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Marie-Hélène Broihanne

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Abstract

This article examines the gender gap in subjective financial literacy of retail clients of a large European bank. Using a database of banking records and questionnaire answers of more than 50,000 retail clients, the gender gap in subjective financial literacy was found to be significantly higher for individuals living as part of a couple. To distinguish the respective impact of financial responsibility and subjective literacy between partners in households, the study was based on 7,382 dual-income couples for which data was matched since spouses hold a joint bank account. The findings suggest that the gender gap in subjective financial literacy between spouses is reduced because of couple consensus during spouses' joint decision-making. As 70% of couples exhibit no gender gap in subjective financial literacy, the couple characteristics that explain either a classical or an inverse subjective financial literacy gender gap are identified. We show that the heterogeneity in the gender gap in subjective financial literacy of couples is related to that of spouses' financial management styles.

Keywords : Subjective financial literacy, Gender gap, Spouses' financial decision-making, Spouse dominance, Financial management styles

JEL Classification : G02, G11, G28

*LaRGE Research Center, EM Strasbourg Business School, University of Strasbourg

Address: 61 Avenue de la Forêt Noire, 67085 Strasbourg Cedex, France

E-mail: mhb@unistra.fr / Corresponding author

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1 Introduction

There exists a vast literature showing that financial literacy¹ has important consequences in the behavior and choices of investors, including day-to-day financial management skills (Hilgert et al., 2003), retirement planning and wealth accumulation (Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011a), as well as decisions related to indebtedness (Lusardi et al., 2010; Lusardi and Tufano, 2015). A well documented measure of objective financial literacy (i.e., whether individuals can objectively answer questions about financial markets and instruments correctly) is essentially based on the answers to the “the Big 3” questions (Lusardi and Mitchell, 2008; 2011b). These questions cover basic knowledge on interest compounding, inflation and diversification of risk. Lusardi and Mitchell (2014) indicate that the levels of financial literacy evaluated by the Big 3 are very low all over the world.²

Another approach is to ask individuals to self-assess their financial knowledge, which is called subjective financial literacy.³ However, subjective financial literacy derives from self-confidence and people usually overestimate what they know (Bucher-Koenen et al., 2017). Importantly, although objective financial knowledge has received more attention in the past, Bucher-Koenen et al. (2017) find a significant gender gap, that is women exhibit a significantly lower financial literacy than men (Lusardi and Mitchell, 2008; Lusardi and Mitchell, 2011a; Lusardi and Mitchell, 2014), both in objective and subjective financial literacy. As women’s life expectancy is generally higher than that of men, the gender gap in financial literacy is an important economic and social issue.

In this paper, we address a direct comparison of the subjective financial literacy of both spouses in a huge sample of dual-income couples, that is married or cohabited individuals. Examining self-assessed financial literacy of both spouses in a couple is very important because it allows taking into account the distribution of responsibility for financial knowledge and decision-making between relationship partners. Besides, in most studies of retail investors, only one member of the couple reports information (e.g., education, financial knowledge...) for both respondents. Studying the answers of only one partner may bias the results towards males, as husbands generally undertake financial decision-making in the couple (e.g., Rosen and Granbois, 1983; Meier et al., 1999; Bernasek and Bajtelsmit, 2002; Burgoyne et al., 2007; Fonseca et al., 2012 and Hsu, 2016).

An important point in our analysis is that our financial literacy score is a subjective measure of financial literacy. We argue that subjective financial literacy is more important than objective financial literacy for spouses’ financial decision-making. In fact, the spouse who is perceived to be the more knowledgeable person about the household finances is usually the one responsible for financial decisions, whatever his/her objective knowledge in finance. Although a few papers document a different view,⁴ Ward and Lynch (2018) argue that the gap in knowledge between “household CFO” and “non-CFO” is explained by the development of expertise on a “need to know” basis for the partner who is assigned financial responsibility at the outset of the relationship, either when responsibility is related to ability or not. Moreover, our argument is in line with Robb and Woodyard (2011) and Xiao et al. (2011), who showed that subjective financial knowledge may have a more significant impact on financial behavior than objective financial knowledge. In the same vein, Kramer (2016) finds that investors’ self-assessed financial literacy plays a more important role than objective financial literacy in their decisions to seek professional financial advice.

¹According to Lusardi and Mitchell (2014), financial literacy is the ability of individuals to handle economic information and make financial forecasts and decisions in terms of wealth accumulation, debt and retirement.

²For reviews, see also Hastings et al. (2013) and Fernandes et al. (2014).

³Subjective financial literacy has recently been addressed by Bianchi (2018). Bellofatto et al. (2018) and D’Hondt et al. (2021) also use a subjective measure of financial literacy that relies on MiFID questionnaire answers of retail investors of an online Belgian brokerage house.

⁴For example, Bucher-Koenen et al. (2017) find that, even when they are the decision maker, women display lower financial knowledge than men. However, this finding has been observed over a very small sample. Abbink et al. (2020) show that women are more likely to allow their spouses to make decisions than men are. However, this paper examines gender bias in intra-household decision-making in rural Bangladesh, a country in which women’s role is mainly domestic.

We used an original dataset that combines banking records and subjective financial literacy of more than 50,000 retail clients of a large European bank. Among them, about 62% declare they live as a couple and we collected self-assessed financial literacy for the two partners in 7,382 dual-income couples.⁵ This unique dataset derives from the Markets in Financial Instruments Directive (MiFID).⁶ Under this European Directive, a questionnaire is mandatory for every client of investment service providers who holds or is expected to hold securities. Hence, our subjective financial literacy score is built from the answers to MiFID questions dealing with the self-assessed financial knowledge of the risk of various financial instruments. Hence, as these financial knowledge questions are not basic, our measure is of interest for important household financial decision-making such as investment and savings, as opposed to daily ones.

We find that the gender gap in subjective financial literacy is significantly higher in individuals who live as part of a couple than in singles, but we also find higher subjective financial literacy scores in couples than in singles. We attribute these findings to women being less self-confident than men in their financial knowledge and individuals living as part of a couple being more self-confident than singles. We further find that spouses' gender gap in subjective financial literacy is also reduced because of couple consensus when spouses answer together. We also analyze couples who exhibit similar or different literacy scores and find that couples showing either a classical or inverse gender gap show strong characteristics of either male- or female-dominant styles in financial decision-making.

Our research makes three contributions to the existing literature. First, as we collected data for both spouses, the present paper is the first one to consider the gender gap in subjective financial literacy for a huge sample of paired men and women. Although, the marital status of individuals has already been shown to explain part of the gender gap in financial literacy (Bucher-Koenen et al., 2017; Ward and Lynch, 2018), this study moves beyond a dichotomous marital status variable and examines the spousal dynamics that affect the gender gap in subjective financial literacy. Our paper focuses on matched partners for which perceived differences of expertise are not merely reflections of each partner's preferences, education or cognition, but in fact also result from the other partner and the division of tasks between them. Moreover, as previous papers rely mostly on household surveys (Bertocchi et al., 2014; Johnston et al., 2016; Bucher-Koenen et al., 2017, among others), we use MiFID questionnaire answers to measure self-assessed financial literacy. As MiFID questionnaires are mandatory for clients of investment service providers, individuals in our database are expected to give truthful answers in order to get pieces of advice well suited to their personal and economic situation. This argument reinforces our view that perceived financial knowledge is more important for financial decision-making than actual knowledge.

Second, our paper considers answers of both partners together or separately as data include the questionnaire completion date in front of a bank advisor. In fact, some of the papers mentioned previously pointed out that it is very important to take into account the household decision-making process itself in the study of couples' financial decisions. However, the necessary data is often unavailable. By taking into account whether spouses answered the questionnaire together or not, we are able to unravel the complexity of household negotiations and assess the role of spouses' consensus in the gender gap in subjective financial literacy. In doing so, we contribute to the empirical literature that test the implications on the classical approaches, that is unitary or bargaining models, of couples' decision-making (Becker, 1981; Becker, 1985; Manser and Brown, 1980; McElroy and Horney, 1981). Although a classical gender gap in objective financial literacy has already been found in many academic studies, studying differences in subjective financial literacy adds new and important insights into spousal financial decision-making. Therefore, our paper allows separating the

⁵As our objective is to study the gender gap, we restrict our sample to heterosexual couples.

⁶The MiFID questionnaire was first introduced in Europe by the Markets in Financial Instrument Directive I (2004/39/EC and extended by MiFID II, 2014/65/UE, in January 2018). Based on answers to the MiFID questionnaire, investment service providers are required to build clients' risk profile and to in turn offer them a level of protection depending on the service they ask. For example, a low level of protection is required for simple order execution, whereas a high one is for delegated investment or portfolio management services. For that reason, among others, questions on financial capacity, risk tolerance, financial objectives, sensitivity to losses and financial knowledge, are often included in the questionnaires.

contrasting determinants of intra-household financial decision-making such as individual self-confidence, the degree of consensus between spouses and intra-household dominance.

Third, our findings are valuable for policy makers and financial practitioners, who can use the financial knowledge answers to the MiFID questionnaire to identify the “household CFO” in retail clients living as part of a couple. Knowing the spouse who makes the most important financial decisions in a household would be helpful in determining the resources to put in place to ensure that retail clients are served with an appropriate level of financial advice.

The remainder of the paper is organized as follows. In section 2, we survey the studies on the gender gap in financial literacy and on couples’ financial decision-making and develop our main testable hypotheses. Section 3 presents data and descriptive statistics. Section 4 details our subjective financial literacy score and presents our results at the individual level. Section 5 provides our main evidence on intra-household differences in subjective financial literacy. In Section 6, we provide a conclusion.

2 Literature and hypotheses development

In this section, we first review the empirical evidence of a gender gap in financial knowledge between men and women. Then, we present the theoretical models of financial literacy acquisition. We finally focus on spouses’ or intra-household financial decision-making. Based on these different perspectives, we present our testable hypotheses.

A gender gap in objective financial literacy has been widely documented either through the Big 3 questions (Bucher-Koenen et al., 2017), a larger set of questions (Lusardi and Mitchell, 2017; Bucher-Koenen and Lusardi, 2011; Alessie et al., 2011) or using different measures of financial literacy⁷ (Almenberg and Dreber, 2015). Lusardi and Mitchell (2011b) and Lusardi and Mitchell (2014) have also studied and reviewed the financial knowledge gap between men and women in many countries all over the world. Further, the gender gap has been observed in specific sub-cohorts with highly educated women such as alumnae of an elite female college (Mahdavi and Horton, 2014), college students (Chen and Volpe, 2002; Lusardi et al., 2010) and high school students (Ford and Kent, 2010), suggesting that high education of women does not make the gender gap disappear. By means of a representative survey in Germany, Netherlands, and the US, Bucher-Koenen et al. (2017) showed that not only is women financial literacy low but also women are more likely to state that they do not know the answers to questions. Moreover, they also found a gender gap in financial literacy for young people, although young women have a higher education level and more often hold professional occupations than older ones. Importantly, they showed that the gender-gap is observed both in objective and subjective (self-reported) financial literacy. Finally, Bucher-Koenen et al. (2017) highlighted that sociodemographic characteristics (marital status, age, education, income) help reduce the gender gap, but not fully.

As life expectancy is higher for women than men, it is difficult to explain why women do not invest or invest less in financial knowledge acquisition than men. From a theoretical point of view, few models explain the accumulation of financial literacy. Lusardi et al. (2017) originally modelled financial knowledge acquisition as an endogenous choice variable in a multi-period resource allocation decision under uncertainty.⁸ They showed that people who invest in financial knowledge acquisition may gain higher expected returns than those who do not. However, it is costly to invest in financial knowledge as the asset depreciates over time, and more importantly, not everyone benefits from greater financial education. For these reasons, under their model,

⁷The financial literacy gap is not domain-specific as the gender gap has been documented in debt literacy by Lusardi and Tufano (2015) and van Ooijen and van Rooij (2016).

⁸Other models of endogenous financial knowledge acquisition are those of Jappelli and Padula (2013), who also modelled the savings decisions, and Barthel and Lei (2021), who tested whether financial knowledge and financial advice are substitutes or complements.

some individuals rationally remain financially ignorant. Therefore, the gender gap could be explained by the differences in costs and benefits of financial knowledge acquisition between men and women.

An alternative explanation is given by Hsu (2016) and lies in the household task division assumption (Becker, 1981; Becker, 1985). This paper presents a model of the human capital investment process of longer-lived spouses over the life cycle. The model demonstrates that, as men often specialize in handling finances, women acquire financial knowledge slowly at the beginning of the marriage and delay larger investments in human capital. The model also predicts that the rate of investment in financial literacy increases as the expected time of widowhood approaches, so that wives are equipped with the knowledge needed to manage wealth when their husbands die. Hsu (2016) confirmed her conjectures using matched data on wives and husbands.⁹

Applied to the context of spouses' financial decision-making, due to specialization within the household, the gender gap in objective financial literacy might be higher for individuals being part of a couple. As we study subjective financial literacy, we also rely on Bucher-Koenen et al. (2017) who showed that there exist significant self-confidence differences between men and women. Further, Bucher-Koenen et al. (2021) demonstrated that about one third of the gender gap is explained by women's lower confidence levels.¹⁰ Therefore, due to self-confidence, we argue that the gender gap in subjective financial literacy might be higher for couples. As such, we offer the following hypothesis:

H1: The gender gap in subjective financial literacy is higher for individuals being part of a couple than for singles.

It is noteworthy that this first hypothesis only considers the difference in subjective financial literacy between individuals relative to their marital or partnership status. Going one step further, we must also consider the intra-household differences in subjective financial literacy, that is between matched partners, to not confound financial responsibility and financial literacy. To illustrate this point, we rely on Ward and Lynch (2018), who showed that, although financial responsibility and financial literacy are unrelated in early relationships (dating and married individuals), they are increasingly related in longer relationships.¹¹ In fact, spousal dynamics may add to the complexity of intra-household perceived relative financial literacy and ultimately to financial decision-making.¹²

Two main theoretical approaches of household decision-making have been developed: the household production models (Becker, 1981; Becker, 1985), or unitary model, and the bargaining models (Manser and Brown, 1980; McElroy and Horney, 1981). In the unitary model, family members maximize joint utility of the household by means of specialization of tasks. The person who has acquired more human capital related to a particular task and/or who has the lowest opportunity cost of carrying out the task, in terms of income or employment status, specializes in that task as this is efficient. In the bargaining models, family members maximize individual utilities and decisions are influenced by each member's bargaining power.

In the specific domain of finance, the unitary model predicts that the spouse who has a comparative advantage in financial decisions, mainly in terms of education and knowledge, will specialize in that task. In the bargaining model, the person who has the power in a relationship is more likely to exert control over finances. However, many empirical studies have documented different determinants of spouses' relative dominance that contrast the household task division assumption, and give more support to the bargaining perspective.¹³ Economic resources, age, education, expertise or knowledge, employment or work status are

⁹However, using survey data, Fonseca et al. (2012) found little support for financial decision specialization by gender within couples.

¹⁰Interestingly, they showed that, when the answer option "do not know" is not available, the correct answer is often chosen by women.

¹¹Ferber and Lee (1974) first showed that joint decision-making decreases over time and shift to the wife as financial decision maker.

¹²The question of whether and how spouses decide together has already been the scope of research in various domains such as leisure travel or family vacation choices, household purchasing decisions, and retirement decisions. See Kirchler (1995) for a review on economic decisions.

¹³For example, Metzger (2018) analyzes the intra-household allocation of non-mandatory retirement savings between partners

the more frequently suggested determinants¹⁴ of bargaining power (Rosen and Granbois, 1983; Meier et al., 1999; Bernasek and Bajtelsmit, 2002; Elder and Rudolph, 2003; Friedberg and Webb, 2006; Luhrmann and Maurer, 2007; Bertocchi et al., 2014; Ward and Lynch, 2018).

Spouses’ relative dominance and financial decision-making are therefore complex phenomena. They have many determinants that, in addition, evolve over time with changing resources and/or expertise but also with complex interactions and partnership decisions (divorce, widowhood...). For these reasons, intra-household decision-making responsibility over financial choices show a wide array of different dominance styles (Bertocchi et al., 2014) or different financial management styles (van Raaij et al., 2020). Bertocchi et al. (2014) showed that the allocation of financial decision-making responsibility is associated with both the relative bargaining power of the partners (which depends on economic but also on socio-demographic characteristics) and the division of labor within the couple. van Raaij et al. (2020) identified four financial management styles in couples from whether the bank account is a joint one or not and by asking who makes financial decisions: syncratic/joint, male-dominant, female-dominant, and autonomous financial management. In the syncratic style, partners have a joint bank account and make most financial decisions together. In the male/female-dominant styles, one partner (husband or wife) makes the main financial decisions. In the autonomous style, both partners have their own bank accounts and make their own decisions. van Raaij et al. (2020) showed that couple financial management styles are mostly determined by couples’ characteristics such as income sharing and the relative financial knowledge of partners.

Taking these findings into account, we argue that, due to the heterogeneity of financial management styles, one may observe differences in intra-household subjective financial literacy. In our database, we do not directly observe the decision-making process of couples; however, by examining the relative characteristics of paired men and women and their gender gap in subjective financial literacy, we can get insights on their financial management styles. Therefore, we develop the following second hypothesis.

H2: The heterogeneity in the intra-household gender gap in subjective financial literacy is related to the heterogeneity of financial dominance/management styles.

3 Data and descriptive statistics

Our analysis is based on a database available for 53,426 retail clients of a large European retail bank having activities in France over the 2007_2015 period.¹⁵ For these clients, we match banking records and MiFID questionnaire¹⁶ answers. The MiFID questionnaire was first introduced in 2007 by MiFID I (2004/39/EC) and extended by MiFID II (2014/65/UE) in January 2018 for reinforcing the protection of retail investors. Under MiFID, investment service providers are required to build their retail clients’ profiles based on their MiFID questionnaire answers. Provided with these data, financial advisors are expected to in turn provide them financial services that are suited to their financial situation.

The MiFID questionnaire is mandatory for every client who holds or is expected to hold securities directly or indirectly through a life insurance (savings) contract. For couples, two MiFID questionnaires, that is, one for each spouse, are generally conducted by investment providers. In the bank that provided us with the data, questionnaires were administered through face-to-face interviews by a financial advisor, and not online. Importantly, individuals were under no obligation to answer any question. Out of the 53,426 retail clients (referred to later as the “Initial sample”), 62.4% live as part of a couple. Thanks to the anonymity codes

and shows that the unitary model of household decision-making is not applicable. In fact, he finds that retirement savings decisions occur mainly at an individual level, with some behavioral peer effects among partners.

¹⁴Johnston et al. (2016) also identify non economic determinants such as physical and mental health and cognitive ability.

¹⁵We restrict our sample to individuals aged more than 18, the legal majority age in France.

¹⁶As some retail clients answered successive questionnaires over the period, we restrict our attention to the last questionnaire of each client, that is, answers to the questionnaire conducted before and close to the date of extraction for banking data, that is, 07/31/2015.

attributed to spouses' joint bank accounts in the initial sample, we select 14,764 individuals or the equivalent of 7,382 dual-income heterosexual couples (referred to later as the "Spouse's sample"), for whom we gather data on both spouses (married or cohabiting).

Table A.1 in the Appendix details the variables in our database. Banking records consist of gender, nationality, place of living, education, number of children, professional occupation, marital status, matrimonial regime and net monthly income. In the set of MiFID questions, we use the answers to self-reported financial knowledge questions to compute the *subjective Financial Literacy* score.¹⁷ Moreover, the date at which the questionnaire was administered is available in our data. Consequently, we know whether couples answered the financial knowledge questions together or separately.

Table 1 presents descriptive statistics of individual variables on the initial and spouse's samples and frequencies of within-couple variables. As the spouse's sample is a sub-sample of the initial sample, this table mostly shows that the two samples are similar in sociodemographic variables, especially the proportion of women (*Female*).¹⁸ The average individual is middle-aged (51 years old in the initial sample and 53 in the spouses' sample), with husbands being significantly older than their wives (the correlation in spouses' ages is high, $r=.9512$, $p<.01$). The education levels are similar in the two samples: around 12% only attended primary school, 64% to 68% completed secondary school and 20% to 23% held a university degree. However, men significantly more often graduated from university than their spouse (the correlation in couples' education is moderate, $r=.4062$, $p<.01$). Looking at professional occupations, the two samples are almost similar with about 14% self-employed, 56% employees, 19% retired and 12% without any occupation¹⁹ in the initial sample. In the spouse's sample, males are more frequently self-employed or retired and less frequently employees or without any occupation than females. The average monthly income is, not surprisingly, higher in the spouses' sample.²⁰ The individual monthly incomes of spouses are highly and positively correlated ($r=.6352$, $p<.01$) and show significantly higher income for husbands than for wives.

Individuals are mostly native-born of the country (around 87%) in both samples and 12.11% of couples are intercultural ones, that is, one spouse is native-born of the country while the other is not.²¹ About 10% of individuals and couples live in the capital region (*Paris*) which is also the most economically developed one of the country. The average number of children is, not-surprisingly (but not significantly), higher in the spouse's sample than in the initial sample (0.57 and 0.72 respectively). In the within-couple variables, partners have identical occupation type (that is, self employed, employee, retired, or no occupation) in around 65% of couples. Further, on average men contribute more (54.69%) than women to the household monthly income. Finally, 72.86% of spouses answered the MiFID questionnaire at the same date, that is together, and around 17% of married couples arranged a marriage settlement that consists in separation of ownership.

¹⁷A detailed presentation and discussion of the subjective financial literacy score and descriptive statistics are given in sub-section 4.1.

¹⁸Based on national statistics of INSEE (2016), socio-demographic variables in the initial sample are representative of the country's individuals statistics. INSEE is the national statistics bureau for France (www.insee.fr).

¹⁹Since we selected dual-income couples, the proportion of individuals with no occupation is not surprisingly lower in the spouses' sample than in the individual sample

²⁰To compute mean and standard deviations, we took the central or boundary amounts for the brackets of monthly income.

²¹We do not consider couples where both spouses are not native-born of the country because we aim at looking at the "nationality gap" (Brown and Graf, 2013). See sub-section 4.3 for details.

Table 1: Descriptive statistics

Initial sample (53,426 retail clients)			Spouses' sample (14,764 retail clients)				
	N	Mean/% (Std.)	N	Mean/% (Std.)	Male	Female	M-F
Individual variables							
Female	53,426	47.54% (0.49)	14,764	50.00% (0.50)			
Age	53,426	51.14 (17.37)	14,764	53.61 (15.46)	54.65 (15.53)	52.57 (15.32)	2.08***
Education	41,395	1.11 (0.58)	11,396	1.09 (0.56)	1.11 (0.62)	1.06 (0.48)	0.05***
- Primary school (0)		12.28%		11.60%	14.42%	8.43%	0.059***
- Secondary school (1)		64.37%		68.02%	60.29%	76.69%	-0.164***
- University degree (2)		23.35%		20.28%	25.28%	14.88%	0.104***
Self-employed	52,857	14.44% (0.35)	14,629	13.64% (0.34)	17.93% (0.38)	9.33% (0.29)	0.086***
Employee	52,857	55.43% (0.49)	14,629	58.62% (0.49)	57.09% (0.49)	60.14% (0.49)	-0.030***
Retired	52,857	18.52% (0.38)	14,629	19.78% (0.39)	23.43% (0.42)	16.10% (0.36)	0.073***
No occupation	52,857	11.61% (0.32)	14,629	7.96% (0.27)	1.52% (0.12)	14.42% (0.35)	-0.129***
Monthly income	53,424	2,852.39 (2,354.94)	14,764	3,537.76 (2,462.48)	3,819.86 (2,479.82)	3,255.65 (2,412.42)	564.21***
Native	53,426	86.38% (0.34)	14,764	88.08% (0.32)	88.20% (0.32)	87.95% (0.32)	0.002
Paris	52,365	12.67% (0.33)	14,562	9.60% (0.29)	9.64% (0.29)	9.57% (0.29)	0.007
Number of children	53,426	0.57 (0.97)	14,764	0.72 (1.04)	0.76 (1.06)	0.68 (1.02)	0.08***
Couple	53,426	62.46% (0.48)					
Within-couple variables (7,382 couples)							
Intercultural				12.11%			
Same occupation category				64.11%			
Male's income share				54.69%			
Same quest. date				72.86%			
Separation regime				16.80%			

Table 1 presents descriptive statistics of individual variables in the initial and spouse's samples and within-couple variables. The first column reports all variables. For each variable, N is the number of retail clients for which data are available and for which we report the mean/the proportion and standard deviation (Std.). Individual variables are described in Table A.1 in the Appendix. In the spouses' sample, we also report the mean/proportion and Std. for male and female and test the difference between the means (male minus female). Statistical significance levels are reported for the differences (*** for 1%, ** for 5%, and * for 10%).

We report frequencies (%) on common characteristics of spouses (within-couple variables). *Intercultural* is a dummy variable that takes the value of 1 if one of the spouses is native-born in the country, while the other is not. *Same occupation category* is a dummy variable that takes the value of 1 if the spouses' occupations belong to the same category (categories are *Self-employed*, *Employee*, *Retired* and *No occupation*). *Male's income share* is the share of man's income in total household income. *Same quest. date* is a dummy that takes the value of 1 if the spouses answered the questionnaire together. *Separation regime* is a dummy variable that takes the value of 1 if the spouses' matrimonial regime is the separation of assets and liabilities of the household members.

4 Methodology and results at the individual level

In this section, we present the average subjective financial literacy scores for all retail clients (4.1) and test H1 by means of univariate (4.2) and multivariate analyses (4.3).

4.1 The subjective financial literacy score

The self-assessed financial literacy is an individual score that is built from the collected answers to four financial knowledge questions extracted from the MiFID questionnaire (see A.1, Panel B in the Appendix). The *subjective Financial Literacy* score is a summing scale from 0 to 4 derived from the Yes (coded 1)/No answers relative to the knowledge of the risk of "Stocks," "Bonds," "Other unusual financial products," and "Market functioning." As a result, *subjective Financial Literacy* ranges from 0 (no subjective financial literacy)

to 4 (high level of subjective financial literacy). Using this score eases the interpretation of our results as, following van Rooij et al. (2012), we analyze this ordinal financial literacy score without looking at the way the score has been reached.²²

In Table 2, we present descriptive statistics on the financial literacy average scores and components and on the subjective gender gap for all retail clients, men and women. The average self-assessed financial literacy score is 1.96 (Std. of 1.14) and is significantly higher for men (2.05, Std. 1.16) than for women (1.87, Std. 1.12). Hence, the average gender gap in subjective financial literacy significantly differs from zero and amounts to 0.18.

Looking at the subjective financial literacy score components, we find that retail clients declare a high knowledge of the risk associated with stocks or bonds (significantly higher than 50%), then with markets functioning, and, lastly, with the risk of other investment products. We observe that men declare significantly higher levels of knowledge in each category than women. Among all score components, the difference in knowledge of the risk associated with stocks is the one that contributes the less to the total gender gap in subjective financial literacy.

Looking at scores distribution, we find that a majority of retail clients (79.03%) reach a medium score, that is, a score of 1, 2, or 3, whereas around 10_11% have either a null or maximal score. We further observe, in line with Bucher-Koenen et al. (2017), that men answer significantly less frequently that they do not know or know a little (scores of 0 to 3) and significantly more frequently that they perfectly know (score of 4) than women.

Table 2: Univariate results on subjective financial literacy in the initial sample

	All Mean/% (Std.)	Men Mean/% (Std.)	Women Mean/% (Std.)	Subj. GG
All individuals	1.96 (1.14)	2.05 (1.16)	1.87 (1.12)	0.18***
N	53,426	28,025	25,401	
Stocks	87.13%	88.36%	85.77%	0.026***
Bonds	62.53%	64.79%	60.04%	0.048***
Markets	29.59%	31.61%	27.35%	0.043***
Others	17.03%	20.01%	13.75%	0.063***
.....				
0	11.84%	10.73%	13.06%	-0.023***
1	23.08%	21.79%	24.50%	-0.027***
2	31.18%	30.45%	31.98%	-0.015***
3	24.77%	26.01%	23.39%	0.026***
4	9.13%	11.02%	7.07%	0.039***

Table 2 presents descriptive statistics of the subjective financial literacy scores in the initial sample for all individuals, men and women, and the subjective gender gap (men minus women). N is the number of retail clients. We report the mean and standard deviation of the score and the proportion (%) of retail clients in the score components (knowledge of the risk of Stocks, Bonds, Others and knowledge of Markets) and score distributions (0 to 4). Statistical significance levels are reported for the differences (*** for 1%, ** for 5%, and * for 10%).

4.2 Marital status and gender gap in subjective financial literacy

In Table 3, we present descriptive statistics on the subjective financial literacy scores and gender gap in the initial sample for individuals living as a couple or singles, and in the spouses' sample.²³ In the initial sample, the average subjective financial literacy score is significantly higher for individuals living as a couple (2.04,

²²For example, a financial literacy score of 2 could have both been reached by an individual declaring that h/she knows the risk of stocks and bonds or by another individual declaring that h/she knows financial markets functioning and the risk of stocks.

²³Among the 33,370 individuals living as part of a couple in the initial sample, 18,606 are not included in the sub-sample of "spouses" either because their spouse is not a retail client of the bank, or because both spouses are clients of the bank but we do not have data on the subjective financial literacy score of the spouse, or because they have no joint bank account.

Std. 1.13) than for singles (1.82, Std. 1.15), a result that also holds in women and men. Moreover, in the two sub-samples, the average subjective financial literacy scores of women are always significantly lower than those of men. Interestingly, the average score of women living as a couple (1.93) is significantly higher than that of single men (1.89). Importantly, in the spouses' sample, the average scores (2.08, Std. 1.11 for all individuals, 2.01, Std. 1.10 for women, and 2.16, Std. 1.11 for men) are close to the ones obtained for all couples in the initial sample.

Although a higher level of subjective financial literacy is observed in couples, the subjective gender gap is significantly higher for individuals living as couples (0.20 and 0.15 for spouses) than for singles (0.12). At first sight, this finding is consistent with the household task division assumption (Meier et al., 1999; Hsu, 2016; Ward and Lynch, 2018). However, because we analyze subjective (and not objective) financial literacy, the explanations of such differences in the gender gap may have to do, not only with the differences in the distributions of subjective financial literacy scores of men and women and/or of singles and couples, but also with the dynamics of spousal perception of their relative expertise. Besides, the decision to live as part of a couple is not random and the relationships between income inequality and assortative mating are well-documented (Greenwood et al. (2014)). For these reasons, we address intra-household differences in section 5.

Looking at the subjective financial literacy score components over the 3 sub-samples, we observe similar patterns and frequencies in the 4 components of the score as those of sub-section 4.1.²⁴

Looking at scores distributions, we find that retail clients living as a couple answer less frequently that they do not know (scores of 0 or 1) and more frequently that they well know (scores of 2 to 4) than singles. This finding also holds for men and women. We further observe symptoms of overconfidence in subjective financial literacy in men (i.e., men show significantly lower frequencies for low scores and higher frequencies for high scores than women), and this pattern is even stronger for men living as part of a couple than for single men. Finally, the distribution of subjective financial literacy scores of spouses stochastically dominates the one of couples, which also dominates the one of singles (Kolmogorov-Smirnov two-sample tests). As this finding is mostly due to higher proportions of high scores and lower proportions of low scores in spouses/couples, we conclude that the higher gender gap in spouses/couples is attributed to a higher self-confidence for individuals living as a couple. Actually, being two partners dealing with financial decisions is more comfortable than being alone, and at least, of course, because income is generally higher for couples than for singles. Moreover, distributions of subjective financial literacy scores of men stochastically dominate those of women, and this is true in each of the 3 sub-samples.

To conclude, we find that the higher gender gap in individuals living as a couple than in singles can be attributed to both a lower self-confidence of women relative to men, and a higher self-confidence of individual living as part of a couple relative to singles.

²⁴For these reasons, we do not report these statistics for women and men (available upon request).

Table 3: Univariate results on subjective financial literacy

	Initial sample			Spouses' sample
	Couples	Singles	Difference	
	Mean/% (Std.)	Mean/% (Std.)	(C-S)	Mean/% (Std.)
All individuals	2.04 (1.13)	1.82 (1.15)	0.22***	2.08 (1.11)
N	33,370	20,056		14,764
Stocks	89.21%	83.66%	5.55%***	90.96%
Bonds	65.54%	57.81%	7.73%***	66.92%
Markets	31.33%	26.68%	4.65%***	32.79%
Others	18.48%	14.64%	3.84%***	18.02%
0	9.86%	15.13%	-5.27%***	8.24%
1	22.25%	24.46%	-2.21%***	22.24%
2	31.78%	30.17%	1.61%***	32.61%
3	25.85%	22.96%	2.99%***	26.40%
4	10.26%	7.28%	2.98%***	10.51%
Women	1.93 (1.11)	1.77 (1.13)	0.16***	2.01 (1.10)
N	15,254	10,147		7,382
0	11.38%	15.58%	-4.20%***	9.24%
1	23.70%	25.71%	-2.01%***	23.54%
2	32.61%	31.02%	1.59%***	32.93%
3	24.54%	21.66%	2.88%***	25.47%
4	7.77%	6.03%	1.76%***	8.82%
Men	2.13 > (1.13)	1.89 > (1.17)	0.24***	2.16 > (1.11)
N	18,116	9,909		7,382
0	8.58% <	14.66%	-6.08%***	7.25% <
1	21.03% <	23.18% <	-2.15%***	20.93% <
2	31.08% >	29.30% <	1.78%***	32.28%
3	26.95% >	24.29% >	2.66%***	27.34% >
4	12.36% >	8.57% >	3.78%***	12.20% >
Subjective gender gap	0.20***	0.12***	0.08***	0.15***

Table 3 presents descriptive statistics of the subjective financial literacy scores and gender gap in the initial sample for individuals living as part of a couple and singles and in the spouses' sample for the 3 categories: all individuals, women and men. Column 4 shows the differences between *couples and singles* (C-S). N is the number of retail clients. We report the mean and standard deviation of the score and the proportion (%) of retail clients in the financial literacy components (Stocks, Bonds, Markets, and Others) in all individuals and score distributions (0 to 4) in the 3 categories. Statistical significance levels are reported for the differences between couples and singles (***) for 1%, ** for 5%, and * for 10%). For the differences between men and women, we use > (or <) to indicate significance at the 1% level.

4.3 Financial literacy determinants

In this sub-section, to definitively conclude on H1, we run a multivariate analysis to check whether the gender gap in subjective financial literacy, both for spouses and for all individuals, remains when we take into account the main determinants of financial literacy. Following Lusardi and Mitchell (2014), we look at the impact of gender, income, employment status, age, and of other factors of interest to researchers that have been documented to be determinants of financial literacy.

In Table 4, we present our results for the ordered logistic regression of the subjective financial literacy score over the following independent variables: *Female*, *Age*, *Native*, *Paris*, *Ln Income*, *Education*, professional categories (*Self-Employed*, *Employee*, *Retired*, *No occupation*), and *Couple*. Following van Rooij et al. (2011), *Age* and *Education* are introduced as dummy categories (quintiles for *Age* are defined by the ages of 32, 42,

52, and 65). Our models are run in the initial and spouse’s samples and show high significance.

As expected, we show evidence of the gender gap in subjective financial literacy in the initial sample as well as in the spouse’s sample. Indeed, the coefficients of *Female* are always significantly negative, although reduced in the spouse’s sample. Interestingly, when we add *Couple* in the initial sample’s independent variables (model 2), we find that being part of a couple increases the subjective financial literacy score.

Therefore, we validate H1 and conclude that the gender gap in subjective financial literacy is higher for individuals living as part of a couple, with all other financial determinants being controlled for.

Looking at controls, all variables, except *Female* and *Age*, contribute positively and significantly to explain the subjective financial literacy score, as expected. The negative impact of age on the score decreases as individuals age. This finding is in accordance with Finke et al. (2017), who found that, though objective financial literacy falls with age, people’s confidence in their own financial knowledge and abilities increases with age. As our paper deals with a subjective and not an objective measure of financial literacy, the negative and decreasing impact of age we find is consistent with the opposite effects of experience (which increases with age) and cognitive abilities (which decrease with age) on subjective financial literacy (see also Lusardi and Mitchell, 2011a and Lusardi and Mitchell, 2011b).

Our findings confirm the “nationality gap” (Brown and Graf, 2013), that is that being native-born in the country increases financial knowledge, seemingly through language or familiarity (Grinblatt and Keloharju, 2001) and cultural effects (Bucher-Koenen et al., 2017). We also find that, for retail clients who live in the capital of the country (*Paris*), the average subjective financial literacy is significantly higher than for the others.²⁵ These findings are in line with empirical studies showing positive relationships between social interactions, in the workplace or in the community, and objective financial knowledge. For example, people living in rural areas score worse than their city counterparts (Klapper and Panos, 2011) and there is some dispersion in objective financial literacy across regions in Italy (Fornero and Monticone, 2011), Romania (Beckmann, 2013), and US states (Bumcrot et al., 2013).

Controlling for employment status, subjective financial literacy significantly increases with the individual’s monthly income. In fact, Lusardi and Tufano (2015) and Lusardi and Mitchell (2011b) have shown that objective financial literacy vary by income and employment type, with lower-paid and unemployed individuals doing less well than employees and those self-employed. As objective financial literacy has been shown to increase with education (Lusardi and Mitchell, 2007; Lusardi and Mitchell, 2011b), we confirm this conjecture in our subjective measure and find a positive impact that increases with the education level.

²⁵Closely related to that result is that of Arrondel et al. (2010), who showed that households living within Paris are more likely to invest in risky assets.

Table 4: Ordered logistic regression results

Subjective FL score	Initial sample		Spouses' sample
	(1)	(2)	(3)
Female	-0.180*** (.016)	-0.177*** (.016)	-0.065** (.031)
Age1 (age<32 yrs)	-0.962*** (.035)	-0.926*** (.036)	-0.723*** (.076)
Age2 (32<age<42 yrs)	-0.613*** (.033)	-0.615*** (.033)	-0.669*** (.059)
Age3 (42<age<52 yrs)	-0.485*** (.032)	-0.487*** (.032)	-0.596*** (.058)
Age4 (52<age<65 yrs)	-0.232*** (.029)	-0.232*** (.029)	-0.323*** (.052)
Native	0.350*** (.024)	0.355*** (.024)	0.262*** (.048)
Paris	0.343*** (.024)	0.354*** (.024)	0.287*** (.052)
Ln Income	0.193*** (.005)	0.187*** (.005)	0.591*** (.022)
Education1	0.260*** (.025)	0.261*** (.025)	0.078 (.031)
Education2	0.714*** (.026)	0.718*** (.026)	0.452*** (.057)
Self-employed	0.230*** (.025)	0.231*** (.025)	0.178*** (.048)
Retired	0.084*** (.034)	0.100*** (.034)	0.093 (.064)
No occupation	0.112*** (.034)	0.117*** (.034)	0.221*** (.075)
Couple		0.136*** (.017)	
.....			
N	51,806	51,806	14,428
Loglik.	-76,007.92	-75,976.65	-20,805.89
LR-Chi2	5,114.07***	5,176.62***	1,469.76***
PseudoR ²	0.0325	0.0329	0.0341

Table 4 displays the results of the ordered logistic regression of the subjective financial literacy score on a set of independent variables in the initial and spouse's samples. Variables are described in Table A.1 in the Appendix. *Age* and *Education* are introduced as dummy categories (quintiles for *Age* are defined by ages of 32, 42, 52, and 65). *Ln Income* is the logarithm of monthly income. *Couple* is added as an explanatory variable in the initial sample. Statistical significance levels are reported for coefficients (***) for 1%, ** for 5%, and * for 10%). We also indicate the number of individuals (N), the log likelihood (Loglik.), LR-Chi2 statistic, and PseudoR² in each model.

5 Intra-household differences in subjective financial literacy

In this section, we investigate the gender gap in subjective financial literacy of matched spouses. We first focus on intra-household interactions and control for the characteristics of individuals living as a couple to analyze the gender gap in subjective financial literacy. Then, a test of H2 is conducted through the analysis of the determinants of the gender gap in matched spouses.

5.1 Intra-household interactions

In the previous section, we found a significantly higher gender gap in subjective financial literacy for individuals living as part of a couple than for singles. However, intra-household decision-making is a complex mechanism in which many individual characteristics determine each spouse's relative bargaining power (Bernasek and Bajtelsmit, 2002; Elder and Rudolph, 2003; Bertocchi et al., 2014; Johnston et al., 2016). Hence, we investigate to what extent the gender gap in subjective financial literacy of matched spouses is related to spousal decision-making determinants. We address this question in two ways: propensity score matching of individual living as a couple and singles and testing the differences in the gender gap of spouses answering the questionnaire together or not.

5.1.1 Propensity score matching

The decision to live as part of a couple is not random due to assortative mating which has been documented for income (Becker, 1981; Becker, 1985; Greenwood et al., 2014). Hence, finding a higher gender gap in subjective financial literacy in individuals living as part of a couple could derive from endogeneity concerns. Besides, people living as part of a couple generally share common income and common expenses, making them wealthier than singles. They also specialize into different tasks, the husband usually handling finances.

To deal with this endogeneity issue, we implement propensity score matching (Rosenbaum and Rubin, 1983) to test whether the subjective financial literacy score of women/men living as part of a dual-income couple is higher than that of single women/men who share a number of common characteristics with married or co-habited women/men. Propensity score matching consists in pairing the treated and untreated subjects with similar propensity score values. This matching process ensures that the only difference between the two groups is the treatment effect, that is the decision to live as part of a couple, the observed covariates being well-balanced in both groups. In line with the bargaining model, we aim at comparing singles whose characteristics would help exert identical bargaining power as if they were living as a couple, to spouses.

Our methodology is the following. We consider separate sub-samples of men and women and use logit regressions to model the probability that an individual lives as part of a couple. The independent variables of the logit model are the individual characteristics that we used as determinants of financial literacy (see sub-section 4.3). Based on the logit coefficients, we compute propensity scores in each of the sub-samples. Then, for each man who lives as part of a couple, we select (without replacement) a matching man whose propensity score is closest to the score of the married or co-habited man.²⁶ We proceed in the same way for women living as part of a couple and single women.

Table 5 reports the results of the logit regressions before and after matching in the two sub-samples. The post-matching regressions are conducted for 14,458 men and 14,342 women. Before matching, determinants are mostly significant (except for *Age4* and *No Occupation* in the women sub-sample). As expected, after matching, almost none of the determinants remain significant.

Table A.2 in the Appendix presents the balancing tests after matching. For each determinant, the difference in propensity scores between the treated and control individuals are not significant anymore, as expected.

²⁶Nearest-neighbor matching algorithm is run under Stata.

Table 5: Logit regression of “Couple” in the sub-samples of men and women

	Men sub-sample		Women sub-sample	
	Before matching	After matching	Before matching	After matching
Age1 (age<32 yrs)	-1.1706*** (.071)	0.0212 (.090)	-0.7435*** (.063)	0.0303 (.078)
Age2 (32<age<42 yrs)	-0.4303*** (.056)	0.0164 (.067)	-0.1625*** (.054)	0.0274 (.063)
Age3 (42<age<52 yrs)	-0.4078*** (.055)	0.0215 (.066)	-0.1739*** (.054)	0.0464 (.063)
Age4 (52<age<65 yrs)	-0.1959*** (.050)	0.0149 (.058)	-0.0587 (.050)	0.0324 (.056)
Native	0.3512*** (.042)	-0.0038 (.053)	0.1752*** (.042)	0.0088 (.053)
Paris	-0.4775*** (.045)	-0.0018 (.057)	-0.4655*** (.046)	-0.0048 (.057)
Ln Income	0.7150*** (.041)	0.0158 (.027)	0.8579*** (.019)	0.0061 (.023)
Education1	0.1113*** (.033)	0.0055 (.053)	-0.1125** (.054)	0.0668 (.067)
Education2	-0.1184*** (.046)	0.0060 (.057)	-0.5525*** (.058)	0.0213 (.073)
Self-employed	-0.2229*** (.038)	0.0059 (.047)	-0.1686*** (.056)	-0.0059 (.054)
Retired	0.1833*** (.057)	0.0259 (.067)	-0.4847*** (.065)	0.0949 (.078)
No occupation	-0.7851*** (.105)	0.0270 (.144)	-0.0142 (.062)	0.1257 (.079)
Intercept	-6.9445*** (.175)	-0.0337 (.223)	-7.5594*** (.165)	-0.1541 (.194)
.....				
N	41,099	14,458	39,008	14,342
N (in couples)	7,229	7,229	7,199	7,171
N (not in couples)	33,870	7,229	31,809	7,171
Pseudo R2	0.105	0.000	0.114	0.0002

Table 5 displays the results of our logit regressions wherein the dependent variable, Y_i , is a binary variable that equals 1 if the individual lives as part of a couple and 0 otherwise. Independent variables are the following: *Age dummies*, *Native*, *Paris*, *Ln Income*, *Education dummies*, *Self-Employed*, *Retired* and *No occupation*. The results are reported before and after matching for the two sub-samples of men and women. Statistical significance levels are reported for coefficients (*** for 1% and ** for 5%). We also indicate the number of individuals (N), and Pseudo R2.

Overall, these tables show that the samples of singles and married/co-habiting individuals share similar socio-demographic and economic characteristics. We then test whether their average subjective financial literacy scores differ. For men, we find that the subjective financial literacy score is significantly (1% significance) lower if they live as part of a dual-income couple (2.156) than if they are single (2.282). We find the opposite in women, who exhibit an average subjective financial literacy score that is significantly (5% significance) lower when they are single (2.001) than when they live as part as a couple (2.034). Specifically, living as part of a couple has opposite gendered effects on the subjective financial literacy of individuals. Men appear less self-confident in their financial knowledge if they live as part of a couple as their average declared financial knowledge is lower than if they are single, whereas the opposite is observed for women. Therefore, the intra-household differences in subjective financial literacy could be explained by couple’s consensus. Couple’s consensus is defined as agreement or similarity between spousal perceptions of the decision outcome (Moen et al., 2006; Hiller and McCaig, 2007 and Barnett and Stum, 2012). Couple’s consensus is related to the unitary model of spouses’ decision-making as it usually serves to make decisions that minimize conflict and resolve tensions. Hence, we argue that couple’s consensus plays a strong role in reducing the gender gap in subjective financial literacy and we directly test this conjecture for matched spouses in the next sub-section.

5.1.2 Same questionnaire date

As we know the date at which each spouse answered the questionnaire, we know whether spouses assessed their financial knowledge together or separately. When spouses are together, we assume that their answers take into account the answers of the other spouse and that couple’s consensus is high.

The questionnaire was administered separately to spouses in 2,003 couples (the number of days between the two questionnaires ranges from 1 to 2,708 days) and the completion date is identical for 72.86% of couples (5,379 couples). In Table 6, we present univariate results on subjective financial literacy of matched spouses and questionnaire date. We confirm that the average gender gap in subjective financial literacy is significantly higher when spouses answer the questionnaire separately (2.15) than when they answer it together (2.09).

We also find significant differences in the scores of 0 and 4, that is, lower frequencies of null score and higher frequencies of the highest score, when individuals answer separately than when they answer together with their partner. In a nutshell, individuals show lower subjective financial knowledge when they answer the questionnaire together. Everything happens as if individuals were declaring inflated financial knowledge when they are alone and not when their spouse is also present (and potentially could contradict them). This finding brings support to the couple’s consensus assumption. Hence, we conclude that the gender gap in subjective financial literacy is reduced by couple’s consensus.

Finally, a Kolmogorov-Smirnov two-sample test confirms that being part of a couple makes individuals more self-confident in their financial knowledge. In fact, the distribution of subjective financial literacy scores of spouses who answer the questionnaire separately (column 3 of Table 6) stochastically dominates the one of singles (column 3 of Table 3).

Table 6: Univariate results on subjective financial literacy of spouses and questionnaire date

	Same quest. date	Different quest. date	Difference
	N=10,758	N=4,006	
	Mean/% (Std.)	Mean/% (Std.)	(D-S)
All individuals	2.06 (1.11)	2.15 (1.09)	0.09***
.....			
0	8.99%	6.24%	-2.75***
1	21.94%	23.02%	1.08%
2	32.74%	32.25%	-0.49%
3	26.43%	26.33%	-0.1%
4	9.90%	12.16%	2.26%***
Women	1.99 (1.10)	2.05 (1.08)	0.06***
.....			
0	10.00%	7.19%	-2.81%***
1	23.05%	24.86%	1.81%*
2	33.09%	32.50%	-0.59%
3	25.36%	25.76%	0.40%
4	8.50%	9.69%	1.19%*
Men	2.13 (1.11)	2.24 (1.10)	0.11***
.....			
0	7.97% <	5.29% <	-2.68%***
1	20.84% <	21.17% <	0.33%
2	32.38%	32.00%	-0.38%
3	27.49%	26.91%	-0.58%
4	11.30% >	14.63% >	3.33%***
Subjective gender gap	0.14	0.19	0.05***

Table 6 presents descriptive statistics of the financial literacy scores in the spouses’ sample for the 3 categories of all individuals, women and men when spouses answered the questionnaire at the same date, i.e. together (column 2), or at different dates, i.e. separately (column 3), and the differences between the two, that is, Different minus Same or D-S (column 4). N is the number of retail clients in each category. We report the mean and standard deviation of the financial literacy score and the score distributions (0 to 4). Statistical significance levels are reported for the differences between couples and singles (*** for 1%, ** for 5%, and * for 10%). For the differences between men and women, > (or <) indicates that the mean/proportion is significantly higher (or lower) for males than for females.

5.2 Determinants of the gender gap in matched spouses

In the preceding sub-sections, we have shown that individuals living as part of a couple exhibit a higher level of subjective financial literacy than singles, but the average gender gap is higher in couples than in singles. The aim of this sub-section is to understand these two findings through a detailed analysis of the unique sub-sample of 7,382 couples. This analysis allows testing our second hypothesis according to which the heterogeneity of intra-household differences in subjective financial literacy is related to the heterogeneity in dominance/management styles. In this sub-section, we do not focus on the absolute level of subjective financial literacy scores of the couple members, but we aim to identify the within-couple characteristics for which financial literacy scores differ or are identical between spouses. Our methodology considers separately spouses who “disagree” from those who “agree” in their subjective financial literacy scores as this might reflect female- or male-dominant financial management styles, within-couple demographics, and consensus being controlled for.

Specifically, we consider 3 categories of gender gap in spouses’ subjective financial literacy²⁷:

- Category 0 (5,206 couples, 70.52%), in which the financial literacy score is identical for both spouses (Average gender gap: 0)
- Category 1 (1,461 couples, 19.79%) where the financial literacy of the husband is higher than that of his wife²⁸ (Average gender gap: 1.42)
- Category 2 (715 couples, 9.69%), in which the wife has a higher financial literacy score than her husband (Average gender gap: -1.32)

In category 0, the average self-assessed financial literacy score is 2.058 (Std. 1.09). In category 1, the average husband score is 2.87 (Std. 0.88) and the wife’s is 1.45 (Std. 0.95). Interestingly, the reverse is observed in almost 10% of couples (in category 2, the average husband score is 1.47 (Std. 0.91) and the wife’s one is 2.79 (Std. 0.82)). Consequently, the average gender gap of 0.15 in subjective financial literacy between spouses observed in Table 3 is driven by a high proportion of category 1 couples, that is, classical gender gap, in our sample.

To test H2, we run a multinomial logistic regression in which the dependent variable is the probability for a dual-income couple to belong to each of the 3 categories of spouses’ gender gap in subjective financial literacy. We used the main determinants of various financial management styles found by van Raaij et al. (2020) to define the independent variables of the model.²⁹ van Raaij et al. (2020) showed that income sharing makes it more likely for couples to belong to syncratic rather than male-dominant financial management. Likewise, the difference of objective financial knowledge between men and women makes it more likely for couples to belong to the syncratic rather than to the female-dominant financial management style. In the syncratic style, partners have a joint bank account and make most financial decisions together. In the male/female-dominant styles, one partner (husband or wife) makes the main financial decisions. van Raaij et al. (2020) also identified the autonomous style, in which both partners have their own bank accounts and make their own decisions.³⁰ In our paper, according to H2, we assume that the syncratic style corresponds to no gender gap (category 0), whereas the male and female-dominant styles correspond to either the classical or inverted gender gap in

²⁷We indicate the extent of the gender gap in subjective financial literacy, but we do not analyze it because the ordinal nature of our measurement may hide qualitative differences that one cannot rank. For example, in a couple with identical subjective financial literacy scores of 2, the husband might have assessed knowledge in stocks and bonds, whereas the wife might have assessed knowledge in stocks and market functioning.

²⁸By means of simplicity, we also use “husband” and “wife” for co-habiting partners.

²⁹van Raaij et al. (2020) pre-identified 4 styles (syncratic, male-dominant or female-dominant, and autonomous) by using the type of bank account (joint or separate bank account) and the declared decision-maker for the account.

³⁰They find that this management style more likely exists in couples with age difference and those having partnership arrangements.

subjective financial literacy (categories 1 or 2). We do not make predictions on the relationships between the autonomous management style and any gender gap category since spouses in our sample hold a joint bank account.

In our model, we consider income sharing by using *Male's income share* and the logarithm of the sum of spouses' incomes, *Ln Couple Income*. We also use the mean of spouses' education, *Couple Education*, and the difference between spouses education, *Education difference*, to proxy objective financial knowledge and differences between partners. Aside from these financial management styles determinants, our model controls for within-couple demographics (age, place of living, nationality, partnership arrangement) and couple's consensus (*Same quest. date*). We follow Bertocchi et al. (2014) and use couple differentials in terms of age and occupation because they conclude that measuring the degree of heterogamy within couples with precise differential measures rather than with dummies leads to more clear-cut and powerful conclusions.

In Table 10, we present the results of our multinomial logit regressions for the different categories of spouses gender gap in subjective financial literacy, with category 0 as default.³¹

To identify the main factors of spouse's dominance/management style, we look at coefficients signs and significance. We find that couples are more likely to disagree on their subjective financial literacy score (or equivalently to belong to category 1 or 2) when they have a high level of couple education and when they have a partnership arrangement. In contrast, they are more likely to exhibit no gender gap when they answer the questionnaire together, all other variables held constant.

We further find that *Male's income share* and *Education difference* show effects on the direction of the gender gap. A higher income contribution and/or a higher education by the man makes the couple more likely to exhibit a classical gender gap in subjective financial literacy. Put differently, if the woman contributes more than her partner to the household income, and/or if she has a higher education than him, then it is more likely that the couple exhibits an inverted gender gap in subjective financial literacy. This finding is in line with those of van Raaij et al. (2020), but additionally takes into account the questionnaire completion date. Hence, when consensus between partners operates less, we show that the direction of the gender gap in subjective financial literacy is driven by education and income differences between spouses. Moreover, these findings validate H2, according to which the heterogeneity of spouses' management styles and of gender gap in subjective financial literacy are related.

Interestingly, we also find that if partners live in urban areas (*Paris*) or have different occupations, they are more likely to exhibit the classical gender gap. This last finding is in accordance with Luhrmann and Maurer (2007), who shows that urbanity in the area where the household is matters for spouses' dominance. Couple age and age difference between spouses also appear to be determinants of the classical gender gap, albeit with a 10% significance level.

Finally, looking at odds for these determinants, we confirm that the main explanatory variables of the agreement/disagreement in couple's subjective financial literacy level are the male's relative income, then couple education for the classical gender gap, whereas couple education is the first determinant of the inverted gender gap, separation regime being the second one.

³¹We show the coefficients and the relative-risk ratios (RRR). RRR are similar to odds ratios and they allow identifying variables that increase (resp. decrease) the probability of couples belonging to each category when the ratio is higher (resp. lower) than 1.

Table 7: Results of multinomial logistic regression analyses.

	Category 1 (FL man>FL wom.)		Category 2 (FL wom.>FL man)	
	Coeffs.	RRRs	Coeffs.	RRRs
Couple Age	0.006* (0.003)	1.006	0.002 (0.004)	1.002
Age difference	0.015* (0.008)	1.015	0.014 (0.011)	1.014
Paris	0.328*** (0.117)	1.388	0.193 (0.161)	1.213
Intercultural	0.072 (0.114)	1.075	-0.176 (0.162)	0.838
Separation regime	0.171* (0.097)	1.187	0.219* (0.129)	1.245
Ln couple income	-0.053 (0.069)	0.948	-0.211** (0.089)	0.809
Male's income share	1.453*** (0.275)	4.276	-0.319 (0.364)	0.726
Couple education	0.343*** (0.093)	1.409	0.228* (0.122)	1.256
Education difference	0.094 (0.065)	1.099	-0.173** (0.087)	0.840
Same occupation category	-0.256*** (0.087)	0.774	-0.182 (0.116)	0.833
Same quest. date	-0.854*** (0.079)	0.425	-1.194*** (0.100)	0.302
Intercept	-1.606** (0.633)	0.200	0.573 (0.799)	1.775
.....				
N		4,920		
Loglik.		-3747.57		
LR-Chi2		350.69***		
Pseudo R ²		0.044		

Table 10 displays the results from multinomial logistic regressions of dual-income couples belonging to categories 0, 1, or 2 with category 0 being the default. Independent variables are measured at the couple level. Descriptions of couple-related variables are given in Table 1. Additionally, *Couple Age* is the average of the spouses' ages. *Age difference* is man's age minus woman's. *Ln Couple Income* is the logarithm of the sum of spouses' monthly incomes. *Couple Education* is the mean of spouses' education. *Education difference* is the difference between the man and woman's education. Coefficients are given in columns 2 and 4 and relative-risk ratios (RRR) are given in columns 3 and 5. We also indicate the log likelihood (Loglik.), LR-Chi2 statistic, Pseudo R², and the number of individuals. Statistical significance levels are reported for coefficients (*** for 1%, ** for 5%, * for 10%).

5.3 Robustness checks

In this sub-section, we run four robustness checks of the main analysis in Table ?? on different sub-samples. Corresponding results are shown in Tables A.3 and A.4 of the appendix. All our findings are broadly confirmed and only statistical significance of effects differ from our main analysis.

First, as our sample includes married and co-habiting couples, we check whether our findings hold the same in the two sub-samples. Of the couples, 16.2% are co-habiting. In the sub-sample of married couples, we find results similar to those of Table ?? but with higher significance levels for couple age in category 1, and for separation regime and education difference in categories 1 and 2. Note that, as the separation regime is not relevant for cohabiting partners, the higher significance of the separation regime in married partners indicates that legal arrangements reinforce the relative bargaining power of spouses. In the sub-sample of cohabiting

couples, we find that education and age variables are no longer significant, putting a higher emphasis on the economic determinants of the gender gap when no contractual partnership exists.

A second analysis consists in determining whether employment status matters to the gender gap in subjective financial literacy. Among the 7,382 dual-income couples, the proportions of men and women working are very close (68.7% and 74.5%) but those of single workers differ for the two genders: in 11.9% of couples, the woman is the only spouse working, compared to 6.1% with a single working man. Due to the small numbers of non-working women in our data, we look at the relatively large sub-sample of working women (4,685 out of 4,920 couples). Performing such an analysis do not modify our findings but shows that separation regime (in category 2) and education difference (in category 1) both have a more significant power in the sub-sample of working women than in the whole sample. This indicates that the employment status of women reinforces their bargaining power mainly through legal arrangements.

In a third robustness check, we aim at determining whether our findings still hold when women earn more than or as well as men in a couple. Interestingly, in category 1, we find a higher significance for age difference, separation regime and education difference and a lower significance for variables related to professional income (Male’s income share, and same occupation category) when women contribute at least as well as men to the household income. In category 2, statistical significance is higher in Paris, separation regime, and male’s income share. These findings confirm the importance of the relative economic power of each spouse to determine gender gap categories.

Finally, we test whether the average of spouses’ age, which is also a proxy (although imperfect) of the length of the relationship, has an impact on our findings. As the median age of couples is around 50 in our database, we separate couples in two sub-samples according to this cutoff. Interestingly, the separation regime is no longer significant in young couples, for whom the impact of education differences is now significant in category 1. In contrast, the separation regime has a higher significance level and education difference is no longer significant in older couples. Hence, as couples who cohabit are usually younger than married ones³², we conclude that young and old couples appear to mainly differ in the relative impact of education difference and legal arrangements (marriage and/or separation regime) to determine gender gap categories.

5. Conclusion

In this paper, we analyze the subjective financial literacy gender gap of couples (among which are paired dual-income spouses) and single individuals. We show that the gender gap in subjective financial literacy is significantly higher for individuals who live as part of a couple than for singles. We also find that women are less self-confident in their own knowledge than men but also that individuals who live as part of a couple are more self-confident in their financial knowledge. When taking into account the distribution of responsibility for knowledge and decision-making between matched relationship partners, we show that their subjective financial literacy gender gap is reduced because of couple consensus during spouses’ joint decision-making and especially when they answer the questionnaire together. We also separately analyze matched spouses who exhibit similar or different subjective financial literacy scores and find some couples who exhibit an inverse gender gap or no gap in subjective financial literacy. We show that agreement/disagreement in the subjective financial literacy scores of spouses depends on the consensus between them and on the differences in education and household income contribution of each spouse. These determinants of the sign of the gender gap in subjective financial literacy are also those of the dominance/management styles of couples that impact intra-household financial decision-making.

Our findings highlight that only approximately 20% of couples exhibit a “classical” gender gap in subjective financial literacy, which mitigates the scope of financial illiteracy in women. Such a finding may encourage

³²In our dataset, married individuals are 14 years old on the average older than individuals who cohabit

equality policies between men and women as they could also be effective in reducing the gender gap in objective financial literacy. This result may also drive future research to consider subjective financial literacy as a key determinant of household financial decision-making. Future work has to be done in order to check whether investment and savings decisions in couples depend on the dominance types that are identified through subjective financial literacy score differences. Actually, as we dealt with advanced subjective financial literacy, it would be interesting to establish a link between important household financial decisions (as opposed to daily financial decisions) and the gender gap in subjective financial literacy. Accordingly, some future work may study the financial outcomes of couples such as savings or investments depending on their dominance styles as determined by the differences in spouses' subjective financial literacy.

Based on our findings, we also consider that living as part of a couple could be another way, along with social interactions, in the workplace or in the community, for individuals to acquire financial literacy. This would work, of course, as soon as role allocations in households shift towards more egalitarian decision-making in financial matters. Financial service providers and educators must also understand gender differences in individuals living as part of a couple in order to build new financial education methods or to provide targeted financial advice to each partner. Such considerations are necessary since the divorce reforms over the last 20 years, for example in the US and France, have weakened the necessity of mutual consent for a married couple to separate. This leaves more room for various types of selfish behavior to occur and for the gender gap in financial literacy to expand if no equality policy is undertaken to reduce it.

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Appendix

Table A.1: Variables in database.

Variables	Definitions
Panel A: Banking records	
Individual variables	
Female	Dummy variable coded 1 for females and 0 for males.
Age	Age of the individual as of 07/31/2015 (in years).
Native	Dummy variable coded 1 if the individual is native-born in the country and 0 otherwise.
Paris	Dummy variable coded 1 if the individual lives in and close to the biggest city of the country and 0 otherwise.
Education	Categorical variable coded 0 if the individual education level is primary school, 1 for secondary school, and 2 for a university degree.
Number of children	Number of children of the individual.
Self-employed	Dummy variable coded 1 if the individual directly perceives his/her income as being from his/her own professional activity and 0 otherwise.
Employee	Dummy variable coded 1 if the individual has a wage or salary from an employer and 0 otherwise.
Retired	Dummy variable coded 1 if the individual is retired and 0 otherwise.
No occupation	Dummy variable coded 1 if the individual has no professional occupation (e.g., students or no professional activity) and 0 otherwise.
Monthly income	Monthly income of individuals (in euros) in 5 brackets: €0; <€1,500; [€1,500;€3,000[; [€3,000;€5,000[; [€5,000;€10,000[; and >€10,000.
Couple-related variables	
Couple	Dummy variable coded 1 if the individual lives as part of a couple (i.e., married or cohabiting) and 0 otherwise (i.e., single, divorced, widowed, or separated).
Separation regime	Dummy variable coded 1 if the spouse's matrimonial regime of the household members is the separation of assets and liabilities and 0 otherwise.
Panel B: MiFID questionnaires answers	
Subjective financial literacy	Self-assessed financial literacy ranked from 0 (no financial knowledge) to 4 (high level of financial knowledge) obtained from a summing scale derived from the MiFID questions “Do you know the risk associated with stocks (1), bonds (1), and other unusual financial products (1), i.e. warrants, deferred service settlements, convertible bonds, and other financial instruments?” and “Do you understand financial market functioning?” (1), that is, change of order execution delay or existence of different types of orders.
Same quest. date	Dummy variable that takes the value of 1 if the couple answered the questionnaire together and 0 if they answered the questionnaire separately.

Table A.1 describes variables extracted from banking records (Panel A) and MiFID questionnaires answers (Panel B).

Table A.2: Mean values of determinants for treated (“Couples”) and controls

	Men sub-sample			Women sub-sample		
	Treated (couples)	Controls	Difference	Treated (couples)	Controls	Difference
Age 1 (age<32 yrs)	0.0587	0.0586	0.0001	0.0864	0.0866	-0.0002
Age 2 (32<age<42 yrs)	0.2076	0.2080	-0.0004	0.2305	0.2323	-0.0018
Age 3 (42<age<52 yrs)	0.2116	0.2108	-0.0008	0.2133	0.2111	0.0022
Age 4 (52<age<65 yrs)	0.2563	0.2561	0.0002	0.2480	0.2472	-0.0008
Native	0.8875	0.8878	-0.0003	0.8849	0.8844	0.0005
Paris	0.0968	0.0969	-0.0001	0.0970	0.0976	-0.0006
Ln Income	8.0293	8.0286	0.0007	7.8074	7.8058	0.0016
Education 1 (secondary school)	0.4967	0.4971	-0.0004	0.5693	0.5681	0.0012
Education 2 (university)	0.2052	0.2050	0.0002	0.1093	0.1130	-0.0037
Self-employed	0.1795	0.1792	0.0003	0.0938	0.0981	-0.0043
Retired	0.2353	0.2342	0.0011	0.1624	0.1607	0.0017
No occupation	0.0150	0.0148	0.0002	0.1384	0.1317	0.0067

Table A.2 compares the mean values of determinants for treated (individuals living as part of a couple) and controls in the two sub-samples of men and women. Differences are not significant, as expected.

Table A.3: Robustness checks 1-3 of multinomial logistic regression analyses.

	Robustness check 1				Robustness check 2		Robustness check 3	
	Cohabiting couples		Married couples		Woman is working		Woman earns a higher or equal income than man	
	Category 1	Category 2	Category 1	Category 2	Category 1	Category 2	Category 1	Category 2
	Coeffs.	Coeffs.	Coeffs.	Coeffs.	Coeffs.	Coeffs.	Coeffs.	Coeffs.
Couple Age	-0.001 (0.008)	0.006 (0.010)	0.009*** (0.003)	0.002 (0.004)	0.005 (0.003)	0.004 (0.004)	0.006* (0.003)	-0.009 (0.004)
Age difference	0.024 (0.017)	0.016 (0.021)	0.011 (0.010)	0.012 (0.013)	0.015 (0.009)	0.015 (0.011)	0.018* (0.011)	0.017 (0.014)
Paris	0.638*** (0.274)	0.564* (0.350)	0.264*** (0.131)	0.103 (0.183)	0.382*** (0.119)	0.188 (0.164)	0.206 (0.153)	0.381** (0.183)
Intercultural	0.316 (0.274)	0.281 (0.351)	0.032 (0.126)	-0.284 (0.185)	0.055 (0.119)	-0.150 (0.166)	0.213 (0.141)	-0.009 (0.188)
Separation regime	O	O	0.222** (0.101)	0.269*** (0.134)	0.182* (0.100)	0.229* (0.132)	0.281** (0.124)	0.313** (0.157)
Ln couple income	-0.062 (0.158)	-0.257 (0.203)	-0.037 (0.078)	-0.198** (0.101)	-0.090 (0.072)	-0.219** (0.093)	-0.083 (0.081)	-0.213** (0.102)
Male's income share	1.544*** (0.584)	-0.287 (0.741)	1.444*** (0.313)	-0.309 (0.421)	1.364*** (0.281)	-0.462 (0.372)	1.449** (0.677)	-2.707*** (0.731)
Couple education	0.328 (0.242)	0.309 (0.306)	0.334*** (0.101)	0.198 (0.133)	0.328*** (0.101)	0.246* (0.130)	0.276** (0.113)	0.207 (0.144)
Education difference	-0.066 (0.163)	-0.100 (0.202)	0.135* (0.071)	-0.191** (0.096)	0.125* (0.068)	-0.194** (0.090)	0.132* (0.082)	-0.187* (0.105)
Same occupation category	-0.329 (0.208)	-0.354 (0.257)	-0.233** (0.097)	-0.122 (0.131)	-0.259*** (0.090)	-0.166 (0.119)	-0.209* (0.112)	-0.124 (0.143)
Same quest. date	-0.813*** (0.168)	-1.514*** (0.214)	-0.853*** (0.091)	-1.079*** (0.115)	-0.822*** (0.081)	-1.193*** (0.102)	-0.936*** (0.100)	-1.077*** (0.121)
Intercept	-1.192 (1.337)	0.953 (1.676)	-1.966*** (0.739)	0.381 (0.935)	-1.210* (0.652)	0.608 (0.821)	0.029 (0.743)	1.670* (0.901)
N	1,065		3,855		4,685		3,569	
Loglik.	-819.41		-2,918.65		-3,568.62		-2,558.67	
LR-Chi2	107.55***		260.66***		329.87***		231.23***	
Pseudo R ²	0.061		0.042		0.044		0.043	

Table 10 displays the robustness checks from multinomial logistic regressions of dual-income couples belonging to categories 0, 1, or 2 with category 0 being the default. Robustness check 1 separates cohabiting and married couples in two sub-samples. Robustness 2 and 3 focus on, respectively, the sub-sample of working women and the one of women who earn a higher or equal income than men. Independent variables are measured at the couple level. Descriptions of couple-related variables are given in Table 1. Additionally, *Couple Age* is the average of the spouses' ages, *Age difference* is man's age minus

Table A.4: Robustness check 4 (couple age) of multinomial logistic regression analyses.

Robustness check 4				
	Couples aged less or equal to 50 years		Couples aged more than 50 years	
	Category 1	Category 2	Category 1	Category 2
	Coeffs.	Coeffs.	Coeffs.	Coeffs.
Couple Age	−0.010 (0.008)	−0.003 (0.010)	0.012 (0.007)	0.007 (0.010)
Age difference	0.021* (0.012)	0.004 (0.016)	0.011 (0.012)	0.0126 (0.016)
Paris	0.427*** (0.155)	0.157 (0.212)	0.201 (0.181)	0.228 (0.250)
Intercultural	−0.000 (0.163)	−0.415* (0.243)	0.147 (0.161)	0.052 (0.223)
Separation regime	0.096 (0.136)	0.294* (0.169)	0.268* (0.142)	0.082 (0.204)
Ln couple income	−0.070 (0.097)	−0.252** (0.122)	0.031 (0.103)	−0.130 (0.138)
Male's income share	1.359*** (0.363)	0.573 (0.466)	1.645*** (0.430)	0.109 (0.588)
Couple education	0.249* (0.145)	0.301* (0.182)	0.367*** (0.125)	0.134 (0.167)
Education difference	0.209** (0.068)	−0.147 (0.124)	0.010 (0.088)	−0.197* (0.123)
Same occupation category	−0.320** (0.121)	−0.301** (0.154)	−0.204 (0.128)	−0.010 (0.180)
Same quest. date	−0.897*** (0.104)	−1.128*** (0.129)	−0.806*** (0.124)	−1.283*** (0.160)
Intercept	−0.583 (0.861)	1.297 (1.056)	−2.892*** (1.115)	−0.659 (1.454)
.....				
N	2,982		1,938	
Loglik.	-2,220.50		-1,517.52	
LR-Chi2	208.05***		152.86***	
Pseudo R ²	0.048		0.047	

Table 10 displays the robustness check of couple age from multinomial logistic regressions of dual-income couples belonging to categories 0, 1, or 2 with category 0 being the default. Independent variables are measured at the couple level. Descriptions of couple-related variables are given in Table 1. Additionally, *Couple Age* is the average of the spouses' ages. *Age difference* is man's age minus woman's. *Ln Couple Income* is the logarithm of the sum of spouses' monthly incomes. *Couple Education* is the mean of spouses' education. *Education difference* is the difference between the man and woman's