

## REGULAR ARTICLE OPEN ACCESS

# Women's Empowerment and Intra-Household Bargaining Power

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## ABSTRACT

We assess the effectiveness of the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI) in predicting intra-household bargaining power. We conducted a lab-in-the-field experiment with agricultural households, where spouses made decisions about money allocations. The experiment tested whether they would choose efficient overall household gains or favor individual monetary benefits. Our findings demonstrate that women's empowerment levels, as measured by the A-WEAI, are predictive of decisions in the allocation task. This supports the A-WEAI's utility in representing and predicting intra-household dynamics.

**JEL Classification:** C72, C93, D13, J16, O12, Q12

## 1 | Introduction

Empowerment of women and the reduction of gender disparities should be integral priorities in every development policy (Alkire et al. 2013). In the academic literature, multiple (indirect) indicators have been employed to measure women's empowerment: education (Berti et al. 2004; Smith and Haddad 2000), control over income (Pinstrup-Andersen 2014; Berti et al. 2004; Leroy et al. 2009), the gender of the head of the household (Kennedy and Peters 1992), and asset control at the time of marriage (Quisumbing and Maluccio 2003) are a few of the previously utilized metrics (see Gupta et al. 2019, and citations therein).

Given that gender disparities and women's disempowerment are particularly evident in agricultural and rural areas (Alkire

et al. 2013), empowering women in agriculture has the potential to substantially enhance rural economies and promote rural development. However, prevailing policies frequently fall short in being gender-responsive, thereby overlooking the unique needs of rural women and the importance of quantifying empowerment for evidence-based policy-making. Efforts to bridge these gaps and implement inclusive policies are crucial for fostering sustainable development and equitable growth in rural communities.

The women's empowerment in agriculture index (WEAI) (Alkire et al. 2013), emerged as a comprehensive tool for evaluating women's access to resources and decision-making capacity in five agricultural domains: production, resources, income control, leadership, and time allocation. Each domain is assessed through a set of specific indicators, 10 in total. The WEAI

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marked a progression from earlier empowerment measures in several respects and particularly for its ability to be broken down and provide insights into the main factors contributing to both women's and men's disempowerment. Moreover, the original WEAI was relational (including comparison to men and gender inequalities), rather than just measuring women's outcomes.

WEAI underwent significant refinement in response to field challenges, leading to the development of the Abbreviated WEAI (A-WEAI), which is a shorter and more efficient alternative. Specifically, the A-WEAI reduces the original 10 indicators to six while maintaining the core domains of empowerment. This transformation ensures that the A-WEAI offers a more streamlined and accessible approach for assessing women's empowerment in agriculture while requiring about 30% less time to administer.

Despite these advancements in measuring women's empowerment, certain studies argue that empowerment is inadequately or less effectively measured with survey-based methods (Adato et al. 2000; Almås et al. 2018). Additionally, other studies criticize the WEAI, asserting that its characterization of empowerment predominantly revolves around individual autonomy (see Addison et al. 2021, and citations therein). These critiques highlight a perceived limitation in WEAI, namely its omission of the substantial impact that intra-household relationships hold over outcomes (Farnworth et al. 2018; Doss and Quisumbing 2020).<sup>1</sup> Hence, as the discourse continues, there is a growing call for a more comprehensive approach that properly considers the nuanced interplay between individual autonomy and intra-household relationships in the assessment of women's empowerment (Addison et al. 2021; Quisumbing et al. 2023).

Our study contributes to this literature by assessing the validity of A-WEAI as a predictor of intra-household bargaining power; that is, personal versus joint efficiency in decision-making within the household, using a lab-in-the-field experiment with agricultural households in the Republic of North Macedonia. Besides measurement of A-WEAI with a structured questionnaire, we utilized an allocation task, that was administered to spouses within the household, enabling the quantification of power dynamics between men and women within these households. This innovative approach not only enhances the comprehensiveness of our study but also serves to validate the A-WEAI through the lens of experimental economics, providing a robust and multifaceted evaluation of women's empowerment in the agricultural context.<sup>2</sup>

In our lab-in-the-field experiment, we ask spouses to make decisions regarding allocations of money between them and their spouse. The trade-off they face in each choice is between an efficient allocation for the household (more money overall) versus allocations that involve more money for themselves. After making decisions alone and separately from each other, spouses were asked to make joint decisions over similar allocations. By observing discrepancies in choices between the individual decisions of male and female spouses as compared to the joint decisions they make as a couple, we were able to quantify the intra-household bargaining dynamics. We find that the intra-household dynamic that is, personal versus joint efficiency in decision-making within the household, is explained by levels of women's empowerment as measured with the A-WEAI. Our

results thus provide evidence that A-WEAI can be a useful representation of intra-household dynamics, at least in the context of our study which involves a sample of agricultural households in a Balkan country in Southern Europe.

Our paper is structured as follows. In the next section, we review the existing literature related to women's empowerment, the A-WEAI, intra-household decision-making and the connection of women empowerment to household welfare, in order to set the context of our study. Section 3 describes the measurement of A-WEAI and the allocation task, offering detailed insights into both data collection and experimental design. Subsequently, we present the outcomes of the A-WEAI assessment and the experimental results in Section 4. Our paper concludes with a discussion in the final section, summarizing key findings and exploring the implications of the A-WEAI validation through the experimental task.

## 2 | Related Literature

Empowerment is a complex and multifaceted concept that can be evaluated through various methods, enabling the exploration of intra-household decision-making dynamics. While the concept is often broadly defined, it generally involves access to resources, agency, and the ability to convert both into meaningful outcomes. Women's empowerment, in particular, has become a central focus in efforts to improve household well-being, especially in rural development contexts. It features prominently in international development agendas and has motivated numerous interventions aimed at shifting decision-making power within households.

This section briefly examines three strands of work that are most relevant to our study. First, we review efforts to measure women's empowerment in agriculture using composite indices, such as the Women's Empowerment in Agriculture Index (WEAI) and its variants. These survey-based indices aim to provide standardized metrics of empowerment by capturing women's participation in decision-making and control over agricultural resources. However, as Richardson (2018) notes, these indices proposed by some studies (e.g., Alkire et al. 2013; Ibrahim and Alkire 2007; Malapit et al. 2017) may not fully capture the nuances of empowerment, particularly across diverse social and cultural contexts.

Second, we turn to experimental approaches, especially lab-in-the-field and behavioral experiments, to shed light on intra-household decision-making processes. These studies focus on how factors such as power dynamics, asymmetric information, and social norms influence household decisions, offering insights into empowerment that survey instruments may miss. Experimental methods also offer a way to observe latent behaviors and validate self-reported measures of empowerment.

Third, we examine the empirical evidence linking women's empowerment to household welfare outcomes, including income, food security, nutrition, and resilience. While access to education, income, or assets is frequently used as a proxy for empowerment, a growing body of work underscores that control over

these resources, rather than access alone, is more closely associated with improvements in household well-being.

Taken together, these three strands of literature inform our study, which seeks to validate a survey-based measure of empowerment using behavioral data in a rural context. By examining the different dimensions of empowerment and the methods used to measure them, we hope to gain a deeper understanding of the complexities involved in assessing and promoting women's empowerment.

## 2.1 | The Women's Empowerment in Agriculture Index

Women's empowerment in agriculture has garnered significant attention in recent years, with researchers employing various indices to measure and understand the complexities of gender dynamics in this sector. A-WEAI is one such indicator designed to gauge the empowerment levels of women and men across different domains within the agricultural context (Malapit et al. 2017, 2020). The A-WEAI is a short version of the original Women's Empowerment in Agriculture Index (Alkire et al. 2013), which focuses on five key domains, namely, input in agricultural production decisions, access and decision-making power over productive resources, control over the use of income, leadership in the community, and time allocation.<sup>3</sup> Placing the WEAI in the broader evolution of power measurement, Quisumbing (2025) reviews the shift from early household bargaining models that relied on proxies such as age, education, or assets, to multidimensional empowerment tools like the WEAI, which can be decomposed into its component indicators and better reflect the joint nature of decision-making within households.

Created as a more concise version of the WEAI, the A-WEAI underwent cognitive testing and piloting in Bangladesh and Uganda, with subsequent modifications to incorporate feedback from the pilots. A-WEAI's aim is to provide a robust and practical tool for assessing women's empowerment in agriculture on a larger scale (Malapit et al. 2017).

As a testament to the popularity of the index, several studies have explored and applied the WEAI. Here we offer only a selective review of such studies as there are numerous journal articles and discussion papers that deal with various aspects of the index. In one of these studies, Akter et al. (2017) explored gender inequity in agricultural households in Southeast Asia. The authors challenged conventional narratives by highlighting women's equal access to productive resources and greater control over household income. These findings emphasize the importance of tailoring gender intervention frameworks to each country to effectively address gender disparities in agriculture.

Gupta et al. (2019) explored the role household market integration and women's empowerment in agriculture can play in determining women's dietary diversity in rural India. The study emphasized the importance of women's empowerment, particularly in input decisions and participation in self-help groups, in enhancing dietary diversity beyond staple grains. In a critical reflection on the A-WEAI's adaptation to specific country contexts, Gupta et al. (2019) highlighted challenges in questionnaire

adaptation, index construction, and sensitivity analysis, underscoring the importance of tailoring empowerment indices to diverse agricultural contexts for meaningful policy impact.

Similarly, O'Hara and Clement (2018) critically examined the measurement of empowerment through WEAI in Nepal and identified a discrepancy between local meanings of empowerment and standardized agency-based definitions. They suggested that incorporating critical consciousness into empowerment frameworks can enhance measurement accuracy.

The WEAI has also been used on several other occasions to quantify women's disempowerment levels as in Pakistan (Aziz et al. 2023) and Guatemala (Muriel et al. 2019). Their findings underscore the need for tailored policies that address specific cultural and socioeconomic contexts to effectively empower women and promote gender equality in these regions.

While the WEAI and A-WEAI offer structured ways to quantify women's empowerment in agriculture, their application across diverse contexts has revealed important limitations. Cognitive testing during early pilots is necessary to avoid issues with question comprehension (Malapit et al. 2017) since agency alone may not adequately reflect local meanings of empowerment (O'Hara and Clement 2018). In light of this, there is growing interest in using complementary methods, particularly behavioral/experimental approaches, to validate and deepen our understanding of empowerment. The next section turns to experimental studies of intra-household decision-making, which offer a valuable lens on how power, norms, and preferences interact in shaping outcomes within households.

## 2.2 | Intra-Household Decision-Making

Understanding the dynamics of intra-household decision-making and its implications for women's empowerment is crucial in shaping policies and interventions. The empirical evidence so far suggests that women's bargaining power affects a variety of outcomes (Doss 2013). Munro (2018, 2023) provides an authoritative survey of intra-household experiments and emphasizes the need for a behavioral approach to understand decision-making dynamics. Consistent findings in this literature are that intra-household decisions are rarely efficient (e.g., Kebede et al. (2014), Munro et al. (2014), and Claudia et al. (2015); see also Doss and Quisumbing (2020)), joint decisions are often different from decisions made individually and, in one part, this is because individual behavior is affected by opportunities for hiding actions from spouses.

Recent studies also highlight the role of power dynamics, information asymmetry, and social norms in shaping decision outcomes. For instance, a lab-in-the-field experimental study in rural India (Tagat et al. 2024) explored how resolving information asymmetries on spousal preferences related to a bundle of private goods on intra-household allocations, may reduce gendered misperceptions, especially for men. However, Tagat et al. (2024) note that while the provision of information affects beliefs, it may not significantly alter final allocation decisions, indicating the persistence of established gender norms.

Some studies tried to quantify empowerment by either examining shifts from individual to joint decision-making or by examining the transfer of decision making from one spouse to another. For example, Yang and Carlsson (2021, 2016) examined spousal decision-making dynamics when it comes to intertemporal choices and found that males in Rural China had a stronger influence than wives and that a substantial share of choices shifted from individual to joint household decisions.<sup>4</sup> Abbink et al. (2020) conducted a lab-in-the-field experiment in rural Bangladesh regarding risky choices where either a spouse could make the decision themselves or transfer it to the other spouse. They found that women were more likely to let their spouses make risky decisions and that this choice was significantly affected by whether the decision could be hidden from the spouse, suggesting an imbalance of power.

Lecoutere and Wuyts (2020) found that an intervention to increase participatory intra-household decision making in Ugandan agricultural households had a positive impact on women's agency and achievements. Additionally, it contributed to improved household welfare, thus providing a nuanced perspective on empowering women by involving them in strategic decisions.

Most relevant to this paper, in a study focused on Ghana and Uganda, Ambler et al. (2020) assessed the validity of experimental measures for intra-household resource control by examining how well willingness to pay to control resources correlated with individually and jointly played dictator games (note that this is just another term to refer to an allocation task, similar to the one we employ in this study). They found that behavior in both tasks is correlated, suggesting that they measure similar latent variables. In Uganda, experimental data align well with survey measures of women's empowerment, while in Ghana, they do not, highlighting the importance of context in the effectiveness of these measures. Hoel (2015) used a series of dictator games played between spouses in Kenya to measure the fraction of spouses that responded to asymmetric information, identifying who reacts opportunistically and who does not under public and secret allocations. These decisions were then matched with cross-section survey data about spousal knowledge of income and expenditures at home.

In the context of our study country, Almås et al. (2018) measured women's empowerment in North Macedonia by eliciting women's willingness to pay to receive a cash transfer instead of their spouse receiving it. Given that households in their sample had already been recipients of a conditional cash transfer (CCT) program, they found that having already been empowered by the CCT (i.e., residing in a municipality where women were offered the CCT) led, on average, to a lower willingness to sacrifice household income to gain power. Thus, they provided evidence that their experimental set-up, measures bargaining power in a more effective way than traditional survey-based measures.

### 2.3 | Women Empowerment and Household's Welfare

A growing body of research underscores the link between women's empowerment and household welfare, yet findings

also reveal important nuances and methodological challenges. While indicators such as education or asset ownership are often used as proxies for empowerment, several studies have cautioned against interpreting them as direct evidence of bargaining power. For instance, Quisumbing et al. (2023) argue that focusing only on women's resources (e.g., land, assets, inputs) is insufficient; agency, voice, decision-making, and control over time and income, matter for whether and how interventions translate into improved outcomes, which do not occur automatically. They also showed that interventions targeting women without engaging intra-household relations can produce unintended effects, such as higher workloads or backlash, underscoring the need to involve men and address social norms in program design.

This multidimensional perspective is echoed in other research as well. Boateng et al. (2014) examined women's involvement in household decision-making in Ghana and found that wealth, education, age, and employment status are significant predictors of empowerment. Their findings suggest that factors like education and economic status shape women's decision-making power across multiple decision-making domains. This echoes older research (Thomas 1993) that provided evidence that income in the hands of women is associated with greater spending on health, education, and nutrition, suggesting that the control of income within households significantly influences outcomes relevant to child and family well-being.

Other reviews and empirical studies have expanded on this idea. Doss (2013) reviewed the evidence on intrahousehold bargaining and concluded that women's bargaining power, shaped by their education, income, and assets, significantly affects outcomes, although causal pathways are often difficult to identify. Davis (2024) models women's labor supply as a U-shaped function of economic development and shows empirically that historical patriarchal norms significantly shape cross-country differences in women's labor force participation as development progresses. Historical patriarchy may offset the empowering effects of economic development, suggesting that in societies with deeply rooted patriarchal values, development alone is insufficient to advance women's empowerment. Anderson et al. (2021) reviewed the theoretical assumptions and empirical evidence linking female farmer empowerment to agricultural outcomes, highlighting that while potential returns are significant, rigorous estimates of economic benefits remain limited.

Cavatassi et al. (2025) contribute to the discussion by connecting women's empowerment to gains in various spheres of livelihood such as economic well-being, food security, nutrition and resilience. Drawing on household-level data and a meta-analysis of 23 development projects, the evidence consistently demonstrated that empowering women leads to notable gains in income, dietary diversity, and income diversification—underscoring the value of centering development efforts on women's empowerment to advance a range of development objectives.

Finally, studies like Dong (2022) and Laszlo et al. (2020) emphasize the importance of context and multidimensionality. Dong (2022) exploited a 2011 legal reform in China to show that reducing women's intra-household property rights weakened their bargaining power, undermining key aspects of their

empowerment such as the ability to exit low-quality marriages and participate in labor markets. The reform also increased co-residence with in-laws, reinforcing traditional gender norms and further constraining women's decision-making autonomy within the household. By framing women's economic empowerment within intra-household bargaining models, Laszlo et al. (2020) showed how various empowerment measures such as agency, access to resources, and achievements, can influence household decision-making and welfare indicators like labor supply, consumption, and investment.

Taken together, the evidence affirms that women's empowerment is a critical, though complex, determinant of household welfare. While access to education, assets, or income matters, it is women's actual control over these resources that more consistently drives improvements in outcomes such as health, nutrition, income, and resilience. The reviewed studies underscore that empowerment is not a one-dimensional construct, nor are its effects automatic; they depend on context, social norms, and intra-household dynamics. Empowerment must therefore be understood and measured as a multidimensional process. To strengthen the evidence base, experimental methods can be used to validate and complement survey-based indicators of empowerment to help test whether reported agency aligns with actual decision-making behavior under realistic conditions.

### 3 | Methods

Data were collected at both the household and individual levels using two complementary instruments: (i) a structured survey to construct the A-WEAI index, and (ii) an experimental allocation task designed to elicit individual and joint decision-making behavior within the household. A field survey of 464 agricultural households was carried out in eight statistical regions of the Republic of North Macedonia (RNM), in accordance with the Nomenclature of Territorial Units for Statistics—NUTS 3 classification.<sup>5</sup>

To collect data for the A-WEAI, 20 enumerators from the National Extension Agency (NEA) were selected as interviewers based on their long cooperation with the agricultural producers. Each interview was attended by two enumerators and one supervisor.

The A-WEAI was complemented with an allocation task that allows us to quantify the power balance of men/women within the household. For this purpose, a modification of an allocation task from the experimental economics literature was utilized (Cochard et al. 2016; Engel 2011; Forsythe et al. 1994), that elicits the level of women's power in decision-making within the household. As explained later, the allocation task was played first individually and then jointly by the spouses.<sup>6</sup>

#### 3.1 | The A-WEAI

We measured women's empowerment in five domains in agriculture: (1) decisions about agricultural production, (2) access and decision-making power about productive resources which includes two indicators: (a) ownership of assets and (b) access

to and decisions on credit, (3) control over the use of income (4) leadership in the community, and (5) time allocation, using A-WEAI (Alkire et al. 2013; Malapit et al. 2020, 2017). We briefly describe calculations here but more details can be found in Alkire et al. (2013), Malapit et al. (2020), and Malapit et al. (2017). To construct the A-WEAI we first calculated an inadequacy score  $c_i$  for each person, according to his or her inadequacies across all six indicators over the five domains. The inadequacy score of each person is calculated as a weighted average of the inadequacies experienced so that  $c_i \in [0, 1]$  with  $c_i = \sum_{d=1}^6 w_d I_{di}$  where  $I_{di} = 1$  if the person  $i$  has an inadequate achievement in indicator  $d$  and  $I_{di} = 0$  otherwise while  $w_d$  is the weight attached to indicator  $i$  with  $\sum_{d=1}^6 w_d = 1$ .

The disempowerment cut-off  $k$  is the share of weighted inadequacies a woman must have to be considered disempowered. For those whose inadequacy score is less than or equal to the disempowerment cut-off, their score is replaced by 0, so that when  $c_i > k$ , then  $c_i(k) = c_i$  but if  $c_i \leq k$  then  $c_i(k) = 0$ , where  $c_i(k)$  is the censored inadequacy score. Following Alkire et al. (2013) we explored the sensitivity of the empowerment classification for different cut-offs and selected  $k = 40\%$  that resulted in baseline indexes that allow a reasonable scope for improvement. Thus, an individual in our study is disempowered if his/her inadequacy score is greater than 40% which is the same as saying that an individual is identified as empowered in 5DE if he or she has adequate achievements in three of the five domains, enjoys adequacy in some combination of the weighted indicators that sum to 60% or more, or has an adequacy score of 60 or greater.

The Gender Parity Index (GPI) is constructed so as to reflect the inequality in 5DE profiles between the primary adult male and female in each household. Male inadequacy scores are calculated in the same way as female inadequacy scores while the score of men or women whose inadequacy score is less than or equal to the disempowerment cut-off  $k$ , is replaced by  $k = 40\%$  so that when  $c_i > k$  then  $c'_i(k) = c_i$ , but if  $c_i \leq k$ , then  $c'_i(k) = k$ . Censoring in this manner limits the gap in the GPI so that changes in the adequacy of already-empowered men's scores do not affect the GPI, and all progress in reducing the gap would move women towards empowerment (Alkire et al. 2013).

Following the above, each household is classified as having or lacking gender parity; households lack parity if the female is disempowered and her censored inadequacy score is higher than the censored inadequacy score of her male counterpart.

A-WEAI is calculated as a weighted average of the 5DE and GPI. For the A-WEAI data collection, men and women were interviewed with one household questionnaire and two individual questionnaires.

#### 3.2 | The Allocation Task

After eliciting the necessary information to construct the A-WEAI, subjects received instructions on the allocation task that was adapted from Cochard et al. (2016). This task allows us to identify spouses that are strongly motivated by maximizing joint payoffs, by maximizing their own payoff, by maximizing their partner's payoff, or by concerns for equality between partners.

In the allocation task, spouses had to decide between two monetary allocations in Denars (1€=61.2 MKD; \$1=52.5 MKD at the time of the study) between themselves and their spouse. Each decision was framed as a choice between option A, comprising an equal split of 400 MKD, and option B, comprising the distribution of 600 MKD. The distribution for option B was varied across decisions (see Table 1). Option B is always efficient and a unitary household should always choose option B. However, if individual preferences matter, there might be a trade-off between equity and efficiency, leading participants to prefer the equal but inefficient option.<sup>7</sup>

In our experiment, we first asked subjects to make individual decisions separately and secretly from each other. Therefore, the male spouse would choose either A or B for each row of Table 1 and similarly for the female spouse. After both spouses made individual choices, they were brought together and were asked to reach a joint decision for each row of the allocation task. Overall, each couple made 21 choices (7 for the female spouse, 7 for the male spouse and 7 jointly) with the understanding that only one of the choices would be realized at the end.<sup>8</sup> The binding choice for each household had been randomly drawn before hand and was printed inside a sealed envelope that was only revealed after the completion of the 21 choice tasks. We acknowledge that spouses could potentially infer behavior in the experiment from the earnings, despite not being given explicit information about the choices made. Hence, we consider our findings to represent a conservative estimate, thus possibly constituting a lower bound of the actual dynamics.<sup>9</sup>

Subjects were first given examples and were asked comprehension questions before they proceeded with their choices. Every person saw each row of Table 1 on a separate page in a graphical format as shown in Figure 1. All instructions given to subjects along with instructions for the enumerator are reproduced in the [Supporting Information](#).

## 4 | Results

### 4.1 | Sample Descriptive Statistics

Before we proceed with the analysis, some descriptive statistics of our control variables in the regression models that are estimated later are worth discussing (see Table 2). As shown, the average age of the household couples is 49.54 years old.<sup>10</sup> Males are on average relatively older than females (51.6 vs. 47.5 years old). Males

**TABLE 1** | Allocation task.

Choice	Option A		Option B	
	Self	Spouse	Self	Spouse
1	200	200	50	550
2	200	200	100	500
3	200	200	200	400
4	200	200	300	300
5	200	200	400	200
6	200	200	500	100
7	200	200	550	50

younger than 40 years old compose 17.32% of our sample while the corresponding number for females is 28.5%. The vast majority of subjects are educated up to high school, and males are relatively better educated than females. The average number of members present in a household is 3.7 and households had, on average, more female members than males (female over male ratio is 1.16). Table 2 also shows that it is not uncommon for these households to have adult children living with them, in some cases even older than 40 years old, which is something very common for Southern European countries and Balkan countries specifically.

### 4.2 | Women's Empowerment

Table 3 shows descriptive statistics for the calculated indexes. The indexes that have been calculated are the five domains of empowerment index (5DE), the disempowerment index (1-5DE), the Gender Parity Index (GPI), the empowerment gap defined as the percentage difference in empowerment scores between males and females, and the Abbreviated-Womans Empowerment in Agriculture Index defined as  $A-WEAI = 90\% \times 5DE + 10\% \times GPI$ .

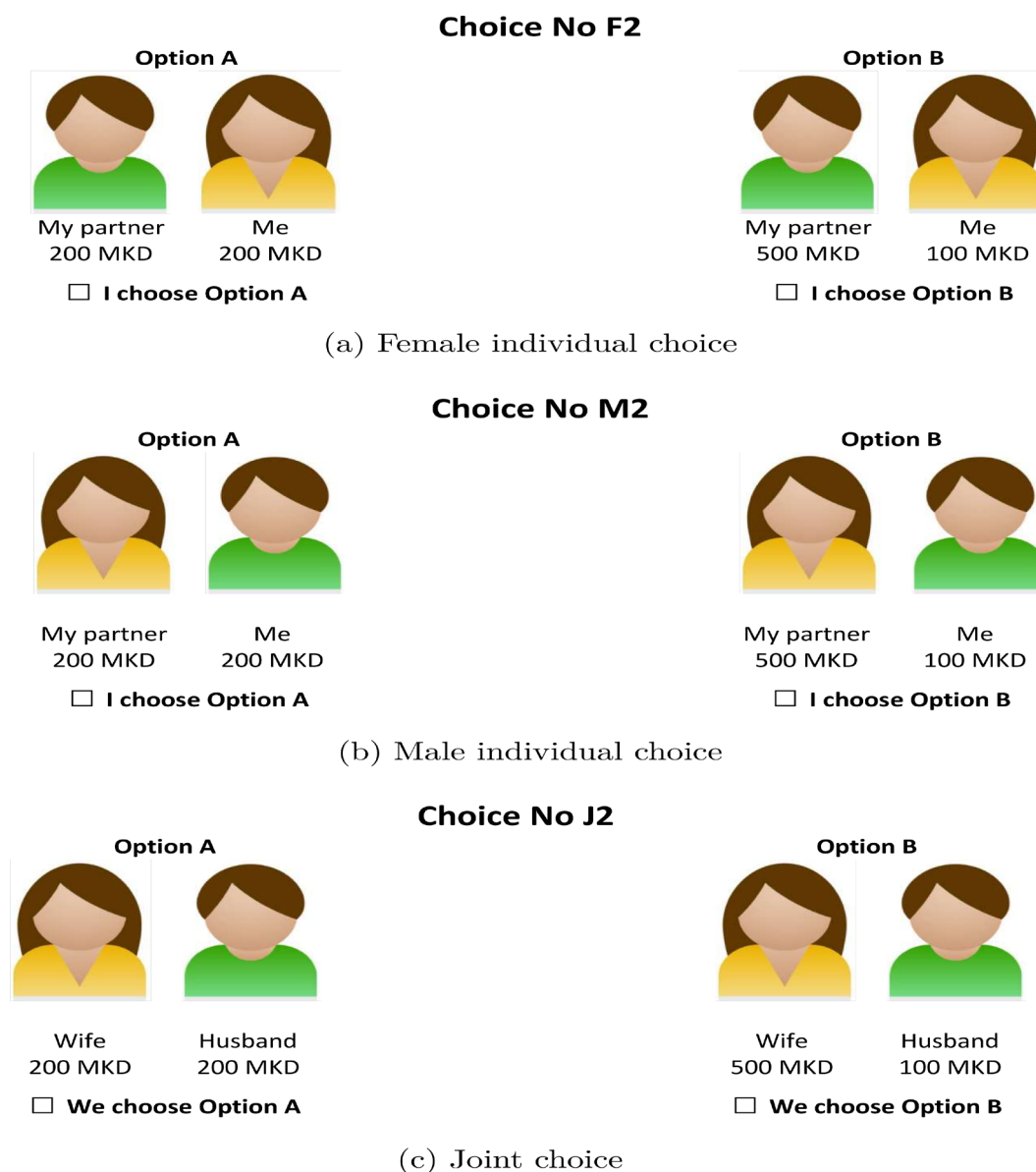
The average value of the 5DE index is 0.643 for females which is equivalent to saying that women are on average empowered in 64.3% of the indicators while males are empowered in 83.4% of the indicators, implying a 19.1 percentage point gap in empowerment levels. This difference is both statistically significant according to a *t*-test ( $p < 0.001$ ) as well as substantively significant. This difference is further reflected in the Gender Parity Index (GPI) of 0.822, indicating that women exhibit empowerment scores that are 82.2% of those of males. The difference with men is reflected in the average empowerment gap which amounts to 17.8% ( $= 1 - GPI$ ).

On the flip side, the disempowerment score can be interpreted as the opposite of the 5DE index; that is, females are disempowered in 35.7% of the indicators. Finally, the A-WEAI is a weighted average between 5DE and GPI. The A-WEAI amounts to an overall value of 0.661 and exhibits significant potential for improvement either through improving 5DE or by reducing the empowerment gap between males and females.

Figure 2 shows contribution to the disempowerment index (DAI) of each one of the six indicators that comprise the disempowerment index by gender. The (dashed) red line in the graph is the national average of the disempowerment index. It is obvious that when it comes to group membership, workload and access/decisions to credit, contribution to DAI is about the same between males and females. Moreover, the empowerment gap varies systematically across key domains: women face substantially higher disempowerment in indicators such as asset ownership, input in decision-making, and control over income—areas which are directly relevant to intra-household allocation dynamics. These three indicators contribute around 34.5% to the value of the DAI for females but only 10.1% to the value of the DAI for males.

### 4.3 | The Allocation Task

The allocation task (see Table 1) allows us to identify participants who prefer their own payoff maximization (i.e., selfish),



**FIGURE 1** | Examples of choices in the allocation task. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

joint payoff maximization or have preferences such as inequality aversion or altruism.<sup>11</sup>

Table 4 shows that about half of all households chose efficient allocations when they decided individually (49.67% of females and 50.54% of males). When couples had to make joint decisions, more couples were able to agree in efficient allocations (percentage rises to 59.44%). The shifts to a higher proportion of efficient allocations are statistically significant at the 5% level based on Wilcoxon signed-rank tests and proportion tests.

For individual decisions, 11.06% of females and 12.36% of males seek to maximize their own payoff. When in a joint decision environment, the number of choices that seek to maximize males' own payoff drops and is exactly zero for choices that seek to maximize females' own payoff. This asymmetric effect between males and females possibly suggests that males have a higher bargaining power for intra-household allocations. In addition, a small proportion of subjects chose to maximize the other spouse's payoffs when they made individual

decisions, which was significantly reduced under the joint decision-making mode.

According to Wilcoxon signed-rank tests, the distribution between males and females does not differ for any of the classifications of Table 4 as far as individual decision-making is concerned. We get similar results if we use proportions tests. This is to say that males and females are classified in the various groups of Table 4 in similar proportions. However, we do find differences when we compare individuals with joint decisions. For example, the number of selfish members is lower under joint decision-making across genders, but the drop for females is down to zero. A small percentage of choices maximize males' payoff even when jointly deciding between options, suggesting that males have a higher intra-household allocation power than females.

Another result coming out from Table 4 is that males and females chose more often to maximize their joint payoff when making decisions jointly than when choosing individually.

**TABLE 2** | Descriptive statistics.

	Females	Males
Age	47.46	51.63
	49.54	
Age < 40 years	28.57%	17.32%
Education		
Up to primary school	28.10%	16.96%
Up to highschool	58.17%	66.74%
University or higher	13.73%	16.30%
Household characteristics		
Received paid maternity leave	28.76%	
Farm accountancy	88.91%	
Responsible person for farm accountancy is ...		
Male	35.14%	
Female	9.09%	
Both male and female	52.83%	
Other	2.95%	
Household composition		
Household size	3.73	
N of females	1.87	
N of males	1.85	
Female over male ratio	1.16	
Male children < 18 years	13.85%	
Male children between 18 and 40 years	27.49%	
Male children > 40 years	2.81%	
Female children < 18 years	14.50%	
Female children between 18 and 40 years	17.75%	
Female children > 40 years	0.43%	

Note: Household composition indicators with %s is the percent of households with any member in the various age ranges.

#### 4.4 | The Allocation Task and Women's Empowerment

In order to correlate behavior in the experimental part of the study with values of the empowerment indexes, we run random effects logistic regressions with clustered standard errors at the household level, where the dependent variable is binary: whether a subject makes an inefficient allocation decision (chooses option A in a row of Table 1) or an efficient one (chooses option B), using repeated observations per subject. The basic specification uses dummies for the mode of the decision environment (female decides alone, male decides alone versus couple makes joint decisions as the base), the money that the more efficient option (option B) allocates to the female (in units of 100

**TABLE 3** | Descriptive statistics for 5DE, GPI, A-WEAI scores and empowerment gap.

	Females		Males	
5DE	0.643	(0.322)	0.834	(0.239)
Disempowerment score (1-5DE)	0.357	(0.322)	0.166	(0.239)
GPI score	0.822	(0.237)	—	—
Empowerment gap	0.178	(0.237)	—	—
AWEAI score	0.661	(0.310)	—	—

Note: 5DE is the five domains of empowerment score (0 = completely disempowered; 1 = completely empowered). A-WEAI is the Women's empowerment in agriculture index. GPI is the gender parity index score (0 = complete disparity; 1 = complete parity). Mean values and percentages are reported; standard deviations in parentheses.

Denars), and the value of the 5DE index for females and males as elicited through the survey questions. Because it is likely that these three basic sets of variables affect the probability of choice non-linearly, our basic setup contains all two-way and three-way interaction terms of these variables. Information criteria values like Akaike's information criteria are always in favor of the model with the interaction terms, so we base our findings on this model.<sup>12</sup> Our base model can be described as:

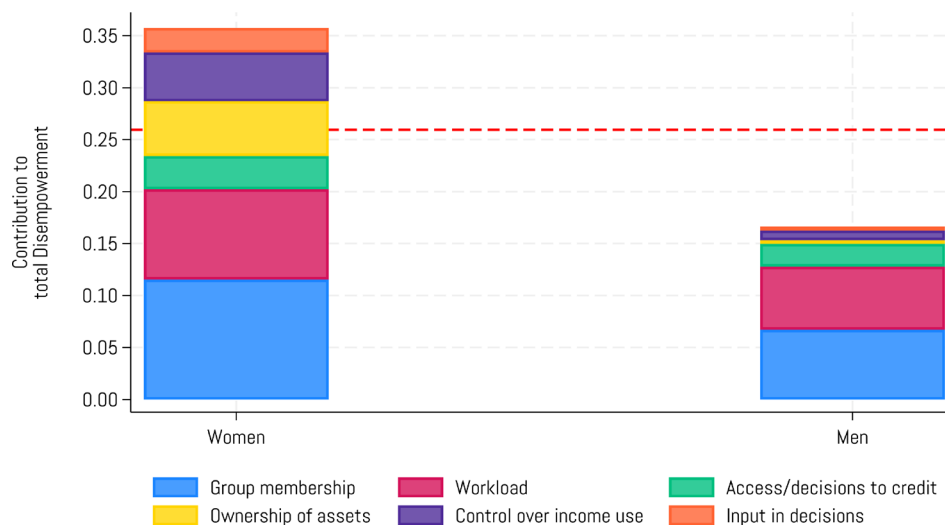
$$\Pr(y_{it} = 1 | \mathbf{x}_{it}) = \Lambda(\mathbf{x}'_{it}\boldsymbol{\beta}) \quad (1)$$

where  $\Lambda()$  is the logistic function and  $\mathbf{x}_{it}$  includes main effects and interaction terms for the following set of variables: (a) decision mode (Female alone, Male alone, with Joint decision as the baseline), (b) the amount of money allocated to the female in Option B ( $\text{moneyF}_{it}$ ), (c) the 5DE score of the female partner ( $\text{fiveDEF}_i$ ), (e) the 5DE score of the male partner ( $\text{fiveDEM}_i$ ), (f) all two-way interactions between decision mode,  $\text{moneyF}_{it}$ , and each 5DE score, and (g) and three-way interactions between decision mode,  $\text{moneyF}_{it}$ , and each of the 5DE scores.

Because of the interaction terms and the non-linearity of the logistic model, we rely on graphical display of marginal effects to interpret our findings. For transparency and completeness, we exhibit the raw coefficient estimates in the [Supporting Information](#).

Figure 3 shows the marginal effects (ME) and associated Confidence Intervals (CI) for an increase of 100 Denars in the amount of money allocated to the female in option B, evaluated at the range of 5DE from 0% to 100%. Note that more money allocated to the female should be interpreted as less money allocated to the male partner. Option B varies the allocation to the female from 50 to 550 Denars, with the cumulative change spanning up to 500 Denars—equivalent to five times the marginal effect displayed in Figure 3. Thus, although the marginal effects for a 100-denar change range between 2.4 and 4.5 percentage points, the full variation across the task implies that the cumulative effects are in the range of 12–22.5 percentage points.

Figure 3 also depicts a vertical red line on zero and consequently any CI crossing over the red line should be interpreted as a null effect. As most CI lines do not cross the red line, the effects are both statistically significant and substantively meaningful.



**FIGURE 2** | Contribution to disempowerment index (1-5DE) by gender. Red line is the national average of the index. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/rode.20077)]

**TABLE 4** | Classification of individual and joint decision making by gender.

	Individual decisions				Joint decisions			
	Females		Males		Females		Males	
Max own payoff	51	11.06%	57	12.36%	0 <sup>†</sup>	0.00%	29 <sup>‡</sup>	6.29%
Max other's payoff	23	4.99%	28	6.07%	0 <sup>†</sup>	0.00%	13 <sup>‡</sup>	2.82%
Max couple's payoff	229	49.67%	233	50.54%	274 <sup>†</sup>	59.44%	274 <sup>‡</sup>	59.44%
Irrational	15	3.25%	16	3.47%	17	3.69%	17	3.69%
Sensitive to efficiency-equality trade-off								
Symmetric	36	7.81%	33	7.16%	37	8.03%	37	8.03%
Asymmetric-selfish	70	15.18%	62	13.45%	47 <sup>†</sup>	10.20%	57	12.36%
Asymmetric-altruistic	37	8.02%	32	6.94%	86 <sup>†</sup>	18.66%	34	7.38%
Total households					461			

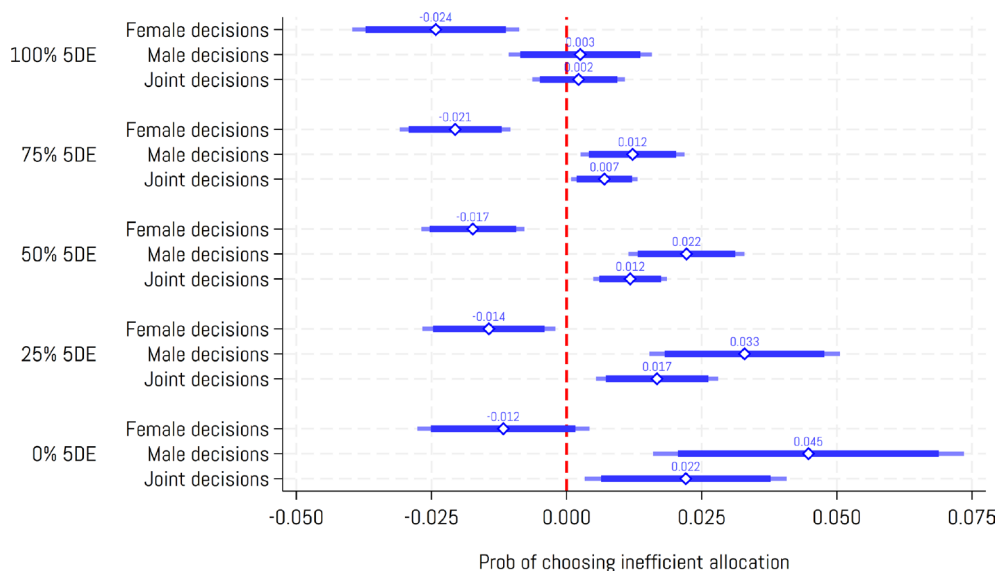
Note: The <sup>†</sup> symbol indicates a statistically significant difference with female decision making at the individual stage according to a Wilcoxon signed-rank test and a proportion test at the 5% significance level. A <sup>‡</sup> symbol indicates a statistically significant difference with male decision making at the individual stage according to a Wilcoxon signed-rank test and a proportion test at the 5% significance level.

Furthermore, the CI intervals get closer to the red line for higher values of the female 5DE (higher values of the 5DE should be interpreted as more empowered females; for example, a 100% value of the 5DE means complete empowerment). This suggests that for more empowered females, increasing the money allocated to the female partner does not significantly affect the probability of inefficient allocations. This moderation effect of empowerment supports the interpretation that A-WEAI captures relevant bargaining dynamics, and even modest changes in decision efficiency can have important implications for household welfare and gender-responsive policy design. Thus, empowerment is highly predictive of behavioral differences within the household.

Let us illustrate this with a more concrete example. Consider the lower range of 5DE values; for example, when the female is completely disempowered (5DE = 0%). In these cases, the marginal effect of increasing the amount of money allocated to the female

in Option B is associated with a higher probability of choosing an inefficient allocation, particularly when decisions are made by males alone or jointly as a couple. This suggests that when the female partner is lacking bargaining power, shifting more money toward her may trigger inefficiencies, perhaps due to control issues, fairness concerns, or perceived threats to existing norms.

However, the pattern changes as female empowerment increases. At the upper range (5DE = 100%), increasing the female's share in the allocation no longer leads to inefficiencies. In fact, the marginal effect becomes negative in some cases, indicating that more empowered women are associated with lower probabilities of inefficient allocations, even when more money flows to them. This reversal underscores the role of empowerment as a stabilizer in household bargaining, likely facilitating cooperative behavior and attenuating conflict around financial control.



**FIGURE 3** | Marginal effect (and 95% CI) of an increase of 100 Denars on the money allocated to the Female household member on the probability of choosing an inefficient allocation. A 100% for 5DE can be interpreted as a woman that achieves empowerment in 100% of the five domains of empowerment. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

While some of the confidence intervals for the marginal effects, particularly those associated with male and joint decision-making partially overlap, this should not be interpreted as statistical noise alone. Rather, the similarity between male and joint decision profiles may reflect the dominance of male preferences in jointly made decisions, consistent with the broader literature on patriarchal household structures and gendered bargaining dynamics (e.g., Doss 2013; Quisumbing and Maluccio 2003; Agarwal 1997). In contrast, the effects for female decision-makers are both more pronounced and more distinct, with non-overlapping confidence intervals in most parts of the empowerment spectrum. This pattern suggests that empowerment moderates allocation behavior most when women have greater influence over decision-making.

Overall, the results offer empirical support for the idea that empowerment can reduce the likelihood that shifts in financial resources destabilize household efficiency. This has direct policy relevance: programs that aim to change the intra-household allocation of transfers or assets may be more effective (and less disruptive) when coupled with empowerment-building interventions.

We also run additional specifications as follows: (i) a specification where the sample is constrained to rational households; that is, it excludes households that chose the fourth choice of Table 1 where the ‘irrational’ option A was chosen (because this is the dominated choice), (ii) same as (iii) but also drops the fourth choice that exhibits very low variability, (iv) same as the baseline specification but with additional demographic controls (at the cost of a lower sample size due to missing observations), (v) same as the baseline specification but where we replace the 5DE score with each of the five domains and sub-domains (vi) same as the baseline specification but where the 5DE index is replaced with A-WEAI.<sup>13</sup>

Marginal effects are displayed in the Supporting Information and are virtually identical to Figure 3, providing evidence of the robustness of our findings.

## 5 | Discussion and Conclusions

Quantifying women’s empowerment and evaluating gender disparities play a pivotal role in shaping policies that address the challenges women face, particularly in rural areas. These metrics are more than numbers since they help form strategies aimed at creating gender-responsive policies. By accurately measuring where women stand in terms of empowerment and access to resources, policymakers can tailor interventions that specifically target the barriers hindering women’s progress. This approach is essential for fostering women’s empowerment and gender parity, which can significantly contribute to enhancing rural economies and promoting broader economic development.

A-WEAI has been at the forefront of these efforts, offering a framework for assessing women’s empowerment and gender equality within agricultural households. The A-WEAI examines various dimensions of empowerment, including women’s access to and control over critical resources, their participation in decision-making processes, and their ability to assert their rights within both the household and the broader community. By covering these key domains, the A-WEAI provides invaluable insights into the status of women’s empowerment.

Despite its contributions, the A-WEAI’s methodology and focus have sparked discussions and criticisms. One of the main concerns is the reliance on survey-based methods, which may not fully capture the nuances of empowerment particularly across diverse social and cultural contexts (Richardson 2018). Survey-based methods could introduce bias by overlooking the complex dynamics of intra-household relationships and decision-making processes, potentially misrepresenting the intra-household bargaining dynamics. For example, Addison et al. (2021) highlight A-WEAI’s notable limitations: its reliance on predefined categories and codes that may distort representations of intra-household relations, its failure to account for the diverse circumstances of farming households across Africa, and its individualistic focus

that overlooks the relational dynamics that shape empowerment within households.

Concerns over comprehension (Malapit et al. 2017), context-specific interpretation, and the limits of agency-based survey measures (O'Hara and Clement 2018) have motivated a shift toward complementary approaches. In particular, experimental methods can help validate survey-based indicators and reveal how empowerment manifests in actual decision-making. In this study, we sought to contribute to the ongoing debate surrounding the effectiveness of the A-WEAI by integrating it with an innovative approach. Specifically, we supplemented the A-WEAI measurement obtained from 464 agricultural households in the Republic of North Macedonia with an allocation task designed to quantitatively assess intra-household bargaining dynamics. This methodological innovation allowed us to explore the predictive value of A-WEAI scores concerning these dynamics.

Despite the acknowledged limitations found in the existing literature concerning the A-WEAI (Addison et al. 2021; Farnworth et al. 2018; Gupta et al. 2019), our study reveals a significant correlation between A-WEAI and intra-household bargaining power, suggesting that both may tap into similar underlying constructs of empowerment and that the A-WEAI could serve as a reliable predictor of bargaining power within households. These same constructs, particularly women's decision-making authority and control over resources, have been linked in prior research to improvements in household welfare, including income, nutrition, and resilience (Thomas 1993; Cavatassi et al. 2025).

As in many studies, we acknowledge however the possibility that our findings are dependent upon the context of our study; that is, specific to a particular sample in a specific country at a single point in time. While we took steps to ensure privacy (e.g., individual decisions made in separate rooms), we recognize that social desirability or interviewer effects cannot be entirely ruled out. Additionally, the higher level of education among farmers in North Macedonia, compared to those in less developed countries, may have impacted their understanding and engagement with the allocation task, potentially skewing the findings. This aspect underscores the importance of considering socio-demographic factors when interpreting the results of empowerment measurements. Moreover, the associations we document between empowerment and decision-making are correlational rather than causal and should be interpreted with caution, particularly given the experimental design and the constructed nature of the A-WEAI index. While the observed patterns are robust and meaningful, they remain subject to contextual interpretation.

Therefore, while our study provides valuable evidence supporting the utility of the A-WEAI as an indicator of intra-household dynamics, it also highlights the need for further research. Prior work shows that the effects of empowerment on welfare are not automatic but depend on social norms, intra-household relations, and the actual exercise of agency (Quisumbing et al. 2023; Laszlo et al. 2020). Future studies should aim to validate our findings across different contexts, samples, countries, and time periods to ascertain the robustness of the A-WEAI as a tool for measuring women's empowerment and intra-household

bargaining power. Despite these considerations, our research marks a significant step forward in understanding the complexities of women empowerment and decision-making within households, affirming the potential of tools like the A-WEAI to yield meaningful insights into the dynamics of gender and power in agricultural communities.

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### Ethics Statement

Ethics approval for this study was granted by the Board of Ethics and Deontology of the Department of Agricultural Economics and Rural Development (3/12.6.2018).

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The Appendix, as well as data and codes to replicate the analysis, has been deposited with the Open Science Framework: <https://doi.org/10.17605/OSF.IO/QZYTG>.

### Endnotes

- <sup>1</sup> Throughout the manuscript, we use the term "intra-household dynamics" to refer specifically to decision-making behavior within the household, as revealed through an experimental allocation task. This includes the extent to which spouses prioritize personal versus joint efficiency and how decision outcomes vary depending on whether choices are made by males, females, or jointly. While intra-household dynamics can encompass various dimensions such as expenditures, labor allocation, or fertility decisions, our focus here is on resource allocation and bargaining behavior related to empowerment.
- <sup>2</sup> Our approach assumes that behavior in incentivized games can act as a truth serum which need not always be the case since some of the same measurement error and challenges that are present in survey data may also affect incentivized decisions. Other approaches as in Jayachandran et al. (2023), use qualitative surveys as the truth serum.
- <sup>3</sup> WEAI and A-WEAI have been used in a variety of settings and a dedicated website (<https://weai.ifpri.info/>) offers information about it and related research instruments as well as maintains a list of publications that have used it over the years.
- <sup>4</sup> Munro (2018) finds that the fact that joint decisions are not a convex combination of individual decisions is a general theme in this literature.
- <sup>5</sup> NUTS is a geocode standard for referencing the administrative divisions of countries for statistical purposes, developed and regulated by the European Union. The main criterion for selecting the regions and municipalities for the survey was the national NUTS nomenclature that provides a single and uniform breakdown of territorial units at the regional and local level. This nomenclature is the basis

for collecting, processing, and publishing regional statistics used for planning and running the regional policy in the RNM. The selection of the agricultural households in the survey was based on a sample defined in the Farm Accountancy Data Network (FADN) system selection plan for each region and the country. The aim was to get a representative sample in the following three dimensions: region, economic size of the farm and type of agricultural production.

<sup>6</sup> It is worth noting the following: (i) Enumerators were mixed-sex pairs, with each household being visited by two interviewers, ensuring a balanced approach during data collection. (ii) The stakes in the allocation task were meaningful for participants: 600 MKD is roughly equivalent to 10 euros, which is approximately half a day's wage for agricultural work, making the stakes sufficiently significant for participants to reveal their true preferences. (iii) Data collection costs included a one-day training session for enumerators, with commuting costs and lunch provided. Each enumerator was compensated 500 MKD per household visit, with each visit lasting approximately 2 h and each household earned on average 500 MKD from the allocation task. (iv) To minimize opportunity costs for participants, visits were scheduled during farmers' preferred non-working hours. To provide some context for the earnings relative to the experiment's stakes, agricultural workers in the study areas typically earned around 20 euros (1200–1300 MKD) for an 8-h workday at the time of the study.

<sup>7</sup> If a household acts as a unit with a common utility function, regardless of who makes the decision, it should prefer allocations that maximize total household resources. In our task, Option B always yields a higher total payoff to the household than Option A, making it the efficient choice in a utilitarian sense. However, Option B is not always Pareto efficient, as in some rows one spouse may receive less than in Option A. These cases involve a trade-off: one partner gives up income so the other gains more, increasing the overall household total. Our main claim is that deviations from Option B reflect behavior inconsistent with household-level efficiency.

<sup>8</sup> To avoid ambiguity during the task, participants always made allocation choices between themselves and their spouse. We used gender-specific avatars and labels to reinforce this framing. For individual decisions, participants chose between “Me” and “My Partner” (e.g., a female participant saw “Me” with a female avatar and “My Partner” with a male avatar). For joint decisions, the couple chose between “Husband” and “Wife.” An example of the individual and joint choice tasks is shown in Figure 1 while all experimental instructions are reproduced in the [Supporting Information](#).

<sup>9</sup> While we cannot rule out post-experimental pooling of rewards within the household, such behavior would align with the unitary household model. However, the substantial heterogeneity we observe in individual allocation choices suggests that many spouses do not act to maximize joint payoffs, pointing instead to non-unitary decision-making. This within-couple variation supports the interpretation that our design captures individual preferences and bargaining power. While gender differences in altruism may play a role, we show in the results section that higher A-WEAI scores predict stronger alignment of joint choices with female preferences, reinforcing the link between empowerment and decision outcomes.

<sup>10</sup> This roughly older age composition of the farm households, reflects the broader demographic reality of the agricultural sector in the country. More details are provided in the [Supporting Information](#).

<sup>11</sup> Observations from the allocation task can be aggregated to identify participants who are maximizing the couples' payoff (always choosing option B), those who are maximizing own payoff (choosing based on the pattern AAABBBB or AABBBBB across the 7 choices) or those who maximize their partner's payoff (choosing the opposite pattern that is, BBBBAAA or BBBBBAA across the 7 choices). Participants that choose option A in choice task 4 are characterized as irrational. This operational definition is standard in similar experimental designs (Cochard et al. 2016). While this behavior may appear

inconsistent with dominance, we do not interpret it as evidence of confusion or randomness. The reason is that the task was introduced and conducted by trained enumerators from the National Extension Agency in collaboration with faculty from Ss. Cyril and Methodius University. It was endorsed by UN Women, and participants were clearly informed about the real monetary stakes. Spouses made their decisions privately and independently. The low frequency of such choices ( $\approx 3\%$ ) supports the view that participants took the task seriously.

Additionally, we can further identify participants who choose option A (the equal option) at least once, but are not classified to any of the categories mentioned above, as suggesting that they are sensitive to the efficiency-equality trade-off. For these participants, we calculate a ratio of ‘own payoff’ to ‘couples’ ‘payoff’ aggregated over all choices. This corresponds to the share of the total payoff retained for the individual. If this share equals 0.5, subjects are classified as symmetric; if this share is greater (lower) than 0.5, participants are classified as asymmetric-selfish (asymmetric-altruistic).

<sup>12</sup> While we have complete data for 461 households for the allocation task, in the logit regressions that follow, we use information from 431 households because the data that are used to calculate the A-WEAI score are incomplete for one domain or another and the final sample size is smaller due to missing observations.

<sup>13</sup> Recall that for the 5DE we can calculate a separate value for males and for females while A-WEAI is calculated only for females. We also note that both male and female education levels are included as control variables in iii, the extended specification. These results, shown in the [Supporting Information](#), confirm that our main findings remain robust when education is accounted for. This suggests that the explanatory power of the 5DE and A-WEAI is not merely driven by differences in educational attainment.

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### Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** Supplementary Information.