Policy Research Working Paper 9431

In It to Win It?

Self-Esteem and Income-Earning among Couples

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WORLD BANK GROUP
Africa Region
Gender Innovation Lab
October 2020

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Abstract

This paper investigates whether the relative self-esteem level of spouses can lead to within- household competition for inputs and affect economic gender inequality in the home. Using data on smallholder farmer couples in Côte d'Ivoire, the paper examines the relationship between spouses' self-esteem and income-earning in agriculture. Although the link between own self-esteem and crop income earning is positive, there is a "battle of the sexes" in which one spouse's self-esteem is negatively related to the other's income earning, particularly income earning in higher-value, export-oriented agriculture. Women's outcomes are more sensitive to their own self-esteem (positively) and to their partners' (negatively) than men's. This negative relationship is driven by individuals during middle age, when self-esteem is considered most stable. A key channel through which self-esteem appears to matter is by increasing control over household land, which is a scarce but crucial input to agricultural production. In addition to confirming the importance of noncognitive skills for poverty reduction in rural settings, the findings highlight the importance of their impact on intra- and inter-household inequality, especially in the presence of interlocking market failures constraining the supply of inputs to production.

This paper is a product of the Gender Innovation Lab, Africa Region. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at adonald@worldbank.org.

In It to Win It? Self-Esteem and Income-Earning among Couples

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Keywords: self-esteem, socio-emotional skills, agricultural investment, export crops, gender
JEL Classification: Q12, J16, J24, O15

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1 Introduction

Noncognitive skills, also referred to as socio-emotional skills, are a set of attitudes and behaviors including self-awareness, personal initiative, perseverance and self-esteem. These skills are termed "noncognitive" because they are both theoretically and empirically distinct from cognitive and technical skills. They have long been recognized as important inputs to human capital production and economic outcomes (Bowles and Gintis (1976); Weiss (1988)). Empirically, the explanatory power of noncognitive skills has been shown to be greater or equal to that of cognitive skills for key labor market outcomes such as schooling decisions, wages, employment, work experience, and occupational choice (Chetty, Friedman, Hilger, Saez, Schanzenbach, and Yang (2011); Heckman, Stixrud, and Urzua (2006)).

Among noncognitive skills, self-esteem (the assessment of one's own value or worth) has been of particular interest to economists. Indeed, a growing body of literature focuses on self-esteem and documents a positive link to earnings (Drago (2002); Girtz (2014); Graham, Eggers, and Sukhtankar (2004); Murnane, Willett, Braatz, and Duhaldeborde (2001); Waddell (2006)), labor force participation (Acosta, Muller, and Sarzosa (2015); Almlund, Duckworth, Heckman, and Kautz (2011); Carneiro, Crawford, and Goodman (2001) and sector choice (Levine and Rubinstein (2017)). This literature underscores the role that a psychological attribute like self-esteem can play as a dimension of human capital in reducing poverty.

As most of the global poor earn a living from agriculture, it is worthwhile to examine the consequences of individuals' self-esteem levels in this sector. While, to the best of our knowledge, self-esteem as a specific trait has not been examined before, there is a growing empirical evidence base on noncognitive skills as a whole within agriculture. Parisi (2018) shows that personality traits significantly affect both production and input choice for farmers in Ethiopia. Montalvao, Frese, Goldstein, and Kilic (2017) document a positive link between the noncognitive skills of women farmers (perseverance, passion for work, and optimism) and the adoption of tobacco, a highly profitable crop, in Malawi. Similarly, Ali, Bowen, and Deininger (2017) find that noncognitive skills (polychronicity, work centrality, and optimism) significantly affect simple adoption decisions, returns from adoption and technical efficiency in rice production in Ghana, and that the size of the estimated impacts exceeds that of traditional human capital measures.

While this empirical literature has looked extensively at the economic benefits of noncognitive skills at the individual level, it has less to say at the relational or distributional level. How do noncognitive skills impact income inequality, such as income inequality by gender? None of the existing studies, from either rich or poor contexts, explores the relationship between individuals' relative noncognitive skills and their economic outcomes. Under certain assumptions, an unequal allocation of resources, whether intra- or inter-household, may be further exacerbated by individual members' noncognitive skills. Understanding how the impact of one's noncognitive skills on economic outcomes is affected by noncognitive skills of other economic actors is, nevertheless, important for maximizing overall welfare gains. This is especially important in agriculture, where the production unit tends to be the household.

In this paper, we focus on intra-household inequality in income-earning. This allows us to adopt a sharper test for mechanisms. It also allows us to hone in on gender income inequality, one of the most pervasive forms of social inequality. Through this lens, intra-household inequality can be affected by how (i) the impact of self-esteem differs across men and women, (ii) interacts with their partner's self-esteem, and (iii) manifests when economic outcomes are constrained by scarcity and market failures in input provision, a particularly relevant topic in development settings.

Thus, the question of how noncognitive skills influence inequality – in our context, self-esteem and intra-household inequality in economic specialization specifically – rests on two axes. First, how does the interplay between the genders' noncognitive skills influence the "general equilibrium", that is the household level? Second, what determines the sign of this interplay, i.e., whether spouses' noncognitive skills are substitutes or complements? A key to answering this question rests on the fact that noncognitive skills, and self-esteem in particular, may affect outcomes by increasing one's ability and willingness to control production inputs and thus determine how resources are allocated among household members (Engle (1990)).

This paper uses self-esteem as a measure of noncognitive skills since it is the main noncognitive skill analyzed in the economics literature. Most importantly, self-esteem has been found to be stable and strongly predictive of future outcomes by psychologists, making it suitable for study of impacts (Donnellan, Trzesniewski, Robins, Moffitt, and Caspi (2005); Orth, Robins, Trzesniewski, Maes, and Schmitt (2009) and references cited therein). Consequently, they are part of standard measures incorporated in large longitudinal studies such as the National Longitudinal Survey of Youth in the United States, the German Socio-Economic Panel and the Household Income and the Labour Dynamics in Australia Survey. Economists researching noncognitive skills (such as Cobb-Clark and Tan (2011); Heineck and Anger (2008)) have relied on these data and the measures.

Our analysis uses data on men's and women's self-esteem in $1,511$ farmer couples in Côte d'Ivoire to determine how relative self-esteem levels in the household affect spouses' agricultural income-earning. Our findings show that while having higher self-esteem increases one's likelihood of earning crop income, one's spouse's self-esteem reduces it. Own self-esteem emerges as a more important determinant of income-earning for women, who also suffer more from their partners' self-esteem. A one standard deviation increase in female self-esteem is associated with her husband being 12 percent less likely to earn crop income, and a one standard deviation increase in male self-esteem is associated with his wife being 33 percent less likely to earn crop income.

Conforming to gendered norms about assertiveness, a high self-esteem wife reduces husband's agricultural income-earning regardless of his own self-esteem; whereas for wives, a high self-esteem husband is not consequential as long as she also has high self-esteem. In line with theory, we find evidence that this channel operates through a higher ability to negotiate access to the fixed inputs in agricultural production functions. Self-esteem levels seem to instead operate as complements in off-farm employment, which relies less on fixed inputs.

Our results have implications for future policy making and research. First, our results show that the impact of noncognitive skills can be underestimated when looking at only one individual in the household, particularly in informal sectors where the household is the relevant unit of production. This insight has important implications for evaluating the growing number of training programs aimed at increasing individual noncognitive skills. Second, our results show that what matters for predicting income-earning is the relative level of noncognitive skills within the household. Looking at equilibrium effects through impacts on other individuals is crucial to fully understand the poverty-reduction potential of noncognitive skills. Lastly, our results imply that positive impacts of noncognitive skills could be enhanced by an accompanying alleviation of inputs scarcity.

The remainder of the paper proceeds as follows. Section 2 introduces the data and presents summary statistics. The conceptual framework is outlined in Section 3, while Section 4 presents our main results on the link between spouses' self-esteem and income-earning and its mechanisms. Section 5 presents evidence on the direction of causality, while Section 6 provides additional results with an alternative outcome specification. Section 7 concludes with policy implications and suggestions for further research.

2 Context

This paper uses data on farmer couples collected by the authors in June-July 2016. The survey formed the baseline of a randomized controlled trial to assess the impact of improving farmers' access to technologies and markets. The survey elicited information on the self-esteem, agricultural self-efficacy and time and risk preferences of the farmers that applied to the program, as well as of their spouses. The spouses were asked these modules separately and privately. The household survey also collected information on couples' socio-demographic characteristics and income generating activities, along with modules on expenditures, saving, credit, transfers and social networks, shocks and coping strategies, assets and food security. Table 1 shows descriptive statistics for our sample.

Our primary outcome of interest is income-earning in agriculture. For the rural households in Côte d'Ivoire we surveyed, the scope for engaging in the formal sector is limited and virtually all households are engaged in some sort of agriculture. The choice households and individuals face is the mix of subsistence agriculture, commercial agriculture and self-employment they engage in – with the key choice for farming households being who engages in higher-value export-oriented agriculture. In what follows, we define cash crops as any crops that households report selling, and export-oriented agriculture as the subgroup consisting of Côte d'Ivoire's main export crops: cashew, cocoa, coffee, palm oil and rubber. Export crop farming is prevalent in our context: of the 19 Sub-Saharan African countries studied in Chauvin, Mulangu, and Porto (2012), Côte d'Ivoire has the second-highest agriculture income share coming from non-staple food other than cereals or fruits and vegetables, both for urban households (57.64 percent) and rural households (62.12 percent).

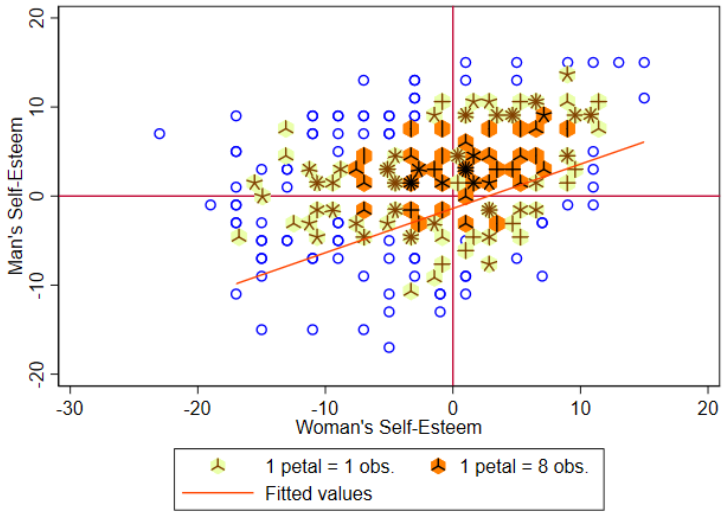
In this study, self-esteem was measured using the Rosenberg Self-Esteem Scale, which is composed of 10 questions that capture one's feelings of self-worth (see A.1 in the Appendix for the

Table 1: Covariates - descriptive statistics

	Mean	SD
Female household head [yes=1]	0.01	0.07
Number of adults	3.21	1.75
Number of children	3.52	2.47
Polygamous relationship [yes=1]	0.17	0.38
Matrilineal ethnicity [yes=1]	0.33	0.47
Age - woman	37.14	11.19
Age - man	45.70	11.01
Years of schooling - woman	3.21	3.73
Years of schooling - man	6.31	4.94
Share plots owned	0.93	0.23
Average distance to plots [minutes]	72.04	60.26
Log farm size	1.66	0.90
Asset index [score=0-18]	10.19	2.00
Liquidity in case of emergency (US$)	56.38	65.13
Any shock [yes=1]	0.82	0.38
Observations	1511	

full scale). We find a correlation of 0.4 between male self-esteem and female self-esteem within couples, significant at the 1 percent level, indicating positive assortative matching as discussed further in Boxho, Donald, Goldstein, Montalvao, and Rouanet (2019). As shown in Figure 1, average male self-esteem is slightly higher than female self-esteem. As a result, after correcting for the acquiescence bias ("yea-saying")[1], self-esteem scores are standardized as z-scores. The most common type of couple in our sample can be found in the upper-right quadrant of Figure 1 where both male and female spouses display high self-esteem, with a male advantage.

Figure 1: Distribution of male and female self-esteem



This figure shows the joint distribution of male and female self-esteem, corrected for the acquiescence bias. Sample size: 1511 couples.

[1]We correct for acquiescence bias by (i) calculating the acquiescence score (mean of positively- and reverse-coded questions) of each individual question, and (ii) subtracting this acquiescence score from the Likert score for each question.

Our analysis focuses on the link between self-esteem and income-earning in agriculture, attributed to either husband or wife. Income-earning in agriculture is a dummy variable equal to one if the spouse earns revenue from the sale of any crop. Since agricultural income is challenging to assign to individual household members, as is distinguishing economic specialization from mere provision of labor, we define this outcome using a survey question on who controls revenue derived from a particular crop.

Table 2 shows the mean and standard deviation of our two main outcome variables: income-earning in agriculture and income-earning in export-oriented agriculture (also called crop income-earning and export crop income-earning in the remainder of the paper). Note that the proportion of men and women working in agriculture (first row) is much higher than that earning income from it, with the former being 91 percent of men and 69 percent of women. The gap between labor provision and income-earning is particularly stark for women (0.7 versus 0.09). This is the reason why we cannot rely on who works in agriculture to determine economic specialization, but rather use who earns at least some income from agriculture as our outcome variable.

The bottom panel of Table 2 provides means and standard deviations for the average and quartiles of both agriculture income and export-oriented agriculture income. These show a wide distribution of income that includes subsistence smallholders (zero income earned) as well as wealthy plantation farmers. As a result, income levels are strongly predicted by whether one earns income. This is particularly true for women, for whom strictly positive levels of income are only found in the fourth quartile. Given this wide distribution, we focus primarily on binary outcome variables in what follows, returning to income levels in Section 6.

Table 2: Agricultural participation and earnings

	Household		Female		Male	
	mean	*sd*	*mean*	*sd*	*mean*	*sd*
Engaged in agriculture	0.94	0.24	0.69	0.46	0.91	0.28
Income-earning in agriculture	0.68	0.47	0.09	0.29	0.58	0.49
Income-earning in export-oriented agriculture	0.62	0.49	0.06	0.23	0.54	0.5
Agriculture income (in US$)	3222.05	10810.70	559.41	5004.53	2260.84	8587.26
Quartile 1	0	0	0	0	0	0
Quartile 2	268.23	175.46	0	0	108.96	72.46
Quartile 3	1231.47	473.07	0	0	810.35	387.42
Quartile 4	11512.48	19434.7	6215.17	15643.68	8455.31	15954.97
Export-oriented agriculture income (in US$)	2209.60	8582.47	109.53	852.87	1852.35	7554.19
Quartile 1	0	0	0	0	0	0
Quartile 2	167.04	105.15	0	0	51.06	30.51
Quartile 3	914.79	377.43	0	0	644.14	368.40
Quartile 4	7859.81	15889.85	1970.152	3085.99	6767.67	14107.72

3 Conceptual Model

In this section, we present a simple model of the relationship between spousal noncognitive traits and their decision to specialize in commercial agriculture to provide the economic intu-

ition behind our empirical tests. The intuition of our model builds most closely on the theoretical contribution by Engle (1990) and empirical observation by Montalvao, Frese, Goldstein, and Kilic (2017) that economic outcomes can be determined by access to inputs, which is a function of noncognitive skills of agents in the household. This intuition is in line with a growing literature which finds that noncognitive skills, including self-esteem, can determine household members' bargaining weights (Flinn, Todd, and Zhang (2018); Mangiavacchi, Piccoli, and Rapallini (2018)).

Individuals who comprise a household compete as well as cooperate. Models of the household portraying its members as a single, unitary decision-maker have been empirically challenged and succeeded by theoretical models that allow for the impact of more than one member's preferences and traits on household decisions regarding production (Browning, Chiappori, and Weiss (2014)). This conceptualization of the household allows us to study how intra-household resources are distributed, what this distribution depends on and what its consequences are.

Noncognitive skills have been formally modeled at least since Becker (1973) as crucial inputs to household production. Attention within this literature has largely been focused on sorting in the marriage market, with the basic result that complementarity (substitution) in traits for household production must lead to a positive (negative) assortative matching–i.e., marrying someone like you–if aggregate output is to be maximized.

Another key intuition deriving from family economics is that spouses' relative noncognitive skills determine economic specialization. The canonical example is the choice of relative time investment in household production versus market work, the latter being compensated at a fixed wage w. Say that market productivity w is enhanced by a personality trait, z_a –perseverance, for example–and home productivity α is increasing in a different trait, z_b. Then, spouses' relative endowments of these productivity-enhancing traits, as well as the gender differential in wage schedules, will determine who works at home and who works outside the home.

This basic intuition is highly relevant in our context. Agriculture is the lifeblood of many poor countries' economies; within farming households operating beyond the minimum subsistence threshold, one of the key choices made by households is who will specialize in high-value commercial agriculture, becoming the primary income-earner from agricultural production. This specialization is present in our context: only 6.48 percent of households have more than one person earning income from agriculture, with only 2.97 percent having more than one income-earner from export-oriented agriculture.

In our simple model, we denote entry into commercial agriculture as I (the probability of income-earning in agriculture). Consider two individuals i, j in a couple and imagine that if spouse i specializes in commercial agriculture, then $I_i > 0$. We write the vector of potential determinants for the specialization of that spouse as:

$$\Theta_i{}^I = \{NC_i, NC_j, L_i(NC_i, NC_j), V_i(NC_i, NC_j), X\} \tag{1}$$

where L is a vector of fixed inputs in agricultural production, V is a vector of variable inputs, NC_i is the level of noncognitive skill of the individual, NC_j is the level of the spouse's noncognitive skill and X is a vector of socio-demographic characteristics and other variables that can shift our outcome. This includes number of children, share of plots owned, average distance to plots, total farm size, household asset index, husband and wife's age and education, and whether the household experienced a shock (shown in Table 1). Many agricultural household models assume that land is a fixed input in each production activity, especially in the short term (Moore and Negri (1992); Singh, Squire, and Strauss (1986)). We assume the same here, especially given weak rental markets for land in Côte d'Ivoire (World Bank (2018)).

Through our notation, we highlight that the determination of whether spouse i enters into commercial agriculture depends both on her own noncognitive skills and her spouse's. We also highlight that the control of inputs to agricultural production can itself be determined by noncognitive skills. These skills could then have both direct and indirect effects on the decision to enter into high-value agriculture. Our model does not require that fixed and variable inputs are the $only$ determinants of specialization that depend on noncognitive skills, but we highlight the dependency here since determining the relevance of this mechanism in our context is important for assessing the implications of our results.

We incorporate these factors into a utility framework, where our primary outcome of interest is participation in high-value agriculture. An individual i has some expected utility from not participating E_{ui0} (likely resulting in just providing household labor in agriculture) and expected utility E_{ui1} from participating (becoming the agricultural income-earner in the farming household). If $E_{ui1} > E_{ui0}$, we observe a switch and the individual specializes. We conceptualize the entry into high-value agriculture as:

$$Pr\{I_i^* = 1\} = Pr\{E_{ui1}({\Theta_i}^I, \epsilon_1) > E_{ui0}({\Theta_i}^I, \epsilon_0)\} \tag{2}$$

Where ϵ represents the stochastic element of utility deriving from determinants not available in our data or from the random component of utility.

To be able to estimate (2) as an equation, we assume that the expected utilities are additively separable in deterministic and stochastic preference and that the deterministic part is linear in variables. We can then rewrite (1) as the difference in the deterministic portions of the expected utilities (${\Theta_i}^I$) and a single error term ($\epsilon = \epsilon_0 - \epsilon_1$):

$$\begin{aligned} Pr\{I_i = 1\} &= Pr\{{\Theta_i}^I - \epsilon > 0\} \\ &= Pr\{{\Theta_i}^I > \epsilon\} \\ &= F({\Theta_i}^I) \end{aligned} \tag{3}$$

This function is symmetrical for both wives (I_w) and husbands (I_h).

Based on the literature reviewed in Section 1, we assume a monotonic effect on own income-earning of noncognitive skills, e.g.,

$$\partial I_w(NC_w, NC_h)/\partial NC_w > 0 \tag{4}$$

That is, noncognitive skills can directly impact the decision to specialize–for example, by increasing the individuals' perception of the expected returns from doing so, thus inducing more effort.

Our primary goal is to examine whether economic specialization is a function of how intra-household resources are distributed, and whether this relationship is driven by relative levels of noncognitive skills in the household. There are interactions between spousal noncognitive skills if the husband's skills affect the marginal utility of his wife's noncognitive skills. Then, if we assume that individuals react to others with their best-response, we can derive a first-order condition for the wife's noncognitive skills.

The direction of the response – revealing whether spousal noncognitive traits are complements or substitutes in agricultural production – is then defined by the sign of the cross-partial derivative, looking at how one spouse's noncognitive traits impact the probability of the other's income-earning:

$$\partial^2 I_w(NC_w, NC_h)/\partial NC_w NC_h \tag{5}$$

Since the functional forms are symmetric, the sign of (5) will mechanically influence the relationship between (I_w) and (I_h).

If (5) is positive, then skills are complements in the couple. This could be the case if spouses' noncognitive skills are differentially linked to agricultural production (e.g., if the husband's noncognitive skills are positively related to specialization or productivity in agriculture, but the wife's are not), or if there are increasing returns to spouses jointly working in a sector. If (5) is negative, then skills are substitutes.

Agriculture, unlike small-scale trading and commerce–the other main employment exercised in our setting–relies heavily on fixed inputs L for production. Given the importance of household labor and most importantly weak rental markets for land, the quantity of households' key agricultural inputs is hard to increase at the margin and can be conceptualized as quasi-fixed.

If this is an important mechanism for determining specialization, we would expect not only (5) to be negative within agriculture. We would also expect the magnitude to be larger for more fixed inputs, since control of these inputs by one spouse will be constraining to the other spouse's production. That is, if one spouse negotiates or seizes control of the fixed inputs necessary for commercial agriculture, the other is less likely to earn income from commercial agriculture.

We would then observe the following:

$$\partial L_h/\partial NC_w > \partial V_h/\partial NC_w \tag{6}$$

And vice-versa for the wife's income-earning. Moreover, if gaining control over fixed inputs is a primary channel through which noncognitive skills operate, we would not expect this relationship to hold in sectors that are less reliant on fixed inputs, like small-scale trading and commerce.

We test these hypotheses in what follows. Our empirical strategy follows the conceptual framework laid out above. We consider a discrete choice model of specialization in commercial agriculture and assume it can be approximated by the following linear function for couple member i in village v:

$$I_i^* = \alpha + \beta NC_i v + \delta NC_j v + \gamma X_i v + \mu X_j v + \lambda_v + \epsilon_{iv} \tag{7}$$

where X is a vector of the covariates shown in Table 1 and village fixed effects (λ_v) account for village differences in unobservable variables. The sign of coefficient δ tells us whether the other spouse's traits positively or negatively impact income-earning in commercial agriculture. To identify mechanisms, we further augment this model and observe how δ varies by introducing as covariates (i) I_j – that is, whether the other spouse earns agricultural income, (ii) more versus less rivalrous inputs as covariates (e.g., agricultural knowledge versus land) and (iii) bargained-over-versus inherited land.

4 Results

4.1 Main Results

We estimate Equation 7 in Table 3. We first examine (I_w), regressing the wife's crop income-earning on her own self-esteem (column 1), her husband's self-esteem (column 2), and both simultaneously (column 3). In the last three columns of this table we turn to the determinants of (I_h), regressing the husband's crop income-earning on the self-esteem of both spouses in the household, using the same specification.

In the full specification (Columns 3 and 6), we find that each member of the couple is more likely to earn income from agriculture if they have higher self-esteem. In line with the existing literature, we verify Equation 4 and identify a positive link between economic outcomes and noncognitive skills at the individual level. More precisely, a one standard deviation increase in self-esteem makes the wife (respectively the husband) around 22 percent (respectively 7 percent) more likely to earn income from agriculture.

Departing from the existing literature, we also find that one spouse's crop income-earning is negatively related to the other's self-esteem: a so-called "battle of the sexes". The higher the self-

esteem of one spouse, the lower the probability that the other earns income from agriculture. The effects are large, with a one standard deviation increase in the wife's self-esteem making the husband 12 percent less likely to earn crop income, and with a one standard deviation increase in the husband's self-esteem making the wife 33 percent less likely to earn crop income. The magnitude of the absolute effect is larger for wives, and even more so proportionally, given substantially lower baseline levels. This implies that women's income-earning is more sensitive to their spouse's self-esteem. Interestingly, results are not symmetric for both genders. Specifically, husbands of high self-esteem women are less likely to earn crop income, regardless of their own self-esteem; whereas for wives, a high self-esteem husband is not consequential as long as she also has high self-esteem.[2]

Because there is assortative matching on self-esteem within couples (i.e., wives and husbands tend to have similar self-esteem levels as shown in Figure 1), the wife's self-esteem is a confounding factor playing against the husband's self-esteem when looking just at the relationship between the husband's crop income-earning and his own self-esteem. Indeed, in Column 4, the husband's self-esteem does not correlate significantly with his income-earning. The correlation only becomes positive when controlling for his wife's self-esteem (Column 6). Again, due to assortative matching, the negative correlation between the husband's self-esteem and the wife's crop income-earning (Column 2) is only significant when controlling for her self-esteem (Column 3).

This has important analytical implications. When looking at the link between economic outcomes and noncognitive skills, in the presence of assortative matching, only looking at the trait of one spouse can bias results. All these results are robust to a logit specification (available upon request).

Table 3: "Battle of the sexes" in agriculture

	(1)	(2)	(3)	(4)	(5)	(6)
	Income-earning in agriculture					
	Female			Male		
Self-esteem (fem)	0.02*		0.02**	-0.06***		-0.07***
	(0.01)		(0.01)	(0.01)		(0.02)
Self-esteem (male)		-0.02	-0.03**		0.01	0.04**
		(0.01)	(0.01)		(0.02)	(0.02)
Outcome mean	0.09	0.09	0.09	0.58	0.58	0.58
R-squared	0.025	0.024	0.031	0.123	0.106	0.127
Observations	1510	1510	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and controls for female household head (dummy), number of adults, number of children, polygamous relationship (dummy), matrilineal ethnicity (dummy), female age, male age, female years of schooling, male years of schooling, share of plots owned, average distance to plots (in minutes), log of farm size, asset index, liquidity in case of emergency (in US$), and having experienced any shock in the previous 12 months (dummy). Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

[2]For the husband's crop income-earning, the negative correlation with female self-esteem is greater than the positive correlation with his own self-esteem, whereas for wife's crop income-earning, the positive coefficient on her own self-esteem and the negative coefficient on her husband's self-esteem are of the same magnitude. In another specification, we explain income-earning by the difference in self-esteem between spouses, and the absolute value of the wife's self-esteem. This gives consistent results (available upon request).

In Table 4, we use the same specification as in Table 3, but using export crop income-earning, a subset of commercial agriculture, as an outcome variable (instead of income-earning from any type of crop). Results are very similar to crop income-earning results, and correlations are bigger in magnitude, given that outcome means are lower for both men and women. Symmetrically, Table 5 uses lower-value crops produced for the domestic as the outcome variable. There is no correlation whatsoever between income-earning from these type of crops and self-esteem. These results indicate that Table 3's results are driven by export-oriented agriculture. This is expected, since most agricultural income is derived from export-oriented agriculture in our setting, and confirms that the "battle of the sexes" is occuring in competition over specialization in a lucrative sector.

Table 4: "Battle of the sexes" in export-oriented agriculture

	(1)	(2)	(3)	(4)	(5)	(6)
	Income-earning in export-oriented agriculture					
	Female			Male		
Self-esteem (fem)	0.02***		0.03***	-0.06***		-0.07***
	(0.01)		(0.01)	(0.01)		(0.02)
Self-esteem (male)		-0.02*	-0.03***		0.01	0.03*
		(0.01)	(0.01)		(0.02)	(0.02)
Outcome mean	0.06	0.06	0.06	0.54	0.54	0.54
R-squared	0.036	0.029	0.045	0.120	0.107	0.123
Observations	1510	1510	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

Table 5: "Battle of the sexes" in non-export agriculture

	(1)	(2)	(3)	(4)	(5)	(6)
	Income-earning in non-export agriculture					
	Female			Male		
Self-esteem (fem)	-0.01		-0.01	-0.01		-0.01
	(0.01)		(0.01)	(0.01)		(0.01)
Self-esteem (male)		-0.00	0.00		0.00	0.01
		(0.01)	(0.01)		(0.01)	(0.01)
Outcome mean	0.04	0.04	0.04	0.10	0.10	0.10
R-squared	0.018	0.016	0.018	0.023	0.023	0.024
Observations	1510	1510	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

4.2 Mechanisms

In this section, we explore the mechanism underlying this relationship and empirically examine equation 6. That is, we explore whether the observed spousal dynamic works through noncognitive skills increasing one's ability to control inputs to agricultural production.

If the dynamic between spouses shown in subsection 4.1 indeed operates through self-esteem's impact on one's control over fixed inputs, we would expect to see a negative relationship between spouses' income-earning in agriculture that is not present in other sectors our sampled

rural households can engage in. As explained in Section 3, crop production requires land and labor, fixed inputs in the household that face a scarcity problem[3], whereas most off-farm occupations in our sample require limited to no fixed inputs: 90 percent of off-farm earners are small-scale traders. By comparing the couple's dynamic regarding income-earning and noncognitive skills in these two sectors (subsections 4.2.1 and 4.2.2), we provide first suggestive evidence of the mechanism through which self-esteem operates: control over limited household resources. This evidence is confirmed in subsection 4.2.3 by looking directly at the channels through which self-esteem operates: comparing several fixed inputs versus variable inputs as mediators to Equation (7).

4.2.1 Spouses as substitutes in export-oriented agriculture

In Table 6, we replicate the specification of Table 4 (shown again in Columns 1 and 3), adding the other spouse's crop income-earning as an additional explanatory variable (Columns 2 and 4). We find a strong negative correlation between spouses' income-earning: when the husband earns income from export crops in the household, the wife is much less likely to do so, and vice-versa. In Section 2, we saw that only one spouse works in commercial agriculture in the vast majority of households. Here we confirm that this affects who earns agricultural income: export crop farming engenders a competitive dynamic between spouses.

Table 6: Income-earning in export-oriented agriculture: substitutes

	(1)	(2)	(3)	(4)
	Income-earning in export-oriented agriculture			
	Female		Male	
Self-esteem (fem)	0.03***	0.03***	-0.07***	-0.06***
	(0.01)	(0.01)	(0.02)	(0.01)
Self-esteem (male)	-0.03***	-0.03***	0.03*	0.02
	(0.01)	(0.01)	(0.02)	(0.02)
Income-earning in export-oriented agriculture (male)		-0.08***		
		(0.02)		
Income-earning in export-oriented agriculture (female)				-0.31***
				(0.06)
Outcome mean	0.06	0.06	0.54	0.54
R-squared	0.045	0.068	0.123	0.144
Observations	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

In this context, spousal levels of self-esteem are thus substitutes in income-earning in agriculture, not complements. Table 6 also contains another important result: the self-esteem coefficients are not significantly different between Columns 1 and 3 on the one hand, and Columns 2 and 4 on the other hand.

This is reassuring in terms of direction of the causality, a topic discussed more extensively in Section 5. Imagine the reverse causality scenario: that it is not that spouse i's self-esteem nega-

[3]While hiring additional agricultural labor is a possibility, there is a large literature on the difficulty of doing this in an effective and timely manner, particularly for women (Carranza, Donald, Jones, and Rouanet (2017); O'Sullivan, Rao, Banerjee, Gulati, and M.Vinez (2014))

tively impacts spouse *j*'s income-earning, but rather that spouse *j*'s income earning negatively impacts spouse *i*'s self-esteem. A plausible scenario for why your spouse specializing in high-value commercial agriculture would decrease your sense of self-worth is that their specializing makes your specializing less likely. That is, if the direction of causality was not from spouse *i*'s self-esteem to spouse *j*'s income-earning, but rather from spouse *j*'s income earning to spouse *i*'s self-esteem, this would very likely operate through a $decrease$ in spouse *i*'s income-earning.

This table shows that this is not the mechanism driving the "battle of the sexes", i.e. the negative correlation between crop income-earning and the spouse's self-esteem, since the coefficients of spouse *i*'s self-esteem on spouse *j*'s income-earning are not significantly different if we control for whether spouse *i* also specializes in commercial agriculture.

4.2.2 No "battle of the sexes" in the off-farm sector

In Table 7, we use the same specification as in Table 6, but with the outcome variable now being income-earning from off-farm activities (which includes wage, self-, or casual employment) for both husbands and wives. Conversely to our finding for agriculture, we find that the skill substitution dynamic does not hold in the off-farm sector. For a given individual in the household, individual income-earning from off-farm activities is correlated with one's own self-esteem but is not correlated with the other's. What matters is the absolute level of the individual's noncognitive skills, not the difference between spouses.

We also find a positive correlation between one's likelihood of earning off-farm income and one's spouse's likelihood of earning off-farm income. If agricultural income-earning is a substitute between couples' members, off-farm income-earning is a complement. That is, couple members "compete" for income-earning in the agricultural sector, and notably in export-crop farming, while they do not compete in the off-farm sector. Knowing that a substantially higher share of inputs to agricultural production are fixed compared to small-scale trading (the primary off-farm activity our sample engages in), in the next section we confirm that these differential results between sectors are linked to the fact that control over fixed inputs is the main channel through which noncognitive skills operate.

4.2.3 What are the drivers of the battle of the sexes?

In this section, we test whether self-esteem affects income-earning in agriculture through the channel of increasing control over inputs. We also test whether fixed or non-fixed inputs matter more. The less-fixed inputs we examine are agricultural knowledge, access to credit and smaller agricultural assets. If these inputs are the ones that matter, our results could be explained by the couple member with a higher sense of self-worth being propelled to acquire more agricultural knowledge and have more liquidity (credit access and agricultural assets), using these inputs to earn agricultural income.

Conversely, in the fixed input scenario, the spouse with a higher sense of self-worth would exert more control over inputs, and due to their fixed nature essentially capture these inputs. This hypothesis is easier to reconcile with the fact that we only find a "battle of the sexes" in the agriculture sector. To test for these potential mechanisms, we regress income-earning of

Table 7: Income-earning in off-farm activities: complements

	(1)	(2)	(3)	(4)
	Income-earning in off-farm activities			
	Female		Male	
Self-esteem (fem)	0.03**	0.02**	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Self-esteem (male)	0.01	0.00	0.03**	0.03**
	(0.02)	(0.01)	(0.01)	(0.01)
Income-earning in off-farm activities (male)		0.15***		
		(0.03)		
Income-earning in off-farm activities (female)				0.15***
				(0.03)
Outcome mean	0.29	0.29	0.30	0.30
R-squared	0.059	0.080	0.112	0.132
Observations	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

women (in Table 8 for women and in Table 9 for men) in export-oriented agriculture using the same specification as in Table 4, but adding separately in each column potential confounders of the "battle of the sexes". In the third column of both tables, we find that rubber agriculture knowledge, the least rivalrous of all inputs to production, does not drive the "battle of the sexes". Similarly, credit access and ownership of agricultural assets (Columns 4 and 5) also cannot fully explain this relationship.

The only variable that mitigates the correlation between self-esteem and control over income is control over land. In both Tables 8 and 9, the coefficients for self-esteem in column 6 are significantly different at the 1% level from those in column 2, as indicated by the p-value of the coefficient test at the bottom of Tables 8 and 9, indicating that control over land is a mediator for the battle of the sexes. In addition, the negative correlation between male self-esteem and female income-earning in export-oriented agriculture disappears entirely when controlling for whether the woman manages any plot of land in the household. These results provide additional evidence that self-esteem operates through the capture of fixed inputs such as land, rather than more variable inputs such as knowledge, liquidity or assets. Couple members with higher self-esteem may be able to exert higher control over fixed resources, and thus enter into commercial agriculture. To investigate this pattern further, we make the distinction in subsection 4.2.4 between land that was actually acquired by the household, and land that was not.

Table 8: Female income-earning in export-oriented agriculture: variable vs. fixed inputs

	(1)	(2)	(3)	(4)	(5)	(6)
	Income-earning in export-oriented agriculture (female)					
	Own SE	Both SE	w/knowledge	w/liquidity	w/assets	w/land
Self-esteem (fem)	0.02***	0.03***	0.03***	0.03***	0.03***	0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.00)
Self-esteem (male)		-0.03***	-0.03***	-0.03***	-0.03***	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Rubber knowledge score (male)			-0.01			
			(0.01)			
Rubber knowledge score (fem)			0.02**			
			(0.01)			
Access to liquidity (male)				-0.03*		
				(0.02)		
Access to liquidity (fem)				0.01		
				(0.01)		
Share of ag assets owned (fem)					-0.01	
					(0.02)	
Manages any plots (fem)						0.22***
						(0.03)
Outcome mean	0.06	0.06	0.06	0.06	0.06	0.06
R-squared	0.036	0.045	0.053	0.048	0.046	0.146
Observations	1511	1511	1511	1511	1448	1511
P-value self-esteem (fem)						0.0000
P-value self-esteem (male)						0.0002

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

Table 9: Male income-earning in export-oriented agriculture: variable vs. fixed inputs

	(1)	(2)	(3)	(4)	(5)	(6)
	Income-earning in export-oriented agriculture (male)					
	Own SE	Both SE	w/knowledge	w/liquidity	w/assets	w/land
Self-esteem (fem)	-0.06***	-0.07***	-0.06***	-0.06***	-0.07***	-0.05***
	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Self-esteem (male)		0.03*	0.03	0.03	0.03	0.02
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Rubber knowledge score (male)			0.00			
			(0.01)			
Rubber knowledge score (fem)			-0.03**			
			(0.02)			
Access to liquidity (male)				-0.03		
				(0.03)		
Access to liquidity (fem)				-0.03		
				(0.03)		
Share of ag assets owned (fem)					0.04	
					(0.04)	
Manages any plots (fem)						-0.18***
						(0.04)
Outcome mean	0.54	0.54	0.54	0.54	0.54	0.54
R-squared	0.120	0.123	0.128	0.125	0.122	0.139
Observations	1511	1511	1511	1511	1448	1511
P-value self-esteem (fem)						0.0002
P-value self-esteem (male)						0.0009

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

4.2.4 Modes of land acquisition

To provide further evidence that part of the relationship between noncognitive skills and income-earning operates through a higher ability to negotiate access to the requisite inputs within the household, we differentiate between land that was inherited or received as a gift, and land that was bought or exchanged. If self-esteem does operate through negotiation over land, it should operate through bought or exchanged land, rather than through inherited or gifted land (such as a marriage gift). This is because noncognitive skills should matter for one's current ability to negotiate acquisition or exchange of land, but less so for inheritance, which is primarily determined by birth order and sibling composition.

This is precisely what we test in Table 10, where we interact self-esteem with a categorical variable equal to zero if the woman does not control any land in the household, and which takes separate values depending on the way land was acquired. Although due to the weakness of land markets discussed above only a small portion of land is bargained over- with over 70 percent of land being inherited-we are still able to detect significant differences by mode of land acquisition. In Table 10, self-esteem coefficients now show the battle of the sexes for couples where the woman does not control any land.

Table 10: Female income-earning and self-esteem, with plot status

	(1)	(2)	(3)	(4)
	Income-earning in agriculture (female)			
	Export-oriented crops		All crops	
Self-esteem (fem)	0.03***	0.01	0.02**	-0.00
	(0.01)	(0.00)	(0.01)	(0.01)
Self-esteem (male)	-0.03***	-0.01	-0.03**	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)
All her plots inherited/gifted		0.22***		0.23***
		(0.04)		(0.04)
Not all her plots inherited/gifted		0.25***		0.25**
		(0.08)		(0.10)
All her plots inherited/gifted × Self-esteem (fem)		0.05		0.06*
		(0.04)		(0.04)
Not all her plots inherited/gifted × Self-esteem (fem)		0.22***		0.21***
		(0.07)		(0.08)
Outcome mean	0.06	0.06	0.09	0.09
Self-esteem p-value (inherited)		0.10		0.09
Self-esteem p-value (bought)		0.00		0.01
R-squared	0.045	0.173	0.031	0.120
Observations	1511	1511	1511	1511

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

Interestingly, in couples where the wife does not control any land, income-earning in both agriculture and export-oriented agriculture does not correlate with male or female self-esteem. However her self-esteem correlates positively with her (export) crop income-earning if she controls land in the household. This correlation is significantly greater when the woman manages land that was bought or exchanged, rather than received through inheritance or gifts. For these women, a one standard deviation increase in self-esteem increases the likelihood that they earn

income from export crops by 22 percentage points, compared to an increase of 5 percentage points for women who inherited or were given land. These results provide further evidence that self-esteem operates through negotiation ability that gives increased access to fixed assets, and notably land.

Overall, we find that the relationship between spouses' noncognitive skills and their income-earning in agriculture is significantly mediated by control over inputs. However, not all inputs matter. Notably, less rivalrous inputs like agricultural knowledge, financial liquidity and agricultural inputs do not emerge as significant mediators. Control over land–especially bought or exchanged land–can explain a substantial portion of the "battle of the sexes" relationship, especially for women's income-earning. Moreover, the negative relationship between participation in a sector, and the negative relationship of one spouse's noncognitive skills in their spouse's participation, only applies to agriculture, a sector characterized by the use of greater fixed and rivalrous inputs. We do not detect this pattern in the off-farm sector, which is mostly composed of small-scale trading.

5 Robustness

In this section, we run three tests to examine the possibility of reverse causality or omitted variable bias driving our results.

5.1 Stability of Self-Esteem

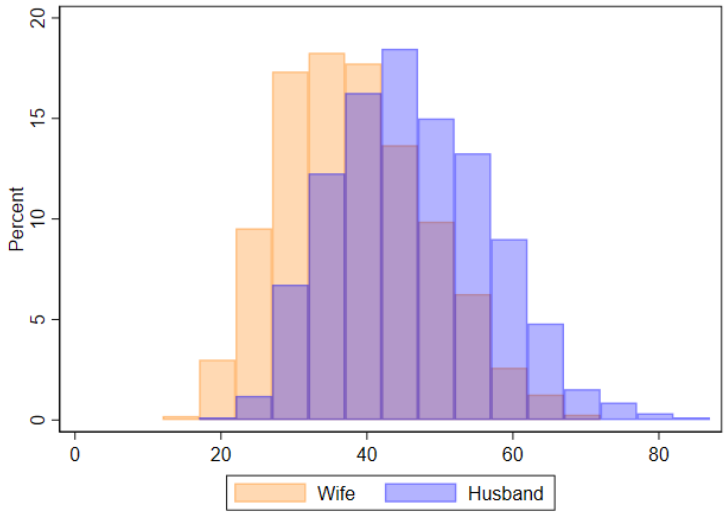
When looking at the correlation between noncognitive skills, including self-esteem, and economic outcomes, one could argue for both directions of causality, with better economic outcomes potentially having a positive impact on reported self-esteem. Though as mentioned in Section 2, self-esteem has largely been found to be a stable trait by psychologists (Donnellan, Trzesniewski, Robins, Moffitt, and Caspi (2005) and references cited therein), in this section we examine the risk of reverse causality more closely.

Numerous studies in the psychological literature have found that self-esteem is most stable at middle age (e.g., Trzesniewski, Donnellan, and Robins (2003)). For that reason, middle-aged individuals' self-esteem is less likely to be impacted by economic outcomes, compared to younger or older individuals. Consequently, examining at which age range the relationship between self-esteem and income-earning is strongest can provide suggestive evidence of the direction of the causality between self-esteem and economic outcomes. Figure 2 shows the distribution of wives' and husbands' ages in our sample. Wives' ages range from 16 to 70 while husbands' range from 19 to 85.

We regress income-earning on a second order polynomial of the wife's age[4], which is also interacted with husband's self-esteem and wife's self-esteem, for both wife and husband. We use the same set of control variables as in Table 4, which allows us to keep constant a range of other factors which might also increase income-earning and be related to age, such as house-

[4]To be consistent, we use the same heterogeneity variable across estimations, wife's age, which ranges from 16 to 70 years old. Given that the correlation between wife's age and husband's age is above 0.6, this is a good proxy for husband's age.

Figure 2: Distribution of wife and husband ages



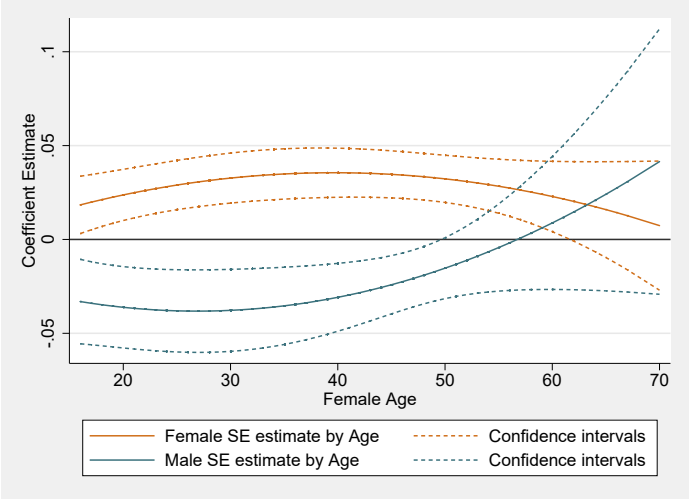
hold headship, household composition and plot characteristics. We then build the age-specific estimate of the correlation between income-earning and the wife's and husband's noncognitive skills respectively.

In Figure 3, we plot these age-specific estimates against age, together with their confidence intervals. The positive correlation between the husband's economic outcomes and his own self-esteem is only significant for wives' ages ranging from 35 to 50 years old, while the positive correlation between female economic outcomes and own noncognitive skills is only significant for female ages ranging from 16 to 60 years old. Similarly, the negative correlation between the husband's income-earning and his wife's self-esteem is only significant for ages 25 to 60, while the negative correlation between the wife's earning from crop income and her husband's self-esteem is only significant for ages 16 to 55. These figures show that overall, the "battle of the sexes" is driven by the middle-aged individuals, which provides some suggestive evidence that the direction of the causality goes from self-esteem to income-earning.[5]

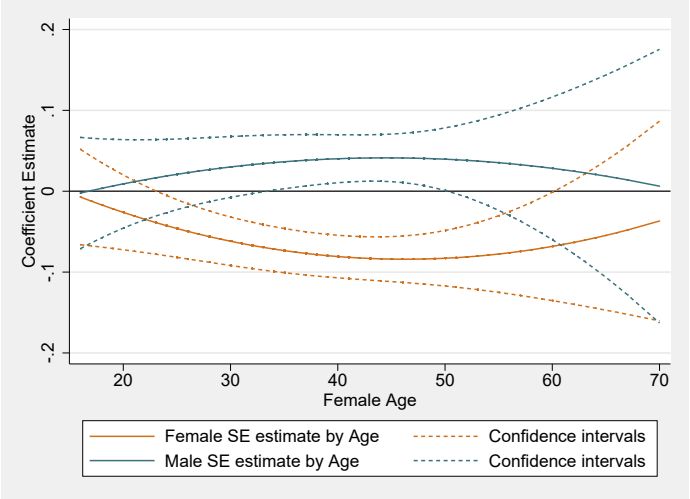
[5] Tables A.2 and A.3 in the Appendix also show that the battle of the sexes result only holds if we restrict the sample to wives older than the median age in the sample's population.

Figure 3: Age-specific self-esteem estimates

Female income-earning in export-oriented agriculture



Male income-earning in export-oriented agriculture



5.2 Omitted Variable Bias

In this section, we examine whether there might be unobservable determinants of income-earning that are also correlated with our measure of noncognitive skills, self-esteem.

In Table 11, we add a number of other personality traits as covariates: time- and risk-preferences, and agricultural self-efficacy. We find that the correlation between self-esteem and income-earning in export-oriented agriculture is not driven by these other traits. While columns (1) and (3) use the same specification as in Table 4 on the subsample of observations for which all personality traits variables are non-missing, columns (2) and (4) additionally control for these other traits. All previous results remain robust.

Table 11: Income-earning in export-oriented agriculture (w/other noncognitive skills)

	(1)	(2)	(3)	(4)
	Income-earning in export-oriented agriculture			
	Female		Male	
Self-esteem (fem)	0.02***	0.02***	-0.07***	-0.06***
	(0.01)	(0.01)	(0.02)	(0.02)
Self-esteem (male)	-0.03***	-0.03***	0.04*	0.04*
	(0.01)	(0.01)	(0.02)	(0.02)
Present bias (male)		0.01		-0.00
		(0.02)		(0.04)
Present bias (female)		0.01		-0.03
		(0.02)		(0.04)
Risk aversion (male)		-0.00		-0.04
		(0.02)		(0.03)
Risk aversion (female)		-0.00		-0.01
		(0.02)		(0.04)
Self-efficacy (male)		0.01		-0.01*
		(0.01)		(0.01)
Self-efficacy (female)		-0.00		0.00
		(0.00)		(0.01)
Outcome mean	0.05	0.05	0.56	0.56
R-squared	0.043	0.046	0.124	0.128
Observations	1254	1254	1254	1254

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

In addition to these traits, there could also be other characteristics that matter but that we do not have data on. To address this issue, we employ the Oster (2019) test for omitted variable bias. The method enables the estimation of identified sets for the parameter of interest in the presence of omitted variable bias, under the assumption that selection on observable controls is proportional to selection of unobservable controls. Table 12 reports the estimated sets. First, consistent with the Oster test specification, we observe that the sets never include the value zero. Second, we observe that the sets are tightly bound around the estimated coefficient of interest. These findings enable us to reject the hypothesis that the association between self-esteem and spouse's income-earning is driven by unobservable heterogeneity correlated with both variables.

Table 12: Battle of the sexes (with Oster bounds)

	(1)	(2)	(3)	(4)
	Income-earning in export-oriented agriculture		Income-earning in agriculture	
	Female	Male	Female	Male
Self-esteem (fem)	0.032***	-0.066***	0.025**	-0.073***
	(0.007)	(0.015)	(0.010)	(0.015)
Self-esteem (male)	-0.029***	0.033*	-0.027**	0.039**
	(0.010)	(0.019)	(0.013)	(0.019)
Beta min - fem	0.032	-0.066	0.025	-0.073
Beta max - fem	0.035	-0.070	0.027	-0.077
Beta min - male	-0.029	0.033	-0.027	0.039
Beta max - male	-1.03e+30	1.64e+31	-1.67e+30	1.15e+33
R-squared	0.045	0.123	0.031	0.127
Observations	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

6 Additional Results

To speak to welfare impacts and examine how our detected pattern varies across specifications, we re-run our main result with the value of earned income, rather than income-earning. That is, we explore whether the "battle of the sexes" results hold when analyzing the effects of self-esteem on spouse's crop income rather than just the likelihood of earning crop income.

This alternative outcome is not our preferred option due to the imprecision in its measurement in our setting, as discussed in Section 2. Nevertheless, Tables 13 and 14 show results for male and female incomes separately. Consistent with the literature, we find a strong positive correlation between male self-esteem and their own income. A one standard deviation increase in self-esteem corresponds to a US$ 477.3 increase (19.5 percent) in total income. Most of the increase is attributable to export-oriented crop income (Column 3 in Table 13). The positive association partly holds for women, whose self-esteem significantly increases both export crop income and off-farm income (through self-employment) but not total income. Given substantially lower baseline levels, the magnitude of the effect for export-oriented crop income is four times larger for women than it is for men. A one standard deviation increase in a female self-esteem almost doubles her export crop income, from US$ 69.11 to US$ 127.11 (Column 3 in Table 14).

In terms of the "battle of the sexes", male self-esteem is negatively correlated with female export-oriented crop income. A one standard deviation increase in his self-esteem is associated with a US$ 51 decrease (73.7 percent) in her export crop income (Column 3 in Table 14). Similarly, there is a significant negative correlation between the female self-esteem and male export-oriented crop income, by which a one standard deviation increase in her self-esteem is associated with a US$ 159.1 decrease (10.6 percent) in his export crop income. Again, it is noticeable that the battle of the sexes result holds for export-oriented crop income only. Results are also not gender-symmetric, so that both wives' participation in agriculture and incomes are more strongly correlated with their spouse's noncognitive skills. All in all, results shown in

Section 4 are mostly robust to a change in the specification of the main outcome of interest.

Table 13: Male income and self-esteem

	(1)	(2)	(3)	(4)	(5)
			Income levels (male)		
	Aggregate	Crops	Export-oriented crops	Off-farm	Self-employment
Self-esteem (fem)	-131.6	-136.7	-159.1**	21.5	0.8
	(111.4)	(95.1)	(70.8)	(31.4)	(26.6)
Self-esteem (male)	477.3**	443.9***	384.3***	46.1	25.9
	(184.9)	(165.6)	(146.6)	(58.9)	(43.7)
Outcome mean	2452.93	1867.73	1508.89	523.68	304.80
R-squared	0.077	0.084	0.099	0.093	0.046
Observations	1510	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

Table 14: Female income and self-esteem

	(1)	(2)	(3)	(4)	(5)
			Income levels (female)		
=	Aggregate	Crops	Export-oriented crops	Off-farm	Self-employment
Self-esteem (fem)	61.1	29.2	58.0***	21.6	33.1***
	(65.2)	(57.0)	(13.1)	(13.9)	(12.0)
Self-esteem (male)	-0.8	-17.3	-51.0***	22.4	10.0
	(51.2)	(54.5)	(16.0)	(18.8)	(16.6)
Outcome mean	520.55	272.26	69.11	210.05	178.27
R-squared	0.035	0.019	0.052	0.049	0.050
Observations	1510	1510	1510	1510	1510

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

7 Discussion

In this paper, we examine the relationship between noncognitive skills and intra-household inequality in economic participation. As most of the global poor earn a living from agriculture, we focus on what determines who in the household is the agricultural income-earner; that is, participates in commercial as opposed to subsistence agriculture. This distinction is economically meaningful, as commercial agriculture is the most lucrative source of income earning among farmers in our rural setting.

Our analysis uses measures of men's and women's self-esteem in $1,511$ farmer couples in Côte d'Ivoire to determine how relative self-esteem levels in the household affect spouses' participation in agriculture. Consistent with the existing literature, our findings show a positive correlation between one's own noncognitive skills and one's income-earning in all economic activities, including in agriculture. This also holds for earned income, highlighting the importance of internal, psychological drivers of rural poverty. We depart from the existing literature by identifying a "battle of the sexes" in agriculture specifically, in which one spouse's self-esteem is negatively related to the likelihood of the other earning agricultural income. This dynamic matters more for women: their noncognitive skills are a more important determinant of own income-earning, and they are more negatively affected by their spouse's noncognitive skills compared to men.

One potential worry is that our results are driven entirely by other factors that increase the likelihood of income-earning, which in turn increases noncognitive skills. While a causal link from noncognitive skills to economic participation has been shown in past studies, this reverse hypothesis may still be true in our setting–despite our holding constant a variety of socio-demographic characteristics and using within-village variation to identify effects. This paper provides suggestive evidence that results are not driven by reverse causality by showing that the "battle of the sexes" pattern is driven by individuals who are in their middle age, during which self-esteem is considered most stable and is thus less likely to be affected by external conditions.

To further shed light on the mechanism behind the observed relationship, we turn to the theory. A central way in which a noncognitive skills, and self-esteem in particular, may affect outcomes is by increasing one's ability and willingness to control intermediate inputs to production (Engle (1990)). We hypothesize that this ability is most relevant in the agriculture sector, which is marked by a higher prevalence of fixed and rivalrous inputs, such as land. This is especially true given that the main alternative to farming in our rural context is small-scale trading and commerce, which requires less land and household labor.

We find that the observed "battle of the sexes" pattern is unique to the agriculture sector, driven by higher-value export-oriented agriculture. While in agriculture we observe a substitution effect between spouses' income-earning, the wife's and husband's income-earning positively relate to each other in off-farm employment. Less-rivalrous inputs, such as knowledge, liquidity and assets, do not mediate the self-esteem and income-earning relationship in agriculture. Control over land does. In particular, land that has been bought or exchanged–and thus, where

noncognitive skills might be more relevant to its acquisition–explains a significant portion of the "battle of the sexes" relationship. Finally, we verify that self-esteem and spouse's income-earning are not driven by time and risk-preferences or unobservable heterogeneity correlated with both variables.

To the best of our knowledge, ours is the first study to look at how noncognitive skills impact inequality, specifically gender inequality in economic participation within the household. Our results show not only how the impact of self-esteem differs across men and women, but that it interacts with their partner's self-esteem, and does so differentially for men and women. Moreover, this interaction appears particularly stark when economic outcomes are constrained by scarcity and market failures in input provision–an especially relevant topic in development settings. Indeed, whether spouses' noncognitive skills are substitutes or complements varies by sector and appears to rest on how fixed the provision of inputs is at the household-level, and whether increased control over rivalrous inputs due to higher noncognitive skills leads to a de facto capture within the household.

Our results have implications for both research and policymaking. First, our results show the importance of taking into account both spouses' noncognitive skills when examining their impact on economic outcomes. When looking at the link between economic outcomes and noncognitive skills in the presence of assortative matching, only analyzing the trait of one spouse can bias results. In our setting, a relationship emerged for men only when controlling for their wives' self-esteem. The impact of noncognitive skills can thus be underestimated by looking at only one individual's traits, particularly in informal sectors where the household is the relevant unit of production. This is especially important for evaluating the growing number of training programs aimed at increasing individuals' noncognitive skills (Adhvaryu, Namrata, and Anant (2018); Fox and Kaul (2018)).

Second, and relatedly, to fully understand the poverty-reduction potential of noncognitive skills, looking at equilibrium effects through impacts on other individuals is crucial. Indeed, our results show that what matters for predicting income-earning is relative levels of noncognitive skills. Moreover, inequality in the household can be amplified through increases in the noncognitive skills of only one member. In the presence of non-unitary households, the composition of household economic participation, and who earns what matters for development outcomes beyond overall household income. For example, Duflo and Udry (2004)) show using data from Côte d'Ivoire that increases in rainfall that benefits traditionally female crops, shifts household expenditure towards food consumption and so improve nutrition of children. Thus, programs or events that unilaterally increase the noncognitive skills of one member (say, the husband) could have potential negative effects on other household members and the future generation if they result in the capture of intra-household resource allocation.

Lastly, our results imply that positive impacts of noncognitive skills, or socio-emotional skills programs, could be unlocked by an accompanying alleviation of inputs scarcity. Within agriculture, this highlights the potentially high multiplier effect of programs focused on property rights and stimulating markets for fixed inputs like land, which could attenuate the "battle of the sexes" and capture of household resources we observe. Such programs may also benefit

from the inclusion of modules on household input management and equitable intra-household allocation.

This is a fruitful avenue for future research. Subsequent studies should further examine which production function characteristics determine whether individuals' noncognitive skills are complements or substitutes, and experimentally investigate the consequences for inequality and welfare.

Appendix

Table A.1: Rosenberg Scale

1.	On the whole, I am satisfied with myself.
2.	* At times, I think I am no good at all.
3.	I feel that I have a number of good qualities.
4.	I am able to do things as well as most other people.
5.	*I feel I do not have much to be proud of.
6.	*I certainly feel useless at times.
7.	I feel that I'm a person of worth, at least equal to others.
8.	I wish I could have more respect for myself.
9.	*All in all, I am inclined to feel that I'm a failure.
10.	I take a positive attitude toward myself.

Table A.2: Income-earning in agriculture and self-esteem: by age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Below median age						Above median age					
	Male			Female			Male			Female		
Self-esteem (fem)	0.02		0.03**	-0.03*		-0.04*	0.02		0.03*	-0.10***		-0.11***
	(0.01)		(0.01)	(0.02)		(0.02)	(0.01)		(0.01)	(0.02)		(0.02)
Self-esteem (male)		-0.03**	-0.04**		0.00	0.02		-0.01	-0.02		0.02	0.07**
		(0.01)	(0.02)		(0.03)	(0.03)		(0.02)	(0.02)		(0.02)	(0.03)
Outcome mean	0.07	0.07	0.07	0.53	0.53	0.53	0.11	0.11	0.11	0.63	0.63	0.63
R-squared	0.042	0.046	0.054	0.125	0.120	0.126	0.040	0.037	0.043	0.159	0.119	0.172
Observations	744	744	744	744	744	744	766	766	766	766	766	766

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

Table A.3: Income-earning in export-oriented agriculture and self-esteem: by age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Below median age						Above median age					
	Male			Female			Male			Female		
Self-esteem (fem)	0.02**		0.03***	-0.03		-0.04*	0.03***		0.04***	-0.08***		-0.10***
	(0.01)		(0.01)	(0.02)		(0.02)	(0.01)		(0.01)	(0.02)		(0.02)
Self-esteem (male)		-0.03**	-0.04***		0.01	0.03		-0.01	-0.02**		0.02	0.05**
		(0.01)	(0.02)		(0.03)	(0.03)		(0.01)	(0.01)		(0.02)	(0.02)
Outcome mean	0.05	0.05	0.05	0.49	0.49	0.49	0.07	0.07	0.07	0.59	0.59	0.59
R-squared	0.057	0.062	0.079	0.137	0.132	0.139	0.034	0.020	0.039	0.137	0.106	0.145
Observations	744	744	744	744	744	744	766	766	766	766	766	766

Note: Robust standard errors are reported in parentheses. All regressions include village fixed effects and the controls listed in Table 1. Self-esteem measures are corrected for acquiescence bias. Significance levels are denoted as follows: * p<0.10, ** p<0.05, *** p<0.01.

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