that individual differences in other potentially relevant perceptions of girls versus boys were related to the central effect.

EXPERIMENT 5: THE MODERATING ROLE OF MONOGAMY

Experiment 5 aimed to provide additional support for our reproductive value model by examining a moderator that speaks directly to our proposed process. We have argued that our effect is directly related to gender differences in reproductive variance. Specifically, males have

a greater variance than females in the number of offspring they produce, such that more males fail to reproduce and more males have an extremely high number of offspring. We posit that this difference is more important in poor economic conditions because many more males fail to find a mate and reproduce, while a few other males secure many mates.

Given our proposed theory, the effect of economic condition on resource allocation to girls should weaken when one believes that mating practices are generally monogamous (one partner for each person). The Trivers-Willard hypothesis assumes at least some degree of promiscuity where some high status males mate with multiple females. Thus, under conditions of strict monogamy, predictions drawn from the Trivers-Willard hypothesis should fail empirical tests because the reproductive variance will be equal for each gender. For example, no evidence for biased investment is expected or found in monogamous species in which one male mates for life with one female (Cockburn, Legge, and Double 2002; Gowaty 1983; Trivers and Willard 1973). Unlike many other organisms, humans have a suite of mating strategies that can range from strictly monogamous to highly promiscuous (Buss and Schmitt 1993; Gangestad and Simpson 2000). An individual's mating strategy is generally positively associated with attitudes and subjective norms that affirm the belief that similar others—such as close kin and children— also follow or will follow a similar mating strategy (Kurzban, Dukes, and Weeden 2010; Weeden, Cohen, and Kenrick 2008). Therefore, our theory predicts that the effect of poor economic conditions on resource allocation to girls rather than boys should be weaker for individuals who are more monogamous and stronger for individuals who are less monogamous (i.e., have multiple partners).

Method

Participants. One hundred forty-three U.S. participants (83 female, 60 male, M_{age} = 35.57, *SD* = 11.5, *Range* = 18 – 73 years) were recruited from MTurk and paid a small monetary compensation of $0.75. Neither age nor gender statistically differed across the two economic conditions (both had *p* > .40), indicating that we had proper randomization on age and gender.

Economic Condition. The study used the economic recession or economic upswing slideshow to manipulate perceptions of economic condition (see Appendix C).

Dependent Measure. The dependent measure involved making a choice about which child would receive a U.S. Treasury bond. Participants were told that we were interested in individual differences in financial decisions, and that they would be making a choice about a U.S. Treasury bond. Participants were asked to imagine that they have two children: one boy and one girl. Additionally, participants were told, "You want to invest in your children's future. Right now you have the opportunity to grant your son or your daughter a U.S. Treasury bond in the amount of $25. The 30-year yield on a U.S. Treasury Bond is currently 3.56%. This choice involves your daughter and your son. Imagining that your choice may result in receipt of a savings bond for your child, please indicate below which of your children you would like to give the Treasury bond to." Participants then indicated their preference on an 8-point scale with "Definitely Son" and "Definitely Daughter" at the endpoints.

Individual Differences. To assess individual differences in monogamy, we asked participants "With how many partners have you had sex within the past year?". The number of sexual partners that a person has in a year is a validated, behavioral measure of individual differences in monogamy (Simpson and Gangestad 1991). Descriptive statistics for this measure were as follows: $M_{partners}$ = 1.20; *SD* = 1.29, range 0 – 12. To rule out that any differences in monogamy does not relate to perceptions of which gender requires more care, we again

measured perceptions of the fragility, financial need, and required care for girls versus boys, as in Experiment 2. Participants provided responses on scales with endpoints of 1 = "Definitely Boys" and 8 = "Definitely Girls".

Results and Discussion

Because the measure of monogamy was positively skewed (*Shapiro-Wilk W* = .45, *p* < .001), we transformed the data by adding 1 to each score, such that the data did not contain zero, and then performed a log-transformation to create our monogamy measure. A General Linear Model on the bond allocation with economic condition and the mean-centered continuous measure of monogamy as factors revealed two significant effects. First, there was a main effect of economic condition on allocating the Treasury bond to girls versus boys ($F(1, 139) = 5.39$, *p* < .03, *d* = .40). Again, consistent with all of our previous results, participants allocated significantly more resources to girls than boys in the economic recession condition ($M_{recession}$ = 6.19, *SD* = 2.40) compared to the economic upswing condition ($M_{upswing}$ = 5.16, *SD* = 2.72). Second, as specifically predicted by our reproductive value model, this main effect was qualified by an interaction with the measure of monogamy ($F(1, 139) = 4.99$, *p* < .03). As shown in figure 5, the effect of economic conditions attenuated for participants practicing stricter monogamy, and was exacerbated for those not practicing monogamy.

--Figure 5 here--

To further test our specific hypothesis in this study, we again used the Hayes (2008, Model 1) PROCESS procedure to probe the nature of the interaction. We examined the effect of economic condition at one standard deviation above and below the mean of monogamy (Aiken and West 1991; Irwin and McClelland 2001). Participants with the greatest number of sexual

partners within the last year (1 SD above the mean) allocated the bond more to girls over boys under economic recessions versus upswings ($M_{recession}$ = 6.65 vs. $M_{upswing}$ = 4.67; $t(196)$ = -3.29, p < .01). In contrast, those with the fewest sexual partners in the past year (1 SD below the mean) displayed no effect of economic condition on allocating the bond to a girl versus a boy ($M_{recession}$ = 5.72 vs. $M_{upswing}$ = 5.65; $t(139)$ = -.12, p > .90). A floodlight analysis indicated that 1.98 sexual partners in the past year is the point at which the effect of economic condition emerges ($t(139)$ = -1.98, p = .05). Here, consistent with our theory, gender preferences completely disappeared for those with monogamy practices as the norm.

As in Experiment 2, an analysis of the other measures again found no differences between the recession and the upswing conditions. Participants generally viewed girls as fragile, financially needy, and requiring care, as compared to boys. However, economic condition did not alter these perceptions of fragility ($M_{recession}$ = 5.73 vs. $M_{upswing}$ = 5.82; $t(140)$ = -.33, p > .74), financial need ($M_{recession}$ = 5.61 vs. $M_{upswing}$ = 5.50; $t(140)$ = .42, p > .67), or requiring care ($M_{recession}$ = 5.87 vs. $M_{upswing}$ = 5.71; $t(141)$ = .64, p > .52). As well, there was no effect of economic condition on an index (α = .84) of these three measures ($t(141)$ = .25, p > .79). These results all indicate that it is unlikely one of these beliefs could have accounted for the effect of economic conditions. Furthermore, when each of the three items was analyzed for evidence of moderation of the investment preference, no interaction effects emerged (all ps > .34), meaning that none of these factors moderated the findings. Our findings do not appear to be linked to simple beliefs of fragility or need.

In summary, Experiment 5 provides additional support for our reproductive value model. In addition to replicating the central effect with a new dependent measure (treasury bond allocation), findings showed that the extent to which an individual practiced monogamy

contributed to the magnitude of our effects. As specifically predicted by our theory, people with many sexual partners showed a stronger gender preference for girls over boys in tough economic conditions. Because strict monogamy does not allow men and women to have different reproductive variance – the primary theoretical reason for the central effect in this paper – it makes sense that the effect is substantially weaker for those who practice monogamy.

GENERAL DISCUSSION

What factors influence how people spend money on their children? We investigated this question by examining how the economic climate might systematically bias investment in boys and girls. Drawing on theory in biology, we predicted that poor economic conditions would increase investment in girls versus boys because poor conditions alter the reproductive value of girls relative to boys. We tested this hypothesis across five experiments. Consistent with our central prediction, as economic conditions worsened, people chose to increase investment in daughters over sons. When economic conditions were perceived to be bad, people preferred to enroll a daughter rather than a son in beneficial programs, preferred to give a U.S. Treasury bond to a daughter compared to a son, and bequeathed more assets in a will to a daughter than a son. This robust pattern persisted across studies despite varying the manipulations of economic conditions and making comparisons to a variety of appropriate control conditions.

As further evidence of robustness, a meta-analysis (Raudenbush and Bryk 2002; Rosenthal and Rosnow 1991) on all of our studies with the will allocation (including those in the Web Appendix) found our key predicted effects for savings (weighted $d = .22$, $p = .02$), real estate (weighted $d = .12$, $p = .09$), valuables (weighted $d = .17$, $p = .04$), and overall composite (weighted $d = .31$, $p = .001$). As well, although not an explicit prediction or a direct test of our

theory, we also found that daughters received more than an equal share of resources across studies in the economic recession condition ($M = 4.72$ vs. Midpoint of 4.5; $t(389) = 6.14$, $p <$ .0001). This suggests parents do not split resources equally among their children, even though many state this goal, so future work may find this topic will prove fruitful.

In addition to documenting a robust novel phenomenon, we also demonstrated process evidence to support our theoretical model. We propose that poor economic conditions lead parents to bias investment toward girls because poor conditions alter the reproductive value of girls relative to boys. Consistent with our theory, the effect of economic condition on preference for girls was statistically mediated by people's perceptions of the reproductive value of girls versus boys. In other words, economic recessions led people to prefer girls *because* they perceived girls as more likely to have children in such conditions.

We also identified a theoretically-derived boundary condition. Consistent with our theory that parental spending is akin to reproductive investment, we hypothesized that the effect of poor economic conditions should be stronger for children nearing the "payoff" age of reproduction. We indeed found that poor conditions exerted a stronger effect to bias spending toward daughters for children who were 15 years old, but not for those who were only 6 months of age.

As further support of our theory, we also tested which individuals exhibited the strongest effect. Our theory posits that poor economic conditions bias investment toward girls as a reproductive risk-management strategy, whereby investing in daughters rather than sons represents choosing a safe reproductive outcome rather than gambling on a riskier long shot. We confirmed our prediction that people who were more risk averse were indeed most likely to divert investment to girls – the safe bet – in the face of an economic decline. We also tested one other individual difference our theory specifically predicts should reduce gender preference

because it relates to gender difference in reproductive variance -- people for whom practicing monogamy is the norm (one partner for each person). We confirmed that monogamy indeed moderated our effect as people with more sexual partners were more likely to bias investment toward girls when economic conditions were bad. In sum, our theory is supported by mediation evidence (Experiment 2) in which expected reproductive value partially accounts for our effect, as well as multiple theoretically-driven moderators with child age (Experiment 3), parent risk aversion (Experiment 4), and monogamy practices (Experiment 5) all influencing our core effect.

This research contributes to growing findings on how consumer choices are influenced by the economic climate and resource scarcity (Griskevicius et al. 2013; Kamakura and Du 2012; Laran and Salerno 2013; Mittal and Griskevicius 2014; Millet, Lamey, and Van den Bergh 2012; Sevilla and Redden 2014), and by sex differences in reproductive biology (Dahl, Sengupta, and Vohs 2009; Durante et al. 2011; Griskevicius et al. 2007, 2012; Janssens et al. 2011; Lens, Driesmans, Pandelaere, and Janssens 2012; Sengupta and Dahl 2008; Van den Bergh, Dewitte, and Warlop 2008). Overall, relatively little consumer research has examined parental decision making. We present a theory and studies showing that consideration of a child's reproductive value helps inform how parents make spending decisions among their children. We identified that people's preference toward children of one gender over the other is influenced by environmental conditions, with poor economic conditions increasing investment in daughters versus sons. This research contributes to the literature on consumer behavior by revealing how, why, and when environmental factors influence spending on girls versus boys.

Implications

Our findings have important implications for consumers, marketers, and researchers. For consumers, we show that parents can unwittingly bias their spending toward specific children. To the extent that parents seek to be equitable in their spending among children, they might be able to de-bias their spending by more carefully tracking their expenditures and being on the lookout for this bias. In fact, our studies may understate this bias as participants could easily see they were making a tradeoff between investing in their children, which may have triggered a heuristic or a social norm to equally split their resources. In everyday life, however, it is more difficult to keep track of expenses that vary across a myriad of categories, over long time periods, and that differ in non-fungible units (e.g., time versus money).

For marketers, a potentially valuable insight is that natural fluctuations in the economy over time can systematically influence relative spending on girls versus boys. For example, based on the findings in the current experiments, we considered how annual fluctuations in U.S. GDP were related to retail spending on boys' versus girls' apparel. We looked at U.S. Real GDP from 1984-2011 (World Bank 2011) and inflation-adjusted retail spending on apparel for male and female children (aged 2 to 16) over the same period (Bureau of Labor Statistics 2011). Findings revealed that GDP had a strong negative correlation with relative spending on girls versus boys ($r(28) = -.62$, $p < .001$). The ratio of spending on girls increased by 18.9% when the economy was doing poorly compared to when it was doing well (the ratio was 1.19 and 1.36 at +/- 1 SD from the mean of GDP). This means that as GDP decreased, relative spending on girls versus boys increased. Although more research is needed, to the extent that consumers spend relatively more resources on girls when the economy is declining, this information can be useful for understanding trends, product planning, and improving market forecasts.

The current research was partially informed by the Trivers-Willard hypothesis in biology (Trivers and Willard 1973). Based on animal research and evolutionary logic, the Trivers-Willard hypothesis asserts that parents' physical condition, such as their health, should influence whether parents maximize their lifetime reproductive success by biasing their investment towards male versus female offspring. Our findings can inform this literature in several ways. First, we show that the ideas from the Trivers-Willard hypothesis are relevant for consumer behavior, whereby parental conditions in humans can influence spending on products and services for boys and girls. Second, we show that gender-biased parental investment applies not just to parents' physical condition, but also to environmental condition, such as the current economic climate. In fact, whereas past studies have considered how individual differences in physical condition correlate with measures of parental care (Cronk 2007), to our knowledge our studies are the first to test whether environmental conditions shape sex-specific investment in offpsring. Given that many modern humans no longer face such dire physical conditions, one could easily imagine that understanding the effects of changing economic conditions may be even more relevant in today's world of relative abundance. Finally, we contribute by highlighting the process underlying our effect—perceptions of a child's reproductive value.

The current research also informs emerging work on the effects of resource scarcity on consumer decision-making (Laran and Salerno 2013; Griskevicius et al. 2013; Mittal and Griskevicius 2014; Roux, Goldsmith and Bonezzi 2015; Sharma and Alter 2012). Whereas previous work has focused on how perceptions of resource scarcity and financial deprivation can change the way people spend money (e.g., Fernbach, Kan, and Lynch 2015; Hill et al. 2012; Kamakura and Du 2012; Laran an Salerno 2014; Shah, Mullainathan, and Shafir 2012; Sharma and Alter 2012), the current research focuses on how such conditions alter how people allocate

resources to their children. Our findings suggest that consumers may systematically prioritize spending on girls in times of resource scarcity. Future work could examine whether certain products are more likely to be biased toward daughters in times of resource scarcity.

Limitations, Alternative Explanations, and Future Directions

Although we have focused on economic conditions, decisions to favor children of one gender over another are likely to be influenced by many factors. For example, cultural factors undoubtedly play a role, as evidenced in cultures such as China where people have historically tended to favor having boys more than girls. We suggest that economic conditions within a culture are also likely to play a relevant role. For example, within cultures such as China, boys may be less favored in areas that are particularly poor. Future research is needed to examine how cultural and biological factors work together to influence parental decision making.

We predicted and found effects consistent with the logic of spending on children as a reproductive investment. However, we also considered several alternative possibilities for why economic recessions might lead people to favor girls over boys. For example, compared to boys, girls might be seen as more fragile, less capable of generating financial resources, and more likely to care for other family members. We tested for these alternative possibilities using multiple approaches: in Experiment 2 we examined whether economic recessions alter people's perceptions in these domains and thereby statistically mediated the core effect in the paper; and in Experiments 4 and 5 we assessed individual differences in people's beliefs in these domains and tested whether they moderated our core effect. We found no evidence here that these types of perceptions or beliefs were related to the central findings in the paper. Economic recessions did not alter people's perceptions in these domains, and people holding such beliefs were no

more likely to show the effect as other individuals. Instead, we presented one parsimonious theory that accounts for the full pattern of findings across all of our studies. Of course, these other considerations may still affect parental spending in contexts other than changes in the economic conditions.

On question that arises is whether our manipulation of an economic recession is more or less aligned with triggering thoughts of individual-level resource scarcity or financial deprivation. Although our recession manipulation was designed to highlight the negative effects economic downturns have on resources (e.g., dwindling jobs, food, and energy resources), it is possible that manipulations of resource scarcity and financial deprivation at the individual level may have produced different effects (Roux, Goldsmith, and Bonezzi 2015; Sharma and Alter 2012). For example, our manipulations depicted an impending recession at the national level. It is possible that consumers may respond differently to our dependent measures if they are led to believe that they are currently doing better versus worse financially compared to their peers. We speculate that manipulations of relative wealth versus poverty would produce similar effects. But, of course, future research is warranted.

We found that individual differences in the practice of monogamy moderated the effect of economic condition on biased investment in girls. Here, we operationalized monogamy by the number of sexual partners the participant has had over the course of one year because this measure signifies people for whom practicing monogamy is the norm (Simpson and Gangestad 1991). Our effect was predicted to weaken for those practicing strict monogamy because these individuals are likely to assume their children will also practice monogamy. We acknowledge that a limitation of this measure is that it does not directly assess beliefs about monogamy norms within one's social group. Future work may wish to examine other measures of monogamy,

including a measure that moves the practice of monogamy closer in relevance to the child by manipulating perceptions about the expected mating ecology of the children (e.g., a perception that monogamy is expected to be enforced when children reach reproductive age).

Finally, future research should consider under what conditions parents might invest more in boys rather than girls. Prosperous conditions might lead parents to bias investment toward males, since such conditions increase the chances that some males can produce a high number of offspring (often with multiple females). In the current studies we did not find that cues to general economic prosperity systematically biased investment toward males. One possibility is that preference for boys over girls might emerge when people's status relative to others has increased, such as when a person becomes wealthier but others do not. Future research is needed to examine whether environmental factors might shift parental investment toward males.

In conclusion, parental spending on children represents a significant portion of all spending. In the U.S., it costs $286,050 on average to raise just one child (Lino 2010), not including college expenses. In Britain, the costs of raising a child have increased by 58% in the last ten years (The Guardian 2013). Given that relatively little consumer research has examined parental spending, future work is poised to build on our findings to further consider how, why, and when parents spend on each child.

REFERENCES

Aiken, Leona S. and Stephen G. West (1991), *Multiple Regression: Testing and Interpreting Interactions,* Newbury Park, CA: Sage.

Andersson, Gunnar, Karsten Hank, Marit Rønsen, and Andres Vikat (2006), "Gendering Family Composition: Sex Preferences for Children and Childbearing Behavior in the Nordic Countries," *Demography* , 43, (February), 255-267.

Bateman, Angus J. (1948), "Intra-Sexual Selection in Drosophila." *Heredity*, 2, 349-368.

Barber, Nigel (2008), "Explaining Cross-National Differences in Polygyny Intensity Resource-Defense, Sex Ratio, and Infectious Diseases." *Cross-Cultural Research,* 42 (March), 103-117.

Beaulieu, David A. and Daphne Bugental (2008), "Contingent Parental Investment: An Evolutionary Framework for Understanding Early Interaction Between Mothers and Children," *Evolution and Human Behavior,* 29 (July), 249-55.

Becker, Gary S. (1991), *A Treatise on the Family: Enlarged Edition,* Cambridge, MA: Harvard University Press.

Becker, Gary S. and Nigel Tomes (1976), "Child Endowments and the Quantity and Quality of Children," *Journal of Political Economy,* 84 (August), S143-62.

Belch, George E., Michael A. Belch, and Gayle Ceresino (1985), "Parental and Teenage Child Influences in Family Decision Making," *Journal of Business Research,* 13 (April), 163-76.

Bereczkei, Tamas (2001), "Maternal Trade-off in Treating High-Risk Children," *Evolution and Human Behavior,* 22 (May), 197-212.

Boesch, Christophe (1997), "Evidence for dominant wild female chimpanzees investing more in sons," *Animal Behavior,* 54 (October), 811-15.

Boland, Wendy A., Paul M. Connell, and Lance-Michael Erickson (2012), "Children's Response to Sales Promotions and their Impact on Purchase Behavior," *Journal of Consumer Psychology,* 22 (April), 272-79.

Bureau of Labor Statistics (2011). Consumer Expenditure Survey. http://www.bls.gov/cex/

Buss, David M., and David P. Schmitt (1993), "Sexual Strategies Theory: An Evolutionary Perspective On Human Mating." *Psychological Review,* 100 (April), 204-232.

Chaplin, Lan N. and Deborah Roedder John (2007), "Growing up in a Material World: Age Differences in Materialism in Children and Adolescents," *Journal of Consumer Research,* 34 (December), 480-93.

Churchill, Gilbert A. Jr. and George P. Moschis (1979), "Television and Interpersonal Influences on Adolescent Consumer Learning," *Journal of Consumer Research,* 6 (June), 23-35.

Clutton-Brock, T. H., S. D. Albon, and F. E. Guinness (1981), "Parental Investment in Male and Female Offspring in Polygynous Mammals," *Nature,* 289, 487-489.

Clutton-Brock, Timothy H. and Steve D. Albon (1982), "Parental Investment in Male and Female Offspring in Mammals," in *Current Problems in Sociobiology,* ed. King's College Sociobiology Group, Cambridge: Cambridge University Press, 223–47.

Clutton-Brock, Timothy H., Steve D. Albon, and Fiona E. Guinness (1985), "Parental Investment and Sex Differences in Juvenile Mortality in Birds and Mammals," *Nature,* 313 (January), 131-33.

Clutton-Brock, Timothy H. and Glenn R. Iason (1986), "Sex Ratio Variation in Mammals," *The Quartely Review of Biology,* 61 (September), 339-74.

Clutton-Brock, Timothy H. (2009). Sexual Selection in Females. *Animal Behaviour*, 77, 3–11.

Cockburn, Andrew, Sarah Legge, and Michael C. Double (2002). "Sex Ratios in Birds and Mammals: Can the Hypotheses be Disentangled," in *Sex Ratios: Concepts and Research Methods.* Cambridge University Press: Cambridge, 266-286.

Constancia, Miguel, Gavin Kelsey, and Wolf Reik (2004), "Resourceful Imprinting," *Nature,* 432 (November), 53-57.

Cotton, Samuel, Jennifer Small, and Andrew Pomiankowski (2006), "Sexual Selection and Condition-Dependant Mate Preferences," *Current Biology*, 16 (September), R755–R765.

Cronk, Lee (2007), "Boy or Girl: Gender Preferences from a Darwinian Point of View," *Reproductive BioMedicine Online,* 15 (September), 23-32.

Daly, Martin and Margo Wilson (1980), "Discriminative Parental Solicitude: A Biological Perspective," *Journal of Marriage and Family,* 42 (May), 277-88.

Daly, Martin and Margo Wilson (1988), "Evolutionary Social Psychology and Family Homicide," *Science,* 242 (October), 519-24.

Dahl, Darren, Jaideep Sengupta, and Kathleen Vohs (2009), "Sex in Advertising: Gender Differences and the Role of Relationship Commitment," *Journal of Consumer Research*, 36 (2), 215-231.

Davis, Jennifer Nerissa, Peter M. Todd, and Seth Bullock (1999), "Environment Quality Predicts Parental Provisioning Decisions," *Proceedings of the Royal Society of London B,* 266 (September), 1791-97.

Durante, Kristina M., Vladas Griskevicius, Sarah E. Hill, Carin Perilloux, and Norman P. Li (2011), "Ovulation, Female Competition, and Product Choice: Hormonal Influences on Consumer Behavior," *Journal of Consumer Research,* 37 (6)*,* 921-934.

Fernbach, Philip M., Christina Kan, and John G. Lynch, Jr. (2015) "Squeezed: Coping with Constraint Through Efficiency and Prioritization," *Journal of Consumer Research*, 41 (February), forthcoming.

Fisher-Thompson, Donna (1993), "Adult Toy Purchases for Children: Factors Affecting Sex-Typed Toy Selection," *Journal of Applied Developmental Psychology,* 14 (July-September), 385-406.

Fisher-Thompson, Donna, Angela D. Sausa, and Terri F. Wright (1995), "Toy Selection for Children: Personality and Toy Request Influences," *Sex Roles,* 33 (August), 239-55.

Foxman, Ellen R., Patriya S. Tansuhaj, and Karin M. Ekstrom (1989), "Family Members' Perceptions of Adolescents' Influence in Family Decision Making," *Journal of Consumer Research,* 15 (March), 482-91.

Gangestad, Steven W., and Jeffry A. Simpson (2000), "The Evolution of Human Mating: Trade-Offs and Strategic Pluralism." *Behavioral and Brain Sciences* 23 (August), 573-587.

Geary, David C. (2000), "Evolution and Proximate Expression of Human Paternal Investment," *Psychological Bulletin,* 126 (January), 55-77.

Goldberg, Marvin E. and Gerald J. Gorn (1978), "Some Unintended Consequences of TV Advertising to Children," *Journal of Consumer Research,* 5 (June), 22-29.

Goldberg, Marvin E., Gerald J. Gorn, Laura A. Peracchio, and Gary Bamossy (2003), "Understanding Materialism Among Youth," *Journal of Consumer Psychology,* 13 (September), 278-88.

Gollwitzer, Peter M. (1990), "Action Phases and Mind-sets," In E. T. Higgins

      & R. M. Sorrentino (Eds.), *Handbook of Motivation and Cognition* (Vol. 2, pp. 53-92)

      New York: Guilford.

——— (1993), "Goal Achievement: The Role of Intentions," *European Review of Social*

      Psychology, 4 (January), 141–85.

Goodman, William, Stephen Antczak, and Laura Freeman (1993), "Women and jobs in

      recessions: 1969-92, *Monthly Labor Review*, 116 (July), 26-35.

Gottlander, Karin (1987), "Parental Feeding Behaviour and Sibling Competition in the Pied

      Flycatcher Ficedula Hypoleuca," *Ornis Scandinavica,* 18 (November), 269-76.

Gowaty, Patricia Adair (1983), "Male Parental Care and Apparent Monogamy among Eastern

      Bluebirds (Sialia Sialis)." *American Naturalist,* 121 (February), 149-157.

Green, Leonard and Joel Myerson (2004), "A Discounting Framework for Choice with Delayed

      and Probabilistic Rewards," *Psychological Bulletin,* 130 (September)*,* 769-92.

Griskevicius, Vladas, Joshua M. Ackerman, Stephanie M. Cantú, Andrew W. Delton, Theresa E.

      Robertson, Jeffry A. Simpson, Melissa Emery Thompson, and Joshua M. Tybur (2013),

      "When the Economy Falters, Do People Spend or Save? Responses to Resource Scarcity

      Depend on Childhood Environments," *Psychological Science,* 24 (February), 197-205.

Griskevicius, Vladas, Joshua M. Tybur, Joshua A. Ackerman, Andrew W. Delton, Tessa E.

      Robertson, and Andrew Edward White (2012), "The Financial Consequences of Too

      Many Men: Sex Ratio Effects on Saving, Borrowing, and Spending," *Journal of*

      Personality and Social Psychology, *102* (January), 69-80.

Griskevicius, Vladas, Joshua M. Tybur, Jill M. Sundie, Robert B. Cialdini, Geoffrey F. Miller,

      and Douglas T. Kenrick (2007), "Blatant Benevolence and Conspicuous Consumption:

When Romantic Motives Elicit Strategic Costly Signals," *Journal of Personality and Social Psychology*, *93* (July), 85–102.

Griskevicius, Vladas, Michelle N. Shiota, and Stephen M. Nowlis (2010), "The Many Shades of Rose-Colored Glasses: An Evolutionary Approach to the Influence of Different Positive Emotions," *Journal of Consumer Research,* 37 (August), 238-50.

Gronau, Reuben (1988), "Consumption Technology and the Intrafamily Distribution of Resources," *Journal of Political Economy*, 96, (June), 1183-1205.

Hagen, Edward H., Raymond B. Hames, Nathan M. Craig, Matthew T. Lauer, and Michael E. Price (2001), "Parental Investment and Child Health in a Yanomamö Village Suffering Short-Term Food Stress," *Journal of Biosocial Science,* 33 (October), 503-28.

Hayes, Andrew F. (2008), *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. Guilford Press: New York, NY.

Hill, Sarah E., Christopher D. Rodeheffer, Vladas Griskevicius, Kristina Durante, and Andrew Edward White (2012), "Boosting Beauty in an Economic Decline: Mating, Spending, and the Lipstick Effect," *Journal of Personality and Social Psychology,* 103 (August), 275-91.

Hsee, Christopher K. and Elke U. Weber (1999), "Cross-National Differences in Risk Preference and Lay Predictions," *Journal of Behavioral Decision Making,* 12 (June), 165-79.

Insel, Thomas R., and Larry J. Young (2001), "The Neurobiology of Attachment," *Nature Reviews Neuroscience,* 2 (February), 129-136.

Irwin, Julie R. and Gary H. McClelland (2001), "Misleading Heuristics and Moderated Multiple Regression Models," *Journal of Marketing Research,* 38 (February), 100-09.

Janssens, K., Pandelaere, M, Millet, K., Van den Bergh, B., Lens, I. & Roe, K. (2011), "Can buy me love. Mate attraction goals lead to perceptual readiness for status products," *Journal of Experimental Social Psychology, 47*, 254-258.

Jennions, Michael D. and Marion Petrie (1997), "Variation in Mate Choice and Mating Preferences: A Review of Causes and Consequences," *Biological Reviews of the Cambridge Philosophical Society*, 72, 283–327.

John, Deborah Roedder (1999), "Consumer Socialization of Children: A Retrospective Look at Twenty-Five Years of Research," *Journal of Consumer Research,* 26 (December), 183–213.

John, Deborah Roedder and John C. Whitney, Jr. (1986), "The Development of Consumer Knowledge in Children: A Cognitive Structure Approach," *Journal of Consumer Research,* 12 (March), 406-17.

Kahneman, Daniel and Amos Tversky (1979), "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica,* 47 (March), 263-91.

Kamakura, Wagner A., and Rex Du (2012), "How Economic Contractions and Expansions Affect Consumption Priorities," *Journal of Consumer Research* 39 (August), 229-47.

Kurzban, Robert, Amber Dukes, and Jason Weeden (2010), "Sex, Drugs and Moral Goals: Reproductive Strategies and Views about Recreational Drugs," *Proceedings of the Royal Society B: Biological Sciences, 277* (June), 3501–3508.

Laran, Juliano and Anthony Salerno (2013), "Life History Strategy, Food Choice, and Caloric Consumption," *Psychological Science*, 24 (February), 167-73.

Leimar, Olof (1996), "Life-History Analysis of the Trivers and Willard Sex-Ratio Problem," *Behavioral Ecology,* 7 (Fall), 316-25.

Lens, I., Driesmans, K., Pandelaere, M. & Janssens, K. (2012), "Would male conspicuous consumption capture the female eye? Menstrual cycle effects on women's attention to status products," *Journal of Experimental Social Psychology, 48(1)*, 346-349.

Lino, Mark (2010), "Expenditures on Children by Families, 2009," Miscellaneous Publication No. 1528-2009, Center for Nutrition Policy and Promotion, U. S. Department of Agriculture, http://www.cnpp.usda.gov/Publications/CRC/crc2009.pdf.

Lundberg, Shelly (2005), 'Sons, Daughters, and Parental Behaviour," *Oxford Review of Economic Policy,* 21 (March), 340-356.

Maestripieri, Dario and Kelly A. Carroll (1998), "Child Abuse and Neglect: Usefulness of the Animal Data," *Psychological Bulletin,* 123 (May), 211-23.

Manitoba Agriculture Study (2004), "The Costs of Raising Children," http://home.gicable.com/~jqgregg/Cost%20of%20raising%20children.pdf.

Mann, Janet (1992), "Nurturance or Negligence: Maternal Psychology and Behavioral Preference Among Preterm Twins," in *The Adapted Mind: Evolutionary Psychology and the Generation of Culture,* ed. Jerome H. Barkow, Leda Cosmides, and John Tooby, New York, NY: Oxford University Press, 367-90.

Millet, Kobe, Lamey, L. and Van den Bergh, B. (2012), "Avoiding Negative vs. Achieving Positive Outcomes in Hard and Prosperous Economic Times," *Organizational Behavior and Human Decision Processes, 117*(2), 275-284.

Mittal, Chiraag, and Vladas Griskevicius (2014), "Sense of Control Under Uncertainty Depends on People's Childhood Environment: A Life History Theory Approach. *Journal of Personality and Social Psychology*, 107 (October), 621-637.

Moschis, George P. and Gilbert A. Churchill, Jr. (1978), "Consumer Socialization: A Theoretical and Empirical Analysis," *Journal of Marketing Research,* 15 (November), 599-609.

Peracchio, Laura A. (1992), "How Do Young Children Learn to be Consumers? A Script-Processing Approach," *Journal of Consumer Research,* 18 (March), 425-40.

Pollet, Thomas V., and Daniel Nettle (2009), "Market Forces Affect Patterns of Polygyny in Uganda," *Proceedings of the National Academy of Sciences* 106 (July), 2114-2117.

Pratt, John W. (1964), "Risk Aversion in the Small and in the Large," *Econometrica,* 32 (January – April), 122-36.

Price, Linda L., Eric J. Arnould, and Carolyn Folkman Curasi (2000), "Older Consumers' Disposition of Special Possessions," *Journal of Consumer Research,* 27 (September), 179-201.

Rabin, Matthew and Richard H. Thaler (2001), "Anomalies: Risk Aversion," *Journal of Economic Perspectives,* 15 (Winter), 219-32.

Raudenbush, Stephen W. and Anthony S. Bryk (2002), *Hierarchical linear models: Applications and Data Analysis Methods*. Thousand Oaks, CA: Sage.

Rindfleisch, Aric, James E. Burroughs, and Frank Denton (1997), "Family Structure, Materialism, and Compulsive Consumption," *Journal of Consumer Research,* 23 (March), 312-25.

Robbins, Andrew M., Martha M. Robbins, and Katie Fawcett (2007), "Maternal Investment of the Virunga Mountain Gorillas," *Ethology,* 113 (March), 235-45.

Robertson, Thomas S. and John R. Rossiter (1974), "Children and Commercial Persuasion: An Attribution Theory Analysis," *Journal of Consumer Research,* 1 (June),13-20.

Rosenthal, Robert and Ralph L. Rosnow (1991), *Essentials of Behavioral Research: Methods and Data Analysis*. New York: McGraw-Hill.

Roux, Caroline, Kelly Goldsmith, and Andrea Bonezzi (2015), "On the Consequences of a Scarcity Mindset: Why Thoughts of Having Less Can Lead to Taking (and Giving) More," *Journal of Consumer Research,* forthcoming.

Sahin, Aysegul (2011), *Unemployment Gender Gap During the Current Recession.* Darby, PA: DIANE Publishing.

Sedghi, Ami (2013), "How much does it cost to raise a child in 2013 compared to a decade ago?" http://www.guardian.co.uk/news/datablog/2013/jan/24/cost-to-raise-a-child-compared-to-decade-ago.

Sengupta, Jaideep and Darren W. Dahl (2008), "Gender-Related Reactions to Gratuitous Sex Appeals in Advertising," *Journal of Consumer Psychology,* 18 (1), 62-78.

Sevilla, Julio, and Joseph P. Redden (2014), "Perceived Limited Availability Reduces the Rate of Satiation," *Journal of Marketing Research,* 51(April), 205-217.

Shah, Anuj K., Sendhil Mullainathan, and Eldar Shafir (2012), "Some Consequences of Having Too Little," *Science,* 338 (November), 682-685.

Sharma, Eesha, and Adam L. Alter (2012), "Financial Deprivation Prompts Consumers to Seek Scarce Goods," *Journal of Consumer Research*, 39 (October), 545-560.

Simpson, Jeffry A., and Steven W. Gangestad (1991), "Individual Differences in Sociosexuality: Evidence for Convergent and Discriminant Validity," *Journal Of Personality And Social Psychology,* 60 (June), 870-883.

Spiller, Stephen A., Gavan J. Fitzsimons, John G. Lynch, Jr., and Gary H. McClelland (2013), "Spotlights, Floodlights, and the Magic Number Zero: Simple Effects Tests in Moderated

Regression," *Journal of Marketing Research*, 50 (April), 277-88.

Sulloway, Frank J. (1995), "Birth Order and Evolutionary Psychology: A Meta-Analytic Overview," *Psychological Inquiry,* 6 (1), 75-80.

Taubman, Paul (1991), "Discrimination Within the Family: The Treatment of Daughters and Sons," In *Essays on the Economics of Discrimination*, Emily P. Hoffman, ed. Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 25–42.

Trivers, Robert L. (1972), "Parental Investment and Sexual Selection," in *Sexual Selection and the Descent of Man: 1871–1971,* ed. Bernard G. Campbell, Chicago, IL: Aldine, 136-79.

Trivers, Robert L. and Dan E. Willard (1973), "Natural Selection of Parental Ability to Vary the Sex Ratio of Offspring," *Science,* 179 (January), 90-92.

Verick, Sher (2009), "Who Is Hit Hardest During A Financial Crisis? The Vulnerability of Young Men and Women to Unemployment in an Economic Downturn. No. 4359. IZA Discussion Papers.

Van den Bergh, B., Dewitte, S., & Warlop, L. (2008), "Bikinis instigate generalized impatience in intertemporal choice," *Journal of Consumer Research, 35*, 85-97

Wade, Michael J. (1979), "Sexual Selection and Variance in Reproductive Success," *The American Naturalist* 114 (May), 742-747.

Weeden, Jason, Adam B. Cohen, and Douglas T. Kenrick, (2008), "Religious Participation and Reproductive Strategies," *Evolution and Human Behavior, 29* (September), 327-334.

World Bank. (2011). GDP growth (annual %) [Data file]. Available from http://data.worldbank.org/ indicator/NY.GDP.MKTP.KD.ZG/countries.

FIGURE 1

SPLITTING RESOURCES BETWEEN A GIRL VERSUS A BOY AS A FUNCTION OF ECONOMIC CONDITION IN EXPERIMENT 1
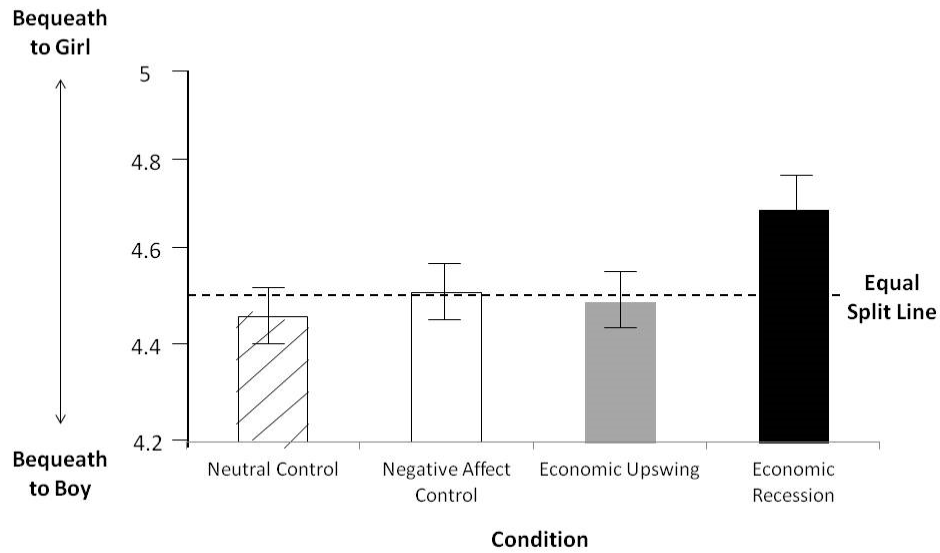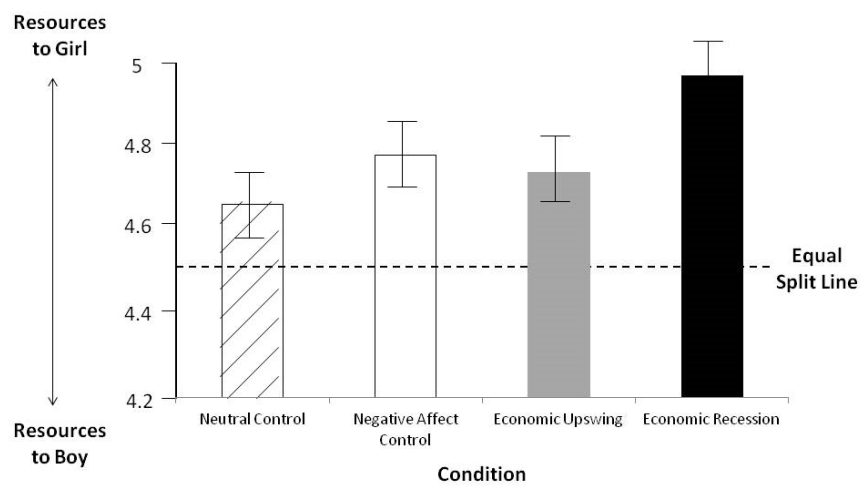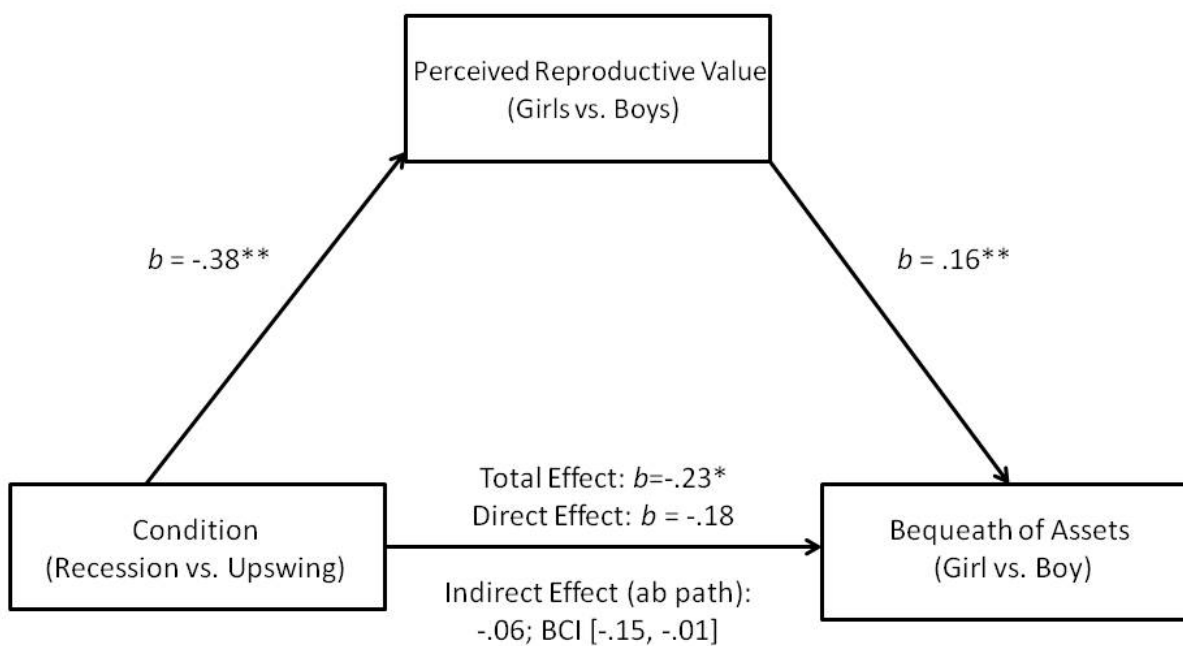
Figure 1A: Bequeathing Assets in Will

Figure 1B: Spending on Beneficial Expenditures

FIGURE 2

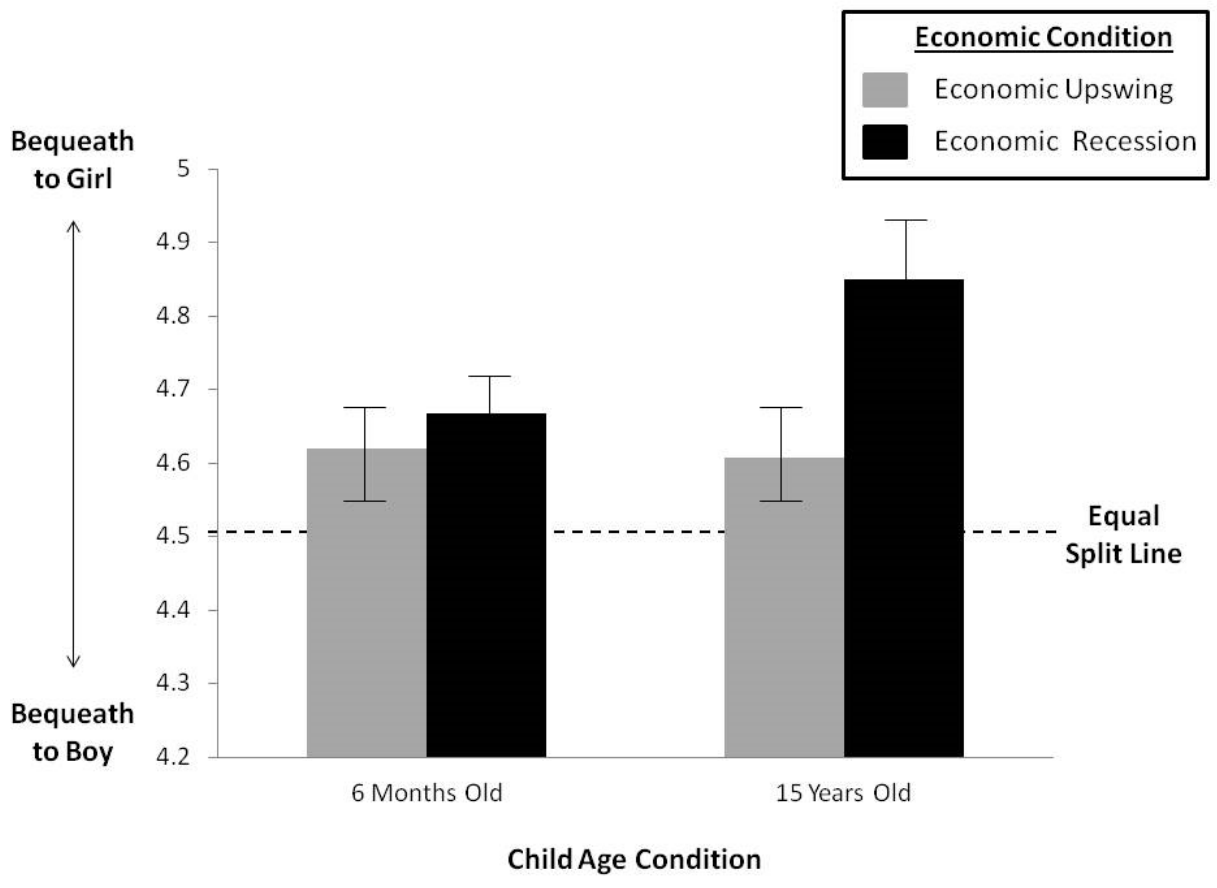**MEDIATION ANALYSIS IN EXPERIMENT 2**

Note. — Path coefficients represent non-standardized regression weights
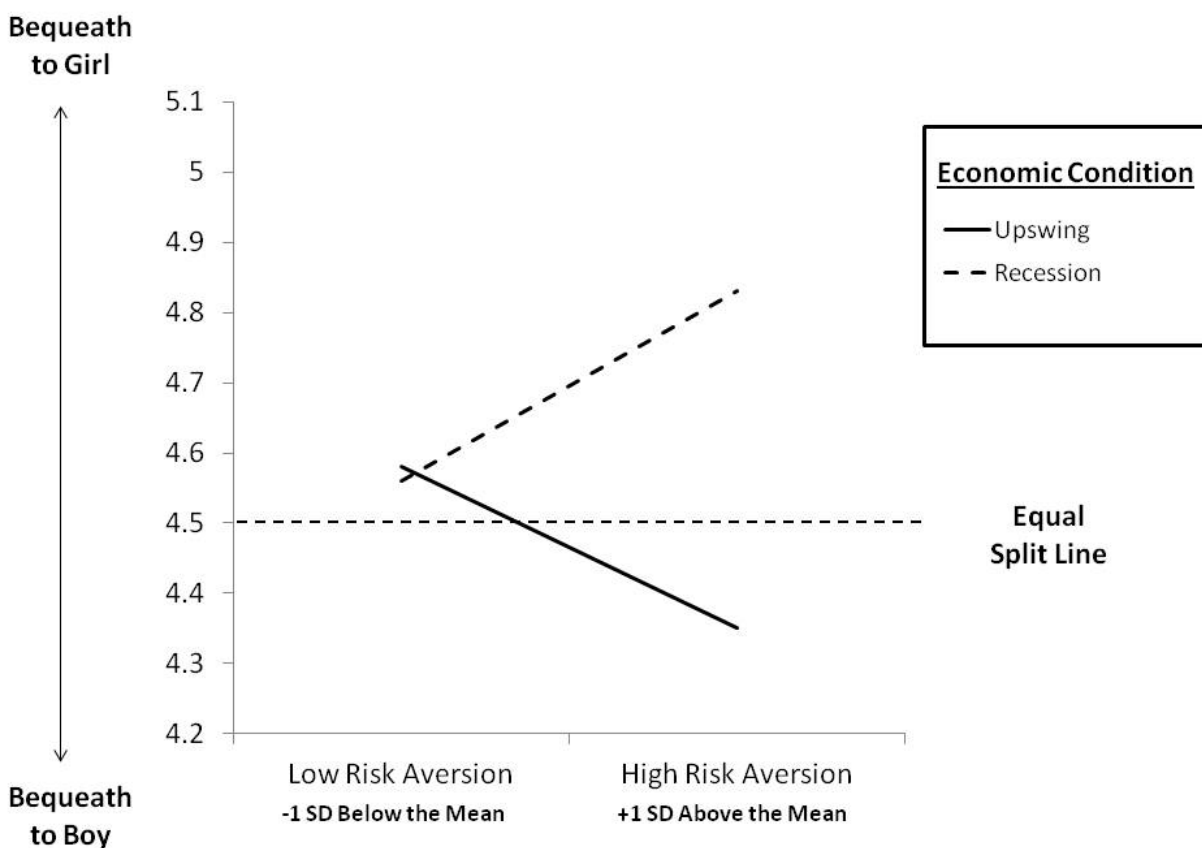
* $p < .05$, ** $p < .01$

FIGURE 3

SPLITTING RESOURCES BETWEEN A GIRL VERSUS A BOY AS A FUNCTION OF

**ECONOMIC CONDITION AND AGE OF CHILD IN EXPERIMENT 3**

FIGURE 4

SPLITTING RESOURCES BETWEEN A GIRL VERSUS A BOY AS A FUNCTION OF

ECONOMIC CONDITION FOR PEOPLE HIGH VERSUS LOW IN RISK AVERSION

IN EXPERIMENT 4

NOTE. — This figure was created from analyses using continuous scores on the risk aversion measure. Risk aversion scores were graphed at one standard deviation above the mean to represent high scores on the risk aversion measure, and one standard deviation below the mean to represent low scores on the risk aversion measure (per procedures recommended in Aiken and West 1991).

FIGURE 5

SPLITTING U.S. TREASURY BOND BETWEEN A GIRL VERSUS A BOY AS A

FUNCTION OF ECONOMIC CONDITION AND MONOGAMIC PRACTICES
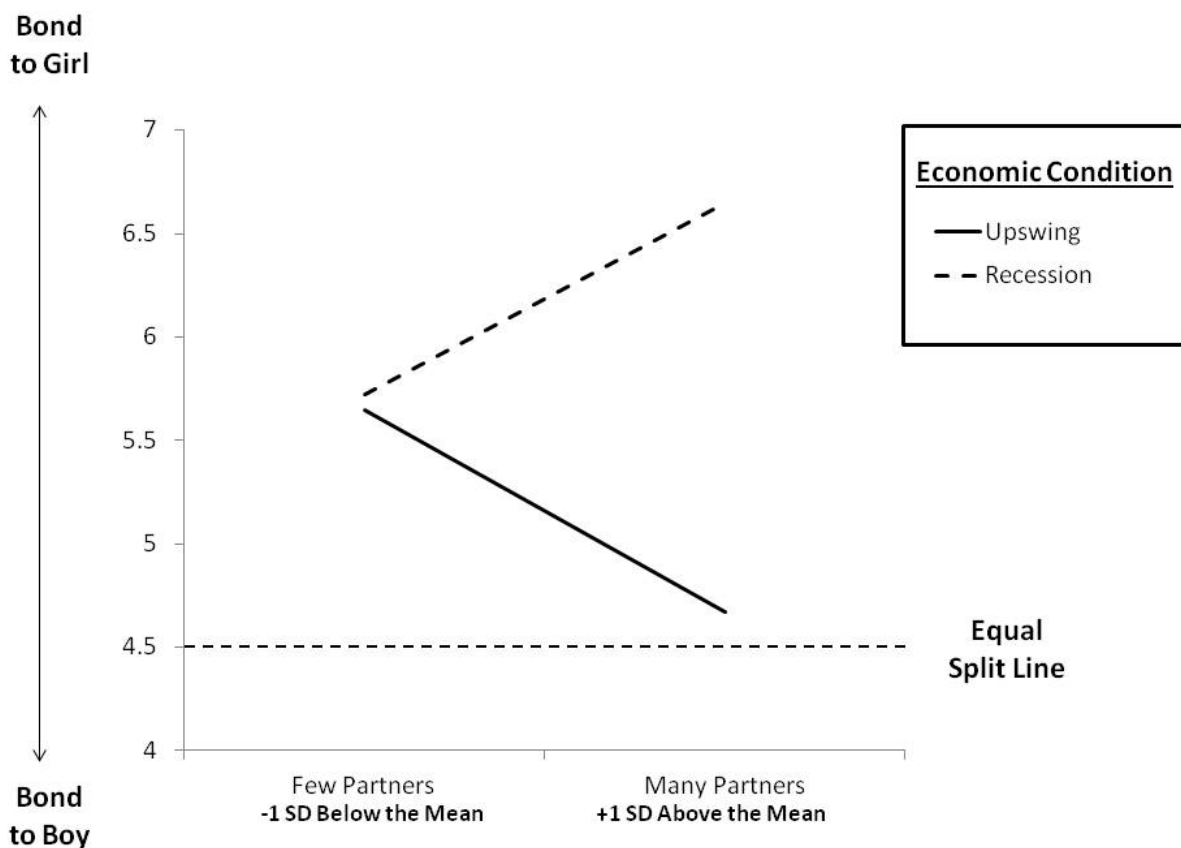
NOTE. — This figure was created from analyses using continuous scores on the number of partners measure. The number of partners scores were graphed at one standard deviation above the mean to represent high scores on the monogamy measure, and one standard deviation below the mean to represent low scores on the monogamy measure (per procedures recommended in Aiken and West 1991).

APPENDIX A

ECONOMIC CONDITION NEWS ARTICLE MANIPULATIONS (EXPERIMENT 1)

<u>Economic Upswing</u>

Happy Days Are Here Again: Economic Growth To Hit New High
By MORGAN JAMESTON, Senior Times Writer

A year ago Jonathan Pierce was standing in a dreary unemployment line downtown. Today, he makes a six-figure salary as head of strategic forecasting for a Fortune 500 company. "I didn't think this could happen to me," says Pierce with a grin. "Just last year I was unsure where my career would land. Now, I have a stable, well-paying job, a new car, and the home of my dreams."

Jonathan's situation is not unique. Over the past year, unemployment lines have dwindled and the financial markets are on a tremendous upward trajectory. "The early numbers on job growth are staggering," notes Oliver Windsor, the head of the U.S. Economic Commission. And it's not just white-collar jobs like corporate management that have grown exponentially in recent months. All employment sectors, including blue-collar jobs like construction and food service, are rising steadily. According to Windsor, "the economy has turned a huge corner. Not only have fears of a recession been overblown, but all signs are pointing toward job growth alone to soar to an all time high in 2013." Since the first quarter of 2009, the Dow Jones Industrial Average is up 51%, the S&P 500 is up 58% and the Nasdaq is up 69%. The NYSE Financial Stock Index is up 137% and bond market risk spreads have narrowed considerably, suggesting that investors are confident in the stability of this economic upswing moving forward.

The economic boom is only the beginning of the new reality for Americans. After early speculation of an economic dip, experts agree that the U.S. is on the verge of an extremely positive economic shift. "The economy of the 21st century is fundamentally different from that in the past," explains Dr. Patricia Wharton, chair of the panel for U.S. Economic Stability. "The current generation of working men and women are likely to be the first to do twice as well as their parents financially—and their children will likely be even better off. The American Dream – as we know it – will ring true for more Americans than ever before. The housing market has taken off, energy prices are dropping, the trade deficit has narrowed, and the credit crisis is on the verge of disappearing."

The fact that younger Americans should expect to have more economic advancement is only part of the industry predictions for the next decade. The continued development of alternative energy – such as wind, hydro, and solar sources – will not only preserve natural resources but allow for a new trend toward growth. To understand how these factors are changing life for Americans, Oliver Windsor, one of 80 leading scientists who contributed to the government report, notes: "In the near future, the world's population will no longer be competing for resources – whether they be natural resource such as food and water or employment resources. The truth is we are looking at a new dawn for the world as we know it."

New data support the prediction that our planet will be able to support the needs of the world's population if the current trend to preserve resources continues. While it may be difficult for some to even imagine that the U.S. economy can be impacted by other developing nations, the world in the 21st century is highly inter-connected. The positive growth of the economy and alternative energy resources in China, India, and Africa have tremendous consequences for what happens in the rest of the world. As necessities like safe food, drinkable water, and breathable air become more plentiful, the world as we know it will become a happier place.

Watching Jonathan Pierce speak about his good fortune, one can't help but be reminded of the Gilded Age of American growth, industrialization, and entrepreneurship—a time in American history that most people only remember from their history classes. The images of the Gilded Age are difficult to erase: The rise of industrialists and financiers such as John D. Rockefeller, Andrew Carnegie, and Cornelius Vanderbilt, the wave of expansion that brought about new towns and factories, and the rise in opportunity and wealth that brought a surge in immigration and prosperity. The truth for people like Jonathan Pierce and countless others is that this is only the beginning. Happy days are here again.

Economic Recession

Tough Times Ahead: The New Economics of the 21st Century
By MORGAN JAMESTON, Senior Times Writer

Five months ago Jonathan Pierce had a stable, well-paying job. Having earned a college degree, Jon was doing well at age 25. He even believed he was about to be promoted. Today, however, Jon is yet again standing in the dreary unemployment line downtown. "I didn't think this could happen to me," he mutters while shaking his head. "I have a college degree and I can't even get a job interview, let alone a job. I'm facing foreclosure on my house, and I just don't know where the money is going to come from."

This depressing scene is not unique. Over the past year, unemployment lines have grown across the country. "The early numbers are staggering," notes Oliver Windsor, the head of the U.S. Economic Commission. And it's not just blue-collar jobs like construction and food service that are being cut. It's the white-collar jobs like management and office work that are being hit the hardest. According to Windsor, "the best-case scenario looks like the recession will endure indefinitely. The worst-case scenario is a depression similar to that in the 1930s." Unfortunately, there is little more the government can do to remedy the situation. As every economist knows, changing the interest rates might slow the bleeding, but it can't fix the underlying structural problems.

The impending economic crisis is only the beginning of the new reality faced by Americans. After decades of economic growth, experts agree that the U.S. is on the verge of an economic shift. "The economy of the 21st century is fundamentally different from that in the past," explains Dr. Patricia Wharton, chair of the panel for U.S. Economic Stability. "The sad truth is that this generation is certain to be the first generation to do worse than their parents— and their children will likely be even worse off. The American Dream - as we know it - will no longer exist for our children. The housing bubbles, skyrocketing energy prices, a massive trade deficit, and the credit crisis only begin to scratch the surface of our economic problems."

The fact that younger Americans should expect to have little economic advancement is only part of the imminent economic disaster. Skyrocketing worldwide population growth and scarcity of natural resources are both working together to transform the U.S. economy. To understand how these factors are changing life for Americans, Oliver Windsor, one of 80 leading scientists who contributed to the government report, reminds us of the basics: "There are literally billions of people out there competing with each other. And these people are not just competing for jobs. The truth is that they're competing for food, water, and air."

The underlying fact is that our planet simply cannot support tens of billions of people. While it may be difficult for some to even imagine that the U.S. might one day be in poverty, the world in the 21st century is highly inter-connected. Things that happen in China, India, and Africa have tremendous consequences for what happens in the rest of the world. And as necessities like safe food, drinkable water, and breathable air become scarcer and expensive, the world as we know it will become a very different place.

Watching Jonathan Pierce wait in the unemployment line downtown, one can't help but be reminded of the Great Depression—a time in American history that most people only remember from their history classes. The images of the Depression are difficult to erase: Malnourished children begging for food, people standing in line for days just to get a slice of bread and a cup of soup, everyone struggling to feed themselves and their families. The sad truth for people like Jonathan Pierce and countless others is that losing a job is only the beginning. Tough times are ahead.

APPENDIX B

SUPPLEMENTAL DESCRIPTIVE STATISTICS FOR STUDIES 1 – 4

Experiment 1. Means and SDs for each of the 3 items in the Will measures and each of the 3 items in the Expenditure measure by Condition (Upswing, Recession, Negative Affect, and Neutral Condition).

Will

Resource	Condition	*Mean*	*SD*
Savings	Recession	4.73	1.26
	Upswing	4.59	1.26
	Negative Affect	4.45	1.34
	Neutral Control	4.57	1.03
Real Estate	Recession	4.39	1.30
	Upswing	4.21	1.39
	Negative Affect	4.10	1.36
	Neutral Control	4.20	1.06
Valuables	Recession	4.84	1.23
	Upswing	4.62	1.28
	Negative Affect	4.78	1.38
	Neutral Control	4.68	1.15

Expenditures

Resource	Condition	*Mean*	*SD*
Healthy Lunch	Recession	4.97	1.48
	Upswing	4.86	1.52
	Negative Affect	4.68	1.46
	Neutral Control	4.94	1.49
Extra-curricular Activity	Recession	4.24	1.52
	Upswing	3.86	1.55
	Negative Affect	4.03	1.44
	Neutral Control	3.86	1.45
Braces	Recession	5.54	1.35
	Upswing	5.39	1.40
	Negative Affect	5.17	1.56
	Neutral Control	5.43	1.39

Experiment 2. Means and SDs for each item in the Will by Condition.

Resource	Condition	*Mean*	*SD*
Savings	Recession	4.91	.98
	Upswing	4.65	1.14
Real Estate	Recession	4.29	1.02
	Upswing	4.39	1.09
Valuables	Recession	5.16	1.13
	Upswing	4.63	.98

Experiment 3. Means and SDs for each item in the Will by Condition and Child Age (6 months vs. 15 years).

Resource	Condition	*Age*	*Mean*	*SD*
Savings	Recession	6 months	4.72	1.25
		15 years	4.85	1.25
	Upswing	6 months	4.68	.97
		15 years	4.70	1.02
Real Estate	Recession	6 months	4.13	1.32
		15 years	4.47	1.27
	Upswing	6 months	4.26	1.01
		15 years	4.23	1.04
Valuables	Recession	6 months	5.15	1.25
		15 years	5.23	1.28
	Upswing	6 months	4.91	.91
		15 years	4.89	1.03

Experiment 4. Means and SDs for each item in the Will by Condition.

Resource	Condition	*Mean*	*SD*
Savings	Recession	4.85	1.07
	Upswing	4.40	1.30
Real Estate	Recession	4.27	1.27
	Upswing	4.10	1.30
Valuables	Recession	4.94	1.07
	Upswing	4.89	1.25

APPENDIX C

ECONOMIC CONDITION SLIDE SHOW MANIPULATIONS
(EXPERIMENTS 2, 3, & 4)

<u>Economic Upswing</u>

Modern Times of Economic Prosperity:
More than Enough to Go Around

Economists are in agreement: Current economic trends suggest that the economy is on the rise. Prosperity is on the rise for the American people.

Modern Times of Economic Prosperity:
More than Enough to Go Around

One among many: A thriving business district attempts to maintain control over the increasing population of business men and women. Jobs are being created faster than they can be filled.

Modern Times of Economic Prosperity:
More than Enough to Go Around

With the increasing availability of better jobs with higher pay, the family that just bought this house is eager to move in—the third family to buy on this same block in a month's time. More Americans than ever before are being able to enjoy the perks of home ownership.

Modern Times of Economic Prosperity:
More than Enough to Go Around

During recent months, stock prices are on the rise: One of the many indicators that the economy is thriving. Investors are experiencing a huge return on their investments.

Modern Times of Economic Prosperity:
More than Enough to Go Around

As the supply of consumer goods has increased, people are able to get groceries and other goods at low prices. As a result, many families have extra money to save, invest, or spend on finer consumer products.

Modern Times of Economic Prosperity:
More than Enough to Go Around

Having extra cash in their pockets, many people have taken up new travel and means of recreation - times are good!

Economic Recession

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

The most recent government shutdown single-handedly triggered a 25% decrease in annualized Gross Domestic Product and a loss of about 120,000 private sector jobs in the first two weeks of October 2013 alone. These estimates understate the full economic effects of the episode – more job losses on the horizon.

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

National debt is a bomb waiting to explode. The rising national debt means less food and other resources for you and your family.

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

Experts warn scarcity will come to define the US economy in 2014. People will have less access to basic things like water and food. Grocery stores and even food pantries for the hungry are already having trouble keeping food on the shelves.

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

Big cities saw home foreclosures increase dramatically in October 2013. More than ever before people are losing the roof over their heads. Experts are predicting that 2014 will be the "Year of Foreclosures".

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

No longer able to keep their doors open, businesses across the country are forced to close leaving many without jobs. Abandoned strip malls will become a common scene.

2014: MOST DEVASTATING ECONOMIC DISASTER IN HISTORY IS UPON US

Unemployment offices are again packed with people forced to wait in long lines in the winter cold. Each hoping that they won't lose even these small benefits. The future of America's workforce is harsh and uncertain.

Web Appendix

Spending on Daughters Versus Sons in Economic Recessions

KRISTINA M. DURANTE
VLADAS GRISKEVICIUS
JOSEPH P. REDDEN
ANDREW EDWARD WHITE

In addition to Experiments 1 – 5 presented in the main text, two additional studies were conducted examining the effect of economic condition on resource allocation to daughters versus sons. This web appendix presents a detailed methodology and results for each additional study. Experiment A examined the effect of economic condition on resource allocation to a daughter versus a son. Experiment B again examined the effect of economic condition on resource allocation, including an examination of the moderating role of risk aversion.

EXPERIMENT A: THE EFFECT OF ECONOMIC CONDITION ON RESOURCE ALLOCATION TO GIRLS

Method

Participants. One hundred forty-eight participants (86 women and 62 men) were recruited from an Internet panel (MTurk) and paid a small monetary compensation of $0.60. Participants' ages ranged from 18 to 74 years ($M = 34.8$, $SD = 12.8$). Participants were told that the study examined how people process information through different channels, such as by reading or by seeing pictures. All of the participants were told that they would see a series of images that summarized a recent news story.

Economic Condition Manipulation. Participants were randomly assigned to view a slideshow about either an economic upswing or an economic recession. The manipulation was based on Hill et al. (2012) and Griskevicius et al. (2013), which used slideshows to manipulate perceptions of economic conditions. The upswing slideshow depicted the U.S. economy as recovering and doing well. It highlighted job growth, an improved housing market, low debt, and

positive sentiment about the future of the economy. The recession slideshow depicted the U.S.

economy as mired in recession. It highlighted job losses, a poor housing market, increasing debt,

and negative sentiment about the future of the economy (see Appendix C for the slideshows).

Dependent Measure. After viewing the slideshow, participants were told that the study

was also interested in how people make household decisions. Participants were asked to imagine

that they have two children – one boy and one girl. They were then asked to make a will that

involved dividing their assets between their son and daughter based on a measure used in

previous work (Price, Arnould, and Curasi 2000). Specifically, participants indicated how they

would divide three types of assets: savings, real estate, and valuables. For each asset, participants

indicated their preferences on an 8-point scale with "Definitely Son" and "Definitely Daughter"

at the endpoints.

Results and Discussion

We predicted that participants would favor the girl over the boy in the economic

recession condition. We performed a repeated-measures analysis of variance (ANOVA) with

asset type as a within-subject factor and economic condition as a between-subjects factor. The

economic condition had a significant main effect on the will allocation ($F(1, 146) = 5.47$, $p <$

$.03$), and it did not interact with asset type ($F < 1$, $p > .69$). There was a main effect of asset type

($F(2, 145) = 17.00$, $p < .0001$), indicating that people allocated more resources toward a son

versus a daughter for real estate ($M = 4.18$, $SD = 1.43$) compared to savings ($M = 4.98$, $SD =$

1.19) and valuables ($M = 5.22$, $SD = 1.40$). However, consistent with predictions, people were

more likely to bequeath assets to their daughter in the economic recession condition compared to

the economic upswing condition ($M_{recession} = 4.93$, $SD = .67$ vs. $M_{upswing} = 4.67$, $SD = .70$; $d =$ .38). Because a mean score of 4.50 represented an equal split between girl and boy, the pattern of findings suggests that whereas allocation was relatively equal in the upswing condition, it was skewed toward girls in the recession condition. Thus, supporting our key prediction, experimentally manipulated cues to an economic recession increased resource allocation to girls rather than boys.

EXPERIMENT B: THE MODERATING ROLE OF RISK AVERSION

Our theoretical model contends that poor environmental conditions favor investment in females relative to males as an evolutionary risk-management strategy. Because investing in girls is akin to investing in the sure thing or odds-on favorite, investment in girls rather than boys represents choosing a safer reproductive outcome rather than gambling on a riskier long shot. Thus, we hypothesized that the effect of poor economic conditions on resource allocation to girls rather than boys should be stronger for individuals with naturally higher trait levels of risk aversion.

Method

Participants. Eighty participants (46 female, 34 male; $M_{age} = 35.15$) were recruited from MTurk and paid a small monetary compensation of $0.60.

Economic Condition. The study used news article to manipulate perceptions of economic conditions, whereby participants were randomly assigned to read an economic recession news

story or an economic upswing news story. Participants were told that the article recently appeared in a Sunday section of the *New York Times*, and it was formatted to look like a web-article featuring the newspaper's logo, font, and style. The news articles were based on Hill et al. (2012) and Griskevicius et al. (2013), which used a news article to manipulate perceptions of economic conditions.

The economic recession condition article was titled "Tough Times Ahead: The New Economics of The 21st Century." It described the recent economic recession, including job losses, declining access to resources, and how the economic problems are likely to persist in the future. The economic upwing condition article was titled "Happy Days Are Here Again! Economic Growth to Hit New High." It described how the economy is recovering and predicted a foreseeable economic boom (see Appendix A for the text of the articles).

Dependent Measure. The dependent measure assessed preference for giving resources to a girl versus a boy using the same 3-item will measure used in Experiment A above. For each item, participants again indicated their preferences on an 8-point scale with "Definitely Son" and "Definitely Daughter" at the endpoints.

Individual Differences in Risk Aversion. To assess individual differences in risk aversion, we used standard measures based on previous research (Green and Myerson 2004; Hsee and Weber 1999; Kahneman and Tversky 1979). Specifically, participants made a series of 10 choices between receiving a certain monetary reward (e.g., $100 for sure) or a 50% chance of getting a larger monetary reward (e.g., a 50% chance of getting $250). For each choice, the certain option offered $100, but the 50% gamble option ranged in payoff from $110 to $1000 ($110, $200, $300, and each $100 increment thereafter). The risk aversion index was comprised

of the total number of times (out of 10) that a person chose the safe and certain option. Thus, the measure ranged from 0 to 10, with higher numbers indicating more risk aversion.

Results and Discussion

We predicted that the effect of economic condition on biasing investment toward girls would be stronger for individuals who are risk averse. A repeated-measures ANOVA was performed with asset type as a within-subjects factor, economic condition as a between-subjects factor, and a continuous measure of individual differences in risk aversion. The analysis revealed a significant main effect of economic condition on resource allocation to daughters versus sons ($F(1, 76) = 5.03$, $p < .03$, $d = .39$). There was a main effect of asset type ($F(2, 75) = 14.12$, $p < .0001$), indicating that people allocated more resources toward a son versus a daughter for real estate ($M = 4.25$, $SD = 1.13$) compared to savings ($M = 4.68$, $SD = 1.18$) and valuables ($M = 4.99$, $SD = 1.04$). More importantly, consistent with all of our previous results, participants significantly increased resource allocation to girls vs. boys in the economic recession condition ($M_{recession} = 4.79$, $SD = .83$) compared to the economic upswing condition ($M_{upswing} = 4.51$, $SD = .37$). Although there emerged a three-way interaction between asset type, condition, and risk aversion ($F(2, 75) = 5.06$, $p < .01$), our key prediction was focused on how risk aversion would impact the overall assets bequeathed (i.e., mean of three items) to a girl versus a boy. As predicted, this main effect of economic condition was qualified by a significant interaction with the individual measure of risk aversion ($\beta=-.13$, $F(1, 76) = 5.69$, $p < .02$). Figure 1 reports the overall resource allocation (i.e., average of three items) to show the nature of the interaction. As

our theory predicted, the effect of economic conditions attenuated as people were less risk averse.

To further test our specific hypothesis in this study, we used the Hayes (2008, Model 1) PROCESS procedure to probe the interaction by examining the effect of economic condition at one standard deviation above and below the mean of risk aversion (Aiken and West 1991; Irwin and McClelland 2001). At high levels of risk aversion (1 SD above the mean), economic recessions (vs. economic upswings) led participants to significantly increase overall allocation of assets to girls to a far greater degree ($M_{recession} = 5.05$ vs. $M_{upswing} = 4.43$; $t(79) = -3.17$, $p < .003$). However, at low levels of risk aversion (1 SD below the mean), there was no effect of economic condition on bequeathing overall assets to a girl versus a boy ($M_{recession} = 4.58$ vs. $M_{upswing} = 4.61$; $t(79) = .18$, $p > .85$). This interaction indicates that risk aversion contributed to the magnitude of our effects, as predicted by our theory.

Figure 1 about here
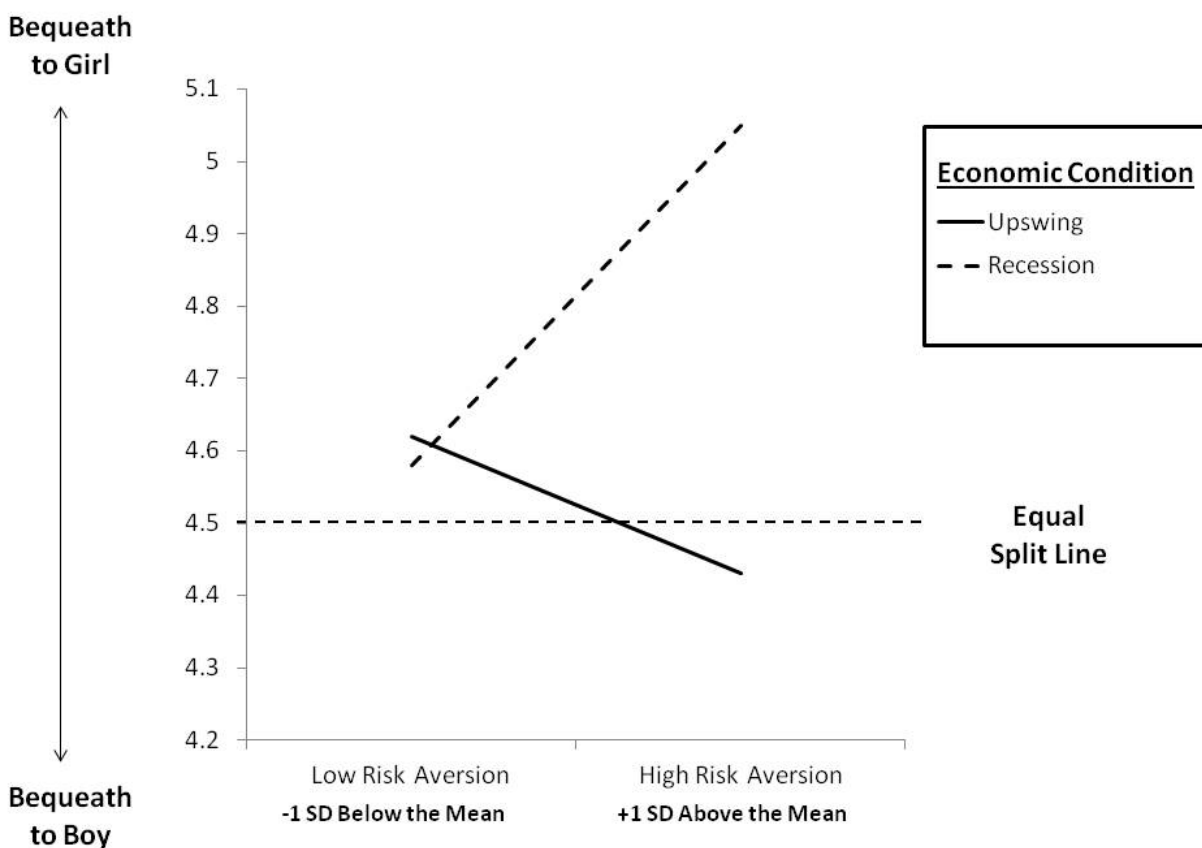---

In summary, Experiment B again replicated our core finding that poor economic conditions lead people to increase resource allocation to girls over boys. It also demonstrated the key role played by risk aversion, as predicted by our theoretical model. We contend that poor economic conditions should favor investment in females relative to males as a reproductive risk management strategy. Because poor conditions make the reproductive value of boys more variable, highly risk-averse individuals should especially prefer the greater certainty of the returns from investing in girls. Indeed, Experiment B showed that the preference for investment in girls in tough times was driven by people who are more risk averse.

References

Aiken, Leona S. and Stephen G. West (1991), *Multiple Regression: Testing and Interpreting Interactions,* Newbury Park, CA: Sage.

Green, Leonard and Joel Myerson (2004), "A Discounting Framework for Choice with Delayed and Probabilistic Rewards," *Psychological Bulletin,* 130 (September)*,* 769-92.

Hsee, Christopher K. and Elke U. Weber (1999), "Cross-National Differences in Risk Preference and Lay Predictions," *Journal of Behavioral Decision Making,* 12 (June), 165-79.

Irwin, Julie R. and Gary H. McClelland (2001), "Misleading Heuristics and Moderated Multiple Regression Models," *Journal of Marketing Research,* 38 (February), 100-09.

Kahneman, Daniel and Amos Tversky (1979), "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica,* 47 (March), 263-91.

Price, Linda L., Eric J. Arnould, and Carolyn Folkman Curasi (2000), "Older Consumers' Disposition of Special Possessions," *Journal of Consumer Research,* 27 (September), 179-201.

FIGURE 1

SPLITTING RESOURCES BETWEEN A GIRL VERSUS A BOY AS A FUNCTION OF

ECONOMIC CONDITIONS FOR PEOPLE HIGH VERSUS LOW IN RISK AVERSION

IN EXPERIMENT B

NOTE. — This figure was created from analyses using continuous scores on the risk aversion measure. Risk aversion scores were graphed at one standard deviation above the mean to represent high scores on the risk aversion measure, and one standard deviation below the mean to represent low scores on the risk aversion measure (per procedures recommended in Aiken and West 1991).