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Gendered farm work, off-farm employment, and decision-making power:

quantitative evidence from Tajikistan

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INTRODUCTION

Globally, nearly half of all workers in rural areas work in agriculture (International Labour Organization 2020). Women are heavily involved in agricultural production, but often get assigned different roles and responsibilities compared to men (Doss 2018). In many contexts, women have less decision-making power than men regarding their households' agricultural production or on how to spend agricultural income (FAO 2011). Yet, recent evidence suggests that a generalized assumption that women have no or little decision-making power in agriculture is misplaced and that there are also settings where joint decision-making between men and women is common (Akter et al. 2017; Maligalig et al. 2019). It therefore remains imperative to add new evidence on women's and men's roles and decision-making in agriculture – particularly from contexts that have not been extensively studied.

Whereas agriculture plays a key role for employment and income in rural areas, the non-farm sector is critical for diversifying farm risks, increasing household income and building assets (Ellis 2000). Women's off-farm employment – if paid – is expected to increase her autonomy and influence in the family (Sen 1987; Kabeer 2008). Indeed, several studies find that off-farm employment is associated with greater intra-household decision-making power for women living in farm households (Anderson and Eswaran 2009; Maligalig et al. 2019). Yet, participation in employment is not necessarily empowering, particularly when there is continued male-led household decision-making (Kabeer 2016; Kosec et al. 2021). Krumbiegel et al. (2020), for example, find that wage employment on pineapple farms does not increase household decision-making power of women in Ghana unless they are jointly employed with their husbands.

Off-farm employment might offer greater opportunities for women's empowerment compared to own-farm employment. Bangladeshi women working on the household farm were shown to have no more decision-making power as compared to women performing unpaid reproductive work. Employment outside of the husbands' farm, however, did contribute to rural women's autonomy (Anderson and Eswaran 2009). Whether women's work on and off the farm effectively increases women's decision-making power therefore remains an empirical question.

This study analyzes gender differences in participation in crop production and marketing activities, and the association between women's decision-making power and farm and non-farm employment in Tajikistan. Our analysis contributes to the existing literature on women's roles in agriculture by adding relatively recent evidence from Tajikistan, a country in a region that has received less attention than many others in the agriculture and gender literature. With respect to women's

roles in agriculture, Tajikistan is especially interesting to study. First, agriculture plays an important role in providing rural employment. The remoteness of many of communities in Tajikistan means there's also a large extent of subsistence and semi-subsistence farming, making agriculture also a critical livelihood or potentially the sole livelihood for many households (Takeshima et al. 2022).

Second, legal constraints on non-collectivized agricultural production were widely lifted after 1989 across Eastern Europe and the former Soviet Union (Hierman and Nekhbakhshoev 2018). In rural areas, the breakup of collective farms into smaller private farms as well as shifts in cropping patterns away from major crops such as cotton or wheat caused considerable changes in agricultural production processes and rural employment, and therefore also in farm household organization. Kandiyoti (2003) argues that the liquidation of collective farms has unfavorably shifted women's positions in the workforce towards unpaid family labor or as casual labor earning piece-wage rates.

Third, the post-Soviet transition also offered a renewed – though contained – freedom for communities to express traditional and religious values. In several countries, a return to pre-Soviet traditional and religious values has been observed – though the expression thereof is contained by state leaders of different countries in Central Asia. Nevertheless, many communities witnessed a resurgence of customary norms emphasizing women's roles as caretakers and constraining mobility and economic opportunities for women (Mukhamedova and Wegerich 2018; Turaeva and Becker 2022).

Fourth, the lack of good quality and well-paid jobs at home and the option of better employment opportunities abroad led to substantial outmigration, particularly among young and middle-aged men from rural areas (ADB 2016; Najjar 2022). This affected the demographic composition of the population in rural areas, particularly towards more women. In this regard, Central Asian states are said to experience a feminization of rural areas or of agriculture at large (Najjar 2022).

Moreover, our study helps to fill a gap in the literature on the linkages between participating in on- and off-farm employment and women's decision-making power. In Tajikistan, rural women often work informally and for low wages. Mukhamedova and Wegerich (2018) conclude that these employment positions, despite poor contractual conditions, contribute positively to women's decision-making power. In this study, we use quantitative data to assess whether employment is indeed linked with women's decision-making power, and whether this is different depending on the

sector and conditions of employment – farm versus non-farm employment and family versus non-family-based employment.

We present our findings in this paper as follows. In section two we provide more background information on agricultural production and gender in Tajikistan. In section three we describe the data and methodology of the study. Section four presents the descriptive analysis of women's participation in agriculture and agricultural value chains. The association between women's value chain participation and decision-making power is explored in section five. We conclude in the final section.

BACKGROUND

Tajikistan is a mountainous landlocked country in Central Asia, surrounded by Afghanistan in the south, Uzbekistan to the west, Kyrgyzstan to the north and China to the East. In 2021, it was estimated to have a population of 9.8 million people, of which about three quarters live in rural areas (World Bank 2022a). The country formerly belonged to the Soviet Union but seceded in 1991. The newly established country however was heavily affected by a post-independence Civil War in 1992–1997 (Atkin 1997). These dramatic events plunged the country into poverty. An estimated 83 percent of its population was poor in 2000, but major progress was made in reducing poverty thereafter. By 2021 the estimated poverty rate had fallen to 26.5 percent (World Bank 2022a).

Agricultural production in Tajikistan

In 2019, about 20 percent of Tajikistan's GDP was from the agricultural sector (IFAD 2022). Agricultural land in Tajikistan is the exclusive property of the state, but land use rights can be inherited, as described by the Land Code and Civil Law (Lerman and Sedik 2008; Hierman and Nekbakhshoev 2018). Land Use Certificates and Land Passports were introduced in 1998 to provide documented confirmation of an individual's land use rights (Lerman and Sedik 2008). Agricultural crop production mainly takes place on four types of land: household plots, presidential land, individual or collective dehkan farms, and farm enterprises (Shaltovna 2016).

Household plots are by far the most productive segment of agriculture, accounting for over 50 percent of the value of agricultural production on about 12 percent of arable land (Yakubov 2013). Presidential lands were distributed by a Presidential Decree in 1995, when a total of

about 50,000 hectares of agricultural land was distributed across farm households. With an average size of 0.115 hectares, they were intended to supplement the household plot as a source of food for household consumption (Mukhamedova and Wegerich 2018).

Dehkan farms have their origins in the former state-owned collective farms. In the Soviet period, Tajikistan's agricultural land was mainly organized into state-owned collective farms, with cotton as a main crop. Men and women were members and workers of these collective farms and entitled to salaries (Mukhamedova and Wegerich 2018). Upon independence in 1991, collective farms were to be restructured and divided among its members, thus establishing individual dehkan farms. The dissolution of collective farms occurred gradually and with considerable variation in the ownership, management and organizational settings of the newly established dehkan farms. Members did not always receive their rightful share of the collective farms, oftentimes intentionally so to avoid taking on a share of the collective debt compiled under the former collective system that would be associated with the land title (Hofman and Visser 2021). The implementation of land reforms was also seriously hampered by the Civil War which took place between 1992 and 1997 (Mukhamedova and Wegerich 2018).

Aside from the individual dehkan farms, collective dehkan farms also exist. These collective farms perpetuate the form of organization of the former state-owned collective farms, despite their new name (Lerman and Sedik 2008). Moreover, farm enterprises continue to exist and effectively constitute formerly collective dehkan farms (ibid.).

Distribution of additional land to household plots and the restructuring of agricultural enterprises reduced control by the government over the mix of crops produced. As a result, the area sown to cotton has fallen and the area in grain and horticultural crops has increased (Lerman and Sedik 2008; Buisson and Balasubramanya 2019). Nevertheless, national and local governments can still intervene in cropping and production decisions of farms through the tools of "intra-farm" land use planning, severely restricting the property rights of the farmers and contradicting the "freedom to farm" principles (Lerman and Sedik 2008; Hofman 2018).

Rural employment and gender

Tajikistan has a low labor force participation rate. In 2021 it was estimated that 40 percent of the adult population (aged 15 years and older) was in the labor force (WorldBank 2022c). Women's labor force participation was much lower than men's, respectively 30 percent and 51 percent

(ibid). There are gender patterns in terms of occupational choices as well as in terms of the positions men and women have in the workplace. Women outnumber men as unskilled workers, teachers, seamstress, cleaners or servants (TAJSTAT 2016).

In rural areas, the dismantling of the collective farm system, the lack of a burgeoning non-farm economy and the devastation to the economy during the Civil War left many men and women with few employment opportunities aside from poorly paid jobs in agriculture (Lerman and Sedik 2008; Mukhamedova and Wegerich 2018). Migration therefore became a common phenomenon, and remittances contribute significantly to the country's GDP. In 2019 it was estimated that personal remittances received by Tajik households accounted for 28 percent of GDP (WorldBank 2022c). The latter significantly affected the gender composition of the agricultural labor force since primarily young and middle-aged men left the country for migrant work (Mukhamedova and Wegerich 2018).

Several studies have analyzed the impact of migration or remittances on women's labor force participation. Outmigration of household members might have different impacts on household labor allocation. On the one hand, household labor availability is reduced therefore necessitating non-migrating household members to provide more labor to household farm or non-farm enterprises. On the other hand household income is supplemented if remittances are being received, therefore lowering the need for other household members to earn income. The studies on this topic have not been fully conclusive. Murakami et al. (2021) find that migration and remittances reduce labor supply of household members left behind. Yet, Kan and Aytemir's (2019) study indicates that having a migrant household member does not impact women's labor force participation. Moreover, Ghimire (2021) finds that women in migrant households are more involved in irrigation system and crop management. Mukhamedova and Wegerich (2018), as well, suggest male-dominated rural outmigration leads to an increase in women's participation in agricultural value chains. The latter study is based on qualitative in-depth interviews and group discussion in Sughd Province, whereas the three former studies were based on an analysis of quantitative data from different regions in the country.

Despite the high share of male outmigration, there is little evidence pointing at the emergence of a significant amount of female-adult-only households (Meurs & Slavchevska 2014). Tajik households are often of a large size and host multiple generations (Turaeva and Becker 2022). Young couples tend to reside with the husband's parents during childbearing age and left-behind women of male migrants remain hosted with their parents-in-law (Bakhtibekova 2014 in Turaeva and Becker 2022; Meurs & Slavchevska 2014).

Women face discrimination in the labor market due to the emergence of pre-Soviet traditional and religious values which emphasize women's roles as caretakers and constrained mobility for women (Turaeva & Becker 2022; Mukhamedova &Wegerich 2018). Moreover, laws remaining from Soviet time protect women's work in hazardous occupations, but in practice severely limit women's employment options (World Bank 2022b). Farm work, however, is considered compatible with child-rearing. A shortage of household farm labor therefore necessitates many women to provide significant labor to household farming. Kan and Aytemir (2019) find that women in farm households work significantly more hours than women in non-farm households in Tajikistan.

Despite women's significant contributions to agriculture, customary gender norms have also caused the redistribution of state ownership of many income-generating resources, such as agricultural land or machinery, to be biased towards men rather than women (Mukhamedova and Wegerich 2018; Hierman & Nekhbakhshoev 2020). In 2019, 77.9 percent of dehkan farms were led by men and the remaining 22.1 percent were led by women (TAJSTAT 2022). Moreover, Hierman and Nekbakhshoev (2020) argue that the combination of restrictive social norms towards women's economic opportunities with male-dominated rural outmigration has been exploited by local elites to slow the pace of agrarian change and to perpetuate collective farms in Tajikistan. A similar argument was made by Kandiyoti (2003) related to the agrarian reforms in neighboring Uzbekistan, and in addition she argues that the liquidation of collective farms has unfavorably shifted women's positions in the workforce towards unpaid family labor or as casual labor earning piece-wage rates.

DATA AND METHODOLOGY

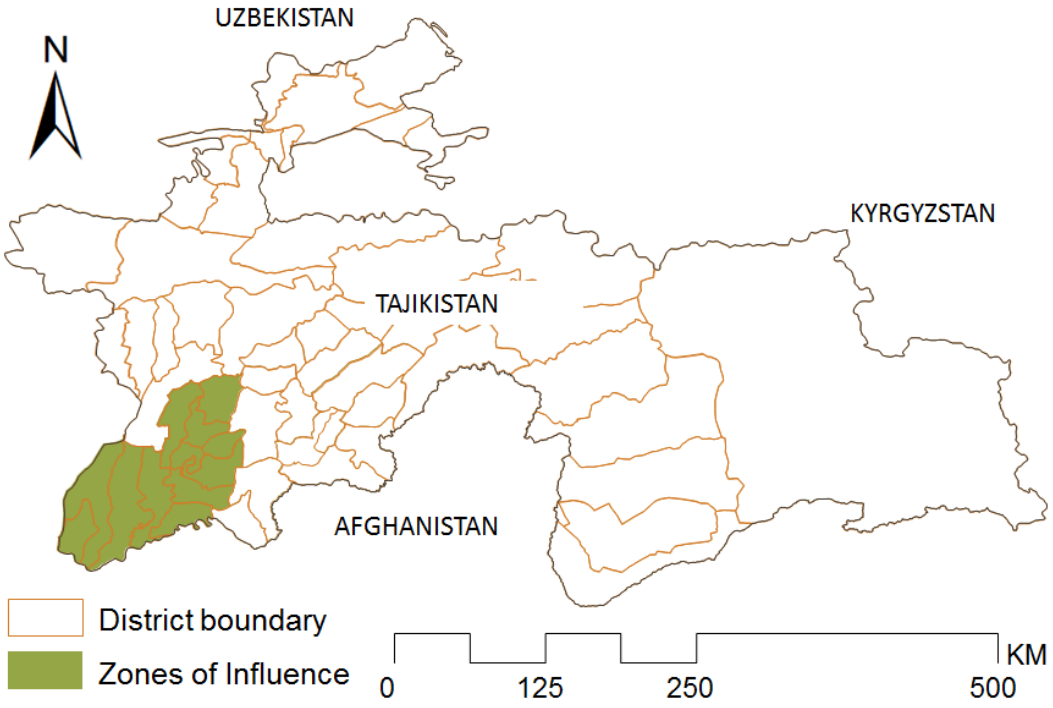
We rely on two datasets for the analyses in this report. The first dataset, "the Assessment of Nutrition-Sensitive Value Chains in the Feed the Future Zone of Influence in Tajikistan", was collected by IFPRI and USAID in 2018. The second dataset is the 2017 Demographic and Health Survey (DHS) for Tajikistan. In the first subsection we provide more details on these datasets. The second subsection explains the methods of analysis.

Data

In August and September 2018, IFPRI and USAID administered a household survey to 1,200 households in USAID's Zone of Influence (ZOI) in Khatlon Province (Figure 1). It is estimated that the ZOI contains about 1.7 million people, which is more than half of the total population of

Khatlon Province. During the Soviet era, this was a major cotton-growing area. Yet, the region has not been able to retain its former economic status after independence as it suffered particularly heavily during the Tajik Civil War and is hampered by aging infrastructure and fragmented institutional frameworks.

Figure 1. Map of Tajikistan and the Zones of Influence covered in our sample



Source: USAID Tajikistan

The study was designed to capture information about households that were engaged in production on various types of agricultural farms including household and presidential plots, dehkan farms and rental land. Moreover, the study intended to cover households that are engaged in horticultural production. Therefore, the sample is not intended to be representative of the ZOI as such. The survey covered 80 villages from 12 districts in the ZOI. Out of 15 households to be surveyed in a village, on average 10 households were selected from a list of households whose household members had attended agricultural and water management capacity building activities. The remaining (on average) five households per village was randomly selected from household listings of local administrative areas (jamoats; every next Nth household) with the added precondition that they met the two aforementioned horticultural production and sale criteria. The sample

design does not allow for reweighting to be representative of the population or a specific subpopulation. Hence, findings from this dataset are to be interpreted as sample shares rather than as population shares.

The survey focused on household agricultural activity and local agricultural value chain systems and cross-reference this data with other indicators pertaining to household wellbeing. Given its focus on horticultural crops, certain detailed modules were asked only of major horticultural crops, based on the sales of the crop and the cultivated area. No details were asked about wheat and cotton, which are also commonly cultivated.

Finally, the questionnaire contained the modules of the abbreviated Women's Empowerment in Agriculture Index (a-WEAI), but these were only administered to one female respondent. They were intended to be administered to a female primary decision maker. The sample therefore likely exhibits an upward bias in terms of economic participation and decision-making of its female respondents when compared to all the women living in the sample households. Moreover, we cannot compare women's scores with men's scores given that the modules were not administered to a male respondent. Given the drawbacks of the sample and given that certain socio-economic indicators of interest cannot be constructed from the IFPRI/USAID dataset, we supplement our analysis with information from the Tajikistan DHS.

The Tajikistan 2017 DHS sample is designed to be representative at the national and regional level. The DHS does not suffer from the sample limitations in the IFPRI/USAID dataset. Moreover, the DHS questionnaire contains more detailed information on the respondent's occupation, her earnings, and a series of widely used indicators related to decision-making power. However, similar to the IFPRI/USAID dataset the Tajikistan DHS does not interview men individually. Given that DHS questionnaire does not focus on agricultural production and crop marketing, the DHS data complements rather than supersedes the IFPRI/USAID dataset.

Methodology

The analysis of the paper is descriptive. We begin by providing a descriptive overview of gender patterns in crop production and marketing. The IFPRI/USAID data are not weighted and not considered representative (as explained in the subsection above). They nevertheless provide good insights into gender roles in agricultural production. In this dataset, whether a person is the documented parcel owner is derived from the question "*In whose name is the legal title/ownership registered?"*. Whether a person is a parcel decision maker is derived from the question "*Who primarily makes decisions about the use of this plot?"*. This question is asked for every

plot type and regardless of its ownership or cultivation status. Some parcels have a non-household member as the documented owner of a parcel (12 percent) or a non-household member as the main decision maker of a parcel (10 percent) (Table A.1). We expect that these non-household member owners or managers mainly consist of migrating relatives, relatives living in other households, or potentially deceased relatives in case of documented ownership. It is however notable that non-household members are particularly prevalent among dehkan farms (19 percent of documented owners and 18 percent of plot decision makers). We do not have further information on the gender or other characteristics of the non-household members. The gender of the main parcel owner or decision maker will therefore be marked as missing for these parcels and we will not report on these plots owned or managed by persons outside of the household.

The second part of the analysis section focuses on the associations between women's economic participation and household decision-making. We rely on both the IFPRI/USAID and DHS dataset for this. The IFPRI/USAID analysis is based on the responses from female primary decision makers among agricultural households in rural Khatlon. The descriptive analyses of the DHS dataset are calculated using population weights. We limit the DHS analysis to rural women to allow for a clear focus on rural areas, and we limit the analyses to married women given that several decision-making questions were asked to married women only. Unlike the IFPRI/USAID dataset, the DHS also includes women from non-farm households, and we retain them in the sample for our analyses.

In addition to a comparison of women's decision-making power conditional on their employment status and type of employment, we also conduct regression analyses to further explore these associations. Specifically, we estimate the following empirical specification using Ordinary Least Squares (OLS):

$$Y_i = \beta_0 + \beta_1 E_i + \beta_2 X_i + \varepsilon_i \qquad (1)$$

where i is an index for each respondent. Each regression analysis has a binary outcome variable Y_i, which is a decision-making variable. For the IFPRI/USAID dataset we have two outcome measures: whether the respondent feels that she can make decisions on minor household expenditures, and whether the respondent feels that she can make decisions on major household expenditures. These variables are calculated following the a-WEAI guidelines (IFPRI 2022). For the DHS dataset we rely on five decision-making variables as outcome variables: on major household purchases, on the earnings of the respondent's husband, on the respondent's own earnings (if applicable), on the respondent's healthcare, and on the respondent's visits to her family.

We are mainly interested in the impact of women's economic activities, here represented by E_i on her decision-making power. For analyses based on the IFPRI/USAID data we to construct E_i based on whether the respondent participates in a given activity or not. Thus, participation in various economic activities is possible – they are not mutually exclusive to one another. This variable is different in analysis based on the DHS dataset, where E_i stands for the main occupation of the respondent, thus instead showing a series of mutually exclusive occupational categories.

The factor X_i represents a series of control variables that control for respondent, household and location characteristics. Where possible and relevant, both the IFPRI/USAID and DHS analyses include the same control variables. However, we also exploit the strength and richness of each dataset and include different relevant control variables for each set of analyses. The IFPRI/USAID dataset allows us to control for more detailed information regarding the household farm. The DHS dataset allows us to control for several factors that were deemed instrumental to women's empowerment based on the literature for Tajikistan (for example whether she lives with her in-laws).

It is important to bear in mind that we can only show associations and not establish causality between economic participation and decision-making. There are likely other factors that jointly determine economic participation and decision-making that we cannot control for, such as the person's skills, interest, abilities and personal beliefs as well as those of her immediate social network that co-determine these factors.

CROP FARMING

Productive resources

Agricultural land

Despite significant male rural outmigration and likely ensuing higher involvement of women in agriculture, we find that the documented owners of a large majority of plots in our sample are men in the household (80 percent), and men are also often considered the main agricultural decision maker (81 percent) (Table 1). Women own and manage only 20 and 19 percent of the plots. This gender gap is relatively similar across different plot types but smaller among rented plots. The latter supports the narrative that women have an interest to farm but are more disadvantaged in access to land through ownership than men, either after inheritance, purchase or land redistribution. Women who wish to farm therefore more often have to revert to hiring land in order to access land compared to men who wish to farm.

Table 1: Documented owner and main parcel decision maker, by gender and plot type

	Documented owner [a]				Main parcel decision maker [b]			
	Male	Fe-male	M/F Test	*N plots*	Male	Fe-male	M/F Test	*N plots*
All plots	0.80	0.20	***	1,730	0.81	0.19	***	1,824
HH Plot	0.82	0.18	***	1,063	0.81	0.19	***	1,100
Presidential	0.79	0.21	***	427	0.80	0.20	***	440
Dehkan	0.78	0.22	***	239	0.81	0.19	***	243
Rented					0.70	0.30	***	40

a Includes all plots where a household member is documented owner; b Includes all plots where a household member is the main decision maker on the use of the plot. Stars indicate significant differences between plots of male and female owners or decision makers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset

We consider whether women own or cultivate smaller or lower-quality plots in Table 2 (based on gender of the main decision maker) and Table A.2 (based on gender of the documented owner). Plots owned or managed by women are smaller than those owned or managed by men (though at low significance level, at p<0.15), but this is mainly driven by dehkan farms. Women's dehkan farms which are significantly smaller (roughly a third smaller) than men's dehkan farms.

In our sample all types of plots are located relatively close to the home and road, with no sizeable differences by gender of the plot manager (Table 2). Plots managed by women are more often perceived as having low soil quality, an effect which mainly appears driven by household plots and rented plots. Women-owned plots also appear at a disadvantage in terms of access to water, particularly when focusing on household plots. Women's household plots less often have access to a public or private water pipe, but they more often use inner small ditches as water source for cultivation. These findings resonate with qualitative research findings from Uzbekistan, where women also have lower quality plots than men (Najjar et al. 2022).

Gendered crop patterns

We explore whether men and women have different cropping patterns in Table 3 and 4. We only consider plots on which at least one crop is grown. We find a similar number of crops are being cultivated on plots with male and female decision makers. Most crops or crop types are as likely to be cultivated on male- as on female-cultivated plots, but vegetables or fruits are less often grown on female-managed plots (33 percent) compared to male-managed plots (40 percent). This is not necessarily driven by different types of plots cultivated by men and women, given that we also find that men more often grow vegetables and fruits on household plots or dehkan farms only (not shown here).

Table 2: Plot characteristics, based on gender of main decision maker and by plot type

	All Plots		HH Plot		Presidential		Dehkan		Rented	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Plot size (in sotka/are)	48.9	35.2	15.1	16.1	11.1	10.5	266.4	166.2*	55.8	59.9
	(4.1)	(6.5)	(0.3)	(0.8)	(0.5)	(0.9)	(25.6)	(46.2)	(24.5)	(31.8)
Cultivated plot size (in sotka/are)	43.2	31.1	8.5	9.5**	11.0	10.4	253.8	164.5	55.1	58.8
	(4.1)	(6.5)	(0.2)	(0.6)	(0.5)	(0.8)	(25.2)	(46.3)	(23.8)	(31.9)
Plot distance from home in km	0.5	0.6*	0.0	0.0	1.0	1.4	1.3	1.8	1.5	0.6
	(0.0)	(0.1)	(0.0)	(0.0)	(0.1)	(0.2)	(0.1)	(0.6)	(0.3)	(0.4)
Plot distance from road in km	0.2	0.3**	0.1	0.1	0.3	0.6***	0.4	0.7	0.4	0.1
	(0.0)	(0.1)	(0.0)	(0.0)	(0.0)	(0.2)	(0.1)	(0.3)	(0.2)	(0.0)
# crops grown on the plot	2.58	2.39	3.39	3.20	1.08	1.10	1.82	1.60	1.18	0.92
	(0.07)	(0.12)	(0.10)	(0.16)	(0.05)	(0.14)	(0.12)	(0.25)	(0.18)	(0.26)
Soil quality										
Low	0.40	0.48***	0.38	0.49***	0.45	0.46	0.40	0.40	0.68	0.83
Medium	0.48	0.39***	0.50	0.36***	0.44	0.44	0.48	0.47	0.21	0.17
High	0.12	0.13	0.12	0.15	0.11	0.10	0.12	0.13	0.11	0.00
Main source of irrigation										
Public water pipe	0.12	0.10	0.15	0.10**	0.07	0.12	0.06	0.07	0.25	0.17
Private water pipe	0.03	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.04	0.00
Artesian or water well	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Natural spring, river, or lake	0.14	0.13	0.12	0.10	0.15	0.20	0.20	0.16	0.00	0.08
Canal	0.22	0.20	0.18	0.18	0.30	0.23	0.29	0.24	0.14	0.08
Drainage canal	0.02	0.01	0.01	0.01	0.03	0.01	0.02	0.00	0.11	0.17
Inner small ditch	0.46	0.52*	0.48	0.55**	0.44	0.42	0.43	0.53	0.46	0.50
Number of observations	*1,469*	*355*	*892*	*208*	*350*	*90*	*198*	*45*	*28*	*12*

The sample includes all plots where a household member is the main plot decision maker. Standard errors of continuous variables are shown in brackets. Stars indicate significant differences between plots of male and female decision makers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset

We see a similar pattern when we instead consider the share of plots with vegetables or fruits that have a female decision maker (Table 3). When we compare this with the average share of plots managed by women (19 percent), we find that vegetables and fruits are grown disproportionately less frequently on women's plots (Table 3, grey columns). That women less often cultivate vegetables or fruits aligns with the assumption that men tend to focus more on cultivating high-value crops.

Table 3: Gender cropping patterns, by gender of the main parcel decision maker

	# crops and share of plots on which crop is grown			Among all plots with crop, share managed by woman		# plots with crop
	Male	Female	Test [a]		Test [b]	
# crops (any plot)	2.89	2.71		n/a		
# crops on HH plot	3.45	3.24		n/a		
# crops on presidential plot	1.48	1.55		n/a		
# crops on dehkan farm	2.27	2.06		n/a		
# crops on rented plot	1.57	1.38		n/a		
Cotton	0.05	0.03		0.13	*	*79*
Wheat	0.07	0.09		0.23		*124*
Corn (consumed)	0.13	0.12		0.18		*209*
Fodder	0.17	0.20		0.21		*290*
Potatoes	0.41	0.45		0.21		*678*
Tomatoes	0.41	0.40		0.19		*663*
Veggies/fruit [c]	0.40	0.33	**	0.16	***	*632*
Tree fruits & nuts	0.32	0.36		0.21		*527*
Legumes	0.07	0.06		0.16		*115*
Other	0.22	0.24		0.20		*363*
Number of observations	*1,313*	*312*		*n/a*		

This sample includes all plots where a household member is decision maker and on which at least one crop is grown. [a] Test for significant differences in the number of crops or whether a crop was grown on a lot with a male decision maker compared to a plot with a female decision maker [b] Test comparing the share or female plotholders among all plotholders cultivating the crop compared to the average share of plots managed by a woman (0.19). [c] These are vegetables and fruits other than tomatoes and tree fruits. Stars indicate significant differences at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

Input use and labor for selected major plot/crops

The survey contains details on input usage for plots where major horticultural crops are grown but does not include information from plots on which cotton or wheat crops are mainly grown. Table 4 shows that female-managed plots with major horticultural crops less often receive inputs, sometimes across all plots or sometimes when considering a specific plot type. Overall, female-managed plots less often make use of owned machinery for production, they less often receive fertilizer (any type) and chemical fertilizer in particular. Female-managed dekhan farms less often use hired labor (none in our sample) and mechanization (38 percent) than men-managed dehkan farms (13 and 64 percent respectively), but interestingly they more often apply manure or organic fertilizers (57 percent versus 38 percent). Among the dehkan farms on which major horticultural crops are grown in our sample, only seven dehkan farms received any extension for their horticultural crops. These seven dehkan farms were all male-managed farms, meaning none of the

female-managed dehkan farms had received any advisory/extension services for their horticultural crops.

Table 4: Input use on major horticultural crops, by plot type and gender of plot decision-maker

	All Plots		HH Plot		Presidential		Dehkan		Rented	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Employed hired labor	0.03	0.02	0.01	0.02	0.03	0.00	0.13	0.00*	0.20	0.40
Used machinery in production	0.26	0.24	0.18	0.20	0.57	0.53	0.64	0.38**	0.90	0.40**
Owns machinery used in production [a]	0.11	0.04*	0.11	0.05	0.09	0.00	0.10	0.00	0.22	0.00
Used fertilizer	0.76	0.69**	0.76	0.70*	0.77	0.40***	0.71	0.81	0.60	0.60
Used chemical fertilizer	0.58	0.50**	0.57	0.48**	0.57	0.40	0.62	0.67	0.50	0.60
Used manure or organic fertilizer	0.56	0.52	0.60	0.55	0.46	0.27	0.38	0.57*	0.10	0.00
Used improved seeds	0.46	0.46	0.41	0.40	0.65	0.73	0.69	0.67	0.50	1.00*
Received advisory services	0.05	0.05	0.05	0.06	0.03	0.00	0.07	0.00	0.00	0.00
# observations	*943*	*232*	*766*	*191*	*61*	*15*	*106*	*21*	*10*	*5*

This sample includes all plots where a household member is decision maker and on which at least one major crop is grown. M=male-managed plot; F=female-managed plot. [a] This applies only to plots on which machinery is used; Stars indicate significant differences between plots of male and female decision makers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

Women perform about half of the farm labor provided by household members on plots with major crops, and this is relatively consistent when considering different crops, plot types or household categories (Table 5). Women perform slightly under half of all household labor days (48 percent) on male-managed plots, and slightly over half (53 percent) on female-managed plots. As expected, women's share of household labor days is higher on female-managed plots compared to male-managed plots. Nevertheless, while the difference is significant for all crops combined and for several crop types, it is not very sizeable (5 percent for all major horticultural crops combined).

Table 5: Women's share in household labor days allocated to major horticultural crops, by gender of plot decision maker

	All plot managers	Male managed plot	Female managed plot		#
All major crops	0.49	0.48	0.53	***	*1,427*
Tree fruits & nuts	0.50	0.49	0.59	***	*296*
Potatoes	0.46	0.46	0.49	*	*424*
Tomatoes	0.51	0.49	0.57	***	*295*
Veg & Fruit [a]	0.48	0.48	0.51		*402*
HH plot	0.49	0.48	0.54	***	*1,168*
Presidential plot	0.50	0.49	0.53		*81*
Dehkan farm	0.44	0.44	0.47		*163*

This sample includes all major crops on plots where a household member is decision maker and on which at least one major crop is grown. We do not show this for other crops and rented plots given limited number of observations. Stars indicate significant differences between plots of male and female decision makers at * p<0.10; ** p<0.05; ***p<0.01. [a] This includes all vegetables and fruits except for tomatoes and tree fruits. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

CROP MARKETING

Which and whose crops are being sold?

We first consider all crops cultivated by respondent's households. Remember however that households were selected for interview based on at least a minimum engagement in crop marketing, hence we expect a higher share of households selling crops in our sample as compared to the average farm household in this area. Indeed, nearly half of all crops cultivated were intended for sale, and to a larger extent on plots of a female manager (50 percent) as compared to plots with a male manager (46 percent) (Table 6). As expected, crops are more often intended for sale on dehkan farms (68 percent) and least often on presidential plots (32 percent).

For selected horticulture crops (excluding cotton, cereals and forage crops) that respondents considered 'major crops' in terms of cropping area and sales volumes, we also have more detailed information on the values and share of the crops sold and consumed. Table 7 and appendix table A.3 consider this by the main plot manager. In total, the value of major crops sold is not significantly different when comparing crops on male- and female-managed plots. Moreover, while one might expect that women reserve a larger portion for consumption, we do not find a significant difference in crop commercialization between male-and female-managed plots among most drop categories. Women in our sample sell a higher share and consume fewer of their tree fruits and nuts.

Table 6: Share of households selling or intending to sell crops that have been harvested, by gender of plot decision maker and plot type on which crop is grown

	Male	Female	*# Observations*
All crops	0.46	0.50*	*3,874*
Cotton	0.70	0.67	*52*
Wheat	0.10	0.21	*123*
Corn (consumed)	0.25	0.23	*165*
Fodder	0.15	0.19	*263*
Potatoes	0.64	0.68	*675*
Tomatoes	0.48	0.54	*659*
Veggies/fruit	0.50	0.53	*915*
Tree fruits & nuts	0.47	0.52	*838*
Legumes	0.19	0.21	*118*
Other	0.35	0.25	*66*
Household plot	0.45	0.50*	*3,073*
Presidential plot	0.32	0.41	*427*
Dehkan farm	0.68	0.59	*339*
Rented plot	0.54	0.78	*35*

This sample includes all crops on plots where a household member is decision maker and on which at least one crop is grown. T-test for significant differences between commercialization on plots managed by a male household member as compared to by a female household member were conducted, indicated with * at p<0.10. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

Table 7: Mean value and share of total harvest of major crops being sold or consumed, by gender of the main plot manager

	Value marketed		**Value consumed**		**Share marketed**		**Share consumed**		
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	***#***
All major crops	962	812	221	228	0.64	0.66	0.24	0.22	*1,488*
	(69)	(98)	(13)	(21)	(.01)	(.02)	(.01)	(.01)	
Tree fruits & nuts	1,058	1,206	170	178	0.73	0.80**	0.19	0.13**	*331*
	(116)	(225)	(17)	(45)	(.02)	(.03)	(.01)	(.02)	
Potatoes	649	515	235	254	0.59	0.57	0.25	0.26	*434*
	(55)	(50)	(31)	(31)	(.01)	(.02)	(.01)	(.02)	
Tomatoes	488	685	285	292	0.53	0.55	0.35	0.31	*305*
	(52)	(185)	(20)	(44)	(.02)	(.03)	(.01)	(.03)	
Veggies/fruit	1,548	950	205	194	0.69	0.71	0.19	0.18	*407*
	(208)	(319)	(24)	(54)	(.01)	(.03)	(.01)	(.02)	
Household plot	653	659	196	222	0.61	0.64	0.26	0.23**	*1,231*
	(44)	(72)	(8)	(22)	(.01)	(.02)	(.01)	(.01)	
Presidential plot	1,304	802	235	139	0.79	0.74	0.14	0.21	*80*
	(199)	(230)	(97)	(41)	(.03)	(.05)	(.02)	(.05)	
Dehkan farm	2,861	1377	397	174	0.75	0.76	0.15	0.14	*162*
	(440)	(429)	(82)	(46)	(.02)	(.05)	(.02)	(.03)	

This sample includes all major crops on plots where a household member is decision maker and on which at least one major crop is grown. We do not show this for other crops and rented plots separately given limited number of observations. Share marketed and share consumed do not sum to 1 given that there are other uses of the crop that we do not report on here, for example gifts, in-kind payments or post-harvest losses. Standard errors are shown in brackets. Stars indicate significant differences between plots of male and female decision makers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

Who is selling the crops

The person selling a crop is not necessarily the same person as the main person cultivating the crop. We do not have information on which household members sold each major crop, but we do know the gender of the crop seller. Table 8 shows that both men and women are selling major crops (about 46 percent of crops) and 9 percent are sold by men and women jointly. While overall, men and women are as likely to sell any of the major crops, we find two exceptions. First, tomatoes are significantly more likely to be sold by women than by men, and this difference is very sizeable, with women being almost twice as likely to be selling tomatoes than men. Yet, other vegetables are 1.5 times as likely to be sold by men than women.

Table 8: Share of major crops sold by men, women, or jointly by men and women.

	Gender of person selling crop			
	Male	Female	Joint	#
All major crops	0.47	0.45	0.09	*1,505*
Tree fruits & nuts	0.49	0.45	0.05	*335*
Potatoes	0.47	0.43	0.09	*435*
Tomatoes	0.33	0.58***	0.08	*309*
Veggies and fruits	0.54	0.34***	0.12	*415*
Other	0.36	0.64	0.00	*11*
Household plot	0.43	0.49***	0.07	*1,241*
Presidential plot	0.65	0.26***	0.10	*82*
Dehkan farm	0.60	0.22***	0.19	*164*
Rented plot	0.72	0.22***	0.06	*18*
Crops on male-managed plot	0.51	0.40***	0.10	*1,207*
Crops on female- managed plot	0.31	0.63***	0.06	*298*

The sample includes only crops from plots with a household member as main decision maker and on which a major crop is grown. Standard errors of continuous variables are shown in brackets. Stars indicate significant differences between male and female sellers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset

When we consider the produce by type of plot (Table 8), we find that women more often sell produce from the household plot, but significantly less often produce from presidential plots, dehkan farm and rented plots. They are less than half as likely as men to be selling crops from these non-household plot types. It is notable however that the gender of the person selling is often not the same as the gender of the main plot manager. It is therefore relevant to reconsider sales volumes based on the gender of the person selling the crop.

Table 9 shows that men sell much larger volumes (in value terms) compared to women, and significantly so for tree fruits and nuts, vegetables and fruits, and potatoes. A similar table but for median values is shown in appendix Table A.4. Striking are the gender differences for other

fruits and vegetables where the sales value is three times higher for men compared to women. Furthermore, this also holds for the combined value of major crops sold from household plots, on which men's sales values are roughly two times as high as those of women's sales. One major caveat here is that we have no information on product differentiation, such as bulk sales versus products that have received minor processing.

Table 9: Mean value of crops marketed, by gender of the person selling the crop

	Value marketed (in 2017 Tajik Somoni)			
	Male	Female	Joint	*# obs*
All major crops	1,335	538**	781	*1,488*
	(113)	(44)	(116)	
Tree fruits & nuts	1,589	597***	608	*331*
	(189)	(73)	(127)	
Potatoes	755	451**	710	*434*
	(83)	(32)	(148)	
Tomatoes	570	468	764	*305*
	(61)	(68)	(400)	
Veggies/fruit	2,054	685***	916	*407*
	(311)	(169)	(193)	
Other	633	376		*11*
	(168)	(65)		
Household plot	906	449***	533	*1,231*
	(80)	(29)	(75)	
Presidential plot	1,316	1,135	405	*80*
	(219)	(288)	(117)	
Dehkan farm	3,289	1,709	1,635	*162*
	(577)	(621)	(410)	
Rented plot	5,104	740	340	*15*
	(2,253)	(530)		

The sample includes only major crops from plots with a household member as main decision maker. Standard errors of continuous variables are shown in brackets. Stars indicate significant differences between male and female sellers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset

As a final part in this section, we consider whether market and marketing characteristics differ by gender of the seller. Here, too, we find large differences between male and female sellers of major crops. Women sell more often at the farmgate than men (70 percent versus 51 percent). Men more often transport their produce by vehicle, either their own or borrowed from others. Men spend less time travelling to the place of sales than women (16 hours versus 23 hours), more often make prior price agreements (13 percent vs. 7 percent) or have contracts (4 percent versus 2 percent), and also more likely received inputs or advances from the buyer (4 percent vs. 2

percent). These gender differences in crop marketing continue to hold when we consider them by crop or crop type (not shown here) and therefore are not explained by men and women selling different crops.

Table 10: Marketing characteristics of major crops marketed, by gender of the person selling the crop

	Male	Female	Joint	*M/F Test*
Sold at farmgate	0.51	0.70	0.64	***
Transported by own vehicle	0.12	0.02	0.04	***
Transported by family/friend/other vehicle	0.29	0.21	0.22	***
Transported by own/borrowed cart	0.04	0.04	0.07	
Other transportation	0.05	0.03	0.03	
Cost of transportation (somoni)	117	90	93	
	(19)	(26)	(55)	
Travel time (hours)	16	23	6	***
	(1.1)	(2.1)	(1.0)	
Price agreement prior to arriving at the place of sales	0.13	0.07	0.06	***
Contract with buyer	0.04	0.02	0.04	***
Received inputs or advances from the buyer	0.04	0.02	0.03	**
Number of observations	*729*	*698*	*136*	

The observations here are by plot, major crop and season, and includes all major crops on plots where a household member is the main decision maker. Standard errors of continuous variables are shown in brackets. Stars indicate significant differences between male and female sellers at * p<0.10; ** p<0.05; ***p<0.01.

Source: authors' calculations based on IFPRI/USAID 2018 dataset

WOMEN'S ECONOMIC PARTICIPATION AND HOUSEHOLD DECISION-MAKING?

Previous sections indicate that women play an important role in agricultural crop production and marketing in Tajikistan. Yet, whether participation in economic activities translates to decision-making power in the household is questionable. We explore this further in this section. We will provide the evidence relying on two different populations. First, we focus on primary female respondents from rural agricultural households based on the IFPRI/USAID dataset focusing on Khatlon province. Secondly, we expand our focus to female respondents in rural Tajikistan at large based on the DHS dataset.

Decision-making power in agricultural households in Khatlon province

The sample and respondent selection for the IFPRI/USAID 2018 dataset leads to a significant oversampling of women respondents involved in agricultural production, yet it is an informative dataset to explore the extent to which women participating in farm and non-farm activities also have a say over the activities they participate in and the income derived thereof. Table 11 shows that regardless of the specific economic activity they participate in, respondents generally have some input in decisions on this activity (between 93 and 100 percent) and on income from the activity (between 89 and 100 percent). However, much fewer respondents feel they really can make personal decisions on the activity (between 69 and 83 percent).

Table 11: Participation in and decision-making on economic activities, in percentage of female respondents

	Participates in [...]	Conditional on participation		
		Has some input in decisions on [...]	Has some input on income from [...]	Feels can make personal decisions on [...]
Crop farming	89%	95%	91%	82%
Livestock farming	49%	94%	90%	80%
Fishing/fishpond culture	0.3%	100%	100%	75%
Non-farm economic activities	20%	96%	92%	70%
Wage and salary employment	21%	99%	95%	69%

Source: authors' calculations based on IFPRI/USAID 2018 dataset

In contrast to women's economic participation and their decision-making over these activities, only 13 percent of female respondents feel they can make personal decisions on major household expenditures and only 46 percent does so on minor household expenditures. The question therefore arises to which extent participation in income-generating activities effectively results in women's economic decision-making options at home.

In Table 12 we show the percentage of female respondents who feel they can make decisions on minor and major household expenditures, comparing women who do not and do not participate in different employment categories. Across all employment categories, the findings show that women who do participate in each economic activity have more decision-making power in minor and major expenditures than women who do not participate in the respective economic activity. The decision-making gap between participants and non-participants is however different depending on the type of activity and whether the decisions relate to minor or major expenditures.

Table 12. Percentage of female respondents who feel they can make decisions on minor or major household expenditure, by participation in specific livelihood activities

	Makes decisions on minor household expenditures			Makes decisions on major household expenditures		
	Does not participate in [...]	Participates in [...]	Test	Does not participate in [...]	Participates in [...]	Test
Crop Farming	23%	49%	***	8%	14%	*
Wage Employment	44%	57%	***	11%	22%	***
Livestock Farming	38%	56%	***	7%	20%	***
Fishing/Fishpond Culture	47%	50%		13%	50%	**
Non-Farm Economic Activities	43%	61%	***	8%	37%	***

Stars indicate significant differences between female respondents who do not or who do participate in specific livelihood activities at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset.

Several factors may be linked to both women's employment and their decision-making power. In Table 13 we show the findings from regression analyses that control for some of these factors, though we cannot claim to establish causal effects here. In the interpretation of the results, it is important to keep in mind that the employment variable captures all women's income-generating activities rather than only the main occupation of the respondent. Many women engage in multiple income-generating activities, and most wage workers are also own-farm workers.[1]

Based on the regression analyses, we find that women working on the household farm have more decision-making power over minor household expenditures than those who do not work on the household farm. Moreover, the association of this effect is larger than any other occupation. It is possible that women's work on the household farm is more easily combined with household management as it usually occurs around or nearby the homestead, therefore allowing them to participate more directly in decision-making on minor household expenditures. Yet, the regressions show that when we control for respondents' individual and household characteristics, working on the household farm has no significant association with decisions on major household expenditures (Table 13).

Women wage workers - mainly agricultural wage workers in this sample - have significantly less decision-making power over both minor and major household expenditures than those who do not participate in wage work. The negative association of wage work with decision-making in particular confirms the findings of Mukhamedova and Wegerich (2018) who mention how low-paid agricultural work has become less rewarded and provides insufficient wages for meeting

[1] Only five respondents are wage workers but do not participate in own-farm activities.

basic household needs. Participation in other economic activities such as livestock raising or working in other non-farm enterprises are positively associated with decision-making power over major household expenditures.

Table 13. Regression analysis of factors associated with respondents feeling they can make decisions on minor or major household expenditures

	MINOR	MAJOR
Participates in own farm activities	0.205***	-0.046
Does wage work	-0.077*	-0.050*
Participates in livestock rearing	0.108***	0.085***
Works in a NFE	0.039	0.187***
Plot owner	0.066	0.079***
Respondent is < 30 years old	-0.011	-0.026
No education [1]	-0.005	-0.029
Primary education [1]	0.007	-0.122**
Basic education [1]	0.029	0.015
Higher education [1]	-0.019	0.069*
Married	-0.041	-0.037
Household size (in adult equivalents)	0.015	-0.007
# HH members with age <5 years	-0.037*	0.016
Household and presidential plot only [2]	-0.022	0.019
Dehkan farm or rented plot [2]	-0.039	0.064**
Household grows tree crops	0.002	0.024
Household grows vegetables and greens	0.053*	-0.005
Household grows potato	0.020	0.032
Household grows tomato	-0.023	0.016
Good quality floor	0.032	0.030
Good quality cooking fuel	0.013	0.022
Constant	-0.126	0.224**
Number of Observations	*1,173*	*1,166*
R-Squared	.272	.299

1 The base category for the educational variables is secondary education. 2 The base category for farm type is a farm household with a household plot only. Stars indicate coefficients are significantly different from zero at * p<0.10; ** p<0.05; ***p<0.01.

Source: authors' calculations based on IFPRI/USAID 2018

Decision-making power in rural households across Tajikistan

We now turn to the DHS dataset to assess the relation between women's employment and decision-making power among rural women across the country. The DHS dataset contains information from a more diverse group of women compared to the IFPRI/USAID dataset: it includes both women in agricultural and in non-agricultural household and women from all regions of the country; moreover, female respondents are randomly selected among adult women (rather than

selected based on being the primary female decision maker in their households). We will limit our analysis to married women in rural areas because decision-making questions are only asked to married women. We focus on rural areas because agricultural work is more common in rural areas compared to urban areas. Note also that the DHS only informs us on the respondent's main occupation, but not on any additional employment activities she might perform.

Table 14 shows the percentage of rural women who can make economic and personal decisions, either solely or jointly with other household members. First, it is striking that few women have a say in household and personal decisions. Only 35 percent of rural women decide on large household purchases and 37 percent have input into the use of their husbands' earnings. Among those earning income, 69 percent decide on their own earnings. Furthermore, only 43 and 42 percent of respondents respectively decide on their own health care or on making family visits.

Table 14. Percentage of rural married women who feel they can make decisions solely or jointly with other household members, by main occupation

	Large hh purchases	Husband's earnings	Respondent's earnings[1]	Respondent's healthcare	Visits to respondent's family	*# obs*
All rural women	35%	37%	69%	43%	42%	*4,783*
No occupation	29%	30%	n/a	36%	36%	*3,648*
Non-agricultural employment	56%	61%	75%	69%	64%	*719*
Agricultural employment	45%***	48%***	58%***	56%***	54%**	*416*
Works for non-family member	53%	56%	70%	64%	61%	*822*
Works for self or family	49%	54%	67%	60%	58%	*313*

1 This question is only asked to women who engage in paid work. Stars indicate significant differences between those engaged in agricultural and non-agricultural employment at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on DHS 2017

Women without occupations have less decision-making power compared to women with an occupation across all decisions in Table 14. The share of women who can make different types of decisions is higher among women who work in the non-agricultural sector as compared to women who work in agriculture. The difference between women working for non-family members and women working for family members is relatively small, though we do observe a small and positive effect of working for non-family members.

We further analyze the association between employment and decision-making more rigorously by running regression analyses. These analyses allow us to control for relevant individual and household-level characteristics that could drive both respondent's occupations and decision-

making power. In terms of main occupation, we chose agricultural work as the base category. The other effects observed are therefore in comparison to agricultural work.

After controlling for other characteristics, women without occupations are significantly worse off in all decision-making categories as compared to women who mainly work in agriculture (Table 15). Women working mainly in the non-agricultural sector have higher economic decision-making power in the household compared to those working in agriculture, but we do not find a significant effect on personal decisions regarding healthcare or making family visits. Working for non-family members is only positively and significantly associated with women's decision-making on their own earnings but not on any other household economic or private decisions, particularly for women working in agriculture (the base category for the analyses). For women working in the non-agricultural sector there is no longer a significant difference when working for a non-family member (the effect of working for non-family member is undone by the negative interaction effect).

Table 15. Factors associated with whether rural married women feel they can make decisions solely or jointly with other household members, by main occupation

	Large purchases	Respondent's earnings [1]	Husband's earnings	Healthcare	Family visits
No occupation	-0.073**		-0.126***	-0.106***	-0.109***
Non-farm employment	0.132***	0.226***	0.111**	0.056	0.023
Farm employment for non-family member	0.042	0.142**	-0.046	0.013	0.010
Non-farm employment for non-family member	-0.085	-0.195***	-0.005	0.032	0.038
Husband worked abroad in past 3 years	0.038***	0.043	0.021	0.024*	-0.001
Household size (in adult equivalents)	-0.017***	-0.007	-0.015***	-0.010***	-0.010***
Lives with in-law	-0.157***	-0.163***	-0.127***	-0.146***	-0.147***
Age	0.011***	0.007***	0.011***	0.011***	0.011***
Educational attainment (level)	0.006	0.013	-0.000	0.009	0.004
Wealth index	0.007	-0.014	-0.008	-0.000	-0.000
Sughd region	0.078***	0.221***	0.097***	0.183***	0.209***
DRS	0.020	0.242***	-0.046***	0.019	0.033**
GBAO	0.373***	0.335***	0.327***	0.417***	0.378***
Other women present during interview	-0.016	0.020	-0.030**	-0.016	-0.012
Constant	0.104*	0.218*	0.233***	0.155***	0.161***
Number of Obs	*4,783*	*919*	*4,732*	*4,783*	*4,783*

Note: base levels for main occupation is agricultural wage employment, geographically Khatlon region is the base level. 1 This analysis is limited to married women in rural areas who engage in paid work. Stars indicate coefficients are significantly different from zero at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on DHS 2017

We note several other interesting associations among our control variables that follow the expectations based on the literature, which establishes confidence in the relevance of these variables. Women whose husbands have worked abroad in the past three years have a modest but significantly higher say over large purchases and their own healthcare. Women's decision-making power is lower when she lives with her in-laws (similar to findings by Turaeva and Becker 2022) and in larger households, but it increases with age. Finally, women in Khatlon region are generally worse off in terms of decision-making power compared to rural women in other regions of Tajikistan, although they more often make decisions on their husbands' income compared to women in Sughd region.

DISCUSSION AND CONCLUSION

Agricultural activities and the decision-making thereon generally exhibit gender patterns, thus making gender an essential category for understanding the impacts of any agricultural policies and investments (Doss 2018). "Fact-checking" attempts based on quantitative data have, on the one hand, shown that common assumptions about gender differences do not always align with reality (Doss et al. 2018), and on the other hand, that these patterns can differ substantially across contexts (Akter et al. 2017; Maligalig et al. 2019). The first part of the analysis of this paper therefore provides an in-depth assessment of gender patterns in crop production and marketing in Tajikistan, a country that has received relatively little scholarly attention on this topic.

Many rural households engage in off-farm economic activities, which can supplement household income and provide a buffer for seasonality and shocks in farm income. When a member earns additional resources for the household this may increase the person's bargaining power in the household (Sen 1987; Kabeer 2018). In rural communities where women have little decision-making power at home, off-farm employment could therefore potentially improve women's decision-making power. Evidence of the success of women's off-farm employment on her empowerment is however mixed, and it remains an empirical question whether and under which conditions women do gain significantly from employment. We therefore analyze the associations between women's on- and off-farm employment, and her decision-making power over various household economic and private decisions in rural Tajikistan.

The evidence from farm households in Khatlon province suggests that women contribute significantly to agricultural production, but they have little control over agricultural resources. Women perform about half of the farm labor provided by household members on the plots of major horticultural crops. Nevertheless, the main agricultural decision maker of a plot is usually male, and

a large majority of plots are documented in men's names. Female-managed plots tend to be smaller and of lesser quality than men's plots, and they are less likely to receive inputs.

There are no clear gendered cropping patterns, although we do find that women in our sample less often cultivate vegetables or fruits, other than tomatoes or tree crops. Our findings align with the assumption that men tend to focus more on cultivating high-value crops. Marketing of horticultural crops is done by both men and women, but we do observe several gender differences. Women have lower sales volumes than men, more often sell at the farmgate, and less often have prior contracts or price agreements with buyers.

Within farm households, female primary respondents indicate they participate in decisions regarding agricultural activities and on the income obtained from agriculture as well as from other livelihood activities that they participate in. Yet unlike non-farm work, own-farm work is only positively associated with decision-making over minor household expenditures and not with major household expenditures. Performing wage work, which respondents mainly perform in addition to own-farm work rather than as sole occupation, is associated with lower levels of decision-making.

When we more generally consider all rural women nationwide, we find that employment also matters. Women with no main occupation are worse off than other women in terms of all assessed indicators: economic decision-making (major household purchases and their husbands' earnings) and personal decision-making (health and mobility). Yet, the effect of farm work on economic decisions is smaller compared to those having another main occupation. Farm work for non-family members, as main employment, does give women more decision-making power over their own earnings as compared to working on the household farm but not over any other decisions. We do not observe a similar effect for non-farm work.

Overall, these findings are driven by a low valuation of women's farm wage work, and it points at the limitations in the extent to which it contributes to women's agency. Moreover, our study corroborates that other factors, such as migration and intergenerational living arrangements are important predictors of women's agency. Yet, many questions remain unanswered due to limitations in terms of representativeness, data availability and attributing causality in a study based on cross-sectional data. Questions remain as to how to leverage these significant contributions of women in the agricultural sector to increase crop productivity, household incomes and their individual and household wellbeing. Moreover, more insights are need into the role of the non-farm economy in empowering women, and what might drive the observed larger associations

with empowerment as compared to farm work. These limitations could at least partly be addressed with a more comprehensive data collection effort or through carefully designed studies that accompany interventions to increase women's empowerment.

APPENDIX

Table A.1: Documented owner and main parcel decision maker including plots managed or owned by non-hh members, by gender and plot type

	Documented owner [a]					Main plot decision maker [b]				
	Male	Female	Outside HH	M/F Test	*N plots*	Male	Female	Outside HH	M/F Test	*N plots*
All plots	0.70	0.17	0.12	***	*1,977*	0.73	0.18	0.10	***	*2,026*
HH Plot	0.73	0.16	0.11	***	*1,198*	0.74	0.17	0.08	***	*1,198*
Presidential	0.70	0.19	0.11	***	*482*	0.73	0.19	0.09	***	*482*
Dehkan	0.63	0.18	0.19	***	*296*	0.67	0.15	0.18	***	*296*
Rented						0.57	0.24	0.18	***	*49*

The sample consists of all plots except those rented in by the household; b The sample includes all plots owned or cultivated by the household. Stars indicate significant differences between plots of male and female owners or decision makers at * p<0.10; ** p<0.05; ***p<0.01.
Source: authors' calculations based on IFPRI/USAID 2018 dataset

Table A.2: Plot characteristics, based on gender of documented owner and by plot type

	All Plots		**HH Plot**		**Presidential**		**Dehkan**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Parcel size (in are)	47.89	38.06	15.26	15.57	11.10	10.30	265.71	168.08*
	(4.29)	*(7.11)*	*(0.31)*	*(0.72)*	*(0.50)*	*(0.85)*	*(27.13)*	*(41.17)*
Agricultural plot size (in are)	41.76	33.64	8.65	8.99	10.98	10.21	251.10	164.08
	(4.18)	*(7.04)*	*(0.22)*	*(0.50)*	(0.500)	(0.839)	*(26.60)*	*(4070)*
Plot distance from home (in km)	0.45	0.54	0.00	0.00	1.10	1.12	1.40	1.48
	(0.03)	*(0.09)*	*(0.00)*	*(0.00)*	*(0.09)*	*(0.15)*	*(0.13)*	*(0.48)*
Plot distance from road (in km)	0.19	0.22	0.09	0.07	0.32	0.41	0.45	0.44
	(0.02)	*(0.03)*	*(0.01)*	*(0.02)*	*(0.05)*	*(0.09)*	*(0.08)*	*(0.11)*
# crops cultivated on this plot	2.56	2.49	3.33	3.30	1.07	1.03	1.66	2.00
	(0.07)	*(0.13)*	*(0.11)*	*(0.17)*	*(0.06)*	*(0.13)*	*(0.10)*	*(0.39)*
Soil quality								
Low	0.40	0.47**	0.39	0.47**	0.45	0.47	0.38	0.49
Medium	0.48	0.40**	0.49	0.39**	0.43	0.43	0.49	0.40
High	0.12	0.12	0.12	0.14	0.11	0.10	0.12	0.11
Main source of irrigation								
Public water pipe	0.13	0.11	0.16	0.11	0.08	0.12	0.06	0.06
Private water pipe	0.03	0.02	0.05	0.03	0.00	0.00	0.00	0.00
Artesian or water well	0.00	0.01*	0.00	0.02*	0.00	0.01	0.00	0.00
Natural spring, river or lake	0.14	0.13	0.12	0.10	0.15	0.19	0.21	0.13
Canal	0.22	0.20	0.18	0.17	0.29	0.23	0.26	0.26
Drainage canal	0.02	0.00**	0.01	0.00*	0.03	0.01	0.02	0.00
Inner small ditch	0.46	0.53**	0.47	0.57**	0.43	0.43	0.45	0.55
Rainwater	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00
# observations	1,392	338	869	194	336	91	186	53

The sample includes all plots where a household member is the documented owner. Standard errors of continuous variables are shown in brackets. Stars indicate significant differences between plots of male and female decision makers at * p<0.10; ** p<0.05; ***p<0.01. Source: authors' calculations based on IFPRI/USAID 2018 dataset

Table A.3: Median value (in Tajik Somoni) and share of total harvest of major crops being sold or consumed, by gender of the main plot manager

	Value marketed		**Value consumed**		**Share marketed**		**Share consumed**		
	Male	Female	Male	Female	Male	Female	Male	Female	*#*
All major crops	350	400	105	120	0.66	0.67	0.22	0.20	*1,488*
Tree fruits & nuts	400	560	75	36	0.75	0.83	0.14	0.11	*331*
Potatoes	330	400	150	180	0.59	0.53	0.25	0.25	*434*
Tomatoes	228	300	200	180	0.50	0.50	0.37	0.32	*305*
Veggies/fruit	400	260	80	60	0.72	0.77	0.14	0.11	*407*
Other	470	494	30	0	0.50	1.00	0.06	0.00	*11*
Household plot	300	318	120	125	0.60	0.63	0.25	0.20	*1,231*
Presidential plot	810	425	90	75	0.83	0.75	0.12	0.21	*80*
Dehkan farm	1,071	800	141	122	0.80	0.79	0.09	0.10	*162*
Rented plot	775	1,800	125	1,000	0.67	0.82	0.16	0.09	*15*

This sample includes all major crops on plots where a household member is decision maker and on which at least one major crop is grown. Share marketed and share consumed do not sum to 1 given that there are other uses of the crop that we do not report on here, for example gifts, in-kind payments or post-harvest losses. Source: authors' calculations based on IFPRI/USAID 2018 dataset

Table A.4: Median value of crops marketed (in Tajik Somoni), by gender of the person selling the crop

	Value marketed			
	Male	Female	Joint	*# obs*
All major crops	500	276	340	*1,488*
Tree fruits & nuts	600	300	450	*331*
Potatoes	400	300	345	*434*
Tomatoes	320	220	225	*305*
Veggies/fruit	600	250	400	*407*
Other	645	450		*11*
Household plot	400	256	270	*1,231*
Presidential plot	800	688	400	*80*
Dehkan farm	1,250	600	800	*162*
Rented plot	1,250	210	340	*15*

The sample includes only major crops from plots with a household member as main decision maker. Source: authors' calculations based on IFPRI/USAID 2018 dataset

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