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## Household bargaining, pension contributions and retirement expectations: evidence from the German Panel on Household Finances

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# **Non-technical summary**

## **Research question**

In this paper we analyse how household bargaining style influences men and women's annual contributions to private pension plans and funds as well their expected standard of living in retirement.

## **Contribution**

Individuals in the same household cooperate to different extents when making financial decisions, depending on their household's bargaining style. In previous research, such discrepancies have been shown to influence individual retirement outcomes. We use a direct measure of household bargaining style as well as indirect measures of individual bargaining power from the German wealth survey (Panel on Household Finances (PHF)) in our empirical analysis. Additionally, we contribute to the existing literature by arguing that the ways in which partners in a household share resources and how much information they possess about each other's finances differ according to household bargaining style.

## **Results**

Household bargaining styles influence individual annual contributions to private pension plans as well as the individual expected standard of living in retirement, with gender differences. Individual decision-making power within a household is more strongly related to the outcomes of individuals belonging to households in which members make financial decisions together, especially for women. In turn, having knowledge about one's household's finances more strongly influences the outcomes of those belonging to households in which one person makes decisions for everyone else, particularly for men. In households in which each individual makes financial decisions independently, altruistic individuals who earn more (less) than their partner make more (fewer) private pension contributions. In these types of households, the individuals with the highest (lowest) contributions who have information about their partners' finances make more (fewer) contributions to their own private pension plans.

# Nichttechnische Zusammenfassung

## Fragestellung

Wir untersuchen in diesem Papier, ob die Art und Weise, in der Paarhaushalte finanzielle Entscheidungen treffen, mit deren Beitragszahlungen zur privaten Altersvorsorge und ihren Erwartungen hinsichtlich des Lebensstandards im Alter zusammenhängen. Dabei gehen wir auch auf Unterschiede zwischen Männern und Frauen ein.

## Beitrag

Bei finanziellen Entscheidungen in Haushalten stimmen sich die Haushaltsmitglieder unterschiedlich stark miteinander ab. Die Literatur zu dem Thema zeigt, dass die Art und Weise, wie Entscheidungen im Haushalt getroffen werden, sich unter anderem auf die Beiträge zur Altersvorsorge und die Situation der einzelnen Haushaltsmitglieder im Alter auswirken kann. In den existierenden empirischen Studien werden meist indirekte Maße verwendet, um abzubilden, wie Entscheidungen in Haushalten getroffen werden und welche Einflussmöglichkeiten einzelne Haushaltsmitglieder darauf haben („bargaining power“). Uns stehen dagegen direkte Maße aus der Befragung „Private Haushalte und ihre Finanzen (PHF)“ zur Verfügung. Inhaltlich geht unser Papier über die existierenden Studien hinaus, indem wir aufzeigen, dass die Aufteilung von Ressourcen auf die Haushaltsmitglieder und das Wissen über die Finanzen des Partners damit zusammenhängen, wie Haushalte Entscheidungen über finanzielle Belange treffen.

## Ergebnisse

Wie Haushalte finanzielle Entscheidungen treffen, hängt signifikant damit zusammen, wie viel die einzelnen Haushaltsmitglieder monatlich in Verträge zur privaten Altersvorsorge einzahlen und welchen Lebensstandard sie im Alter erwarten. Dabei zeigen sich Unterschiede zwischen Männern und Frauen. Das Ausmaß der individuellen Einflussmöglichkeit auf Entscheidungen der Haushalte ist besonders für Frauen wichtig und dann, wenn Haushalte Entscheidungen gemeinsam treffen. In Haushalten, in denen eine Person die finanziellen Entscheidungen für alle Haushaltsmitglieder trifft, spielt Wissen über die Finanzen des Partners eine wichtige Rolle, besonders für Männer. Und in Haushalten, in denen jede Person ihre eigenen Entscheidungen trifft, zeigen sich höhere (geringere) monatliche Beiträge zur Altersvorsorge für altruistische Individuen, die mehr (weniger) als ihr Partner oder ihre Partnerin verdienen. Auch finden sich in diesen Haushalten höhere (geringere) Altersvorsorgebeiträge für Haushaltsmitglieder, die mehr (weniger) verdienen als ihr Partner und gleichzeitig über dessen Finanzen informiert sind.

# Household bargaining, pension contributions and retirement expectations: evidence from the German Panel on Household Finances

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## Abstract

In this paper, we study the relationship between intrahousehold bargaining styles, bargaining power and individual pension contributions and expected standard of living in retirement, using microdata from the German Panel on Household Finances (PHF) survey. The paper builds on a theoretical framework that predicts non-cooperative (cooperative) households to have lower (higher) expected standards of living in retirement, due to the uncertainty regarding intrahousehold resource sharing. The empirical results suggest that household bargaining is significantly correlated with individual retirement-related behaviour and expectations, with gender differences. Cooperative partners expect higher standards of living in retirement, relative to non-cooperative ones, because they may insure against old-age poverty by pooling and redistributing personal and household resources amongst each other in retirement. Finally, our data indicate that intracouple information sharing and altruism may mediate the relationship between household decision-making and individual contributions to private pension plans, especially in non-cooperative households.

**Keywords:** Intrahousehold bargaining, Intrahousehold information sharing, Gender, Household finance, Private pension plans, Retirement expectations, Altruism, Panel on Household Finances.

**JEL classification:** D12, D14, G51

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\*Emails: ines\_p\_fernandes@college.harvard.edu, tobias.schmidt@bundesbank.de, We would like to thank Hannah Paule-Paldukiewicz, Dev Patel, and Jenna Anders for their valuable comments on earlier drafts of this paper. This paper represents the authors' personal opinions and does not necessarily reflect the views of the Deutsche Bundesbank or the Eurosystem.

# 1 Introduction

The issue of individual financial sustainability in old age is relevant to German public policy given the significant share of retirees living in poverty<sup>1</sup> in the country. Indeed, according to OECD data<sup>2</sup>, in Germany, the poverty rate of the entire old-age population (66 years old and over) was 9.6 % in 2016. Additionally, women in Germany are at a higher risk of poverty in retirement (10.6%) than men (7.4%). Among the multiple factors that influence individual retirement outcomes are individual contributions to (private) pension plans and funds during working life, given that these directly affect personal income in old age, as well as individual expectations of standard of living in retirement, since these are likely to change working-life individual behaviour regarding insurance against old age poverty.<sup>3</sup> In multi-person households, pension contributions and retirement expectations are, in turn, the result of collective household decision-making or bargaining, given that the pension contributions of one household member affect the resources that may be allocated to other members' consumption and that household members probably expect to share individual resources in retirement (see Joubert 2020, using data from Chile).<sup>4</sup>

Our paper's main contribution is an empirical analysis of the relationship between household bargaining styles and individual pension outcomes, using microdata from Germany. We build on previous empirical work suggesting that household bargaining influences the characteristics of individual private pension plans (Lim 2013; Yilmazer and Lich 2015; Yilmazer and Lyons 2010). However, to the best of our knowledge, the correlation between household bargaining and individual contributions to private pension plans or retirement expectations has not yet been thoroughly explored in the empirical literature on household decision-making. Our analysis also goes beyond existing research by using direct measures of household bargaining, in addition to proxy measures used in the literature, such as relative income ratios. We use direct qualitative information on households' decision-making processes to construct three household bargaining styles, namely non-cooperation, central planning and cooperation. Intrahousehold bargaining power is measured by personal-to-couple employment income ratios and the identity of the individual with the most knowledge of his/her household's finances, who is likely to be that household's primary decision-maker. Finally, we investigate whether the relationship between bargaining and individual contributions to private pension plans, and consequently retirement income, poverty, and expectations, is mediated by gender, following the existing literature on bargaining, gender and financial outcomes (Kan and Laurie 2010, 2014; Lee and Pocock 2007; Lundberg and Ward-Batts 2000).

We build on three main categories of household bargaining models discussed in the theoretical household decision-making literature, namely the unitary, collective, and non-cooperative frameworks. We develop a theoretical framework that describes couples' consumption and saving over two time periods: working life and retirement. In our framework, during working life, agents in cooperative couples pool their individual employment incomes and invest a share of their collective income in individual (private) pension plans, redistributing the remaining resources among themselves, for consumption purposes, according to each partner's intracouple bargaining power. In retirement, they pool individual pension benefits and redistribute them within the couple according to the same or a different sharing rule. According to the unitary framework, central planning couples (i.e. one household member makes decisions for all others)

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<sup>1</sup>The OECD sets the poverty threshold at 50% of median, equivalised household disposable income.

<sup>2</sup>To access the data, visit the OECD statistics website <https://stats.oecd.org/index.aspx?queryid=69414>.

<sup>3</sup>An exploration of the influence of retirement expectations on pension contributions is beyond the scope of this paper.

<sup>4</sup>It is also possible that retirement expectations influence bargaining style, although this topic is not the focus of the paper.

engage in a similar resource pooling and redistributing mechanism during working life and in old age, but their sharing rule is a function of the central planner’s characteristics, rather than each individual’s bargaining power. In non-cooperative couples, each partner decides how much individual employment income to invest in (private) pension plans independently of their partner, and spousal resources are not pooled in retirement. Non-cooperative partners may, however, altruistically transfer personal pension benefits to their partner in retirement.

We derive several empirical predictions from our theoretical framework to guide our empirical analysis. First, the framework predicts household bargaining styles to be associated with individuals’ expected standard of living in retirement. Their association with monthly pension contributions is less clear, however. Second, it predicts empirical proxies of intrahousehold bargaining power distributions to be considerably correlated only with the retirement expectations of cooperative couples and proxies of the identity of the household head to be correlated with the retirement expectations of individuals in central planning units. Third, it predicts that gender, individual levels of altruism, and intracouple information sharing mediate the impact of household bargaining on individual retirement outcomes.

The first main empirical finding of our paper is that household bargaining is significantly correlated with individual retirement-related behaviour and expectations, with gender differences. Importantly, our analysis suggests that discrepancies between individual expectations about standard of living in retirement and pension contributions (i.e. high expectations despite low contributions and vice versa) could be partly explained by intracouple resource sharing in retirement that is mediated by partners’ bargaining style. The data also corroborate our framework’s prediction that intrahousehold bargaining power proxies are more strongly correlated with retirement expectations in cooperative units, whereas proxies of the identities of household heads are more strongly correlated with expectations in central planning, particularly for men. Additionally, we find empirical evidence that non-cooperative partners insure against old-age poverty by transferring, rather than pooling, household resources to each other in retirement. Finally, individuals in non-cooperative households that make altruistic donations to non-profit organisations and whose employment income is higher than that of their partner contribute more to their pension plans. Moreover, in non-cooperative couples, individuals who are likely informed that their partner makes relatively fewer pension contributions contribute more to their own private pension plans.

When interpreting our results, it is important to keep in mind that, while our theoretical framework discusses causal mechanisms, the descriptive statistics and regression analysis used to empirically test the hypotheses it generates refer to correlation, not causation. Nonetheless, our study is relevant for understanding household bargaining mechanisms that are conducive to higher individual pension contributions, and it provides public policy-relevant insight into the bargaining dynamics affecting household members who are more likely to suffer from old-age poverty, particularly women.

The paper is structured as follows: Section 2 presents an overview of the theoretical and empirical literature in household bargaining, particularly as it relates to savings and pension plans. Section 3 develops a theoretical framework of household bargaining that is anchored in previous models and literature. Section 4 explains the empirical framework of the paper and the construction of key variables, also presenting descriptive statistics for the sample of PHF respondents relevant to our empirical analysis. Section 5 presents and discusses the empirical results of our regression analysis, analysing the robustness checks included in the appendix. Section 6 concludes.

## 2 Relevant literature

This paper’s theoretical and empirical frameworks are grounded on existing theoretical and empirical literature on household economics and finance, which we review in this section.

### 2.1 Theoretical models of household bargaining

Economic models of intrahousehold decision-making attempt to unveil the rules that guide resource or consumption allocations among household members. For simplicity, these frameworks usually assume that household size and composition are static and that households cannot force decisions upon other households. Intrahousehold decision-making models mainly fall under three broad categories: unitary, collective, and non-cooperative models.

#### 2.1.1 Unitary models

The first framework of intrahousehold decision-making consists of unitary models, of which the household production model of Becker (1974a, 1981), income-maximisation models and the household-preferences-focused model of Behrman et al. (1982) are some key examples.

Unitary models of intrahousehold allocations treat the household as a cohesive economic unit with a single utility or welfare function that is maximised by one or more family members under several household level constraints, such as household technology and income. Such frameworks assume income pooling at the household level, deeming income distributions among household members irrelevant. Moreover, unitary models do not require that household members share the same individual preferences. Rather, intrahousehold resource allocations could result from a consensus amongst its members or be imposed by a household central planner. The models generate information about household consumption, yielding reduced-form equations for household demand for market and non-market goods, which are functions of exogenous variables, such as market prices.

The main criticism of unitary models is their treatment of all household members as a single individual, which is mathematically achieved through the aggregation of several individual utility functions into a single household-level welfare function. In reality, empirical evidence suggests that individual household members’ utility functions, preferences and consumption needs are not only significantly distinct from each other but individual intrahousehold bargaining power is asymmetrically distributed and correlated with household consumption allocations. Indeed, empirical studies following a 1980’s policy change in the United Kingdom found that, when mothers receive governmental income transfers previously allocated to fathers, household expenditure for children and women’s clothing increase, while expenditure usually attributed to men, such as cigarettes and alcohol, decreases (Lundberg, Pollak and Wales 1997). Similarly, a study of housing reforms in China that enabled tenants to purchase their state employers’ rental properties found that the transfer of ownership rights to men increased both household consumption of male-favoured goods as well as women’s time spent on housework. By contrast, the transfer of property rights to women decreased household consumption of male-favoured goods (Wang 2013).

### 2.1.2 Collective models

The recognition that intrahousehold bargaining power distributions influence household outcomes led to the development of the more realistic collective approach to modelling intrahousehold decision-making, which was first proposed by Chiappori (1988), Chiappori et al. (1992) and Apps and Rees (1988) and has subsequently been elaborated by Browning, Bourguignon, Chiappori and Lechene (1994), Browning and Chiappori (1998), and Chiappori and Ekeland (2006). The core assumption of collective models of household bargaining is that, whenever the negotiation process results in household decisions, the outcomes are Pareto efficient. Under this assumption, bargaining may be cooperative or non-cooperative.

In collective, cooperative models, household allocation decisions are analogous to a two-stage budgeting procedure through which households act as if they first pool and allocate income to each individual according to a household sharing rule and then each person maximises their individual subutility subject to their allocated income. The sharing rule describes the outcome of resource allocation within the household and is a function of exogenous constraints, such as prices, total income and, possibly, individual income and assets.

A commonly used model of cooperative bargaining is Nash bargaining (Manser and Brown 1979 and 1980; McElroy and Horney 1981). Cooperative game theory assumes that there are no barriers to communication between players and that they can make binding agreements that are costlessly enforceable, focusing on the distribution of the potential benefits of cooperation among players. Moreover, it assumes that partners are unable to access extramarital institutions that enforce household contracts. Models of Nash-bargained consumption incorporate the possibility of disagreement on resource allocation among household members, claiming that they maximise the product of each individual's difference between their utility under an agreement between household members and their utility in the case of a disagreement. The latter utility level is denominated the individual's "threat point", and it may represent a value inside or outside of marriage, measuring the utility level one would enjoy in the event that disagreement were optimal. If one's threat point is within marriage, the individual utility level outside of marriage (in divorce) constitutes one's "reserve utility", since it is the (minimum) utility level one could enjoy. In the event that household members agree on any resource allocation, the amount of collective utility above the threat point is divided among household members. In a two-person household, members thus maximise  $(U^A - V^A) * (U^B - V^B)$ , where  $U^i$  represents household member  $i$ 's utility under the household agreement and  $V^i$  his/her utility in the event of disagreement. The game assumes that  $U^i \geq V^i$  for each person  $i$ .

The distribution of individuals' bargaining power within a household plays an important role in collective bargaining models. Browning and Chiappori (1998) argue that, if household behaviour is Pareto efficient, households maximise the weighted sum of each household member's utility function subject to the household's budget constraint and with the welfare weights being endogenous and dependent on market prices and household income. Importantly, any factors that influence household members' bargaining power within their family unit (i.e. their ability to influence family decision-making), such as individual income and control over household assets (Chiappori 1992; McElroy 1990), may affect the aforementioned welfare weights.

In sum, such weights can be considered a measure of individual intrahousehold bargaining power, and the sharing rule that describes the resources allocated to each household member an expression of the unit's bargaining power distribution.

### 2.1.3 Non-cooperative models

The final class of intrahousehold bargaining models describes non-cooperative processes, which potentially lead to inefficient outcomes. Non-cooperative game theory rejects the aforementioned assumption that partners enter binding, costlessly enforceable agreements. Instead, its solution concept is a profile of strategies where each player’s strategy is a best response to the strategies in the other player’s profile. Given that Nash equilibria do not assign specific strategies to players, there may be no obvious way to choose between multiple Nash equilibria in non-cooperative game theory. The non-cooperative labour allocation model of Walther (2018), for instance, in which partners allocate their labour supply to wage or agricultural labour in order to maximize future bargaining power, accurately predicts the inefficient labour allocation of non-cooperative individuals in Malawi.

## 2.2 Empirical work on household bargaining and its gendered effects on household finances

Empirical studies have systematically tested the predictions of the aforementioned theoretical frameworks, especially unitary and collective approaches, investigating the relationship between household or couples’ bargaining styles and individual consumption of specific goods (Bhalotra and Attfield 1998; Bonke 2015), time and labour allocations (Walther 2018), personal and children’s education and health outcomes (Ponczek 2011; Xu 2005), intrahousehold wealth distributions (Grabka, Marcus and Sierminska 2015), individual money transfers to family members (Diaz Fuentes 2013), life insurance purchases (Wong 2013), savings, and the risk levels of individual pension plans (Yilmazer and Lich 2015; Yilmazer and Lyons 2010). Whereas most studies have found evidence supporting the existence and relevance of intrahousehold bargaining power distributions and corroborating the validity of collective models, some analyses, such as that of Jianakoplos and Bernasek (2008), conclude that the financial risk-taking behaviour of dual-earner, married households is better explained by resource pooling than intracouple bargaining power distributions.<sup>5</sup> Given this paper’s focus on individual pension contributions, we mostly review empirical findings concerning the effects of bargaining on savings and retirement-related investment decisions.

Regarding individual or couple savings, data from the British Household Panel Study (BHPS) suggests that couples hold savings under joint names more frequently than investments or debts, despite the increase in spousal financial independence from 1995 to 2005 (Kan and Laurie 2010, 2014). Interestingly, the psychological well-being of female, but not male, respondents is influenced by their partner’s savings (Kan and Laurie 2010), which could incentivise women to save more than their male counterparts. The fact that heterosexual women are usually younger and have a longer life expectancy than their husbands has also led to the hypothesis that women with greater intrahousehold bargaining power save more or accumulate more wealth due to their expected need to finance a longer retirement period (Gibson, Trinh and Scobie 2006).

Indeed, female bargaining power, as measured by women’s share of household income, seems to partly determine the savings decisions of individuals and households in South Korea, given that, in units where women have more bargaining power, both women’s share of household savings and total household savings are higher (Lee and Pockock 2007). Moreover, data from the US Health and Retirement survey suggests that female bargaining power, as measured by women’s level of education relative to that of their husbands, is positively correlated with net

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<sup>5</sup>Such discrepancy may be explained by the use of culturally distinct datasets and proxies of bargaining power, rather than direct measures of household bargaining style.

worth (Lundberg and Ward-Batts 2000). Nguanbanchong (2004) also suggests that women with higher bargaining power tend to save more than men for purposes such as child allowances and education, consumption and business investment.

Other studies, however, indicate that women with more bargaining power do not have a higher propensity to save (Bettio and Caretta 2004; Rom 2015), which could be due to the fact that the aforementioned studies used data from different countries, across which individual saving attitudes and bargaining differ. Similarly, using a 1995 sample of 300 couples in Ottawa-Hull, Canada, Phipps and Woolley (2008) found that female control of household finances was negatively correlated with both their probability of holding Registered Retirement Savings Plans (RRSP) as well as their levels of RRSP, which the authors attribute to mothers' expenditures on their children and "the legacy of centuries without property rights, cultural stereotypes, intimidation or marketing" of which women have been the target. Gibson, Trinh and Scobie (2006) also found that, for pre-retirement couples in New Zealand, women's bargaining power correlated negatively with net worth, which the authors attribute to the fact that public pensions in New Zealand, relative to those in other countries, are more generous and not affected by private wealth or income.

Not only do intrahousehold bargaining power distributions influence individual savings, but they also affect the characteristics of the assets in which individuals choose to invest their savings. Specifically, for participants of the US Health and Retirement Study (1992-2006), only the risk tolerance of the partner with the most bargaining power is positively correlated with the share of risky assets in the portfolios of two-person households (Yilmazer and Lich 2015). In another study with data from the US Survey of Consumer Finance (SCF), Yilmazer and Lyons (2010) showed that women whose income corresponds to a higher share of the couple's income (the sum of her and her husband's earnings, which is an empirical proxy of intrahousehold bargaining power) are less likely to own risky pension plans, reflecting female risk aversion. In contrast, the same metric does not impact the riskiness of men's pension plans.

Data from couples in the 2010 SCF suggests that each partner's risk aversion weighted by his/her relative bargaining power, as measured by the ratio of personal to couple income, significantly influences the husband's (but not the wife's) decision to annuitise his occupational pension plans (Lim 2013). Additionally, data from the US Health and Retirement Study suggests that the share of equities in a couple's portfolio depends on the husband's subjective survival probability when he is the decision-making partner but not on the expected horizon of a wife with more decision-making power (Pak and Babiarz 2019).

In sum, empirical literature on household decision-making points to a significant correlation between household bargaining and retirement-related behaviour and outcomes. This paper studies the relationship between household bargaining and individual pension contributions as well as retirement expectations, contributing to the literature in several ways.

First, grounded in existing theoretical literature, we argue that households with different bargaining styles share resources differently. Units in which a single individual makes financial decisions for all other household members as well as partners in cooperative households pool and share household resources according to the household head's characteristics and each member's bargaining power. In turn, non-cooperative individuals, we argue, transfer individual resources to their partner according to their personal levels of altruism.

Second, we contribute to current empirical literature by using novel ways to find evidence of resource transfers (and against resource pooling) amongst non-cooperative partners. Specifically, we use proxies of intracouple information sharing and altruism to argue that, in non-cooperative couples, the partner who is more likely to enjoy higher standards of living in retirement transfers

personal income to their partner, according to their own levels of altruism and information about their partner’s financial needs.

Third, our empirical analysis goes beyond existing research by using direct measures of household bargaining, in addition to proxy measures used in the literature, such as relative income ratios. We use direct qualitative information on households’ decision-making processes to construct three household bargaining styles, namely non-cooperation, central planning and cooperation.

### 3 Theoretical framework

In this section, we present a theoretical framework that is anchored in existing household economics theoretical and empirical literature and that makes empirically testable predictions about the relationship between household bargaining, pension contributions and retirement expectations. We also present the theoretical rationale behind the construction of the bargaining style indicators used in our regression analysis. We do not attempt to set up a fully developed theoretical model of intrahousehold bargaining, but instead outline the mechanisms derived from theory in a consistent framework in order to guide our empirical analysis.

#### 3.1 Couples’ intertemporal consumption problem

For the purposes of our theoretical framework, we assume that individuals only live through two time periods: working life and retirement.<sup>6</sup> During working life (time period 1), prior to retirement, individuals earn employment income as a product of their activities in the labour market, using a certain income share for consumption purposes and investing their savings  $s$  in pension plans, at an interest rate of  $r$ . During retirement (time period 2), individuals cannot participate in labour markets and thus derive income from their pension benefits, according to their contributions to such plans during time period 1 and their plans’ interest rate  $r$ , which we assume to be equal for all schemes<sup>7</sup>. Throughout this section, income refers to individual employment income only, and the terms “households” and “couples” are used interchangeably, since households refer to two-person units, and household members are unmarried or married partners.

The framework is populated by rational economic agents who derive utility from consumption and whose patience level corresponds to the time-discounting factor  $\beta$ . By definition, partners in non-cooperative households make intertemporal consumption decisions independently of each other, taking into account their personal income constraints. Partners may derive utility from their partner’s consumption according to their individual levels of altruism  $\omega$ .<sup>8</sup> Thus, they may

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<sup>6</sup>The framework makes no assumptions about the simultaneity of partners’ retirement, since individual retiring dates do not impact the paper’s analysis and the PHF does not contain information about these dates. For simplicity, we also do not account for the possibility of divorce, separation or the death of a partner. Although models of household bargaining usually consider individuals’ outside option, that is the possibility for them to leave the relationship, this paper does not. We attempt to control for factors that characterize individuals’ utility should they take the outside option, such as personal employment income and education level, in the empirical section of the paper, however.

<sup>7</sup>For simplicity, we assume that retired partners cannot alter the intrahousehold resource allocation decisions they made during working life. In reality, however, such commitment may be impossible or implausible, as discussed by Mazzocco (2007) and Lise and Yamada (2019).

<sup>8</sup>In this framework, individuals act altruistically because they place positive weight on their partner’s consumption in their own utility function. For simplicity, we assume that all individuals may derive utility from their partner’s consumption, regardless of their household’s bargaining style, although we acknowledge that altruism may be more strongly correlated with some bargaining styles than others.

altruistically choose to transfer  $t$  income to their partner in time period 2 in order to fund their partner's consumption in retirement. Realistically, individuals may also choose to transfer employment income to their partner during working life, allowing their partner to invest such funds in a pension plan of their choice<sup>9</sup>. Moreover, it is possible that inter-partner income transfers are bidirectional, in which case non-zero couple net transfers point to one partner as the main beneficiary and the other as the main contributor, while zero net transfers indicate that such a distinction cannot be made. For simplicity, we focus on non-zero net inter-partner transfers that take place only after working life.

In non-cooperative couples, if partner A transfers income to partner B, the former solves the inter-temporal consumption problem:

$$\max_{C_1^A, C_2^A, t} u^A(C_1^A, C_1^B | \omega_A) + \beta_A u^A(C_2^A, C_2^B(t) | \omega_A) \text{ s.t. } C_1^A \leq y_1^A - s^A \text{ and } C_2^A \leq (1+r) \cdot s^A - t \quad (1)$$

where  $C_i^J$  refers to the consumption level of partner  $J$  in time period  $i$ ,  $u^J$  to the utility function of individual  $J$ ,  $y_1^J$  to the employment income of partner  $J$  during time period 1, and  $s^J$  to the savings of individual  $J$  during time period 1, i.e. working life. This is equivalent to solving

$$\max_{C_1^A, C_2^A, t} u^A(C_1^A, C_1^B) + \beta_A u^A(C_2^A, C_2^B(t)) \text{ s.t. } C_1^A + \frac{C_2^A}{1+r} \leq y_1^A - \frac{t}{1+r} \quad (2)$$

In turn, partner B solves the following intertemporal consumption problem:

$$\max_{C_1^B, C_2^B} u^B(C_1^B, C_1^A | \omega_B) + \beta_B u^B(C_2^B(t), C_2^A | \omega_B) \text{ s.t. } C_1^B + \frac{C_2^B}{1+r} \leq y_1^B + \frac{t}{1+r} \quad (3)$$

A similar rationale applies to non-cooperative couples in which partner B transfers resources to partner A.

As per our definition of cooperative households, in these units, partners make intertemporal consumption decisions jointly, i.e. at the household level. First, members pool resources, effectively summing each individual's income into a collective household income. Second, they redistribute resources according to a predefined sharing rule, which determines the share of household income that each member may use for his/her consumption purposes, effectively determining the individual's consumption levels. The sharing rule depends on each member's intrahousehold bargaining power, which is a function of factors that have been empirically shown to affect intrahousehold resource allocation, such as age differences and individual-to-household income ratios.

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<sup>9</sup>In this case, individuals might have to incur a monitoring cost to ensure that their partner invests such resources properly rather than consume them. In theory, higher inter-partner transaction costs during working life, relative to retirement, could also provide an incentive for partners to invest in their own pension plans during working life and share resources in retirement instead of doing so during working life. The framework also does not consider taxation. In a given country, plans acquired for couples may be taxed more heavily than plans acquired individually, which may incline individuals to invest during working life and share resources in retirement and vice-versa. Our empirical results could indicate that couples in our sample have a preference for investing in their own pension plans and sharing resources in retirement instead of transferring funds to their partner during working life.

Therefore, in a cooperative couple, the unit solves the constrained maximization problem:

$$\max_{C_1^{HH}, C_2^{HH}} U(C_1^{HH}) + \beta U(C_2^{HH}) \text{ s.t. } C_1^{HH} + \frac{C_2^{HH}}{1+r} \leq y_1^{HH} \quad (4)$$

In equation (4),  $C_i^{HH}$  denotes household consumption level in time period  $i$ ,  $y_1^{HH}$  refers to household income, which is the sum of the income of partners A and B in time period 1, such that  $y_1^{HH} = y_1^A + y_1^B$ .  $U$  denotes the household level utility function, and  $\beta$  household level patience, which is a weighted average of its members' patience levels. Moreover, we have that:

$$U(C_1^{HH}) + \beta U(C_2^{HH}) = \alpha(w)[u^A(C_1^A, C_1^B) + \beta u^B(C_2^B, C_2^A)] + (1-\alpha(w))[u^A(C_1^A, C_1^B) + \beta u^B(C_2^B, C_2^A)] \quad (5)$$

meaning that, in each time period, household utility is a weighted average of each household member's individual utility function, where the Pareto weight  $\alpha$  captures each individual's intrahousehold bargaining power, which in turn is a function of a vector of exogenous factors  $w$ , such as wages.

Central planning couples also solve equation (4), but, in these units, the weight  $\alpha$  in equation (5) only depends on the identity of the central planner. In sum, whereas in cooperative bargaining  $\alpha$  depends on factors that affect individual intrahousehold bargaining power, in central planning units, only the structure of the bargaining agreement and the characteristics of the central planner matter for intrahousehold resource allocations.<sup>10</sup>

The framework has the implication that individuals may benefit from intrahousehold insurance against old-age poverty, regardless of their household's bargaining style, because agents with relatively low earnings or a low ability and/or willingness to save during working life may receive enough income from or share income with other members in retirement to meet their consumption needs. Households differ in the way in which they administer such "insurance" mechanisms according to their bargaining style, however, and this has implications for individual contributions to pension plans and retirement expectations during working life. Specifically, our framework implies that, although individuals in all types of households share resources, some bargaining styles are conducive to inter-partner income transfers and others to intracouple resource pooling and redistribution.

Due to the nature of independent decision-making and the separation of partners' finances in non-cooperative households, less income pooling takes place, so partners share resources with one another via altruistic transfers, which take place from the financially better-off partner to the less well-off partner. Given that, in non-cooperative units, individuals' likelihood of receiving spousal income transfers in retirement depends on their partner's altruism, individuals in these households perceive such transfers as uncertain and are less likely to rely on their partner as a stable source of income in retirement. In contrast, the stability of resource pooling and redistribution as well as the predictability of sharing rules or the household head's characteristics in cooperative and central planning units, respectively, have the implication that individuals in these types of households may rely on their partner as a somewhat certain source of income in retirement. Individuals in cooperative and central planning units might thus have an incentive to under-contribute to their personal pension plans during working life. Therefore, our

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<sup>10</sup>Cooperative households can be said to have a household head, defined as the member with the most bargaining power. However, this individual differs from a central planner in that he/she does not impose individual decisions on other members, but rather participates in collective household negotiations that end in consensus.

theoretical framework predicts that, relative to cooperative and central planning partnerships, non-cooperative couples make higher pension contributions during working life to insure against old-age poverty.

Additionally, by definition, members in cooperative units participate in collective household negotiations, during which members may express and discuss their consumption and investment preferences, argue why they believe their household should make specific choices, and convince others to adopt behaviour they deem advantageous. Collective household decision-making requires the input of several members, offering them the opportunity to use their bargaining power to influence other people's opinions and thus change the unit's final choices in personally advantageous ways. In non-cooperative units, partners make decisions independently, which means that collective decision-making during which partners could use their individual intrahousehold bargaining power to change each other's economic choices are scarcer, which has the implication that, relative to cooperative households, bargaining power distributions in non-cooperative units are less relevant. In central planning partnerships, household members agree to let a single individual, the central planner, make decisions for the entire unit, effectively forgoing participation in collective negotiations and transferring their decision-making power to the central planner. In such households, the identity and traits of the central planner, rather than bargaining power distributions, are the most relevant determinants of household decisions, since his/her characteristics represent the household's preferences. Thus, individual intrahousehold bargaining power is relevant in central planning insofar as it determines the central planner's identity and, consequently, characteristics. In sum, the existence of bargaining power distributions assumes that household members have a non-zero ability to influence household decision-making and integrate their personal preferences into household-level preferences. However, in households where the characteristics of one individual overrule those of other members, as in central planning, or where each individual's decision-making depends only on his/her characteristics, as in non-cooperation, it is reasonable and relevant to assume that particular individuals have near total household and/or personal decision-making power and to discuss their choices individually, rather than addressing intrahousehold bargaining power distributions.

Thus, the framework predicts that individual bargaining power indicators should preferentially influence the private pension contributions and retirement expectations of individuals in cooperative units and that proxies of the identity of the central planner or household head should preferentially influence the outcomes of individuals in central planning units.

To conclude, the framework generates several hypotheses, which we test empirically in Section 5. First and most straightforwardly, it predicts that both household bargaining styles and intrahousehold bargaining power distributions are associated with individuals' expected standard of living in retirement but their association to individual monthly pension contributions is less clear.<sup>11</sup> The framework predicts that a given household's bargaining style can impact individual pension contributions during working life because it determines whether household members share resources preferentially via resource pooling or altruistic transfers, and because it affects individual expectations about spousal behaviour.<sup>12</sup> A key implication is that individuals may expect to have an income or standard of living that is too high or too low, given their savings

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<sup>11</sup>The framework is deterministic, since it does not explicitly model retirement outcomes as uncertain. However, we assume that individuals expect the model's predicted outcomes to become true after they retire. Uncertainty can be introduced in the framework by assuming that individuals have imperfect information about their partner's level of altruism or their household's bargaining power distribution, which is beyond the scope of this paper.

<sup>12</sup>The paper does not exclude the possibility that non-cooperative couples engage in resource pooling and redistribution or that cooperative and central planning partners make altruistic income transfers. It only makes assumptions about the preferential sharing mechanism of each bargaining style. It is also possible that couples use resource pooling and transfers on different occasions in order to diversify and reduce the risk of their decision-making outcomes

during working life, because they expect to receive funds from or give funds to their partner in retirement, respectively. In this case, personal pension contributions are not necessarily a good predictor of expected standard of living in retirement, and bargaining style would influence individual expectations regardless of its effect on pension contributions.

Second, it predicts that household bargaining styles impose decision-making structures that make intracouple bargaining power distributions relevant for individual retirement outcomes in cooperative households and the identity of the household head relevant in central planning. A key implication is that, relative to intrahousehold bargaining power distributions, household bargaining styles allow researchers greater insight into household decision-making.<sup>13</sup>

This paper extends upon past criticism of the use of earnings ratios and other proxies of household bargaining,<sup>14</sup> arguing that intrahousehold bargaining power indicators are mostly relevant in units with a cooperative bargaining style and that it is possible that previous studies found relative earnings to be significantly correlated with individual and household outcomes because the majority of households engage in some degree of cooperation or joint decision-making.

Third, it predicts that any factors that affect the identity of the central planner or intrahousehold bargaining power distributions, such as gender, should mediate the relationship between household bargaining and individual outcomes. Given that men are often more likely to be household heads, that is, potential central planners, we expect male central planners to have higher expected standard of living in retirement.

Fourth, the framework predicts that altruistic household heads or financially better-off members make more contributions to their pension schemes during working life because they anticipate sharing or transferring resources to others in retirement. Finally, the framework predicts that, in non-cooperative households, partners who are aware that their partner's pension contributions during working life are insufficient for them to achieve an adequate income in retirement make more contributions to their own pension plans, in order to be able to transfer resources to their partner after they retire.

## 4 Empirical framework

In this section, we present the dataset used for our analysis, the Panel on Household Finances (PHF), the construction of our main variables for bargaining style, pension contributions and expectations regarding standard of living in retirement as well as descriptive statistics related to these variables and the sample itself. Additionally, we describe the theoretical and empirical rationales behind the construction of our proxy of household heads' identities as well as an assessment of its validity.

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<sup>13</sup>If a single individual makes decisions for all other members of a household, the unit's bargaining power distribution would assign that individual 100% of household bargaining power and 0% to all other members. In couples in which individuals make decisions independently and each partner makes the same number of decisions within a certain time period, each individual effectively holds 50% of total household bargaining power. However, in reality, both partners have full control of their own decision-making. It is thus more rigorous to discuss the bargaining style of such households, rather than individual members' bargaining power.

<sup>14</sup>The use of earnings ratios as a measure of household bargaining has been criticised in the literature, with Browning, Chiappori, and Lechene (2006) as well as Lundberg and Pollak (1996) arguing that relative earnings can only be a valid proxy of bargaining power if consumption and leisure are separable and labour supply constrained. Pollak (2005) has also pointed out that married individuals' earnings are not a suitable measure of their potential earnings outside of marriage because labour supply is endogenous to household production.

## 4.1 Data

This study uses data from the 2010-11 (wave 1), 2014 (wave 2) and 2017 (wave 3) PHF, which is a triennial survey conducted by the Deutsche Bundesbank and is part of the European Household Finance and Consumption Survey (HFCS). Each survey consists of a representative sample of the German population with a higher selection probability for wealthy households. The PHF collects detailed information on household demographics, consumption, real assets and their financing, liabilities and credit constraints, private businesses and financial assets, inter-generational transfers and gifts, employment, pensions and insurance policies, income, saving behaviour, financial literacy, price expectations, and real estate purchases (waves 2 and 3), amongst other household characteristics. The PHF produces five implicate observations per household. In this paper, however, we only conduct our empirical analysis and present results for the first of these implicates.<sup>15</sup>

Each household’s financially knowledgeable person (FKP) answers survey questions concerning household and individual-level variables about him/herself and, for certain questions, other household members. The FKP is determined when an interviewer asks “We are conducting a household survey supplemented by an individual survey of each individual member of the household. Therefore, we need one contact for the entire household, and he or she should have the best overview of the household’s finances. By that I mean things such as income, savings and checking accounts, pensions, real estate. Who among the household members living here knows the most about the household’s finances?”. For respondents who are at least 16 years of age, the survey also includes information on individual household members’ demographic characteristics, income, pension and insurance contributions, benefits and eligibility, their expected standard of living in retirement, and other variables, which is provided by the respondent and not the FKP. Information on pension plans includes the type of plan, current account balance, contributions to the plan, income currently received as part of the plan, expectations about its amount and, where relevant, whether the employer contributes to the plan and whether the account is subsidized by the state.

In this paper, the sample is restricted to married couples or individuals who reported being in a partnership between the ages of 16 and 64.<sup>16</sup> Although individuals who are not employed are not excluded from our analysis, we include a dummy variable that accounts for individual employment status in our empirical analysis. In the total pooled sample of 12,120 PHF respondents who are younger than 65 years of age and either married or in a partnership, 6,417 are women and 5,703 are men.

## 4.2 Household bargaining styles

### 4.2.1 Construction of the household bargaining style variable

For each survey wave, the PHF questionnaire includes the question “Viewed in general: How do you make investment decisions in your household?”, which prompts each household’s financially knowledgeable person (FKP), i.e. the person with the best insight into the household’s finances, to reveal their unit’s bargaining style. Respondents may answer (1) “Primarily, each person in the household on their own”, (2) “We decide on the essential things together”, (3) “One household

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<sup>15</sup>For a more detailed description of the PHF survey, see Altmann et al. (2020) and [www.bundesbank.de/phf-research](http://www.bundesbank.de/phf-research).

<sup>16</sup>For this reason, the terms partner and partners as well as couple, unit and household are used interchangeably in this study.

member for the household” or (4) “It depends”. Note that the question refers to household bargaining that concerns financial investments only. For this reason, our analysis focuses on the relationship between bargaining and individual investment as well as the expected outcomes of such investments.

In this paper, the bargaining style of households whose financially knowledgeable person answers the aforementioned PHF question with option (1) is assumed to be most accurately modeled by non-cooperative arrangements, in line with non-cooperative (collective or otherwise) bargaining models, which represent the lowest level of cooperation between household members. In non-cooperative households, each member makes financial decisions independently of other individuals in the same unit, taking into account their personal preferences and constraints. The extent to which individuals incorporate other household members’ preferences into their decision-making depends on whether they derive utility from other members’ consumption or welfare, and it is mediated by their levels of altruism. Given that such households do not engage in resource pooling, this paper argues that resource or income transfers between household members is the main mechanism through which non-cooperative individuals share resources with each other and change the intrahousehold resource allocation that one would expect from observing household members’ characteristics and constraints (e.g. personal income and savings).

Households whose FKP claims that its members decide on essential things together only cooperate in decision-making that pertains to specific goods or activities, which are perceived as relevant to the household or its individual members. For this reason, the paper refers to this household bargaining style as relevance-specific cooperation. In contrast with non-cooperative households, these units engage in resource pooling and redistribution, which is carried out according to a household-specific sharing rule in line with theoretical frameworks of collective, cooperative bargaining. The implied sharing rule assigns each household member a percentage of household income, which that member can choose to consume, save or invest. Moreover, it is a function of each member’s bargaining power within the household, since those individuals with more intrahousehold bargaining power are better able to shift household decision-making in a way that is perceived to be personally advantageous or that reflects their personal preferences more strongly. In other words, in cooperative households, household sharing rules are such that individuals with more intrahousehold bargaining power consume a higher share of the unit’s resources.

This paper argues that members of households whose FKP claims that the identity of those members who are involved in his/her unit’s decision-making “depends” engage in cooperative bargaining when decision-making pertains to certain goods or activities. For this reason, we refer to the bargaining style of such households as item-specific cooperation. The main difference between item-specific and relevance-specific bargaining is that, in the former, individual household members use information about the items at the centre of household decision-making to decide whether to negotiate or cooperate with other household members. In the latter, they estimate the consequences of household investments in that item in order to decide whether to partake in bargaining. Given that, in relevance-specific bargaining, there is a set of items over which households will always collectively negotiate (the ones deemed relevant) whereas in item-specific bargaining, there is no such predetermined list of items, the former is likely to represent a higher-level of household cooperation. For simplicity, however, we assume that such a difference is not significant and group relevance-specific and item-specific cooperation into a single bargaining style, denominated “cooperation”.<sup>17</sup>

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<sup>17</sup>In order to test the validity of this assumption, we run regressions that control for our constructed cooperative style variable and similar regressions that control for item-specific and relevance-specific cooperation as separate bargaining styles. Results for the first set of regressions are presented in Table 4, and results for the latter set are presented in Table A.8 in the appendix. Given the similarity between the coefficients for bargaining styles and

Households whose FKP claims that one household member makes investment decisions for the entire unit are considered to be headed by a central planner, who may or may not be the FKP, in line with unitary bargaining models. Their bargaining style is denominated “central planning”. Theoretical unitary bargaining frameworks assume that a household’s central planner takes into account every member’s utility when maximising the household’s collective welfare function, given the appropriate constraints. Moreover, such models are a subset of collective bargaining frameworks, where the household head has perfect information about other members’ utility. However, given that, in central planning, only one person is effectively involved in household decision-making, we refrain from comparing the level of intrahousehold cooperation in central planning and cooperative households. In this study’s framework, both central planning and non-cooperation represent low levels of intrahousehold cooperation because, in both arrangements, household members make decisions independently of each other. The main difference between these styles is the number of individuals who engage in decision-making separately, since, in central planning, only one member in the household makes decisions, and, in the latter, each household member does so.

#### 4.2.2 Descriptive statistics

Table 1 provides descriptive statistics, namely the mean and standard deviation or total percentage, for the household bargaining variables used in this paper’s regression analysis, separately for men, women and the full sample. Individual intrahousehold bargaining power is empirically estimated by proxy indicators, namely a dummy variable for whether respondents’ income is higher than that of their partner<sup>18</sup> and a dummy variable that equals one for respondents who are the financially knowledgeable person in their household and zero otherwise. Household bargaining styles are constructed as per the description in Section 4.

Table 1: Descriptive statistics for the household bargaining styles and intrahousehold bargaining power of the men and women in our PFH sample

	Men	Women	Full sample
<b>N</b>	5,703	6,417	12,120
<b>Bargaining indicators</b>			
Bargaining style (%)			
Cooperation	85	84	85
Non-cooperation	7	7	7
Central planning	8	9	9
Bargaining power proxies			
Earnings/Couple’s earnings	0.630 (0.338)	0.400 (0.355)	0.511 (0.365)
FKP (%)	57	39	48

When indicated by a % sign, the statistics refer to the total percentage of respondents in our sample to whom the variable applies. Otherwise, statistics refer to the variables’ mean and, in parentheses, standard deviation. The sample is restricted to individuals under the age of 65.

According to Table 1, amongst our sample of PHF respondents, cooperation is the most common household decision-making style, followed by central planning and non-cooperation, which suggests that most partners in our study make decisions jointly. Specifically, 85% live in a cooperative household, 9% live in a unit that engages in central planning, and 7% are members of a non-cooperative couple. With reference to intrahousehold bargaining power indicators, in our

indicators in these tables, we conclude that the construction of our bargaining style indicators is valid.

<sup>18</sup>Individual-to-couple or individual-to-household income ratios are the bargaining power proxy most commonly used in empirical literature (Webb and Friedberg 2006).

sample, the average respondent has employment income that is similar to that of his/her partner, which indicates that power distributions in sampled households are somewhat egalitarian. Nonetheless, relative to women, men are more likely to have a partner with lower employment income and are more likely to be the FKP in their unit. Indeed, less than half of all individuals in our sample, namely 48%, are the FKP in their household, but 57% of men and 39% of women in this study are their unit's FKP. The descriptive statistics in Table 1 thus suggest that, on average, the men in our sample have more intrahousehold bargaining power than the women.<sup>19</sup>

As per Table 2, the descriptive statistics for individual, household and spousal-level characteristics of the respondents in our sample are identical across bargaining styles, with some exceptions. Specifically, relative to individuals in other types of units, respondents in non-cooperative households are more likely to have higher levels of education, to be employed, unmarried, and to live in a household with no children. Higher percentages of individuals in central planning units are married and their households tend to have higher net wealth. Respondents in cooperative units are also more likely to be married than individuals in non-cooperative units and tend to have lower employment income, relative to both non-cooperative and central planning partners. Heterogeneity along the aforementioned characteristics may indicate that such variables are determinants of household bargaining style or that they reflect the consequences of household decision-making. In this paper, we focus on bargaining as a determinant of individual-level, retirement-related outcomes rather than the determinants of household bargaining arrangements, and we control for the variables listed in Tables 1 and 2.<sup>20</sup>

### 4.3 Pension contributions and expected standard of living in retirement

In the PHF, respondents are asked about their private pension plans<sup>21</sup>: “How high are the contributions that you make for this form of retirement pension in a month, quarter or year?” Moreover, in waves 2 and 3, the PHF asks “What do you think: How will your standard of living be in old age?”, with possible answers (1) “Somewhat lower than during working life”, (2) “Roughly the same as during working life”, and (3) “Somewhat higher than during working life”. This study uses answers to the aforementioned questions on annual private pension contributions and expected standard of living in retirement as dependent variables in the empirical analysis in Section 5.

According to Table 3, the mean total annual contributions to private pension plans is 1,089 euro in cooperative households, 1,379 euro in non-cooperative units, and 1,364 euro in central planning. The men in our sample contribute an average of 1,405 euro per year in cooperative units, 1,650 euro in non-cooperative units and 2,090 euro per year in central planning units to their private pension plans. An average woman in our sample contributes 807 euro annually in a cooperative unit, 1,142 euro in a non-cooperative unit, and 743 euro per year in a central planning household. In sum, relative to individuals in households with other bargaining styles, respondents in non-cooperative units make more contributions to their private pension schemes per year on average. Relative to men in households with other bargaining styles, men in central planning units make the most contributions to their private pension schemes, and, relative to other females, women in non-cooperative units make the highest contributions to their private pension plans.

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<sup>19</sup>Our PHF sample contains a total of 43 homosexual couples, specifically 19 male and 24 female couples. For this reason, male and female bargaining power ratios are not symmetrical.

<sup>20</sup>See Table A.1 in the appendix for the descriptive statistics of individual, spousal and household-level demographic and financial characteristics for our sample.

<sup>21</sup>For an overview of the German pension system see OECD (2009) and OECD (2019).

Table 2: Descriptive statistics for demographic, financial, and bargaining indicators at the individual, household, and partner levels

	Cooperation	Non-cooperation	Central planning	Total
<b>N</b>	10,243	840	1,037	12,120
<b>Bargaining power indicators</b>				
FKP (%)	48	47	47	48
Earnings/Couple's earnings	0.510 (0.365)	0.514 (0.336)	0.512 (0.394)	0.511 (0.365)
Absolute difference partners' annual earnings	33063.0 (63098.9)	33103.5 (37425.0)	42226.3 (52814.5)	33849.8 (60883.5)
<b>Demographics: individual</b>				
Female (%)	53	53	54	53
Age	48.00 (10.74)	47.13 (11.98)	49.49 (9.814)	48.07 (10.77)
Education (%)				
Low education level (iscd 0-3)	51	36	44	49
Medium education level (iscd 4-6)	27	30	31	28
High education level (iscd 7-8)	22	34	26	23
Country of birth (%)				
Germany	86	92	87	86
Europe (excl. Germany)	11	7	9	11
Other	3	1	3	3
Employed (%)	75	82	74	76
Married (%)	88	57	92	86
Income / 1,000	29.02 (50.59)	35.24 (39.10)	33.02 (49.71)	29.80 (49.71)
<b>Household characteristics</b>				
Number of children in the household (%)				
No children	65	81	66	66
One child	16	13	18	16
Two children	14	6	13	14
Three and more children	5	1	4	5
Household net wealth / 1,000	451.9035 (1155.8600)	565.4400 (1212.8026)	733.2024 (1365.8245)	483.8406 (1181.9625)
Donates (%)	56	64	67	58
<b>Demographics: partner</b>				
Age	48.54 (11.52)	47.85 (12.81)	50.31 (10.91)	48.65 (11.57)
Education (%)				
Low education level (iscd 0-3)	50	36	39	48
Medium education level (iscd 4-6)	28	30	33	28
High education level (iscd 7-8)	23	34	28	24
Country of birth (%)				
Germany	86	92	88	87
Europe (excl. Germany)	11	6	9	11
Other	3	1	3	3
Employed (%)	73	78	71	73
Yearly income/1,000	28.60 (50.85)	34.54 (39.55)	32.20 (47.72)	29.32 (49.91)

Table 3: Descriptive statistics for contributions to pension plans and expected standard of living in retirement according to bargaining style

	Cooperation	Non-cooperation	Central planning	Total
<b>Women</b>				
Total private pension contributions	807.1 (1923.3)	1141.8 (1973.6)	742.6 (1307.9)	824.8 (1883.3)
Private pension contributions/Monthly income	0.0541 (0.178)	0.0526 (0.165)	0.0673 (0.207)	0.0550 (0.179)
Expected standard of living in retirement (%)				
Somewhat lower than during working life	54	60	41	53
Roughly the same as during working life	42	38	54	43
Somewhat higher than during working life	4	2	5	4
<b>Men</b>				
Total private pension contributions	1404.7 (2733.3)	1649.6 (3054.2)	2090.4 (4067.6)	1479.1 (2897.1)
Private pension contributions/Monthly income	0.0320 (0.119)	0.0376 (0.131)	0.0366 (0.0795)	0.0327 (0.118)
Expected standard of living in retirement (%)				
Somewhat lower than during working life	53	50	36	51
Roughly the same as during working life	43	47	58	44
Somewhat higher than during working life	4	4	6	4
<b>Full sample</b>				
Total private pension contributions	1089.0 (2359.5)	1379.3 (2548.2)	1363.9 (2998.5)	1132.7 (2435.9)
Private pension contributions/Monthly income	0.0429 (0.152)	0.0453 (0.150)	0.0519 (0.158)	0.0438 (0.152)
Expected standard of living in retirement (%)				
Somewhat lower than during working life	53	55	39	52
Roughly the same as during working life	42	42	56	44
Somewhat higher than during working life	4	3	6	4

Additionally, central planning couples contribute the highest shares of employment income to their private pension plans, followed by non-cooperative and cooperative partners. The women in our sample contribute higher shares of their income relative to the men, regardless of their household's bargaining style. Moreover, relative to women in other household arrangements, women in central planning contribute the highest shares of income to their private pension plans. Relative to men in other types of arrangements, men in non-cooperative couples contribute the highest shares of personal income to their private pension plans.

More than half (52%) of respondents expect to have a standard of living in retirement that is lower than the one they enjoy during working life: 44% of respondents expect to have the same standard of living, and 4% expect a higher standard of living in retirement.<sup>22</sup> Individuals in central planning households are more likely to expect to enjoy an equal or higher standard of living (62%), and those in non-cooperative households are more likely to expect a lower standard of living (55%). Despite the fact that, on average, male respondents make more contributions to their pension plans, the expected standards of living in retirement of the men and women in our sample are very similar. Nonetheless, relative to men (51%) a slightly higher percentage of women (53%) expect to have a standard of life that is lower in retirement than during working life. This is in line with our aforementioned observation that, in Germany, women are at higher risk of poverty in retirement. Moreover, relative to men in other types of unit, men in cooperative households have the lowest expectations. Relative to other women, women in non-cooperative households have the lowest expectations for their standard of living in retirement.

<sup>22</sup>As a reference point, only one-third of respondents to the 2001 to 2006 Household Income and Labour Dynamics in Australia survey who had not yet retired reported believing that they would not be able to maintain their standard of living in retirement (Bradbury and Mendolia 2012). Culture and politics might thus influence individual retirement expectations.

This paper argues that the discrepancy between respondents' annual private pension contributions and expected standard of living in retirement, as per the aforementioned descriptive statistics, is partly explained by the fact that household bargaining allows for the transfer or sharing of spousal resources in retirement, which are mediated by bargaining style, intrahousehold bargaining power, gender, individual altruism, and intracouple information sharing. We explore these hypotheses in Section 5.

#### 4.4 The FKP as a proxy of the household head's identity

In addition to household bargaining styles and a dummy related to personal-to-couple income ratios, the regressions in Section 5 control for a proxy of the identity of the household head. The proxy consists of a dummy variable that equals one if the respondent is the FKP in their household and zero otherwise.

We argue that being the FKP is not simply a measure of financial literacy and that individuals who are the FKP in central planning units are likely to be central planners for several reasons. First, the FKP may convince other household members that he/she should be the central planner, using the arguments that his/her superior knowledge of the household's finances and that his/her greater financial literacy puts him/her in the best position to make financially responsible decisions for others.<sup>23</sup> Second, being the FKP might be an indicator of frequent decision-making in the past, in which case the FKP will have acquired his/her knowledge of household finances after making multiple decisions for other household members. Given that both household bargaining styles and the identity of households' FKP<sup>24</sup> seem to remain stable over time (see Table 12 in the appendix), FKPs who have made decisions for other members in the past may use their acquired experience to continue leading such decision-making.

In this paper, our proxy for whether a given respondent is his/her household's FKP is interpreted as a direct measure of their household head/member status. Given that, by definition, relative to other household members, household heads tend to have greater intrahousehold bargaining power, our proxy for the identity of the FKP is an indirect measure of individual bargaining power.

To test the claim that our proxy for the identity of the household head is an indicator of individual intrahousehold bargaining power differing from relative income ratios and that it is not simply a proxy for gender, we run OLS linear and ordered probit regressions that assess the correlations between our dummy for the identity of the FKP, the personal-to-couple income ratio, a dummy for whether individual income is higher than spousal income and gender. As per the results to pairwise correlations between our proxy of household heads' identity and other intrahousehold bargaining power indicators in appendix Table A.10, we conclude that our dummy for the identity of the FKP is sufficiently different from the bargaining power indicators used in this paper.

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<sup>23</sup>Alternatively, household members who are not the FKP might recognise their own lack of financial literacy or knowledge of their unit's finances and thus voluntarily decide that assigning responsibility for the household's financial decision-making to the FKP would increase the unit's chances of financial prosperity.

<sup>24</sup>In our sample, 31.04% of PHF respondents lived in a household that changed its FKP from survey wave 1 to wave 3, 30.39% of PHF respondents lived in a household that changed its FKP from survey wave 1 to wave 2, and 34.13% lived in a unit that changed its FKP from survey wave 2 to wave 3.

## 5 Results

### 5.1 Household bargaining and individual retirement outcomes

We begin this subsection by empirically testing the hypothesis that household bargaining styles are correlated with their annual contributions to private pension plans and personal expectations for their standard of living in retirement. To this end, we run ordered probit regressions with the dependent variable of individuals' expected standard of living in retirement and OLS regressions with the dependent variable of individual annual contributions to private pension plans. The regressions have the following specifications:

$$Pension_i = \beta_1 Bargaining + \beta_2 Individual + \beta_3 Partner + \beta_4 Household + \epsilon_i \quad (6)$$

$$Expectations_i = \beta_1 Bargaining + \beta_2 Individual + \beta_3 Partner + \beta_4 Household + \epsilon_i \quad (7)$$

where *Bargaining* is a vector of household bargaining indicators, including style and members' intrahousehold bargaining power as measured by a dummy variable that indicates whether a respondent is the FKP and a dummy variable that indicates whether an individual's employment income is higher than that of his/her partner. In equations (6) and (7), *Individual* is a vector of personal characteristics (gender, age, country of birth, marital and employment status, education level, employment income divided by 1,000, and a dummy variable for whether the person expects to receive an inheritance or gift in the future), *partner* is a vector of the equivalent spousal characteristics, and *Household* is a vector of household characteristics, namely the number of children in the unit and dummy variables for household net wealth brackets. The dependent variable  $Pension_i$  denotes individual  $i$ 's annual private pension contributions,  $Expectations_i$  is his/her expected standard of living in retirement, and  $\epsilon_i$  is the error term.<sup>25</sup>

Table 4: Contributions to private pensions, expected standard of living in retirement and bargaining styles

VARIABLES	Private pensions	Expectations
Non-cooperation = 1	25.77 (95.77)	-0.129** (0.0655)
Central planning = 1	55.72 (119.2)	0.226*** (0.0610)
FKP = 1	365.6*** (44.90)	0.0537** (0.0227)
Personal-to-partner income ratio > 0.5	-118.3 (117.2)	0.0724*** (0.0277)
Female = 1	-448.5*** (64.61)	-0.0317 (0.0290)
Age	4.229 (5.465)	-0.00864*** (0.00301)
Married = 1	80.61 (63.03)	-0.0632 (0.0552)

<sup>25</sup>All regressions in this paper control for PHF wave fixed effects and respondents' and their partners' countries of birth, but the coefficients for these variables are excluded from our tables of results due to their lesser relevance in comparison to the aforementioned independent variables. Additionally, standard errors are clustered at the household level.

Medium education level (isced 4-6)	336.5*** (58.77)	0.0906** (0.0352)
High education level (isced 7-8)	501.3*** (81.55)	0.0766** (0.0378)
Working = 1	437.7*** (43.39)	-0.0262 (0.0412)
Income/1,000	4.319*** (1.666)	0.000291 (0.000216)
Expected inheritance/gift = 2, No inheritance expected	-170.3** (66.28)	-0.0966** (0.0459)
Number of children in the household	-32.60 (28.29)	0.00959 (0.0221)
Household net wealth = 2, €35,000 - €100,000	356.8*** (45.20)	0.0821 (0.0695)
Household net wealth = 3, €100,000 - €250,000	491.4*** (47.86)	0.380*** (0.0631)
Household net wealth = 4, €250,000 - €500,000	758.8*** (60.19)	0.515*** (0.0653)
Household net wealth = 5, More than €500,000	1,506*** (86.08)	0.647*** (0.0660)
Partner's age	-13.64** (5.527)	-0.00340 (0.00284)
Partner's education: Medium education level (isced 4-6)	46.03 (58.08)	0.0548 (0.0352)
Partner's education: High education level (isced 7-8)	-97.87 (85.78)	0.0797** (0.0377)
Partner is working = 1	19.57 (57.74)	-0.0750** (0.0378)
Partner income/1,000	3.290 (2.037)	0.000246 (0.000211)
Constant	421.9*** (147.6)	
Observations	10,818	7,493
R-squared	0.141	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of OLS linear regressions, and the second column the results of ordered probit regressions. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals under the age of 65 for both regressions.

As per the results in Table 4, relative to belonging to a cooperative household, living in a non-cooperative or a central planning unit is positively correlated with individual monthly contributions to pension plans. The relationship is stronger for central planning households, but statistically insignificant for all household bargaining styles. In spite of the positive correlation between non-cooperation and private pension contributions, this bargaining style is negatively and significantly correlated with respondents' expected standard of living in retirement, whereas the equivalent correlation for central planning is positive and significant. Relative to individuals who are not the FKP, respondents who are their household's FKP contribute an extra 365.6 euro to their private pension plans per year and are also significantly more likely to expect a higher

standard of living in retirement. Individuals whose employment income is higher than that of their partner contribute less to their pension plans and are significantly more likely to expect a higher standard of living in retirement. Controlling for other characteristics, women contribute 448.5 euro less per year than men to their private contribution plans, with the coefficient being significant, and they are more likely to expect a lower standard of living in retirement.

The results in Table 4 thus suggest that both household bargaining style and intrahousehold bargaining power distributions significantly influence individual expectations concerning standard of living in retirement and that individual intrahousehold bargaining power may influence respondents' annual contributions to individual private pension plans.<sup>26</sup> Empirical data from the PHF thus supports our hypothesis that household bargaining partly influences individual retirement outcomes, also suggesting that gender may mediate such correlation.

In the following subsections, we investigate how household bargaining mediates observed differences in the pension contributions and retirement expectations of individuals in cooperative, non-cooperative and central planning households. Specifically, we argue that any correlations between individual bargaining power and retirement outcomes are mediated by the decision-making and resource-sharing structures that specific bargaining styles impose on households. We also explore gender differences in the relationship between bargaining on pension contributions and retirement expectations.

## 5.2 Individual bargaining power and gender discrepancies

### 5.2.1 Individual bargaining power

Existing empirical studies of household decision-making usually emphasise individual intrahousehold bargaining power as the main mechanism through which bargaining affects household and individual outcomes. However, we argue that intrahousehold bargaining power should be more relevant for households whose bargaining arrangements impose a stable, collective decision-making structure on household negotiations, which ensures the frequent participation of multiple members in household governance.

To test the hypothesis that, relative to other bargaining styles, individual bargaining power is more relevant in cooperative households and that the identity of the central planner/household head is more relevant in central planning households, in the regressions that follow, we interact household bargaining styles with dummy variables for individual intrahousehold bargaining power and our dummy variable for the identity of household heads. We use a dummy variable that equals one for respondents whose employment income is greater than that of their partner and zero otherwise as an empirical proxy of individual intrahousehold bargaining power.<sup>27</sup> In addition, we use a dummy variable that equals one if respondents are the FKP in their household as a proxy of the identity of the household head.

Being the FKP is a measure of individual level financial literacy, which increases one's ability to make advantageous economic decisions. Therefore, we expect our dummy variable for the identity of the FKP to be significantly correlated with the annual contributions to private pension

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<sup>26</sup>We find that individual pension contributions and expectations are not significantly correlated with most spousal characteristics included as independent variables in our regressions, which is in line with the empirical results of Yilmazer and Lyons (2010). We attribute this finding to the greater relevance of relative personal-to-couple income ratios in determining individual contributions and expectations.

<sup>27</sup>In line with the literature on household bargaining, we assume that individuals with higher earnings than their partner also have more say in the couple's decision-making.

plans and expected standard of living in retirement of PHF respondents, even when we control for household bargaining style, similar to the results in Table 4. Moreover, in cooperative households, being the FKP is likely to be an indicator of higher intrahousehold bargaining power, given that it implies a higher personal-to-household financial literacy ratio. Nonetheless, relative to central planning households, in cooperative units, intrahousehold bargaining power distributions in cooperative units are influenced by a wider range of household members' relative characteristics, such as personal-to-household income, age or education ratios.

Given that the identity of the FKP is the best proxy of the central planner's identity available in the PHF, we expect the interaction term that corresponds to belonging to central planning units and being the FKP to be more positive and statistically significant for retirement expectations, relative to the corresponding term for cooperative and non-cooperative households. Finally, since the personal-to-household income ratio is less relevant as a measure of intrahousehold bargaining power distributions in non-cooperative and central planning households, we predict that the interaction term that corresponds to belonging to the latter units and having income that is higher than that of one's partner is positive but not statistically significant for retirement expectations.

The first column in Table 5 shows the results of ordered probit regressions with the dependent variable of individual expectations for standard of living in retirement and a similar specification as that in equation (7). The regressions in the first column exclude our proxy for the identity of the FKP and include interaction terms for household bargaining style and individual bargaining power as measured by the aforementioned dummy. The second column in Table 5 shows the empirical results of similar regressions that exclude our proxy for individual bargaining power distributions and instead include our proxy for the identity of the FKP as well as interaction terms for household bargaining style and the identity of the FKP.

Table 5: Expected standard of living in retirement, bargaining styles and bargaining power

VARIABLES	(1) Expectations	(2) Expectations
Non-cooperation = 1	-0.178** (0.0854)	-0.166** (0.0765)
Central planning = 1	0.186*** (0.0715)	0.145** (0.0675)
Personal-to-partner income ratio > 0.5	0.0596** (0.0290)	
Non-cooperation, higher income	0.0934 (0.0928)	
Central planning, higher income	0.0775 (0.0710)	
FKP = 1		0.0228 (0.0235)
Non-cooperation, is the FKP		0.0710 (0.0848)
Central planning, is the FKP		0.171** (0.0713)
Female = 1	-0.0360 (0.0290)	-0.0392 (0.0266)
Age	-0.00814*** (0.00301)	-0.00638** (0.00288)
Married = 1	-0.0630 (0.0552)	-0.0723 (0.0526)
Medium education level (isced 4-6)	0.0974***	0.0869**

	(0.0351)	(0.0340)
High education level (isced 7-8)	0.0831**	0.0695*
	(0.0378)	(0.0364)
Working = 1	-0.0259	-0.0684*
	(0.0412)	(0.0368)
Income/1,000	0.000314	0.000373*
	(0.000218)	(0.000221)
No inheritance expected = 1	-0.0965**	-0.0899**
	(0.0459)	(0.0440)
Number of children in the household	0.00964	0.00773
	(0.0221)	(0.0208)
Household net wealth = 2, €35,000 - €100,000	0.0824	0.0765
	(0.0695)	(0.0668)
Household net wealth = 3, €100,000 - €250,000	0.380***	0.378***
	(0.0631)	(0.0606)
Household net wealth = 4, €250,000 - €500,000	0.515***	0.504***
	(0.0653)	(0.0625)
Household net wealth = 5, More than €500,000	0.646***	0.668***
	(0.0661)	(0.0630)
Partner's age	-0.00389	-0.00405
	(0.00283)	(0.00267)
Partner's education: Medium education level (isced 4-6)	0.0483	0.0500
	(0.0351)	(0.0339)
Partner's education: High education level (isced 7-8)	0.0736*	0.0705*
	(0.0376)	(0.0361)
Partner is working = 1	-0.0742**	-0.113***
	(0.0378)	(0.0340)
Partner income/1,000	0.000225	-2.33e-05
	(0.000211)	(0.000226)
Observations	7,493	8,140
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first and second columns present the results of ordered probit regressions that include interaction terms for household bargaining styles and relative income ratios (first column) or the identity of the FKP (second column), restricted to individuals under the age of 65. The first column refers to regressions that do not control for the identity of households' FKP and the second column to regressions that do not control for personal-to-couple income ratios. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

According to the results in Table 5, relative to cooperative units, non-cooperative household membership is negatively and significantly correlated with individual expectations for standard of living in retirement, both in regressions that control for partners' relative income but not the identity of the FKP and for those that control for the identity of the FKP but not relative income ratios. Individuals who belong to central planning units are significantly more likely to expect a higher standard of living in retirement, relative to those in cooperative households for both regression specifications. In the first set of regressions, having personal employment income that is higher than that of one's partner is significantly and positively correlated with expected standard of living. In addition, the coefficients corresponding to the interaction term for belonging to a non-cooperative household and earning more than one's partner as well as the interaction

term for belonging to a central planning household and earning more than one's partner are positive but statistically insignificant. The empirical results thus corroborate our hypothesis that household bargaining style, not power, is the primary determinant of the relationship between household bargaining and individual retirement expectations, since intrahousehold bargaining power distributions are mostly relevant in units with cooperative styles.<sup>28</sup>

The results in the second column suggest that being the FKP is positively but not significantly correlated with expected standard of living in retirement. As predicted, being the FKP, and thus the likely household head, is significantly correlated with individual expectations in central planning units.

### 5.2.2 Gender discrepancies

As per the descriptive statistics in Table 1, the men in our sample are more likely to be their unit's FKP and, thus, household central planners, which suggests that men in central planning households have more decision-making power than women in units with the same bargaining style. Moreover, the employment income of the women in the PHF tends to be lower than that of their partners, which could indicate that women in cooperative households tend to have less bargaining power than males in cooperative units. For these reasons, we predict that gender significantly influences the relationship between household bargaining and individual private pension contributions as well as expected standard of living in retirement. The results in appendix Table A.2 corroborate this hypothesis.

More importantly, we hypothesise that gender interacts with the identity of central planners and personal-to-spousal income ratios differently. Specifically, we expect to observe that being the FKP in a central planning unit is more strongly and significantly correlated with male outcomes and that earning more than one's partner is more strongly and significantly correlated with female outcomes. To test the aforementioned hypotheses, we run regressions with the dependent variable of men and women's expected standard of living in retirement that either control for personal-to-household income ratios or the identity of the FKP. The results are presented in Table 6.

Table 6: Expected standard of living in retirement, bargaining styles and bargaining power

VARIABLES	Women	Men	Women	Men
Non-cooperation	-0.257** (0.101)	0.0120 (0.147)	-0.256*** (0.0976)	-0.0265 (0.122)
Central planning	0.149* (0.0843)	0.252* (0.139)	0.178** (0.0751)	-0.0175 (0.128)
Personal-to-partner income ratio > 0.5	0.0929* (0.0540)	0.0124 (0.0583)		
Non-cooperation, income > partner income	0.0419 (0.159)	-0.0331 (0.169)		
Central planning, income > partner income	0.0955 (0.151)	0.0177 (0.162)		
FKP = 1			-0.0390 (0.0441)	0.107** (0.0479)
Non-cooperation, is the FKP			0.0462 (0.150)	0.00184 (0.151)
Central planning, is the FKP			0.00516 (0.146)	0.380** (0.151)

<sup>28</sup>The relationship between household bargaining indicators and individual contributions and expectations also seems to differ according to the number of children in respondents' households (see Table A.9 in the appendix). An exploration of the reasons for this difference is beyond the scope of this paper, however.

Age	-0.00730 (0.00488)	-0.00879* (0.00529)	-0.00466 (0.00443)	-0.00737 (0.00517)
Married = 1	-0.0903 (0.0688)	-0.0243 (0.0651)	-0.102 (0.0646)	-0.0538 (0.0634)
Medium education level (iscd 4-6)	0.152*** (0.0518)	0.0535 (0.0556)	0.157*** (0.0493)	0.0235 (0.0548)
High education level (iscd 7-8)	0.0350 (0.0622)	0.151** (0.0631)	0.0336 (0.0591)	0.121* (0.0623)
Working = 1	-0.0621 (0.0513)	0.0540 (0.0769)	-0.113** (0.0466)	0.0536 (0.0714)
Income/1,000	5.73e-05 (0.000674)	0.000471* (0.000249)	0.000522 (0.000627)	0.000326 (0.000228)
Expected inheritance/gift = 2, No inheritance expected	-0.0711 (0.0529)	-0.131** (0.0527)	-0.0610 (0.0506)	-0.123** (0.0509)
Number of children in the household	-0.00249 (0.0256)	0.0175 (0.0256)	-0.00171 (0.0243)	0.0137 (0.0244)
Household net wealth = 2, €35,000 - €100,000	0.00291 (0.0831)	0.165** (0.0827)	-0.0103 (0.0792)	0.150* (0.0814)
Household net wealth = 3, €100,000 - €250,000	0.339*** (0.0739)	0.432*** (0.0777)	0.335*** (0.0700)	0.420*** (0.0770)
Household net wealth = 4, €250,000 - €500,000	0.511*** (0.0754)	0.530*** (0.0798)	0.490*** (0.0708)	0.511*** (0.0794)
Household net wealth = 5, More than €500,000	0.621*** (0.0772)	0.668*** (0.0806)	0.642*** (0.0724)	0.673*** (0.0797)
Partner's age	-0.00337 (0.00458)	-0.00583 (0.00523)	-0.00365 (0.00413)	-0.00586 (0.00506)
Partner's education: Medium education level (iscd 4-6)	0.0703 (0.0524)	0.00205 (0.0544)	0.0436 (0.0503)	0.0256 (0.0532)
Partner's education: High education level (iscd 7-8)	0.137** (0.0611)	-0.0255 (0.0633)	0.103* (0.0585)	-0.0183 (0.0619)
Partner is working = 1	-0.0694 (0.0613)	-0.0586 (0.0522)	-0.116** (0.0548)	-0.0799 (0.0493)
Partner income/1,000	0.000306 (0.000221)	-0.000144 (0.000637)	1.43e-05 (0.000235)	-0.000228 (0.000593)
Observations	3,899	3,594	4,312	3,828
Wave FE	YES	YES	YES	YES
Country of birth FE	YES	YES	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first and second columns present the results of ordered probit regressions that include interaction terms for household bargaining styles and a relative income ratio dummy variable, restricted to women and men under the age of 65, respectively. These columns refer to regressions that do not control for the identity of households' FKP. The third and fourth columns present the results of ordered probit regressions that include interaction terms for household bargaining styles and dummy variables for the identity of the FKP, restricted to women and men under the age of 65, respectively. These columns refer to regressions that do not control for income ratios. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

As per Table 6, controlling for personal-to-household income ratios, female respondents in non-cooperative units are significantly more likely to expect a lower standard of living in retirement and women in central planning units are significantly more likely to expect a higher standard of living relative to women who live in cooperative households. Men in both non-cooperative and central planning couples are more likely to expect a higher standard of living than men in cooperative units, although the results are only statistically significant for men in central planning. Similarly to the results in Table 5, the interaction terms for belonging to a non-cooperative or central planning unit and having higher income than one's partner are not statistically signif-

icant for men or women. The female coefficients for the interaction terms for belonging to a non-cooperative or central planning household and having higher income than one's partner are positive. However, only belonging to a central planning unit and earning a higher income than one's partner correlates positively with men's expectations, suggesting that women benefit more from heightened individual bargaining power than men, regardless of their unit's bargaining style.

Controlling for the identity of the FKP, men and women in non-cooperation are more likely to expect a lower standard of life in retirement, although results are only statistically significant for women. Moreover, relative to women in cooperative couples, female respondents in central planning units are significantly more likely to expect a higher standard of living in retirement relative to women and men in cooperative couples. The observation that the sign of the correlations between bargaining style and male expectations changes when controlling for income ratios or the identity of the FKP suggests that these indicators capture different aspects of male bargaining power or that one is a superior measure to the other.

For men, being the FKP is positively and significantly correlated with expected standard of living in retirement, whereas the equivalent correlation for women is negative and not statistically significant. Moreover, belonging to a non-cooperative or a central planning couple and being the unit's FKP is not significantly correlated with women's expected standard of living in retirement, but it is positively and significantly correlated with male expectations. These results suggest that male FKPs benefit more from their control of household finances than female FKPs and that men who are the FKP in central planning units, i.e. men who are likely to be central planners, benefit more from their heightened decision-making power in these households relative to female central planners, possibly by allocating more household resources to their personal consumption. Although women's retirement expectations are positively and significantly correlated with central planning for both regression specifications in Table 6, the result that the correlation between being a central planner and women's expected standard of living in retirement is small and not significant also indicates that retired men benefit more from having been a central planner during working life.

We conclude that the results presented in Tables 6 and B.2 support our hypothesis that household bargaining styles and intrahousehold bargaining power distributions affect male and female retirement outcomes differently. Moreover, the results in Table 6 suggest that retired males who were central planners and women who earned higher income than their partner may benefit from their household's bargaining style and heightened individual bargaining power during working life.

### 5.3 Intrahousehold insurance mechanisms: resource pooling and transfers

In this section, we argue that bargaining styles also impose a structure on intrahousehold resource sharing in retirement that partly determines household members' preferential insurance mechanisms against old-age poverty. Specifically, we argue that, while all bargaining styles allow for retirement resource-sharing among household members, non-cooperative styles increase the likelihood that such sharing takes on the form of altruistic transfers, and that cooperative as well as central planning styles are conducive to sharing in the form of resource pooling and redistribution.<sup>29</sup> We further argue that resource-sharing mechanisms differ in their consequences on individual retirement outcomes.

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<sup>29</sup>At the same time, we recognise that, in reality, it is likely that all types of households utilise both resource transfers and redistribution.

### 5.3.1 Altruism

In order to test the hypothesis that altruism mediates resource transfers in non-cooperative households, we first construct a dummy variable that equals one for households that donate resources to non-profit organisations and zero otherwise as a proxy measure of household-level altruism.<sup>30</sup> As per the descriptive statistics presented in Table 7, 67% of all central planning households donate to non-profit organisations, and smaller percentages of non-cooperative (64%) and cooperative (56%) households make donations to such organisations.

Table 7: Donating behavior according to household cooperation

	Cooperation	Non-cooperation	Central planning	Total
Does not donate	43.7	36.2	32.8	42.3
Donates	56.3	63.8	67.2	57.7
Total	100.0	100.0	100.0	100.0
<i>N</i>	12,120			

In order to test the hypothesis that individuals in non-cooperative couples primarily share resources in retirement by engaging in altruistic transfers, whereas individuals in cooperative and central planning units preferentially pool and redistribute household resources, we run OLS linear regressions with a specification similar to that in equation (6), controlling for whether households donate to non-profit organisations separately for each household bargaining style and for the highest-earning and lowest-earning partners.

Assuming that household altruism is positively correlated with individual levels of altruism, we argue that individuals in households that donate and whose income is higher than that of their partner are more likely to transfer resources to their partner, due to both their individual altruism and their relatively greater financial ability. In such cases, these individuals should make additional contributions to their pension plans in order to transfer personal income to their partner in retirement. Simultaneously, the lowest-earning partners in such units are likely to contribute less to their pension plans given their expectation that their partner's transfers will allow them to have adequate income in retirement. We thus predict that, for the highest earners in non-cooperative couples, household donations are positively correlated with private pension contributions, but that the equivalent correlation is negative for the lowest earners in these units.

As per Table 8, the lowest-earning partners in non-cooperative couples that donate contribute 192 euro less per year than the lowest-earning partners in non-cooperative households that do not donate. The highest earners in non-cooperative couples that donate contribute an additional 414 euro per year to their private pension plans, with the results being statistically significant only for the latter group. In cooperative and central planning units, donating to non-profit organisations is positively and significantly correlated with annual private pension contributions for both lowest and highest-earning partners, although the coefficients are larger for the highest-earning partner in couples with either bargaining style.<sup>31</sup>

The results suggest that household-level (and possibly individual-level) altruism is positively and significantly correlated with the annual private pension contributions of the highest-earning partner, regardless of the couple's bargaining style, which could be due to the fact that altruism mediates not only transfers but resource-sharing in general. Moreover, the fact that

<sup>30</sup>The PHF does not contain information about individual-level altruism.

<sup>31</sup>We believe the coefficients are the highest for central planning units given their higher propensity to contribute to private pension plans, as per Table 3.

Table 8: Annual private pension contributions, bargaining styles and bargaining power

VARIABLES	Non-cooperation		Cooperation		Central planning	
	Lowest earner	Highest earner	Lowest earner	Highest earner	Lowest earner	Highest earner
Household makes donations = 1	-191.6 (238.0)	413.5** (209.1)	134.9** (60.09)	256.4*** (60.58)	644.5*** (232.9)	802.9*** (178.9)
Female = 1	-124.1 (274.3)	-490.4 (303.2)	-666.1*** (117.3)	-139.3 (90.57)	-979.2*** (357.9)	-756.3** (324.5)
Age	3.231 (24.49)	-51.41* (26.21)	12.61 (9.252)	8.722 (7.742)	16.41 (28.39)	-5.819 (27.75)
Married = 1	38.30 (243.0)	238.6 (289.6)	23.41 (93.47)	111.9 (81.02)	-660.9 (557.6)	-199.8 (351.9)
Medium education level (isced 4-6)	338.5 (265.2)	-93.63 (260.8)	444.3*** (92.48)	384.4*** (75.91)	207.5 (283.0)	-13.17 (285.2)
High education level (isced 7-8)	8.666 (265.3)	-125.2 (306.5)	422.5*** (131.4)	638.7*** (121.2)	840.0** (373.0)	135.7 (497.1)
Working = 1	754.2*** (200.8)	884.1*** (301.7)	664.4*** (71.30)	263.6*** (82.56)	292.1 (235.1)	399.1 (414.9)
Income/1,000	-14.36*** (6.093)	16.12*** (6.129)	-8.568*** (3.342)	4.802** (1.887)	7.487 (7.486)	14.03 (10.37)
No inheritance expected = 1	-65.23 (259.1)	-400.4 (347.1)	-144.5 (94.59)	-171.0* (87.50)	-219.5 (270.2)	136.9 (381.1)
Household net wealth = 2, €35,000 - €100,000	271.1 (260.0)	709.9** (327.5)	187.6*** (53.10)	413.8*** (68.84)	704.5** (278.3)	418.9 (259.7)
Household net wealth = 3, €100,000 - €250,000	562.7 (345.0)	484.6 (306.2)	385.5*** (59.55)	559.3*** (74.04)	744.1** (359.7)	370.4 (323.9)
Household net wealth = 4, €250,000 - €500,000	969.2** (375.0)	722.5** (330.9)	621.6*** (77.10)	794.3*** (90.45)	721.3** (286.8)	566.2 (449.3)
Household net wealth = 5, More than €500,000	1,806*** (388.1)	1,701*** (371.2)	1,466*** (128.7)	1,358*** (118.4)	1,392*** (318.9)	977.0*** (376.2)
Number of children in the household	68.17 (187.9)	-138.9 (253.8)	-19.08 (33.93)	-25.08 (39.06)	-5.301 (100.6)	-34.35 (250.5)

Table 8: Continued

VARIABLES	Non-cooperation		Cooperation		Central planning	
	Lowest earner	Highest earner	Lowest earner	Highest earner	Lowest earner	Highest earner
Partner's age	-16.23 (27.41)	12.89 (22.47)	-20.05** (9.707)	-21.26*** (7.635)	-30.00 (28.76)	1.299 (24.29)
Partner's education: Medium education level (isced 4-6)	401.8 (254.6)	-67.79 (253.4)	-2.850 (91.67)	28.23 (82.30)	-94.20 (301.9)	-601.1** (299.5)
Partner's education: High education level (isced 7-8)	374.5 (280.4)	306.9 (315.5)	-222.4* (126.6)	-150.3 (120.0)	-406.6 (328.0)	292.0 (520.4)
Partner is working = 1	-63.20 (303.9)	210.3 (212.6)	19.92 (92.50)	-13.82 (78.83)	297.3 (234.9)	509.1 (332.1)
Partner income/1,000	3.799 (3.729)	-16.74 (10.73)	4.580** (1.801)	4.175 (3.522)	-3.551* (1.817)	-0.530 (14.42)
Constant	234.0 (520.2)	1,327* (754.8)	669.1*** (196.9)	419.8** (186.7)	1,571 (997.0)	-143.0 (1,084)
Observations	367	387	4,421	4,609	435	457
R-squared	0.181	0.214	0.156	0.142	0.182	0.146
Wave FE	YES	YES	YES	YES	YES	YES
Country of birth FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

The first and second columns present the results of OLS linear regressions, restricted to individuals under the age of 65 who live in non-cooperative households and whose employment income is lower or higher than that of their partner, respectively. The third and fourth columns present the results of OLS linear regressions, restricted to individuals under the age of 65 who live in cooperative households and whose employment income is lower or higher than that of their partner, respectively. The fifth and sixth columns present results for OLS linear regressions, restricted to individuals under the age of 65 who live in central planning households and whose employment income is lower and higher than that of their partner, respectively. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

the correlations between household donating behaviour and the pension contributions of the highest-earning and lowest-earning partners only have the opposite sign for non-cooperative couples could indicate that altruistic transfers from the financially better-off partner to the less well-off partner take place preferentially in retired non-cooperative couples, as per our theoretical framework. The results further suggest that, in cooperative and central planning units, altruism leads all members of a unit, regardless of personal income, to make more pension contributions so that they can pool their retirement income and altruistically redistribute resources according to individual consumption needs in retirement.

### 5.3.2 Knowledge of spousal finances

In addition, altruistic transfers from the partner in the most favourable financial situation to the less well-off partner should be mediated by each partner’s knowledge of the other’s finances. Namely, individuals who are aware that they make more contributions to their private pension plans than their partner might increase their annual contributions in order to altruistically transfer resources to their partner in retirement to an extent that individuals with poor knowledge of their partner’s finances would not. In turn, individuals who know that their partner makes more contributions to his/her pension schemes might contribute less to their own plans if they expect their partner to make altruistic resource transfers in retirement.

According to this paper’s theoretical framework, individuals in cooperative households engage in collective decision-making, during which they may inform others about their personal finances. Central planners have information about other household members’ preferences and financial needs, given that they redistribute resources within the household according to these factors. In non-cooperative households, however, partners may have fewer opportunities and little need to share information about personal finances, since they make financial decisions independently of each other. Thus, we argue that, relative to individuals in cooperative or central planning households, members of non-cooperative units should be more likely to have poor information about each other’s finances.

The PHF survey assesses respondents’ knowledge of other household members’ finances with the question “How well do you think you could provide information on the household members’ financial investments such as checking accounts, credit cards, savings agreements, securities and brokerage accounts? Please enter an estimate for each person in your household”. Respondents may answer (1) Very well, (2) Well, (3) Not very well, (4) Poorly, or (5) Don’t know. We use answers to this question to construct a dummy variable that equals one if respondents report having informed the interviewer about their partner’s financial investments very well or well and zero if they claim to have provided information about their finances not very well or poorly, or if they report not knowing how to answer this PHF question. Table 9 presents descriptive statistics for the quality of information that partners have about each other’s financial investments, according to their bargaining style. As expected, individuals in non-cooperative units are the least likely to have good knowledge of their partner’s finances, with 84% of all partners in non-cooperative couples reporting having good knowledge, in comparison to 87% in central planning and 92% in cooperative units.

To test the hypothesis that intracouple information sharing influences the consequences of the resource-sharing structures (resource redistribution or altruistic transfers) that bargaining styles impose on households, we run OLS linear regressions with the dependent variable of annual private pension contributions and total (statutory, private, and occupational) pension contributions, with a similar specification as in equation (6), controlling for individual knowledge of spousal finances. The regression specification includes interaction terms for bargaining style

Table 10: Bargaining style and knowledge of other household members' finances

	Cooperation	Non-cooperation	Central planning	Total
Poor knowledge	7.6	16.0***	12.5***/++	8.6
Good knowledge	92.4	84.0	87.5	91.4
Total	100.0	100.0	100.0	100.0
<i>N</i>	12120			

To indicate a 99% significance level of the t-statistic for difference in means between cooperation and non-cooperation or central planning we use \*\*\*. The ++ symbol indicates a 95% significance level of the t-statistic for difference in means between non-cooperation and central planning.

and personal knowledge of spousal finances, and regressions are run separately for the member of the couple with the highest and lowest private pension contributions. We expect that the interaction term for belonging to a non-cooperative unit and having good knowledge of spousal finances is negatively correlated with the private and total pension contributions of the lowest-contributing partner, but positively correlated with the contributions of the highest contributor in a couple. We further argue that such interaction terms should be more statistically significant for non-cooperation than central planning.

Table 11: Private pension contributions given relative Partner contributions and bargaining style

VARIABLES	Lowest contributor	Highest contributor
Good knowledge of Partner finances = 1, Good knowledge	-8.479 (79.96)	-473.4** (199.8)
Non-cooperation = 1	477.5** (196.6)	-1,036** (470.1)
Central planning = 1	-92.07 (254.7)	-472.8 (440.7)
Non-cooperation, good knowledge = 1	-447.3** (209.2)	1,420*** (513.2)
Central planning, good knowledge = 1	-14.18 (262.9)	612.7 (483.0)
Female = 1	68.53 (45.38)	-523.7*** (129.7)
Age	-11.12** (4.448)	44.53*** (12.55)
Married = 1	105.6* (60.35)	24.60 (172.6)
Medium education level (iscd 4-6)	53.91 (44.95)	582.4*** (127.9)
High education level (iscd 7-8)	47.54 (53.79)	1,023*** (155.9)
Income/1,000	1.792*** (0.293)	4.679*** (1.171)
Expected inheritance/gift = 2, No inheritance expected	-51.56 (44.03)	-77.79 (127.9)
Working = 1	270.0*** (44.80)	360.7** (167.1)
Number of children in the household	-21.52 (21.50)	-160.9** (63.02)
Household net wealth = 2, €35,000 - €100,000	205.4*** (73.32)	465.2** (211.6)
Household net wealth = 3, €100,000 - €250,000	263.0*** (68.13)	807.0*** (196.3)
Household net wealth = 4, €250,000 - €500,000	444.6*** (69.28)	1,199*** (198.9)
Household net wealth = 5, More than €500,000	805.0*** (70.43)	2,615*** (201.9)
Partner's age	3.413 (4.533)	-47.53*** (11.56)
Partner's education: Medium education level (iscd 4-6)	65.54 (44.52)	105.1 (128.9)
Partner's education: High education level (iscd 7-8)	139.1** (54.16)	44.35 (154.3)
Partner is working = 1	138.1** (58.93)	201.3 (125.0)
Partner income/1,000	-0.150 (0.400)	5.018*** (0.859)
Constant	102.7 (161.8)	1,022** (446.0)
Observations	3,832	4,011
R-squared	0.108	0.161
Wave FE	YES	YES
Country of birth FE	YES	YES
Partner education FE	YES	

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column is restricted to individuals under the age of 65 who live in non-cooperative households and whose annual private pension contributions are lower than those of their partner. The second column is restricted to individuals under the age of 65 who live in non-cooperative households and whose private pension contributions are higher than those of their partner. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North and South America, Africa or Oceania.

According to Table 10, for both the highest and lowest contributors in a couple, having good knowledge of spousal finances is negatively correlated with monthly private and total pension contributions, although the results are only significant for the highest contributor. The lowest-contributing partners in non-cooperative couples contribute 478 euro more per year to their private pensions and 420 euro more to all pension types than the lowest contributors in cooperative units. The highest-contributing partners in non-cooperative couples contribute 1,036 euro less per year to their private pensions and 969 euro less to all pension types than the highest contributors in cooperative units. Both the lowest-contributing and highest-contributing partners make fewer contributions to their private pension plans in central planning relative to individuals in cooperative couples. The results are only significant for non-cooperative couples, however, supporting our hypothesis that altruistic transfers from the partner who is likely to be better-off in retirement to the potentially worse-off partner are the preferential resource-sharing mechanism of retired non-cooperative couples.

Regarding the relationship between bargaining style and intracouple information sharing, relative to the lowest-contributing partners in cooperative couples, the lowest-contributing partners in non-cooperative and central planning units contribute 447 euro and 14 euro less per year to their private pension plans, respectively. Additionally, relative to the highest-contributing partners in cooperative couples, the highest-contributing partners in non-cooperative and central planning households contribute 1,420 euro and 613 euro more per year to their private pension plans, respectively.

The observation that non-cooperation and knowledge of one's partner's finances is negatively correlated with the lowest-contributing partners' private pension contributions and positively correlated with the highest-contributing partners' pension contributions indicates that the lowest-contributing partners are more likely to rely on their partner to transfer resources to them in retirement if they are aware that the latter make more pension contributions. In turn, the highest-contributing partners seem to be more likely to altruistically transfer resources to their partners in retirement if they are aware that the latter make fewer pension contributions and are at risk of not enjoying adequate consumption levels in retirement. The interaction terms for bargaining style and knowledge of spousal financial investments are only significant for non-cooperation, which supports our hypothesis that the relationship between household bargaining style and resource sharing is mediated by each household member's insight into the other household members' financial needs.

We thus conclude that PHF data supports the hypothesis that individual pension contributions and retirement expectations vary according to intrahousehold bargaining styles partly because non-cooperative partners mainly insure each other against old-age poverty through altruistic transfers, and cooperative and central planning partners preferentially insure against old-age poverty by pooling resources and redistributing them according to a flexible or fixed sharing rule. The data also seem to partly support the hypothesis that resource transfers between retired non-cooperative partners are not only mediated by altruism, but also each partner's knowledge of the other's pension contributions during working life.

To summarize the empirical results presented in this section, as per Table 4, both household bargaining style and intrahousehold bargaining power distributions significantly influence individual expected standard of living in retirement, which supports our theoretical framework's first prediction. Specifically, relative to cooperative units, non-cooperative (central planning) household membership is negatively (positively) and significantly correlated with individual expectations for standard of living in retirement.

In addition, measures of household bargaining style seem to mediate the relationship between intrahousehold bargaining and individual retirement expectations better than proxies of individual bargaining power within one’s household. Indeed, the results in Table 5 suggest that some measures of individuals’ intrahousehold bargaining power are more applicable to members of certain types of households than others. Specifically, earning more than one’s partner seems to equate to more bargaining power for individuals in cooperative households whereas being the FKP could mean more bargaining power for individuals in central planning households, as per our framework’s second prediction.

The results presented in Tables 6 and B.2 support our hypothesis that household bargaining styles and intrahousehold bargaining power distributions affect male and female retirement outcomes differently. Indeed, retired males who were central planners and women who earned higher income than their partner may benefit from their household’s bargaining style and heightened individual bargaining power during working life, which is in line with our framework’s third prediction.

Moreover, as per Table 8, our proxy of household-level altruism is positively and significantly correlated with the annual private pension contributions of the highest-earning partner and negatively correlated with those of the lowest-earning partner in non-cooperative households. This finding supports our framework’s (fourth) prediction that altruistic transfers from the financially better-off partner to the less well-off partner take place preferentially in retired non-cooperative couples. Finally, the results in Table 10 also seem to partly support our hypothesis that resource transfers between retired non-cooperative partners are mediated by each partner’s knowledge of the other’s pension contributions during working life.

## 5.4 Robustness checks

We assess the robustness of our results along several dimensions, including the pooling of data across waves, different measures of intrahousehold bargaining power, the exclusion of spousal observations from the regressions, the definition of the working age population, our definition of cooperative bargaining, the presence of children in households, and the consideration of pension contributions to non-private plans as control variables. Tables with the results for the aforementioned robustness checks are included in the appendix.

As per Table A.3 in the appendix, the bargaining styles of the households in the PHF are stable over time, which implies that pooling PHF answers across the survey waves is unlikely to influence our results. The results in Table A.4 refer to OLS linear regressions and ordered probit regressions with the same specification as in equations (6) and (7) that include the personal-to-couple yearly employment income ratio as an independent variable instead of our dummy variable for whether individuals’ earnings are higher than those of their partners. Given that the signs and significance of the coefficients are the same for relative income in Table A.4 and for our dummy variable in Table 4, we conclude that our use of a dummy variable referring to the individual-to-couple income ratio in the regressions of Table 4 is valid.

The use of earnings ratios as an empirical proxy of intrahousehold bargaining power has been criticised in the literature, however, given the endogeneity of labour supply (Lundberg and Pollak 1996; Pollak 2005; Browning, Chiappori, and Lechene 2006). Thus, to address the potentially problematic use of our personal-to-couple earnings ratio and dummy, we run the baseline regression specifications in equations (6) and (7) controlling for couples’ personal-to-couple hourly earnings ratio. The results in Table A.5 show that both personal-to-couple earnings and hourly earnings ratios are positively and significantly correlated with expected standard of

living in retirement. The magnitude of the coefficients for bargaining style are similar to the baseline results, although in Table A.5, non-cooperation is not significantly correlated with retirement expectations. Given the similarities between Tables 4 and B.5, we conclude that our baseline results are robust to controlling for partner-to-couple hourly earnings ratios.

The results in Table A.6 refer to OLS linear regressions and ordered probit regressions with a similar specification as in equations (6) and (7). In Table A.6, the first two columns present the results of regressions that include a dummy variable for the identity of the FKP as an independent variable, and that exclude our dummy variable for whether individuals' earnings are higher than those of their partners. The third and fourth columns present the results of regressions that do not control for the identity of the FKP and control for whether individuals' earnings are higher than those of their partners, which is the proxy of intrahousehold bargaining power most often used in existing literature. The coefficients for either indicator have the same sign and significance as those in Table 4, which indicates that our empirical results are robust to the exclusion of either bargaining power indicator as an independent variable from our regression specifications in equations (6) and (7).

In our empirical analysis, for each respondent's answers, we constructed variables referring to his/her partner, and answers from both members of a couple are included in our data. To verify that our empirical results would remain valid if we eliminated direct answers from each individual's partner, we ran the regressions shown in Table 4 for the aforementioned restricted sample. As per Table A.7, the signs and significance of the coefficients referring to bargaining indicators are similar to those in Table 4. However, while our dummy for whether an individual's earnings are higher than those of his/her partner is only significantly correlated with expected standard of living in retirement in Table 4, it is only significantly correlated with private pension contributions in Table A.6. We thus conclude that our empirical results are somewhat robust to the exclusion of direct spousal observations from our sample.

In order to verify that our results are applicable to the working-age population in our PHF sample, we run regressions with the specifications in equations (6) and (7) after restricting our sample to individuals between the ages of 25 and 65. The results in Table A.8 show that the signs and significance of the coefficients referring to household bargaining indicators are the same as in Table 4, which indicates that our empirical results are robust to the aforementioned sample restriction. To investigate whether respondents' annual contributions to other types of pension plans, namely statutory and occupational pensions, alter our main empirical results, we run regressions with the specifications in equations (6) and (7), controlling for individual annual statutory and occupational pension contributions. The results in Table A.12 in the appendix, which refers to the relationship between household bargaining and the aforementioned retirement outcomes, do not differ significantly from the empirical results in Table 4, leading us to conclude that our analysis is robust to the consideration of individual contributions to other types of pensions.

It could be argued that partners in all types of households expect a higher standard of living in retirement as a consequence of sharing information about each other's saving behaviour or of knowing, for example, that their partner makes more contributions to their pension plans. To test whether household bargaining remains significantly associated with individual expectations when we consider how much information partners possess about each other's finances, we run regressions with the specifications in equations (6) and (7) that also control for a dummy variable equal to one if individuals report having good knowledge of their partner's finances and zero otherwise. The coefficients referring to bargaining style and power indicators in Table A.13 do not differ significantly from the ones in Table 4. We conclude that our results support the claim that household bargaining may influence individuals' pension contributions and retirement

expectations not just through its effects on information sharing between partners but also the ways in which they share or transfer resources between each other in retirement.

Finally, we recognize that the identity of the partner who receives an inheritance can be an indicator of his/her bargaining power within the household or the couple. Specifically, the recipient of an inheritance is likely to hold more intrahousehold bargaining power relative to their partner. In case both partners receive an inheritance, the recipient of the largest sum may benefit more from heightened bargaining power. Therefore, in order to test whether the identity of the partner who receives an inheritance is an equally good or better bargaining power indicator than our bargaining style, personal-to-couple income and FKP indicators, we run regressions with the specifications in equations (6) and (7) that also control for a discrete variable equal to zero if neither partner received an inheritance, one if a respondent received an inheritance, two if his/her partner did, and three if both partners received an inheritance. As expected, according to the results in Table A.15, partners who both receive inheritances make fewer annual contributions to their pension plans. Moreover, couples in which both partners receive an inheritance have significantly higher expectations for their standard of living in retirement relative to couples in which neither partner receives an inheritance.

The results are not statistically significant or notably different for couples in which either partner receives an inheritance, however. Additionally, controlling for which partner receives an inheritance does not significantly change the coefficients for our paper's bargaining indicators. We thus conclude that the association between bargaining style and power with partners' retirement-related behaviour and expectations discussed in this paper is not due to the identity of the partner who receives an inheritance. We further argue that direct measures of partners' bargaining styles, such as the ones collected by the PHF, are a superior measure of household bargaining.

## 6 Conclusion

Our study differs from previous empirical approaches in household decision-making in that it uses both direct measures of household bargaining styles and empirical proxies of intrahousehold bargaining power distributions to investigate the influence of household bargaining on individual financial decision-making and expectations. It builds a theoretical framework with the underlying assumption that household bargaining styles impose specific structures on household decision-making that mediate the relationship between individual bargaining power indicators and household members' retirement-related behaviour and expectations, arguing that German PHF data supports most of the hypotheses generated by the framework. We also argue that intracouple information sharing and altruism (two indicators that have not been sufficiently explored in association with household bargaining in the literature) mediate the relationship between household bargaining styles and individual contributions to pension plans.

Regarding the paper's implications, our empirical results do not allow for unequivocal statements regarding the superiority of certain bargaining styles over others. The data suggest that, in central planning units, men are more likely than women to make decisions for the entire household. Moreover, male central planners seem to benefit from their control of household finances in retirement, given that they tend to expect higher standards of living in retirement, as compared to men in cooperative and non-cooperative couples. Women in central planning units make the fewest annual contributions to their private pension plans, but have the highest expectations for their standard of living in retirement. By contrast, men in central planning make the most annual contributions to their private pension plans, which our theoretical framework hypothesises is due to the fact that, as central planners, men might take on the traditional

gender role of the household’s “breadwinner” and over-contribute to their own pension plans in order to be able to allocate a share of their retirement income to their partners. If this is the case, women may rationally choose to enjoy higher levels of consumption and make lower pension contributions during working life due to their belief that they can rely on their partner to achieve adequate levels of consumption after retiring, somewhat independent of their own retirement income. Men may also benefit from higher income in retirement due to their (altruistically) large pension contributions during working life. Such gendered dynamics may only be applicable to heterosexual couples, however.

For the women in our sample, absolute annual contributions to private pension plans are the highest in non-cooperative couples, but their expected standard of living in retirement is the lowest for this bargaining style. Our theoretical framework hypothesises that such an apparent contradiction is due to the fact that individuals in non-cooperative couples preferentially share resources through inter-partner transfers and that, consequently, their likelihood of receiving income transfers in retirement is a function of their partners’ levels of altruism. Given that individuals cannot be certain that they will receive sufficiently large transfers, they make more contributions to their private pension plans in order to insure against old-age poverty. We conclude that, although independent decision-making is usually seen as favourable for females, women might benefit from central planning in retirement. Nonetheless, on average, women in non-cooperative couples have higher employment income than women in cooperative and central planning units, as shown in Table 18. This, in addition to their ability to make investments and consumption choices freely, is likely to lead to higher female utility from quality of consumption and leisure during working life.

The retirement expectations of men and women in cooperative households seem to be a middle ground between those of non-cooperative and central planning units, and the fact that the vast majority of couples in the sample engage in this type of bargaining could suggest that it is the one that leads to the highest perceived utility levels, averaged out over a lifetime, or that it is the style that best conforms to German cultural norms concerning family life.

Regarding this paper’s public policy implications, the descriptive statistics in Table 3 suggest that women contribute higher percentages of their personal income to private pensions. Thus, women’s lower annual pension contributions may result from their lower employment income rather than an unwillingness to save or to invest in private pension plans. Consequently, it is possible that women in Germany are at a higher risk of old-age poverty due to the gender income gaps that they experience during working life, which prevent them from investing enough funds for retirement. Such gaps may or may not be completely counterbalanced by spousal resource sharing in retirement, with retired women married to high-earning, altruistic, and financially knowledgeable individuals in a cooperative or central planning household being more likely to achieve higher consumption levels due to inter-partner resource sharing. Gender gaps in old-age poverty can thus be reduced with the implementation of national gender-equal labour policies, in addition to (or instead of) gender-equal pension reforms.

Indeed, public policy that reduces gender differences and discrimination in the labour market, specifically gender gaps in employment rates and income, are likely to increase women’s intrahousehold bargaining power, especially in cooperative units, which make the majority of German households in our sample. Such heightened decision-making power could lead to better standards of living in retirement for women and alleviate female old-age poverty in Germany. Additionally, given that being a household’s FKP and belonging to either a non-cooperative or central planning unit is positively correlated with PHF male and female respondents’ expected standard of living in retirement, education policies targeted at reducing the German gender gap in financial literacy (Grohmann, 2016) may alleviate women’s greater likelihood of old-age

poverty.

The present study and its theoretical framework could be extended in multiple directions. Descriptive statistics for several demographic characteristics, retirement expectations and contributions to pension plans of individuals in households that engage in item-specific cooperation are more similar to those of individuals in non-cooperative households than those in units with relevance-specific cooperation. Intrahousehold cooperation is likely to exist in a continuum, which makes it challenging to ensure that our grouping of relevance-specific and item-specific cooperation into a single category is sufficiently rigorous and that couples in Germany do not engage in more than one type of non-cooperative and central planning bargaining styles. Future research would thus benefit from exploring the differences between negotiation styles within the same bargaining classification. Additionally, the paper’s theoretical arguments rest on the assumption that partners retire around the same time and could thus also be strengthened by relaxing this assumption. Arguably, the empirical study has several shortcomings that could be addressed in future research, one of which is our use of individuals’ qualitative expected standard of living in retirement as a dependent variable. Indeed, retirement expectations are likely to be a function of several factors that we cannot measure using PHF data, such as personal levels of optimism, expectations about government pension reforms, the expected receipt of inheritances, and individual financial literacy.

The assessment of the optimality and/or efficiency of individual and spousal pension contributions within and/or across household bargaining styles is beyond the scope of this study. However, future theoretical models that derive conclusions about individual behaviour leading to optimal retirement outcomes, given bargaining style and power, may lead to worthwhile recommendations for national pension policies. Specifically, it could be fruitful to investigate whether a lack of information sharing in non-cooperative households leads to inefficient individual over-contribution or under-pension contributions and savings and/or non-optimal consumption levels during working life and retirement. Investigations into the effects of tax, family law and pension reforms on the relationship between bargaining and retirement-related behaviour may also prove to be interesting. Moreover, our analysis would benefit from the availability of direct measures of individual (rather than household) economic preferences, such as patience, altruism, risk aversion and trust, as well as individual data on perceived household bargaining style, since household members might disagree on their unit’s decision-making type.

Finally, pension eligibility and reforms may alter intrahousehold bargaining styles and power distributions (Ambler 2016; Berniell, de la Mata and Machado 2014). Given the extensive range of household decisions that are influenced by bargaining, such changes are likely to have consequences for household consumption, savings and investments (outcomes traditionally investigated) as well as the less well understood outcomes, such as fertility (Komura and Hikaru 2018). Future studies on the effects of pension reforms on existing household bargaining styles and the latter’s subsequent impact on household decision-making could thus constitute interesting research.

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## 7 Appendix

Table A.1: Individual, spousal and household-level descriptive statistics

	Men	Women	Full sample
<b>N</b>	5703	6417	12120
<b>Demographics: individual</b>			
Age	48.60 (10.43)	47.59 (11.03)	48.07 (10.77)
Education level (%)			
Low education level (iscd 0-3)	44	54	49
Medium education level (iscd 4-6)	30	25	28
High education level (iscd 7-8)	26	21	23
Country of birth (%)			
Germany	87	86	86
Europe (excl. Germany)	10	11	11
Other	3	3	3
Employed (%)	84	68	76
Married (%)	86	87	86
Yearly income/1,000	42.02 (63.60)	18.93 (28.67)	29.79 (49.71)
<b>Household characteristics</b>			
Number of children in the household (%)			
No children	64	68	66
One child	17	15	16
Two children	14	13	14
Three children	4	3	4
More than three children	1	1	1
Household net wealth/ 1,000	470.9 (1102.7)	495.4 (1248.2)	483.8 (1182.0)
Donates (%)	57	58	58
<b>Demographics: partner</b>			
Age	46.12 (10.72)	50.90 (11.84)	48.65 (11.57)
Education level (%)			
Low education level (iscd 0-3)	53	43	48
Medium education level (iscd 4-6)	26	30	28
High education level (iscd 7-8)	21	26	24
Country of birth (%)			
Germany	86	87	87
Europe (excl. Germany)	11	10	11
Other	3	3	3
Employed (%)	70	76	73
Yearly partner income/1,000	19.82 (29.81)	37.76 (61.36)	29.32 (49.91)

When indicated by a % sign, the statistics refer to the total percentage of respondents in our sample to whom the variable applies. Otherwise, statistics refer to variables mean and, in the parenthesis, standard deviation. The sample is restricted to individuals under the age of 65. Respondents' countries of birth refers to a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

Table A.2: Contributions to private pensions, expected standard of living in retirement, bargaining styles and bargaining power according to gender

VARIABLES	Contributions		Expectations	
	Women	Men	Women	Men
Non-cooperation	86.09 (97.43)	-29.02 (151.0)	-0.244*** (0.0808)	-0.0135 (0.0794)
Central planning	-192.8** (75.32)	308.8 (221.1)	0.175** (0.0704)	0.249*** (0.0712)
FKP = 1	194.5*** (54.90)	483.7*** (76.54)	-0.0275 (0.0431)	0.142*** (0.0455)
Personal-to-partner income ratio > 0.5	176.8 (112.0)	-441.1*** (118.8)	0.105** (0.0507)	0.00672 (0.0541)
Age	9.346 (6.932)	2.988 (9.119)	-0.00715 (0.00488)	-0.0101* (0.00531)
Married = 1	84.17 (61.18)	100.5 (102.8)	-0.0929 (0.0688)	-0.0323 (0.0652)
Medium education level (isced 4-6)	267.3*** (70.28)	357.8*** (91.52)	0.154*** (0.0519)	0.0343 (0.0558)
High education level (isced 7-8)	406.5*** (98.31)	433.4*** (131.8)	0.0367 (0.0623)	0.129** (0.0634)
Working = 1	201.1*** (54.63)	900.9*** (91.96)	-0.0606 (0.0514)	0.0679 (0.0773)
Income/1,000	6.442*** (2.461)	3.517** (1.556)	6.53e-05 (0.000673)	0.000414* (0.000241)
Expected inheritance/gift = 2, No inheritance expected	-80.44 (66.05)	-275.8*** (102.7)	-0.0697 (0.0529)	-0.130** (0.0527)
Number of children in the household	-16.79 (25.24)	-34.02 (47.53)	-0.00171 (0.0257)	0.0203 (0.0258)
Household net wealth = 2, €35,000 - €100,000	208.1*** (44.22)	510.7*** (73.14)	-0.000300 (0.0829)	0.156* (0.0827)
Household net wealth = 3, €100,000 - €250,000	307.4*** (45.56)	670.5*** (78.92)	0.338*** (0.0738)	0.422*** (0.0777)
Household net wealth = 4, €250,000 - €500,000	460.6*** (62.55)	1,081*** (97.65)	0.509*** (0.0754)	0.521*** (0.0801)
Household net wealth = 5, More than €500,000	958.3*** (91.34)	2,038*** (135.4)	0.618*** (0.0772)	0.655*** (0.0805)
Partner's age	-14.21** (6.522)	-16.02* (9.489)	-0.00342 (0.00458)	-0.00418 (0.00527)
Partner's education: Medium education level (isced 4-6)	3.562 (67.93)	85.57 (97.64)	0.0666 (0.0528)	0.0140 (0.0544)
Partner's education: High education level (isced 7-8)	-154.9 (102.6)	29.79 (139.3)	0.132** (0.0615)	-0.0170 (0.0632)
Partner is working = 1	77.67 (76.05)	-8.574 (86.14)	-0.0660 (0.0614)	-0.0578 (0.0522)
Partner income/1,000	4.241** (1.963)	2.025 (2.280)	0.000288 (0.000220)	-6.93e-05 (0.000645)
Constant	2.007 (139.8)	246.8 (236.2)		
Observations	5,597	5,221	3,899	3,594
R-squared	0.125	0.146		
Wave FE	YES	YES	YES	YES
Country of birth FE	YES	YES	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first and second columns present the results of OLS linear regressions, and the third and fourth columns present the results of ordered probit regressions. For each set of regressions, the sample is split according to gender, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals under the age of 65 for all regressions.

Table A.3: Percentage of individuals in households with each bargaining style per PHF wave

Household bargaining style	Wave 1	Wave 2	Wave 3	Total
Non-cooperation	6	7	7	6
Relevance-specific cooperation	81	79	77	79
Central planning	8	9	9	9
Item-specific cooperation	5	5	8	6
Total	100	100	100	100

Table A.4: Robustness check - relative income as an explanatory variable

VARIABLES	Private pensions	Expected standard of living
Non-cooperation	26.10 (95.78)	-0.130** (0.0654)
Central planning	55.64 (119.2)	0.226*** (0.0611)
FKP = 1	363.9*** (45.19)	0.0541** (0.0227)
Earnings/Couple's earnings	-259.1 (208.1)	0.141*** (0.0397)
Female = 1	-444.2*** (66.83)	-0.0356 (0.0280)
Age	3.991 (5.436)	-0.00849*** (0.00301)
Married = 1	79.72 (63.04)	-0.0628 (0.0552)
Medium education level (iscd 4-6)	336.2*** (58.68)	0.0914*** (0.0352)
High education level (iscd 7-8)	500.6*** (82.43)	0.0776** (0.0378)
Working = 1	472.7*** (52.86)	-0.0433 (0.0416)
Income/1,000	4.558** (1.852)	0.000201 (0.000215)
Expected inheritance/gift = 2, No inheritance expected	-170.0** (66.28)	-0.0967** (0.0459)
Number of children in the household	-32.62 (28.29)	0.00963 (0.0221)
Household net wealth = 2, €35,000 - €100,000	356.8*** (45.21)	0.0823 (0.0695)
Household net wealth = 3, €100,000 - €250,000	490.8*** (47.83)	0.381*** (0.0631)
Household net wealth = 4, €250,000 - €500,000	757.7*** (60.10)	0.516*** (0.0654)
Household net wealth = 5, More than €500,000	1,505*** (85.86)	0.648*** (0.0660)
Partner's age	-13.31** (5.498)	-0.00359 (0.00283)
Partner's education: Medium education level (iscd 4-6)	46.50 (58.05)	0.0544 (0.0352)
Partner's education: High education level (iscd 7-8)	-97.10 (87.05)	0.0787** (0.0376)
Partner is working = 1	-15.75 (57.92)	-0.0582 (0.0385)
Partner income/1,000	3.044 (2.249)	0.000341 (0.000212)
Constant	489.6*** (163.0)	
Observations	10,818	7,493
R-squared	0.141	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

The first column presents the results of OLS linear regressions and the second column presents the results of ordered probit regressions. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for re-spondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals under the age of 65 for both regressions.

Table A.5: Robustness check - controlling for personal-to-couple hourly earnings

VARIABLES	Private pensions	Expectations
Non-cooperation	28.14 (121.0)	-0.111 (0.0729)
Central planning	112.8 (160.7)	0.287*** (0.0683)
FKP = 1	404.1*** (55.28)	0.0678*** (0.0256)
Personal-to-couple hourly earnings ratio	-965.0*** (177.4)	0.144** (0.0588)
Female	-408.5*** (77.51)	-0.0579* (0.0308)
Age	9.846 (7.484)	-0.00481 (0.00359)
Married = 1	90.37 (78.54)	-0.0816 (0.0635)
Medium educational level (isced 4-6)	368.6*** (72.59)	0.0596 (0.0407)
High educational level (isced 7-8)	409.9*** (91.75)	0.0535 (0.0432)
Working = 1	287.0*** (94.13)	-0.132* (0.0788)
Income/1,000	7.640*** (2.174)	-0.000231 (0.000460)
No inheritance expected	-180.0** (84.38)	-0.111** (0.0505)
Number of children in the household	-61.91* (35.88)	0.0170 (0.0252)
Household net wealth = 2, €35000 - €100000	458.2*** (61.51)	0.0829 (0.0861)
Household net wealth = 3, €100000 - €250000	581.2*** (58.56)	0.409*** (0.0752)
Household net wealth = 4, €250000 - €500000	902.6*** (74.73)	0.493*** (0.0783)
Household net wealth = 5, Above €500000	1,804*** (107.3)	0.661*** (0.0776)
Partner's age	-22.57*** (7.773)	-0.00642* (0.00355)
Partner's education = Medium educational level (isced 4-6)	110.4 (70.39)	0.0548 (0.0407)
Partner's education = High educational level (isced 7-8)	43.67 (95.17)	0.0744* (0.0428)
Partner is working = 1	-157.3 (173.6)	-0.0600 (0.0771)
Partner income/1,000	-1.331 (1.206)	0.000118 (0.000391)
Constant	1,237*** (250.6)	
Observations	7,513	5,536
R-squared	0.137	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of OLS linear regressions and the second column presents the results of ordered probit regressions. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals under the age of 65 for both regressions.

Table A.6: Robustness check - FKP or income ratio as the only proxy of bargaining power

VARIABLES	FKP as proxy		Income ratio as proxy	
	Private pensions	Expectations	Private pensions	Expectations
Non-cooperation	81.29 (101.9)	-0.131** (0.0625)	22.73 (95.87)	-0.129** (0.0655)
Central planning	8.906 (108.2)	0.225*** (0.0579)	54.56 (119.3)	0.226*** (0.0611)
FKP = 1	348.9*** (43.31)	0.0423* (0.0222)		
Personal-to-partner income ratio > 0.5			-115.8 (121.2)	0.0733*** (0.0278)
Female = 1	-406.5*** (66.64)	-0.0418 (0.0266)	-472.7*** (66.20)	-0.0360 (0.0290)
Age	3.042 (5.108)	-0.00629** (0.00287)	7.417 (5.446)	-0.00817*** (0.00300)
Married = 1	95.85 (66.37)	-0.0724 (0.0526)	80.63 (63.20)	-0.0631 (0.0552)
Medium education level (iscd 4-6)	321.2*** (60.21)	0.0866** (0.0341)	380.7*** (58.53)	0.0970*** (0.0351)
High education level (iscd 7-8)	475.2*** (79.93)	0.0738** (0.0364)	542.8*** (82.39)	0.0832** (0.0378)
Working = 1	464.0*** (42.66)	-0.0680* (0.0369)	431.2*** (43.48)	-0.0266 (0.0412)
Income/1,000	3.535*** (1.275)	0.000385* (0.000222)	4.542*** (1.720)	0.000320 (0.000219)
Expected inheritance/gift = 2, No inheritance expected	-116.5* (64.43)	-0.0894** (0.0440)	-169.6** (66.31)	-0.0967** (0.0459)
Number of children in the household	-27.29 (32.00)	0.00788 (0.0208)	-32.13 (28.31)	0.00965 (0.0221)
Household net wealth = 2, €35000 - €100,000	351.2*** (44.56)	0.0757 (0.0668)	356.5*** (45.22)	0.0821 (0.0695)
Household net wealth = 3, €100000 - €250,000	486.3*** (47.47)	0.378*** (0.0606)	490.8*** (47.89)	0.380*** (0.0631)
Household net wealth = 4, €250,000 - €500,000	780.5*** (60.38)	0.504*** (0.0624)	758.4*** (60.28)	0.515*** (0.0653)
Household net wealth = 5, More than €500000	1,556*** (95.51)	0.667*** (0.0631)	1,504*** (86.20)	0.646*** (0.0660)
Partner's age	-13.75*** (5.107)	-0.00411 (0.00267)	-16.85*** (5.516)	-0.00386 (0.00283)
Partner's education: Medium education level (iscd 4-6)	39.74 (59.04)	0.0505 (0.0339)	5.528 (58.04)	0.0489 (0.0351)
Partner's education: High education level (iscd 7-8)	-96.40 (81.81)	0.0668* (0.0361)	-138.2 (86.33)	0.0733* (0.0376)
Partner is working = 1	75.09 (62.61)	-0.113*** (0.0341)	33.28 (57.93)	-0.0735* (0.0378)
Partner income/1,000	3.034* (1.745)	-3.31e-05 (0.000228)	3.075 (2.092)	0.000217 (0.000211)
Constant	325.7** (136.7)		603.8*** (147.2)	
Observations	12,120	8,140	10,818	7,493
R-squared	0.133		0.135	
Wave FE	YES	YES	YES	YES
Country of birth FE	YES	YES	YES	YES

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table A.7: Robustness check - elimination of observations corresponding to individuals' partner

VARIABLES	Private pensions	Expected standard of living
Non-cooperation	147.1 (171.4)	-0.203** (0.0946)
Central planning	296.4 (241.1)	0.209** (0.0904)
FKP = 1	280.7*** (72.81)	0.0610 (0.0519)
Personal-to-partner income > 0.5	-408.2*** (126.8)	0.0715 (0.0662)
Female = 1	-494.4*** (99.08)	-0.0280 (0.0656)
Age	8.391 (9.909)	-0.0107* (0.00611)
Medium education level (iscd 4-6)	290.7*** (87.13)	0.134** (0.0638)
High education level (iscd 7-8)	420.7*** (145.5)	0.0885 (0.0744)
Working = 1	380.2*** (78.18)	-0.0386 (0.0752)
Income/1,000	8.996** (3.892)	0.000774 (0.000515)
Married = 1	24.42 (104.0)	-0.0223 (0.0785)
Expected inheritance/gift = 2, No inheritance expected	-87.73 (99.97)	-0.0846 (0.0629)
Number of children in the household	-5.647 (44.50)	0.000743 (0.0299)
Household net wealth = 2, €35,000 - €100,000	397.3*** (78.99)	-0.0782 (0.101)
Household net wealth = 3, €100,000 - €250,000	511.9*** (90.73)	0.334*** (0.0908)
Household net wealth = 4, €250,000 - €500,000	658.3*** (101.0)	0.481*** (0.0942)
Household net wealth = 5, More than €500,000	1,504*** (133.0)	0.546*** (0.0933)
Partner's age	-14.31 (10.25)	-0.00237 (0.00570)
Partner's education: Medium education level (iscd 4-6)	-86.58 (93.16)	0.0832 (0.0650)
Partner's education: High education level (iscd 7-8)	16.42 (140.2)	0.108 (0.0744)
Partner is working = 1	119.9 (90.68)	-0.146** (0.0670)
Partner income/1,000	-1.767* (0.998)	-5.67e-05 (0.000736)
Constant	403.3* (215.9)	
Observations	3,283	2,304
R-squared	0.155	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

The first column presents the results of OLS linear regressions, and the second column presents the results of ordered probit regressions. For all regressions, respondents' partners are randomly eliminated from our sample, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North and South America, Africa or Oceania. The sample is restricted to individuals under the age of 65 for both regressions.

Table A.8: Robustness check - restricting the sample to individuals aged between 26 and 64

VARIABLES	Private pensions	Expected standard of living
Non-cooperation	11.04 (100.3)	-0.139** (0.0677)
Central planning	65.74 (120.0)	0.229*** (0.0600)
FKP = 1	369.3*** (46.06)	0.0553** (0.0230)
Personal-to-partner income ratio > 0.5	-123.9 (119.2)	0.0638** (0.0283)
Female = 1	-453.8*** (66.16)	-0.0293 (0.0297)
Age	3.828 (5.677)	-0.00875*** (0.00315)
Married = 1	74.86 (65.57)	-0.0508 (0.0564)
Medium education level (iscd 4-6)	341.6*** (60.05)	0.0929*** (0.0358)
High education level (iscd 7-8)	503.4*** (82.29)	0.0790** (0.0383)
Working = 1	446.3*** (45.38)	-0.0312 (0.0420)
Income/1,000	4.261** (1.656)	0.000320 (0.000220)
Expected inheritance/gift = 2, No inheritance expected	-167.4** (67.44)	-0.0989** (0.0463)
Number of children in the household	-39.31 (29.23)	0.00922 (0.0225)
Household net wealth = 2, €35,000 - €100,000	352.3*** (45.06)	0.105 (0.0712)
Household net wealth = 3, €100,000 - €250,000	495.5*** (47.51)	0.404*** (0.0642)
Household net wealth = 4, €250,000 - €500,000	769.7*** (60.49)	0.537*** (0.0664)
Household net wealth = 5, More than €500,000	1,523*** (86.45)	0.671*** (0.0666)
Partner's age	-14.18** (5.655)	-0.00356 (0.00292)
Partner's education: Medium education level (iscd 4-6)	41.76 (59.38)	0.0519 (0.0358)
Partner's education: High education level (iscd 7-8)	-105.9 (86.96)	0.0729* (0.0382)
Partner is working = 1	4.779 (59.89)	-0.0864** (0.0385)
Partner income/1,000	3.277 (2.050)	0.000233 (0.000211)
Constant	486.2*** (169.2)	
Observations	10,545	7,308
R-squared	0.138	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table A.9: Robustness check - splitting cooperation into relevance-specific and item-specific cooperation

VARIABLES	Private pensions	Expected standard of living
Item-specific	79.11 (93.19)	0.00441 (0.0677)
Non-cooperation	34.55 (96.71)	-0.129* (0.0660)
Central planning	62.83 (119.2)	0.227*** (0.0614)
FKP = 1	366.0*** (44.95)	0.0538** (0.0227)
Personal-to-partner income ratio > 0.5	-118.3 (117.2)	0.0724*** (0.0277)
Female = 1	-448.3*** (64.63)	-0.0317 (0.0290)
Age	4.265 (5.463)	-0.00864*** (0.00301)
Married = 1	85.33 (63.20)	-0.0629 (0.0555)
Medium education level (iscd 4-6)	335.3*** (58.96)	0.0905** (0.0352)
High education level (iscd 7-8)	500.4*** (81.54)	0.0765** (0.0379)
Working = 1	436.8*** (43.42)	-0.0262 (0.0412)
Income/1,000	4.316*** (1.663)	0.000290 (0.000216)
No inheritance expected = 1	-169.7** (66.28)	-0.0966** (0.0459)
Number of children in the household	-32.65 (28.29)	0.00959 (0.0221)
Household net wealth = 2, €35,000 - €100,000	358.2*** (45.32)	0.0821 (0.0695)
Household net wealth = 3, €100,000 - €250,000	492.7*** (47.93)	0.380*** (0.0631)
Household net wealth = 4, €250,000 - €500,000	758.9*** (60.18)	0.515*** (0.0654)
Household net wealth = 5, More than €500,000	1,504*** (86.29)	0.646*** (0.0661)
Partner's age	-13.69** (5.527)	-0.00340 (0.00284)
Partner's education: Medium education level (iscd 4-6)	44.93 (58.09)	0.0548 (0.0352)
Partner's education: High education level (iscd 7-8)	-98.82 (85.67)	0.0797** (0.0377)
Partner is working = 1	18.97 (57.72)	-0.0750** (0.0378)
Partner income/1,000	3.288 (2.038)	0.000246 (0.000211)
Constant	414.1*** (147.5)	
Observations	10,818	7,493
R-squared	0.141	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of OLS linear regressions, and the second column presents the results of ordered probit regressions. For all regressions, a discrete household bargaining style variable that treats item-specific and relevance-specific cooperation separately is included, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals who are under the age of 65 for both regressions.

Table A.10: Robustness check - splitting the sample according to whether couples live in households with children

VARIABLES	Private pension contributions		Expectations	
	No children	Children	No children	Children
Non-cooperation	27.63 (111.5)	26.01 (185.9)	-0.105 (0.0763)	-0.228* (0.131)
Central planning	63.65 (167.9)	8.807 (140.7)	0.261*** (0.0777)	0.207** (0.0989)
FKP = 1	371.4*** (58.43)	324.6*** (63.69)	0.0531* (0.0297)	0.0465 (0.0357)
Personal-to-partner income ratio > 0.5	25.13 (115.2)	-342.6*** (112.0)	0.0962*** (0.0337)	0.0227 (0.0476)
Female	-485.4*** (75.39)	-404.6*** (107.8)	-0.0267 (0.0367)	-0.0414 (0.0471)
Age	-2.106 (6.554)	15.19 (9.840)	-0.00998** (0.00390)	-0.00831* (0.00489)
Married = 1	67.67 (84.07)	104.2 (92.76)	-0.130* (0.0688)	0.0518 (0.0922)
Medium education level (iscd 4-6)	369.5*** (76.50)	348.8*** (94.59)	0.00653 (0.0438)	0.219*** (0.0586)
High education level (iscd 7-8)	516.7*** (110.1)	511.6*** (109.1)	0.0333 (0.0498)	0.144** (0.0588)
Income/1,000	3.915** (1.817)	7.426*** (2.144)	0.000228 (0.000231)	0.000708 (0.000499)
Expected inheritance/gift = 2, No inheritance expected	-147.8* (88.61)	-201.1** (94.34)	-0.0315 (0.0595)	-0.186*** (0.0707)
Number of children in the household		-55.88 (46.28)		0.00447 (0.0396)
Household net wealth = 2, €35,000 - €100,000	361.1*** (53.69)	462.4*** (76.78)	0.0614 (0.0869)	0.0474 (0.113)
Household net wealth = 3, €100,000 - €250,000	478.5*** (59.91)	656.0*** (72.64)	0.330*** (0.0794)	0.390*** (0.0996)
Household net wealth = 4, €250,000 - €500,000	762.7*** (72.97)	865.3*** (92.27)	0.495*** (0.0799)	0.503*** (0.107)
Household net wealth = 5, More than €500,000	1,568*** (107.3)	1,495*** (149.0)	0.635*** (0.0796)	0.630*** (0.111)
Partner's age	-10.31 (6.672)	-18.43** (8.909)	-0.000221 (0.00362)	-0.00888* (0.00467)
Partner's education: Medium education level (iscd 4-6)	92.62 (75.60)	-56.68 (90.38)	0.00653 (0.0438)	0.109* (0.0585)
Partner's education: High education level (iscd 7-8)	-21.19 (108.8)	-194.6 (119.9)	0.0430 (0.0482)	0.128** (0.0596)
Partner income/1,000	4.602** (1.851)	-1.402 (1.059)	0.000399* (0.000230)	-0.000397 (0.000508)
Constant	779.6*** (158.7)	731.9*** (243.9)		
Observations	6,918	3,900	4,648	2,845
R-squared	0.130	0.165		
Wave FE	YES	YES	YES	YES
Country of birth FE	YES	YES	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first and second columns present the results of OLS linear regressions, and the third and fourth columns present the results of ordered probit regressions, restricted to individuals who are under the age of 65. The first and second columns are restricted to respondents who live in a household with no children, and the fourth and fifth columns are restricted to respondents who live in a household with at least one child. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

Table A.11: Robustness check - correlations between intrahousehold bargaining power distributions, gender and the identity of the FKP

	Earnings/Couple's earnings	Earnings/Couple's earnings	Relative income	Relative income	Earnings/Couple's earnings	Relative income
FKP	0.0460*** (6.72)		0.212*** (9.23)		0.0115* (1.71)	0.0608** (2.52)
Female		-0.195*** (-29.54)		-0.919*** (-38.62)	-0.193*** (-28.76)	-0.908*** (-37.63)
Constant	0.477*** (99.58)	0.598*** (127.84)	-0.121*** (-7.50)	0.441*** (26.30)	0.591*** (97.03)	0.406*** (18.62)
Observations	11996	11996	11996	11996	11996	11996

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first, second and fifth columns present the results of OLS linear regressions with the dependent variable of respondents' personal-to-couple employment income, and the third, fourth and sixth columns present the results of ordered probit regressions with the dependent variable of a dummy variable that equals one if respondents' income is higher than that of their partner. The independent and dependent variable construction follow the specifications in Section 4.

Table A.12: Robustness check - contributions to private pensions and retirement expectations given contributions to non-private pension plans

VARIABLES	Private pensions	Expectations
Annual statutory and occupational pension contributions	0.0166* (0.00897)	-8.43e-08 (2.96e-06)
Non-cooperation = 1	25.60 (95.63)	-0.129** (0.0655)
Central planning = 1	52.28 (119.6)	0.226*** (0.0610)
FKP = 1	365.0*** (44.86)	0.0537** (0.0227)
Personal-to-partner income ratio > 0.5	-117.1 (116.5)	0.0724*** (0.0277)
Female = 1	-447.1*** (64.52)	-0.0317 (0.0290)
Age	4.018 (5.455)	-0.00864*** (0.00301)
Married = 1	78.20 (62.96)	-0.0632 (0.0552)
Medium education level (iscd 4-6)	336.3*** (58.78)	0.0906** (0.0352)
High education level (iscd 7-8)	489.8*** (81.08)	0.0766** (0.0379)
Working = 1	432.4*** (43.30)	-0.0261 (0.0412)
Income/1,000	4.260*** (1.647)	0.000291 (0.000216)
Expected inheritance/gift = 2, No inheritance expected	-168.0** (66.11)	-0.0967** (0.0459)
Number of children in the household	-33.81 (28.22)	0.00960 (0.0221)
Household net wealth = 2, €35,000 - €100,000	359.5*** (45.19)	0.0820 (0.0695)
Household net wealth = 3, €100,000 - €250,000	493.5*** (47.89)	0.380*** (0.0631)
Household net wealth = 4, €250,000 - €500,000	757.4*** (60.13)	0.515*** (0.0654)
Household net wealth = 5, More than €500,000	1,499*** (86.09)	0.647*** (0.0661)
Partner's age	-13.34** (5.517)	-0.00340 (0.00284)
Partner's education: Medium education level (iscd 4-6)	44.97 (58.05)	0.0548 (0.0352)
Partner's education: High education level (iscd 7-8)	-100.4 (85.85)	0.0797** (0.0377)
Partner is working = 1	17.55 (57.82)	-0.0750** (0.0378)
Partner income/1,000	3.301 (2.034)	0.000246 (0.000211)
Constant	419.0*** (147.3)	
Observations	10,818	7,493
R-squared	0.141	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of an OLS linear regression, and the second column presents the results of an ordered probit regression, restricted to individuals who are under the age of 65. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania.

Table A.13: Contributions to private pensions expected standard of living in retirement and bargaining styles controlling for knowledge of partner's finances

VARIABLES	Private pensions	Expectations
Good knowledge = 1	-221.8*** (84.57)	0.124** (0.0534)
Non-cooperation	10.99 (96.48)	-0.122* (0.0656)
Central planning	44.04 (118.9)	0.233*** (0.0607)
FKP = 1	344.6*** (44.94)	0.0646*** (0.0233)
Personal to partner income ratio > 0.5	-118.6 (116.9)	0.0725*** (0.0277)
Female = 1	-451.3*** (64.54)	-0.0307 (0.0290)
Age	3.917 (5.454)	-0.00848*** (0.00302)
Married = 1	89.11 (63.12)	-0.0682 (0.0552)
Medium educational level (iscd 4-6)	334.9*** (58.79)	0.0915*** (0.0352)
High educational level (iscd 7-8)	498.6*** (81.44)	0.0778** (0.0378)
Working = 1	437.5*** (43.44)	-0.0266 (0.0412)
Income/1000	4.325*** (1.663)	0.000292 (0.000217)
Expected inheritance/gift = 2, No inheritance expected	-164.2** (66.28)	-0.100** (0.0458)
Number of children in the household	-31.34 (28.28)	0.00854 (0.0221)
Household net wealth = 2, 35000€ - 100000€	351.1*** (45.11)	0.0830 (0.0695)
Household net wealth = 3, 100000€ - 250000€	487.4*** (47.67)	0.382*** (0.0631)
Household net wealth = 4, 250000€ - 500000€	754.4*** (60.29)	0.518*** (0.0653)
Household net wealth = 5, Above 500000€	1,502*** (86.22)	0.650*** (0.0659)
Partner's age	-13.38** (5.516)	-0.00356 (0.00284)
Partner's education: Medium educational level (iscd 4-6)	47.80 (58.06)	0.0545 (0.0352)
Partner's education: High educational level (iscd 7-8)	-94.62 (85.73)	0.0787** (0.0377)
Partner is working = 1	18.66 (57.74)	-0.0747** (0.0377)
Partner income/1000	3.314 (2.029)	0.000234 (0.000212)
Constant	632.3*** (169.8)	
Observations	10,818	7,493
R-squared	0.141	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of OLS linear regressions, and the second column presents the results of ordered probit regressions. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals who are under the age of 65 for both regressions.

Table A.14: Robustness check - contributions to private pensions, expected standard of living in retirement, and bargaining styles

VARIABLES	Private pensions	Expectations
Non-cooperation	21.37 (95.54)	-0.128* (0.0655)
Central planning	54.83 (119.0)	0.224*** (0.0609)
FKP = 1	356.3*** (44.15)	0.0535** (0.0227)
Personal to partner income ratio > 0.5	-120.1 (116.9)	0.0725*** (0.0278)
Respondent receives inheritance	102.7 (74.61)	0.0584 (0.0448)
Partner receives inheritance	-95.60 (65.58)	0.0703 (0.0453)
Both partners receive inheritance	-246.5*** (77.59)	0.171*** (0.0595)
Female = 1	-447.9*** (64.46)	-0.0324 (0.0291)
Age	3.963 (5.476)	-0.00883*** (0.00303)
Married = 1	86.03 (63.02)	-0.0648 (0.0552)
Medium education level (isced 4-6)	333.9*** (58.69)	0.0895** (0.0352)
High education level (isced 7-8)	502.6*** (81.91)	0.0704* (0.0380)
Working = 1	435.5*** (43.37)	-0.0228 (0.0412)
Income/1,000	4.292*** (1.652)	0.000320 (0.000219)
Expected inheritance/gift = 2, No inheritance expected	-177.5*** (65.73)	-0.0932** (0.0458)
Number of children in the household	-32.05 (28.21)	0.00934 (0.0220)
Household net wealth = 2, €35,000 - €100,000	359.1*** (45.73)	0.0726 (0.0696)
Household net wealth = 3, €100,000 - €250,000	497.3*** (48.77)	0.368*** (0.0635)
Household net wealth = 4, €250,000 - €500,000	773.9*** (62.19)	0.494*** (0.0659)
Household net wealth = 5, More than €500,000	1,528*** (88.31)	0.621*** (0.0668)
Partner's age	-13.26** (5.533)	-0.00335 (0.00285)
Medium education level (isced 4-6)	47.38 (57.89)	0.0531 (0.0352)
High education level (isced 7-8)	-85.57 (85.65)	0.0727* (0.0378)
Partner is working = 1	18.12 (57.75)	-0.0726* (0.0378)
Partner income/1,000	3.232 (2.039)	0.000274 (0.000210)
Constant	439.3*** (147.0)	
Observations	10,818	7,493
R-squared	0.142	
Wave FE	YES	YES
Country of birth FE	YES	YES

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The first column presents the results of OLS linear regressions, and the second column presents the results of ordered probit regressions. For all regressions, survey answers for waves 1 through 3 of the PHF are pooled, and dummies that control for survey wave fixed effects are included. The regressions control for respondents' and their partners' countries of birth with a dummy variable that equals 0 if individuals report having been born in Germany, 1 if they were born in a European country, including Turkey and excluding Germany, and 2 if they were born in Asia, North or South America, Africa or Oceania. The sample is restricted to individuals who are under the age of 65 for both regressions.