Gender, social capital, and market participation in dairy cooperatives in West Shoa, Ethiopia

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This paper investigates the effects of gender differences in social capital on milk market participation using data from dairy cooperatives in Ethiopia. We develop composite indicators which are reliable, valid, and consistent measures of dimensions of social capital: structural, relational, and cognitive. Then, we employ independent sample t-tests, to determine whether there are gender difference across these dimensions. Our results show that female members have less structural social capital. Next, we use a two-way ANOVA test to examine whether milk market participation is affected by gender differences in social capital. The results show that female members have lower milk market participation, which is attributed to their lower structural social capital. Our findings reveal a need to reduce the gender gap in structural social capital. We suggest that this can be done by providing gender-sensitive social capital development, paying attention to gender differences in social network formation, and providing continuous gender training.

Keywords: Social Capital, Gender, Market Participation, Dairy Cooperatives, Ethiopia.

Introduction

In the fields of economics and sociology, there has been a growing research interest in the concept of "social capital" in recent years. Social capital has similarly gained importance among policy makers and influential policy institutions (Grootaert and Van Bastelaer 2002). Work on social capital emphasizes the value of social relations and cooperation for enhancing the well-being of individuals, groups, and society as a whole. Social capital benefits economic actors, by improving the way they interact and organize to generate productive outcomes (Valentinov 2004; Nardone et al. 2010; Gómez-Limón et al. 2014). Social capital has been acknowledged by the World Bank as the missing link, which might allow societies to prosper economically and to achieve sustainable development (Grootaert and Van Bastelaer 2002).

Available evidence shows the importance of social capital in collective actions. Putnam (1995) connects social capital to trust and norms of reciprocity embedded in social networks, which allows individuals to take collective action more effectively in pursuing shared goals. Dinda (2008) relates social capital to social networks and norms that generate trust, reciprocity, and shared understandings, which underpin collective action for mutual benefits. Gómez-Limón et al. (2014, p. 1) describe social capital as "the whole set of shared norms, values, attitudes, and beliefs that promote cooperation among individuals within

the community". As this literature indicates, social relationships make possible certain actions that contribute to the benefit of networked actors, by allowing them to obtain the resources embedded within such relationships. That is, social relationships — together with norms of reciprocity and trust — influence individual and collective performance through the development of shared knowledge and understanding.

Cooperatives are one instrument that promotes farmers' market participation through collective action (Bernard et al. 2010). Cooperatives are composed of autonomous members, who are owners, users, and social actors, at the same time. Cooperatives are formed with the motivation of mutual benefit, and the expectation of collective action among members (Valentinov 2004; Nilsson et al. 2012). Interpersonal relations are the foundation upon which cooperation, communication, and coordination within cooperatives are based. As a result, cooperatives are particularly reliant on social capital as a resource for the coordination of actions, and the creation of links between members (Valentinov 2004).

Gender-related social capital is an emerging theme in the literature, as studies have shown that gender plays an important role in social capital formation. There is gender inequality in the mobilization of social capital, or the potential use of resources embedded in social networks (Westermann et al. 2005; Muñoz-Goy 2013; Karhina et al. 2019). Social capital accrues to, or is

accessed by men and women differently, and thus the benefits derived are also unevenly distributed.

In Ethiopia, emerging evidence shows that women have a lower level of participation in collective marketing in cooperatives than their male counterparts (Jones et al. 2010; Woldu et al. 2013). Gender norms and practices may play a role in constraining women's participation and ability to reap benefits from cooperatives. The literature attributes this to the fact that women are more likely to be socioeconomically disadvantaged compared to men, and these existing gender inequalities create difference in social capital between women and men. This results in a difference in the economic benefits that men and women are able to derive cooperatives, which in turn, perpetuates gender inequality (Muñoz-Goy 2013; Karhina et al. 2019). Consequently, differences in social capital between men and women constrain the effectiveness of collective action (Westermann et al. 2005). In recent years, cooperatives have become the subject of a growing social capital literature (e.g. Valentinov 2004; James and Sykuta 2006; Nilsson et al. 2012; Ruben and Heras, 2012; Liang et al. 2015). Despite its importance, few studies have examined social capital as farmers' propensity to engage in collective marketing within cooperatives. Gender inequalities in particular, have not been adequately addressed in the literature on social capital in cooperatives. In this paper, we examine three dimensions of social capital — structural, relational, and cognitive — in dairy cooperatives, to understand whether there are significant gender differences in these three dimensions, and whether these differences have implications for milk market participation. The paper's contribution is two-fold: First, adding to the methodological literature, we develop a reliable, valid, and consistent measure of dimensions of social capital, and propose this method as a viable means of evaluating social capital in cooperatives. Second, we contribute to research on gender differences in social capital, as a resource relevant for market participation. These findings are important for designing strategies to promote market participation in gender differentiated social groups, such as dairy cooperatives. Our hypotheses are as follows:

H_1. Female members have lower structural social capital than male members.

H_2. Female members have lower milk market participation than male members, which can be attributed to their lower structural social capital.

H_3. Female members have higher relational social capital than male members.

H_4. Female members have higher milk market participation than male members that is attributed to their higher relational social capital.

H_5. Female members have higher cognitive social capital than male members.

H_6. Female members have higher milk market participation than male members that is attributed to their higher cognitive social capital.

The paper proceeds as follows: We begin by presenting the dimensions of social capital that we consider to be important in cooperatives. The third section proceeds with a discussion of the gendered differences in social capital, and highlights the implications of these differences for market participation. It is from this discussion that our hypotheses are derived. In the fourth section, we describe the data and methodology, and then we outline and discuss the results. In the conclusion, we propose some of the policy implications of our findings and suggest avenues for future research.

Dimensions of social capital in cooperatives

Much of the literature indicates that social capital is a multidimensional concept, revolving around different features of human behavior and relationships, which are in many instances, intangible (Nardone et al. 2010; Gómez-Limón et al. 2014). Social capital includes key elements of networks, trust, norms, reciprocity, and cohesion. In their comprehensive review of the literature on social capital, Nahapiet and Ghoshal (1998) identify three distinctive but interrelated dimensions of social capital — structural, relational, and cognitive — which together reflect all of the different features identified in the literature (Nardone et al. 2010; Lindstrand et al. 2011). Each dimension is a separate construct, and has a set of unique qualities.

Structural social capital

Structural social capital refers to the pattern of connections and relationships among individuals (Nahapiet and Ghoshal 1998), and the ways in which members of social networks help each other to access information and resources embedded in the cooperative (Xu et al. 2018). The literature proposes using structural characteristics of social network ties (bonding and bridging) to examine social capital (Putnam 2007). Bonding social capital refers to strong ties among individuals with similar background (such as family, close friends, neighbors), while bridging social capital relates to weak ties with distant friends, associates and colleagues (Ellison et al. 2007).

Cooperatives are established by a group of voluntary members who band together in order to achieve their goals. Cooperatives are collectively owned and used by their members, meaning that members are likely to have social relationships and connections (Valentinov 2004). The social relationships and connections (or structural social capital) within cooperatives can be measured by the strength of the social ties, the density of the social network, and the frequency of social interactions. As Nahapiet and Ghoshal (1998) indicate, a high level of structural social capital is beneficial for creating a platform for information sharing and exchange.

Relational social capital

Relational social capital refers to the quality of relationships and interactions between individuals and involves assets such as trust, reciprocity, and social norms (Nahapiet and Ghoshal

1998). Six (2007) defines trust as a psychological state that involves a willingness to accept vulnerability to the actions of another party, based on the expectation that their actions will be beneficial to you. Literature on cooperatives emphasizes that trust reduces monitoring costs and allows cooperatives to operate more efficiently (James and Sykuta 2006; Six 2007). Reciprocity is a belief that when an exchange takes place, all actors will respond by returning the favor. Reciprocity enhances cooperation through a belief that cooperative exchange is beneficial and long-lasting (Gómez-Limón et al. 2014). Social norms refer to "informal rules, shared understandings, and conventions that proscribe, prescribe, and modulate certain behaviors in various circumstances" (Aldridge et al. 2002, p. 11). Social norms play an important role in controlling and shaping individual behaviors in groups.

Cognitive social capital

Cognitive social capital relates to a common understanding of goals, which can enhance cooperation (Lindstrand et al. 2011). According to Gómez-Limón et al. (2014), civicness and cohesiveness are key features of the cognitive dimension of social capital. Civicness relates to members' propensity to stay informed about their cooperatives' affairs. Gómez-Limón et al. (2014) believe that well-informed members are more likely to have the confidence to influence decisions within the cooperative. Sahin (2007) describes cohesiveness as members' perception of the extent to which members share similar beliefs and characteristics. Sahin (2007) contends that social cohesion enables people to more effectively come together to pursue mutual goals.

Gender dimensions of social capital and market participation

Gender is defined as "a structure of social relations that builds on the perceptions of differences between males and females that are reflected in everyday social practices" (Karhina et al. 2016, p. 3). Literature on gender highlights how entrenched inequalities impact control over productive resources and access to markets, which can in turn, undermine sustainable and inclusive development (World Bank et al. 2009). Previous studies show that there is gender difference in social capital. Social capital is not distributed equally between men and women, and this unequal distribution can perpetuate further inequalities (Westermann et al. 2005; Muñoz-Goy 2013; Barthauer et al. 2016; Karhina et al. 2019). Social, cultural, and economic factors make men and women act differently in different settings, thus influencing the formation and levels of social capital. This, in turn, exacerbates gender inequalities in access to information, resources, and opportunities within societies.

Structural social capital

The literature suggests that there is gender difference in access to, and mobilization of, social networks (Westermann et al. 2005; Padmaja et al. 2006; Muñoz-Goy 2013; Barthauer et al. 2016;

Karhina et al. 2019). Muñoz-Goy (2013) states that women have higher opportunity costs for time, which constrains their participation in certain social networks. Similarly, Jensen (2014) claims that women invest less time in developing new contacts and less frequently connect with their network members than men. Studies suggest that in order to reduce the time required for travel for social interaction, women often form social networks with people who are geographically close. In contrast, men's social networks more commonly consist of individuals who are geographically dispersed and are more likely to include more business and professional acquaintances affiliated with formal associations (Padmaja et al. 2006; Robinson and Stubberud 2011).

Gender difference in structural social capital (social connection and relationships) is rooted in gender-based structural inequality (Lowndes 2004; Robinson and Stubberud 2011; Kim and Sherraden 2014). In particular, women's household and child care responsibilities — imposed by gender segregated roles — mean that women's social networks tend to revolve around their family and neighbors. Women's social networks are traditionally associated with solving domestic problems, and are more strongly embedded in neighborhood areas. In contrast, men's social networks tend to extend beyond their neighborhood area, and generally include fewer neighbors, and more distant friends and co-workers. This means that women's social connections and relationships are usually more dependent on bonding rather than bridging social capital, whereas men rely more heavily on bridging connections (Lowndes 2004; Muñoz-Goy 2013; Maas et al. 2014). As the above arguments highlight, there is reason to believe that structural social capital for female and male members of cooperatives may not be the same. Therefore, Hypothesis 1 is presented:

H_1. Female members have lower structural social capital than male members.

Fafchamps and Minten (2001) claim that information and knowledge about modern technologies and markets diffuse through social networks, and it is through these networks that cooperative members gain information and resources (Valentinov 2004; Liang et al. 2015). As a result of differing social networks, however, women and men have different levels of access to information and resources, which impacts each group's ability to gain economic benefits associated with cooperatives (Robinson and Stubberud 2011; Kim and Sherraden 2014). Women are more likely to have smaller social networks, and thus, they tend to have less access to valuable information and resources. Women are at a particular disadvantage, because they have fewer bridging social capitals links, which connect them to business information and opportunities. The above arguments have implications for whether female and male members are equally able to draw upon their structural social capital to participate in milk markets. Therefore, Hypothesis 2 is presented:

H_2. Female members have lower milk market participation than male members, which is attributed to their lower structural social capital.

Relational social capital

Women tend to build higher relational social capital than men. Because of greater interdependency and work responsibilities that rely on frequent collaboration, women exhibit more norms of reciprocity and trust than men (Westermann et al. 2005; Lowndes 2004; Wood and McKinley 2010; Karhina et al. 2019). Wood and McKinley (2010) assert that women's social networks are more strongly reliant on trust, which is of particular importance for women living in resource-constrained environments. Within cooperatives, Kormelinck (2010) reveals that women have more trust in members compared to men. Kormelinck (2010) also indicates that women tend to be more trustworthy and altruistic than men. With regard to reciprocity, Maclean (2010) states that women more often engage in reciprocal supportive relationships than men. The above arguments have implications for whether relational social capital for female and male members is the same. Therefore, Hypothesis 3 is presented:

H_3. Female members have higher relational social capital than male members.

According to the literature, relational social capital has a positive influence on members' participation in cooperatives. Liang et al. (2015) assert that trust enhances loyalty and enthusiasm in participating in cooperatives. Similarly, James and Sykuta (2006) reveal that trust increases marketing of outputs through cooperatives. As is suggested in Hypothesis 3, female members tend to have more relational social capital than male members, and based on this argument, we suggest that female members may have higher milk market participation than male members, as stated in Hypothesis 4:

H_4. Female members have higher milk market participation than male members, which is attributed to their higher relational social capital.

Cognitive social capital

Compared to men, women are better at civic engagement which is a key tool for advancing their status (Lowndes 2004; Son and Lin 2008). Addis and Joxhe (2016) suggest that women invest more time in voluntary self-help associations, which are one essential ingredient of civic life. The presence of women in a group has been shown to enhance social cohesion and solidarity, which are crucial for collective action (Westermann et al. 2005; Padmaja et al. 2006). This has implications for whether cognitive social capital for female and male members is the same. Therefore, Hypothesis 5 is presented:

H_5. Female members have higher cognitive social capital than male members.

Within the literature on cooperatives, there is considerable evidence that cognitive social capital is a key to participation in collective action. The fact behind this argument is that farmers who share common understandings, find it easier to work collectively (Lindstrand et al. 2011; Liang et al. 2015). As is suggested in Hypothesis 5, female members have a greater propensity toward civicness and social cohesion than male members. Based on this fact, female members are supposed to have higher milk market participation than male members, as reflected in Hypothesis 6:

H_6. Female members have higher milk market participation than male members, which is attributed to their higher cognitive social capital.

Data and methodology

Description of the study area

The West Shoa Zone is in the Oromia Region of Ethiopia. Based on the 2017 population estimation by Central Statistics Authority (2013), the Zone has a population of 2,701,287 — of whom 1,356,810 are women and 1,344,477 are men. The West Shoa Zone has an area of 14,788.78 square kilometers, and a population density of 139.21 per square kilometer. Smallholder agriculture is the source of livelihoods for a majority of the rural population (Oromia Bureau of Finance and Economic Development 2011). The predominance of mixed crop-livestock farming systems in the Zone can be explained by biophysical attributes of the area, such as the availability of vast grazing land, the temperate climate (23-250c), and the abundant rainfall (1300-1700 mm/year).

In Ethiopia, including the West Shoa zone, cooperation is a long tradition in rural society, where rural communities have for centuries participated in traditional collective action organizations (Pankhurst and Hailemariam 2000). Indigenous institutions such as *Iddir* (which provide insurance in the event of death), *Iqqub* (which mobilize credit on rotating basis), *Mahiber* (which are gatherings with spiritual and social functions) and *debbo* (which are labor sharing organizations) are examples of collectives that provide economic, social, and religious services. As
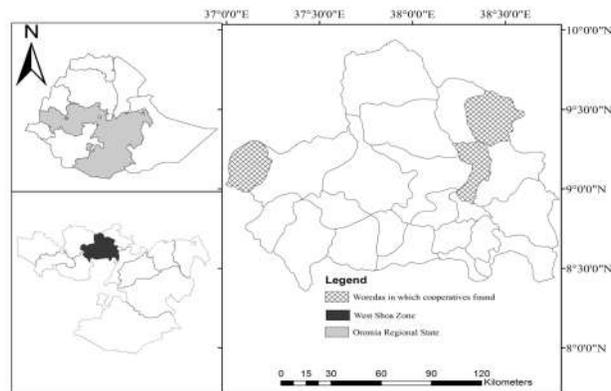
Figure 1 Location of the study areas. (*Source: Oromia Bureau of Finance and Economic Development, 2011*)

Bernard et al. (2010) argue, indigenous institutions play an important role in bringing rural people together, significantly contributing to social cohesion and support among people.

In rural Ethiopia, people largely rely on bonding social capital (dominated by kin-based links), related to networks of families and neighbors (Dodd 2012). This is true in the West Shoa Zone where kinship ties (strong ties) are an important means through which reciprocity networks are extended. At a focus group meeting, farmers from this Zone described how strong ties facilitate reciprocal exchange, including the exchange of labor (*debbo*). This ensures farmers have access to an adequate labor supply at peak periods of agricultural activity. Strong ties also play an important role in the exchange of goods and favors. In general, farmers indicated that bonding social capital is vital to survival and to their agricultural production activities. We also found, that the creation of bridging social capital (weak ties) with distant friends — which complements the social networks provided by families and neighbors — are of growing importance in this area.

In the West Shoa Zone, women bear most of the responsibility for agricultural production and household maintenance. Women are involved in the production of food crops for subsistence and sale. They carry out almost all of the dairy activities in the household as well as the work associated with selling dairy products in the market. Women also bear the burden of greater household responsibilities and domestic duties. Nevertheless, the gender disparity in social and economic structures mean that women are often constrained in terms of their access to, and control over productive resources (Farnworth et al. 2019). This means that despite their labor, women have relatively fewer viable economic opportunities than men.

Sampling and data collection

This research is based on data collected through dairy cooperative member surveys, conducted with 154 cooperative members in the West Shoa Zone between October and November 2016. A two-stage sampling procedure was adopted in selecting the sample farmers. In the first stage, dairy cooperatives were selected on the basis of their performance.

Literature on cooperatives asserts that members should be committed to market their inputs and outputs through the cooperative. These commitments are intrinsically based on the social capital (social networks, trust, norms, reciprocity) of the members (Valentinov 2004; Nilsson et al. 2012; Ruben and Heras 2012). Social capital is essential for the performance of cooperatives because members who know, understand, and trust each other are more likely to work together to achieve their shared objectives (Valentinov 2004). Thus, the performance of the cooperative should be taken into account when analyzing social capital.

We used the extra-value (EV) approach to evaluate the performance of cooperatives. This approach accounts for the total cost of operations, including the cost of using equity, and measures performance in terms of earnings generated above total operating cost (thus "extra value"). The cost of using equity is the opportunity cost of equity capital. It is an interest charge on the equity used at a rate equivalent to the amount the money could earn elsewhere (Liebrand 2012; Ling 2014). If the net savings of the cooperative exceeds the opportunity cost of members' equity, the cooperative can be said to have enhanced the value of the equity, and generated "extra value" for its members (positive extra value). In the contrary, if the cooperative reduced the value of the equity, it generates a negative extra value. For the extra-value approach to be an objective performance measure for comparing the operations of cooperatives, extra value is made neutral to scale and to mode of operations by extra value index (EVI). EVI is an expression of extra value as a percentage of operating capital (Liebrand 2012; Ling 2014).

Extra value is calculated using information commonly found in cooperatives' financial statements (balance sheets and income statements) except for the interest rate on equity. Financial statements of the dairy cooperatives were obtained from the registrar of Cooperative Promotion office in the Zone. Out of nineteen dairy cooperatives, only eight cooperatives were audited and had financial statement for the years 2013/14 and 2014/15. They were therefore retained for performance comparison.

Extra value = Net savings – Interest on equity
    Where
Interest on equity = Members' equity × Interest rate

Note that the interest on equity is the opportunity cost of equity. The interest rate for calculating the opportunity cost of equity ideally should be the bank interest rate (Ling 2014). Thus, we used commercial bank's minimum interest rate on savings (5 percent per annum).

Extra-value index (EVI) = $\frac{\text{Extra value}}{\text{Operating capital}} \times 100$
    Where
Operating capital = Fixed assets + Net working Capital
    Where
Net working capital = Current assets – Current
                                  liabilities

Four dairy cooperatives were selected based on EVI performance rankings (Table 1), representing 50 percent of the total sample. Two high performer and two low performer cooperatives were selected to ensure the representativeness of the sample. Horii Gibee and Dhangaa Kusaayee ranked first and second respectively, and they represent the high performer cooperatives. Bilachaa Bargaa and Kallacha Boruu ranked seventh and eighth respectively and so they were selected as the low performer cooperatives.

In the second stage, a systematic random sampling procedure was used to select every '*n*th' farmer from the list of registered members in each selected cooperative. The sampling frame included all members (255) of the four selected cooperatives. The sample size was determined and obtained based on studies of Krejcie and Morgan (1970), which offers a table for determining sample size for a given population. Krejcie and Morgan (1970) indicate that sample size for a probability sample is determined in relation to the confidence level and sampling error. For this study, the sample size was set with confidence levels of 95 percent and sampling errors of 5 percent. A representative sample

Dairy Cooperative	Year of Establishment	EVI 2012/13	EVI 2013/14	Average EVI	Rank
Bilachaa Bargaa	2008	-13.70	5.20	-4.25	7th
Biruh Tasfaa	2007	7.25	-1.98	2.64	5th
Daandii Guddina	2007	5.61	7.70	6.65	4th
Dhangaa Kusaayee	2008	78.06	47.63	62.85	2nd
Horii Gibee	2008	156.30	-18.60	68.85	1st
Kallacha Boruu	2008	-13.60	-10.83	-12.22	8th
Lalisee	2010	-4.30	9.36	2.53	6th
Taliilaa Bargaa	2006	2.50	13.57	8.04	3rd

Table 1 Ranking of dairy cooperatives by extra value index (EVI)(*Source: Computed from the financial statements of the dairy cooperatives*)

of 154 farmers was drawn from the population of 255 farmers, representing 60.4 percent of the total population. In terms of gender, the sample comprised 83 female and 71 male members. Probability proportional to cooperative size was used to select sample farmers from the four selected dairy cooperatives.

The design of the social capital questionnaire followed and adapted the format suggested by the World Bank (Grootaert et al. 2004) and the Australian Bureau of Statistics (2004). The questionnaire was translated into Afan Oromo, which is the regional language of the farmers interviewed. To test its clarity and applicability, the designed questionnaire was pretested with twelve farmers selected from the four dairy cooperatives. Four enumerators with previous experience in conducting surveys, were selected and trained on the questionnaire including field trials.

Method of data analysis

i. Measurement of dimensions of social capital

Composite indicators were constructed to measure the dimensions of social capital at a farmer level. The construction of composite indicators followed the sequence suggested by the Organization for Economic Co-operation and Development (OECD 2008).

Step 1. Developing theoretical framework

Structural social capital was measured using 15 indicators which are designed to show the farmers' social connections and relationships (bonding and bridging ties, see Appendix A). Similarly, relational social capital was measured using 10 indicators which are designed to reflect farmers' quality of relationships and interactions (trust, reciprocity, and social norms). Cognitive social

capital was measured using 6 indicators which are designed to indicate farmers' common understanding of their goals, for example cognitive sub dimensions (civicness and cohesiveness).

Step 2. Selection of base indicators

Based on the theoretical framework described in section 3.2, relevant indicators for each component of the dimensions of social capital were selected.

Step 3. Imputation of missing data

The indicators dataset was complete. Thus, imputation of missing data was not required.

Step 4. Multivariate analysis

Principal component analyses (PCAs) were used to study the overall structure of the dataset along the components of each dimension of social capital.

Step 5. Data normalization

Min-max normalization was used to express the indicators within a dimensionless range [0, 1] by subtracting the minimum value and dividing by the range of the indicator values.

Step 6. Weightings and aggregation

PCAs were used to weight and aggregate the data to obtain composite indicator.

Step 7. Robustness and sensitivity analyses

Cronbach's alpha coefficient was used to verify the reliability of composite indicator. Cronbach's alpha is the widely used method for assessing the extent to which a measurement pro-

duces consistent results. Its score ranges from 0 to 1 (OECD, 2008).

PCA is conducted on indicators of dimensions of social capital. This helps to construct a composite indicator for measuring the dimensions of social capital at farmer level. We performed PCAs on indicators of each of the dimensions of social capital to capture most of the observed variance of the explanatory variables using the smallest possible number of new variables, called principal components (PCs) (OECD 2008). Following OECD (2008), we retained only the PCs with eigenvalues higher than unity. Furthermore, a Kaiser's varimax rotation is implemented to facilitate the interpretation of these components.

After extracting the PCs for each of the three dimensions of social capital, the intermediate composite indicators were calculated for the specific dimensions corresponding to each PC.

$$ICI_{ji} = \sum_{K=1}^{K=n} w_{kj} Iki \qquad (1)$$

Where
ICI_{ji} = the intermediate composite indicator for the component and farmer
w_{kj} = weighting of indicator in component
I_{ki} = the normalized indicator achieved by farmer

Finally, an index for each of the three dimensions of social capital was calculated as linear weighted aggregations of the intermediate composite indicator of the specific dimension.

$$SCI_i = \sum_{j=1}^{i=n} \alpha_j ICIj \qquad (2)$$

Where
SCI_i = the value of the composite indicator for the farmer i
α_j = the weight applied to the intermediate dimensions of social capital indicator j

By definition, the composite indicator for the specific dimension of social capital of a farmer (SCI_i) range from 0 (the smallest value) to 1 (the largest value).

The final stage in the composite indicator construction is robustness and sensitivity analysis. This enables us to assess the reliability of the composite indicator (OECD, 2008). We used Cronbach's alpha coefficient to verify the internal consistency of the variables included in the dimensions of social capital.

ii. Gender differences in dimensions of social capital and milk market participation

An independent sample t-test was used to investigate whether there are significant gender differences in the dimensions of social capital for female and male farmers. In the case of an independent-sample t-test, each member must have scores on two variables, the grouping (gender) variable and the test (dimensions of social capital) variable. The grouping variable divides cases into two mutually exclusive groups (female and male members) while the dimensions of social capital describe measures of farmers' structural, relational, and cognitive social capital (Kothari 2004).

Two-way ANOVA models belong to a class of linear models suitable when modeling a continuous response variable (dimensions of social capital) against two qualitative explanatory variables, generally called factors (gender and market participation) (Kothari 2004). A two-way ANOVA test was conducted to explore the effect of gender differences in farmers' dimensions of social capital (structural, relational, and cognitive) on milk market participation in dairy cooperatives.

A qualitative tool is also used to collect data through a semi-structured interview. We used focus group discussions to collect qualitative data to supplement the clarification and interpretation of the findings from the quantitative analysis.

Variable	Women (n=83)		Men (n=71)		T-value	Total sample (n=154)	
	Mean	Std Dev.	Mean	Std Dev		Mean	Std Dev.
Age (years)	40.9	11.5	45.8	11.7	-2.58*	43.1	11.8
Household size (No)	6.0	1.8	6.4	1.9	-1.61	6.2	1.8
Education (years)	0.6	2.0	5.1	3.9	-9.01**	2.7	3.8
Land size (ha)	1.7	2.0	2.8	2.2	-3.47**	2.2	2.2
Dairy cow (No)	2.4	1.2	2.9	1.7	-2.24*	2.6	1.5
Share of dairy income (%)	65.6	27.1	48.0	28.7	3.89**	57.5	29.1
Milk production (lt/day)	5.0	3.1	7.8	6.1	-3.60**	6.3	4.9

*and ** denote significance levels at 5 percent and 1 percent, respectively.

Table 2 Characteristics of the sample farmers according to gender: continuous variables. (*Source: Survey data, 2016*)

Variable	Women (n=83)		Men (n=71)		χ2-value	Total sample (n=154)	
	n	%	n	%		n	%
Marital status							
Married	70	84.3	66	93.0	7.73	136	88.3
Other	13	15.7	5	7.0		18	11.7
Extension service							
Yes	60	72.3	64	90.1	7.77**	124	80.5
No	23	27.7	7	9.9		30	19.5
Credit service							
Yes	3	3.6	11	15.5	6.53*	14	9.1
No	80	96.4	60	84.5		140	90.9
Leadership							
Yes	3	3.6	20	28.2	18.16**	23	14.9
No	80	96.3	51	71.8		131	85.1

*and ** denote significance levels at 5 percent and 1 percent, respectively.

Table 3 Characteristics of the sample farmers: categorical variables. (*Source: Survey data, 2016*)

Result and discussion

Descriptive statistics of the sample according to gender

Table 2 shows that the average age of female and male members is about 40.9 and 45.8 years, respectively. There is statistically significant difference between the two groups, indicating that female member have a lower age than male members. The average female and male members' household size is 6.0 and 6.4 persons, respectively. The average number of years of formal schooling completed by female members is 0.6 years whereas the male members have, on average, 5.1 years of formal schooling. This gendered difference in years of formal schooling is statistically significant. The average land size of female and male cooperative members is 1.7 and 2.8 hectares, respectively. The statistically significant difference in land size between the two categories indicates that female members have smaller land size than male members.

As it is shown in Table 2, there is a statistically significant difference in the ownership of dairy cows along the axis of gender, with female members on average owning fewer cows (2.4) than male members (2.9 cows). There is also a statistically significant difference between the two groups in the share of dairy income as a percentage of total income; dairy accounts for 65.6 percent of female members' income, and only 48.0 percent of male members' income. Female members also produce a statistically significantly lower quantity of milk (5.0 liters per day) than cooperative male members (7.8 liters per day).

About 84.3 percent of the female members, and 93.0 percent male members are married (Table 3). Dairy extension services reached 72.3 percent of female members and 90.1 percent of male members. Our results reveal a statistically significant difference

in access to extension service between genders, and female members are shown to have lower access to dairy extension agents than male members in dairy cooperatives. Dairy credit service too is statistically significant between these groups, as it is only extended to around 3.6 percent of females, and 15.5 percent of male members. Female members are underrepresented in the cooperatives management as only about 3.6 percent of women have leadership roles in the cooperatives, as compared to 28.2 percent of male members.

Measuring dimensions of social capital

After applying PCA to the data set of structural social capital, four components were retained, which explain 59.0 percent of the total variance. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.781. The Bartlett's test of Sphericity was significant (chi-square = 767.2; $p = 0.000$), indicating the correlations are large enough for PCA. The statistical tests indicate the appropriateness of performing PCA on the data set of structural social capital (see Appendix 2). Using min-max normalization, the composite indicator for structural social capital is expressed between 0 and 1 (Table 4). To assess the internal consistency of the composite indicator, a reliability analysis was performed. A Cronbach's alpha score was 0.804. This score is above the minimum reliability coefficient level (0.7) and it is acceptable (Appendix 2).

PCA was conducted on relational social capital data set and three components were retained, explaining 55.5 percent of the total variance. The KMO measure of sampling adequacy was 0.793 while the Bartlett's test for Sphericity was significant (chi-square = 278.5; $p = 0.000$) and indicates that the correlations were large enough for PCA. The statistical tests show that

Dimensions of social capital	N	Min	Max	Mean	Std. Dev.
Structural social capital	154	0.3295	0.7868	0.5326	0.0992
Relational social capital	154	0.2186	0.7924	0.4381	0.1299
Cognitive social capital	154	0.1837	0.7703	0.5040	0.1395

Table   4 Summary statistics of dimensions of social capital. (*Source: Survey data, 2016*)

the data were suitable for performing PCA (see Appendix 3). Using min-max normalization, the composite indicator for relational social capital is expressed between 0 and 1 (Table 4). The Cronbach's alpha coefficient was 0.695, indicating the internal consistency of the relational social capital composite indicator (Appendix 3).

PCA was performed on indicators of cognitive social capital to examine the extent of the underlying relationships within the data set. The result indicates that the variables can be summarized with two components, which accounts for 63.1 percent of the explained variance. The KMO measure of sampling adequacy was 0.736, while Bartlett's test of Sphericity was significant (chi-square = 200.2; p = 0.000). The statistical tests support the appropriateness of performing PCA on the data set of cognitive social capital (see Appendix 4). Using min-max normalization, the composite indicator for cognitive social capital is expressed between 0 and 1 (Table 4). The Cronbach's alpha coefficient was 0.726, verifying the reliability of the composite indicator (Appendix 4).

Gender difference in dimensions of social capital

Before conducting our comparison of the dimensions of social capital by gender, we used the Kolmogorov-Smirnov test to determine if samples are randomly drawn from normally distributed populations. The results of the test show that the distributions of dimensions of social capital are normal (Table 5). Moreover, the dimensions of social capital according to gender show normal distribution (Appendix 5).

As expected, the result of the independent sample t- test shows significant difference in structural social capital by gender in the cooperatives (Table 6), supporting the hypothesis (H1) in revealing that female members have lower structural social capital than male cooperative members. This indicates that female members have less social connections and relationships in the cooperatives than male members.

Dimensions	N	Min	Max	Mean	Std. Dev.	Kolmogorov-Smirnov[a]
Structural	154	0.3295	0.7868	0.5326	0.0992	0.069 (0.423)
Relational	154	0.2186	0.7924	0.4381	0.1299	0.089 (0.148)
Cognitive	154	0.1837	0.7703	0.5040	0.1395	0.086 (0.179)

[a] Statistic testing the null hypothesis that the sample is drawn from a normal distributed population (p value in parentheses)

Table   5 Distribution of dimensions of social capital. (*Source: Survey data, 2016*)

The difference in structural social capital can be explained by the fact that female members have smaller networks than male members. The information from focus group discussion how that gender roles are highly traditional in the study area, with women undertaking most of the household and domestic responsibilities. Due in part to this imposed domesticity, female members' social connections and relationships with the wider society are highly restricted, meaning female members tend to have smaller and more domestic networks than men. Previous studies (e.g. Lowndes 2004; Robinson and Stubberud 2011; Muñoz-Goy 2013; Kim and Sherraden 2014) indicate similar results. Moreover, to fulfill their gendered domestic responsibilities, female members create bonding social capital more so than bridging social capital (more diverse social networks). That is, they develop bonding social capital (strong ties with family and neighbors) in their neighborhood areas. This indicates that female members' social connections and relationships are limited to particular social niches, such as neighborhood areas.

Dimensions of Social capital	Women (n=83)		Men (n=71)		T-value	Total sample (n=154)	
	Mean	Std Dev.	Mean	Std Dev.		Mean	Std Dev.
Structural	0.5165	0.0875	0.5514	0.1089	-2.20 (0.015)	0.5326	0.0992
Relational	0.4336	0.1342	0.4433	0.1255	-0.46 (0.678)	0.4381	0.1299
Cognitive	0.5135	0.1245	0.4929	0.1554	0.91 (0.181)	0.5040	0.1395

(p value in parentheses)

Table   6 Dimensions of social capital according to gender. (*Source: Survey data, 2016*)

At the focus group discussions, female members mentioned that building and maintaining social connections and relationships with other cooperative members is costly in terms time. In rural Ethiopia, women's continued domestic and child-care responsibilities restrict the range of social activities that women are able to get involved in (Jones et al. 2010); consequently, female cooperative members usually form social networks with families and neighbors in the cooperatives who are close to them, in an attempt to reduce the length of time required to travel to engage in social interactions. In contrast, men are more likely form social networks beyond their families and neighbors in the cooperatives. This allows them to develop more geographically dispersed social networks with members in the cooperatives. The result is that female members have lower structural social capital than male members within the dairy cooperatives in the West Shoa Zone. This finding is similar to those reported in Katungi et al. (2006) and Kim and Sherraden (2014).

Effect of gender difference in dimensions of social capital on milk market participation

Two-way ANOVA tests were used to investigate the effect of gender differences in dimensions of social capital on milk market participation in dairy cooperatives. As it is shown Table 7, our results reveal that female members have less milk market participation than male members, as a result of their lower structural social capital (social connections and relationships), supporting the hypothesis (H2). Studies show that gender differences in social capital make a difference to market performance (Padmaja

Dimensions of social capital	Market participation	Gender		p-value for ANOVA
	Participant (n=100)	Women	Men	
	Non-participant (n=54)	(n=83)	(n=71)	
Structural	Participant	0.4936	0.5509	0.0064**
	Non-participant	0.5669	0.5521	
Relational	Participant	0.4324	0.4342	0.7523
	Non-participant	0.4361	0.4574	
Cognitive	Participant	0.5017	0.4970	0.5523
	Non-participant	0.5394	0.4866	

*and ** denote significance levels at 5 percent and 1 percent, respectively.

Table 7 Gender difference in dimensions of social capital and milk market participation. (*Source: Survey data, 2016*)

et al. 2006; Robinson and Stubberud 2011; Kim and Sherraden 2014). This suggests that female members are disadvantaged in terms of their access to market information and resources embedded in the cooperatives. Female members' propensity for building bonding as opposed to bridging social capital, as discussed in previous sections, restricts their ability to develop their businesses. This is because bonding social capital is, in general, more effective for solving domestic problems and less useful for economic issues. Men in dairy cooperatives, tend to have more bridging social capital, which stimulates business by providing them opportunities to enhanced access market information and resources from farther afield. Research by Maas et al. (2014) also shows a similar result.

Evidence available in the literature indicates that access to market information raises the probability of farmers' market participation, because information improves farmers' knowledge of markets and helps them make decisions related to market participation (Omiti 2009; Zamasiya et al. 2014). In this regard, female members are less likely to gain market information because they have lower social connections and relationships with the members compared to male members. Consequently, female members have less milk market participation than male members in the diary cooperatives we studied.

Conclusion and policy implications

Understanding social capital as farmers' propensity to engage in collective marketing, is crucial for integrating farmers into the dairy market through cooperatives. However, social capital accrues to, or is accessed by male and female cooperative members differently, and thus the economic benefits derived from it is also different. In this paper, we investigated three dimensions of social capital inequalities in dairy cooperatives, according to gender, tested the significance of gendered differences in social capital, and explored the impact of these differences on milk market participation in West Shoa, Ethiopia.

Our paper makes two overarching contributions. First, by empirically testing the multidimensional model of individual social capital, we developed theoretically based and empirically valid measures of the dimensions (structural, relational, and cog-

nitive) of social capital at a farmer level, thereby contributing to the methodological literature on social capital research. The reliable, valid, and consistent measure of social capital that we developed, can be utilized for assessing the stock of social capital in a variety of contexts. Second, we provided evidence for the effect of gender differences in structural social capital on milk market participation in dairy cooperatives. Consistent with existing literature, we found that female cooperative members have fewer social connections and relationships than male members in cooperatives. We also found that female members have lower milk market participation as a result of their lower structural social capital. Fewer social connections and relationships also corresponds with less access to market information and resources embedded in dairy cooperatives. This information can contribute to wider discussions on how to increase female members' market participation in cooperatives. It can may also be helpful for designing strategies that promote market participation in gender differentiated groups such as cooperatives.

Our sample provided enough statistical power to detect interesting and significant results. These findings are encouraging in light of the small sample size (154 observations), and suggests the possibility of potentially stronger results in a larger sample. It should be noted, however, that our study does not distinguish between female members from male headed and female headed households. This could give rise to some omissions because they face different conditions and may require different interventions, therefore, future research should take this into account.

The findings of this study provide some policy and practice implications. We argue that it is important to improve female members' structural social capital through gender-sensitive social capital development program in order to enhance women's access to market information and resources embedded in cooperatives. Public policy should provide more support for cooperatives to help them strengthen female members' social connections and relationships. Strengthening female members' structural social capital can enhance their market participation and reinforce collective marketing in the cooperatives. However, strengthening structural social capital requires considerations of the structural conditions that create unequal opportunities for women to social connections and relationships, so public policy should pay attention to gender within social networks of the cooperative and the broader context of gender differences within which social networks are formed.

The creation of social capital requires investment of time and effort. Social capital is produced through repeat of interactions between the members. Thus, cooperatives should increase members' interactions through committing resources and time towards cooperative ceremonies and events. This facilitates female members' interactions with others, and might enable them to develop more diverse social networks thereby granting them access to more information and resources embedded in the cooperatives. Gender differences in structural social capital should be addressed through providing continuous gender training and capacity building on gender mainstreaming to both cooperative promotional offices at different levels and cooperatives' management.

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Appendix 1. List of indicators used to measure farmers' dimensions of social capital

Dimension	Sub-dimensions	Variable label	Description	Possible responses
Structural	Bonding	Bonding1	In the past 12 month, how often have you met with your close friends in the cooperative?	1 to 5a
		Bonding2	In the past 12 month, how often have you talked to your close friends about the cooperative issues?	1 to 5a
		Bonding3	In the past 12 month, how satisfied are you with the relationship you have with close friends in the cooperative?	1 to 5a
		Bonding4	In the past 12 month, how often have you met with your neighbors in the cooperative?	1 to 5a
		Bonding5	In the past 12 month, how often have you talked to your neighbors about the cooperative issues?	1 to 5a
		Bonding6	In the past 12 month, how satisfied are you with the relationship you have with neighbors in the cooperative?	1 to 5a
	Bridging	Bridging1	In the past 12 month, how often have you met with other members in the cooperative?	1 to 5a
		Bridging2	In the past 12 month, how often have you talked to other members about the cooperative issues?	1 to 5a
		Bridging3	In the past 12 month, how satisfied are you with the relationship you have with other members of the cooperative?	1 to 5a
		Bridging4	In the past 12 month, how often have you met with board members in the cooperative?	1 to 5a
		Bridging5	In the past 12 month, how often have you talked to board members about the cooperative issues?	1 to 5a
		Bridging6	In the past 12 month, how satisfied are you with the relationship you have with board members of the cooperative?	1 to 5a
		Bridging7	In the past 12 month, how often have you met with extension workers?	1 to 5a
		Bridging8	In the past 12 month, how often have you talked to extension workers about the cooperative issues?	1 to 5a
		Bridging9	In the past 12 month, how satisfied are you with the relationship you have with extension workers?	1 to 5a
Relational	Trust	Trust1	To what extent do you trust your neighbors in the cooperative?	1 to 5a
		Trust2	To what extent do you trust the other the members in the cooperative?	1 to 5a
		Trust3	To what extent do you trust the board members in the cooperative?	1 to 5a
		Trust4	To what extent do you trust your kebele?	1 to 5a
		Trust5	To what extent do you trust farmers training center (FTC)?	1 to 5a

	Reciprocity	Recipro1	If I help a member in the cooperative, that person will help me in the future.	1 to 5 a
		Recipro2	When a member makes me a favor, I feel committed to repay him/her	1 to 5 a
		Recipro3	If I share important information with a member, that person will do the same for me	1 to 5 a
	Norm	Norm1	Selling milk to other buyers if they offer you better price than the cooperative.	1 to 5 a
		Norm2	Cheating on membership fee if there is a chance.	1 to 5 a
Cognitive	**Cohesiveness**	Cohes1	If there is an urgent problem in the cooperative, the members would get together and solve it.	1 to 5 a
		Cohes2	Members have a common understanding on the importance of the cooperative.	1 to 5 a
		Cohes3	Members are active and involve in cooperative issues and activities.	1 to 5 a
	Civicness	Civic1	How much do you feel that you can influence things that are happening in your cooperative?	1 to 4 b
		Civic2	How often you attend meetings in the cooperative?	1 to 4 b
		Civic3	In the past 12 months, how often you are informed about your cooperative affairs?	1 to 5 a

a5 represents the highest level   b4 represents the highest level
Source: Survey data (2016)

Appendix 2. Factor loadings for the rotated factors underlying structural social capital

	Principal component			
	Comp1	Comp2	Comp3	Comp4
Indicators[a]	Bridging	Bonding	Bridging	Bonding & Bridging
Bonding1	0.2293	-0.0431	0.1986	-0.1601
Bonding2	-0.0245	**0.5931**	0.0542	-0.0308
Bonding3	-0.0810	-0.1482	-0.0407	**0.6163**
Bonding4	-0.0288	0.0976	0.2408	0.1987
Bonding5	0.0122	**0.6231**	-0.0765	-0.1149
Bonding6	0.0146	0.2291	-0.3925	0.2995
Bridging1	0.1069	-0.0293	**0.5566**	0.1253
Bridging2	-0.0501	0.3663	**0.4645**	0.1390
Bridging3	0.0744	0.0075	0.1395	**0.5909**
Bridging4	**0.4828**	-0.0884	-0.0018	-0.0222
Bridging5	**0.4110**	-0.0083	0.0796	0.0656
Bridging6	0.1763	0.1578	-0.3767	0.2012
Bridging7	**0.4130**	0.0488	0.0474	-0.1013
Bridging8	**0.4351**	0.0028	0.0174	-0.0204
Bridging9	0.3558	0.0620	-0.2057	0.1048
Eigen value	3.45682	1.98473	1.82988	1.57655
Variance explained	23.1%	13.2%	12.2%	10.5%
Cumulative % of variance explained	23.1%	36.3%	48.5%	59.0%
Overall Cronbach's alpha	0.804			
Bartlett's test of Sphericity chi-value	767.2**			
Kaiser-Meyer-Olkin measure of sampling adequacy	0.781			

** denotes significance level at 1 percent
[a] Full details of observable variables used in the analysis are reported in Appendix A
Note: Component loadings greater than |0.40| are highlighted in bold print
Source: Survey data (2016)

Appendix 3. Factor loadings for the rotated factors underlying relational social capital

|	Principal component		
	Comp1	Comp2	Comp3
Indicators[a]	Trust	Reciprocity	Norm
Trust1	**0.3963**	0.0813	0.2814
Trust2	**0.3464**	0.0626	-0.0650
Trust3	**0.4121**	-0.1479	-0.0628
Trust4	**0.4385**	-0.2328	-0.1615
Trust5	**0.3830**	-0.1860	-0.0329
Recipro1	**0.3350**	**0.3845**	0.0803
Recipro2	-0.1378	**0.6847**	-0.0629
Recipro3	0.2552	**0.4142**	0.1507
Norm1	0.0121	0.0260	**0.7913**
Norm2	-0.1331	-0.2998	**0.4757**
Eigen value	3.08497	1.25998	1.20365
Variance explained	30.9%	12.6%	12.0%
Cumulative % of variance explained	30.9%	43.5%	55.5%
Overall Cronbach's alpha	0.695		
Bartlett's test of Sphericity chi-value	278.5**		
Kaiser-Meyer-Olkin measure of sampling adequacy	0.793		

** denotes significance level at 1 percent
[a] Full details of observable variables used in the analysis are reported in Appendix A.
Note: Component loadings greater than |0.30| are highlighted in bold print
Source: Survey data (2016)

Appendix 4. Factor loadings for the rotated factors underlying cognitive social capital

	Principal component	
	Comp1	Comp2
Indicatorsa	Civicness	Cohesiveness
Cohes1	0.2401	**0.4720**
Cohes2	0.0306	**0.5964**
Cohes3	-0.1584	**0.6406**
Civic1	**0.4793**	0.0179
Civic2	**0.5519**	0.0382
Civic3	**0.6181**	-0.0966
Eigen value	1.94497	1.83824
Variance explained	32.4%	30.6%
Cumulative % of variance explained	32.4%	63.1%
Overall Cronbach's alpha	0.726	
Bartlett's test of Sphericity chi-value	200.2**	
Kaiser-Meyer-Olkin measure of sampling adequacy	0.736	

** denotes significance level at 1percent

a Full details of observable variables used in the analysis are reported in Appendix A.

Note: Component loadings greater than |0.30| are highlighted in bold print
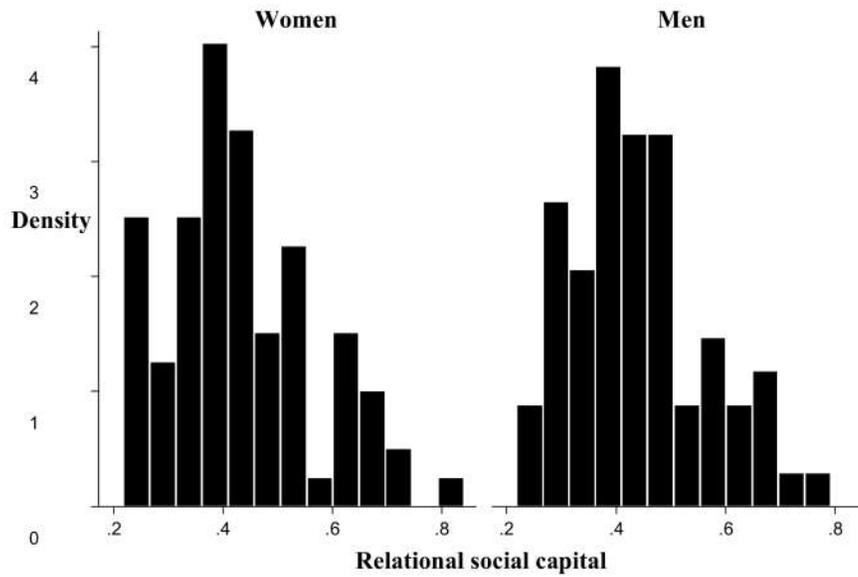
Source: Survey data (2016)

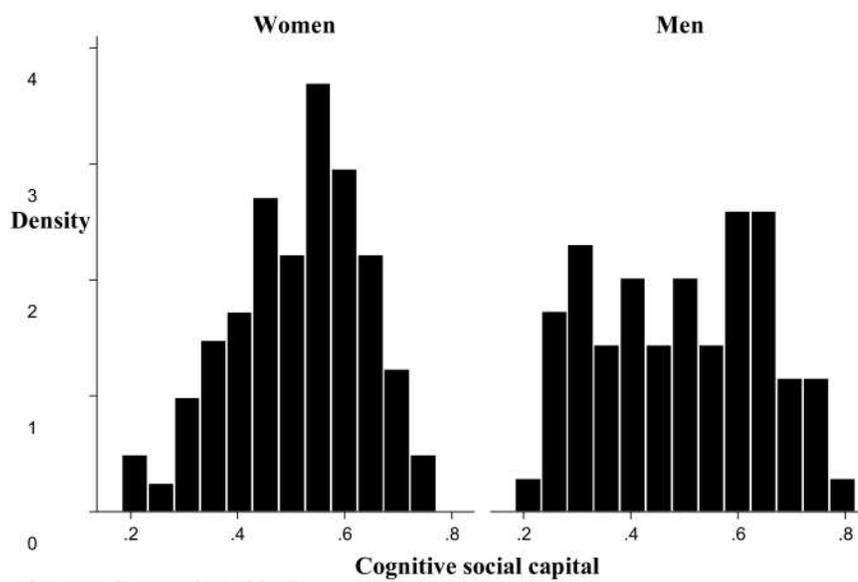**Appendix 5a. Structural social capital according to gender**
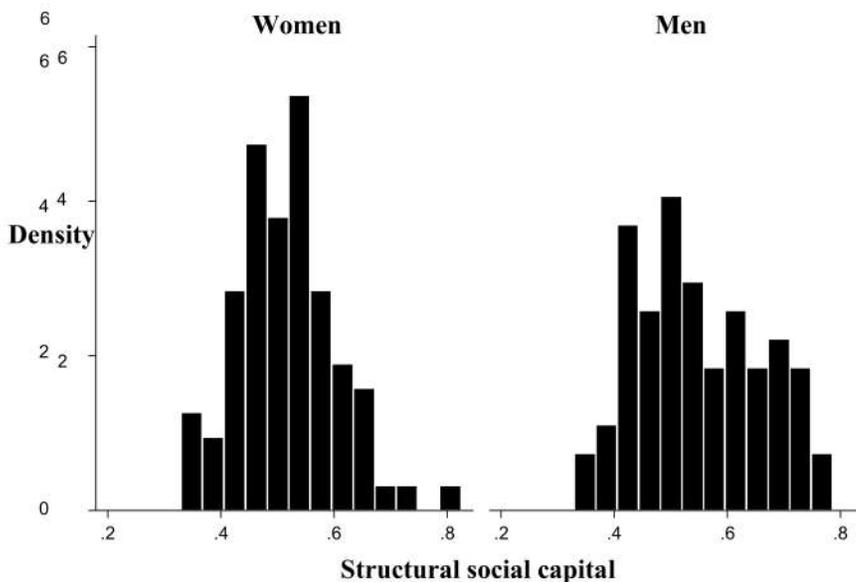
Source: Survey data (2016)

Appendix 5b. Relational social capital according to gender

Source: Survey data (2016)

Appendix 5c. Cognitive social capital according to gender

Source: Survey data (2016)