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RESEARCH

Determinants of gendered participation in domestic trade: evidence from Kenya

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Abstract
This paper examines how regulatory, owner-specific, firm-specific and support factors influence participation in domestic trade by Kenyan firms owned by men and women with a view to informing policy action. Data from the 2016 survey on micro, small, and medium enterprises supported empirical estimations. Two models were estimated using the probit regression. The first was on participation in domestic trade by firms owned by women, while the second was on participation in domestic trade by firms owned by men. I controlled endogeneity and heterogeneity using the control function approach. The findings revealed that firm size, access to credit, goodwill, firm registration status, and university education attainment were significant in influencing participation of Kenyan firms in domestic trade. The evidence indicates a need to mainstream gender issues in making of trade policy; and enforcement of laws guaranteeing women improved access to trade credit and property including land rights. Improving access to incubation and capacity building support among female-owned firms could drive growth, specialization, and knowledge accumulation for enhanced participation in trade.

Keywords Endogeneity · Heterogeneity · Gender

JEL Code F1

Introduction

Although existing studies have examined determinants of trade (Ekanayake, 2001; Fiona & Alastair, 1997; Hannah et al., 2021; Inmaculada & Celestino, 2000; Karam & Zaki, 2013; Rice, 2010; Yue et al., 2022), few have focused on determinants of participation in domestic trade from a gender perspective. This study extends the knowledge that is existing on this subject by investigating the determinants of participation in domestic trade by firms owned by women and men within the context of developing countries. Enhanced knowledge on the subject is expected to promote creation of gender-responsive trade policies.

Bussolo (2009) conceptualizes *gender* as the identity of being either masculine or feminine and respectively roles assigned socially and culturally. In effect, role and identity disparities affect endowment, resource control, and choice to participate in economic activities especially domestic trade. The socially and culturally determined identities and roles subsequently shape biases and prejudices in favor of or against men and women (Becker, 1971). Following Bussolo (2009) and Becker (1971), *gender* in this study is conceptualized to embody identity of economic agents being either female or male and the consequential roles assigned to them culturally together with the ensuing biases and prejudices in favor of or against them. *Gender* influences how women and men view and perceive themselves, how they are viewed and perceived by others in the social, economic, and political sphere, and their inherent capabilities. In effect, this influences choices by women and men, their preferences to participate in economic activities like domestic trade, and their chances of being successful in the activities. Against this understanding, this study conceptualizes *domestic trade participation* to encompass choices made by women and men, cognizant of their social roles and cultural identities, to engage in the activity of selling goods and services to buyers within delimitated borders.

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The Constitution of Kenya stipulates that all persons have fundamental rights and should be treated equally, and this includes among others the right to equitable access to economic opportunities (Kenya Law, 2010). Despite this, it is scarcely known what factors determine participation in domestic trade and whether the factors have differential influence on participating in trade by firms especially those owned by women and men in Kenya. The study focuses on identifying the specific determinants of participation in domestic trade, their effect on gendered participation in the economic activity, and explore policy options that could empower women as a vulnerable group, within a broad aim of fully supporting them to contribute to economic development through enhanced participation in economic activities like domestic trade. From a theoretical point of view, firms owned by either women or men participate in domestic trade with an aim of maximizing profits from the economic activity subject to prevailing factors which could either raise, lower, or retain costs associated with participating in the activity. In effect, these factors could either encourage or discourage firms owned by either women or men to participate in the activity.

Kenya has embraced policy reforms to improve participation in domestic trade, create incentives for firms owned by women and men to embrace domestic trade as a sustainable economic activity that creates and supports jobs, reduces poverty, and spurs sustainable development. The country's Trade Policy commits to enhance the country's competitiveness by tapping into opportunities in the domestic and global markets for accelerated contribution of trade towards realization of the country's Bottom-Up Economic Transformation Agenda (BETA).

Although Kenya's trade policy aims at making the environment under which trade takes place more conducive, the contribution of the economic activity to growth has been declining. Existing stylized facts show that domestic trade currently contributes about 7.9% (KNBS, 2022) compared to 10.0% more than a decade ago (KNBS, 2010). The decline is associated with numerous causes including rigidities in licensing, larger transport costs, bottlenecks in accessing information, credit, weaker supply chains, and differentials in education achievements among women and men (UNDP, 2019; Yadav & Unni, 2016). Within the African context, firms owned by women and men encounter challenges that transcend regulation of business, poor skills, and access to affordable credit. Stylized facts indicate that firms owned by women hold less than 10 percent of the available credit that could support expansion of trade (World Bank, 2017). Moreover, the country's Trade Policy of 2017 aspires to create an environment that enables firms participating in domestic trade as an economic activity to thrive by addressing bottlenecks related to regulations, trading premises, access to credit, and capacity enhancing opportunities.

Synthesis of existing literature reveals that the determinants of participation in domestic trade could be categorized into *support*, *owner-specific*, *firm-specific*, and *regulatory factors* (Sengupta, 2010; KIPPRA, 2019; Zhong et al., 2020; Barzin et al., 2018; Geginat & Ramalho, 2018; Unger et al., 2011; Demenet et al., 2016; McKenzie & Sakho, 2010; Mwatu, 2019). These factors have been documented to have a disproportionate effect on entrepreneurs (KNBS, 2016). This study considers these factors as the specific determinants influencing participation in domestic trade and hypothesize that their effect varies among entrepreneurs in Kenya.

The rest of the paper is organized as follows: the "Literature review" section details review of literature; the "Methodology" section details the adopted methodology, while "Results" and "Conclusion and policy implications" sections present empirical results and policy implications respectively.

Literature review

Kenya had a population of 47.6 million persons in 2019 with the majority of them being women (50.49%) while men were 49.51% (KNBS, 2019). Although women are the majority in the country, the evidence from stylized facts demonstrates that majority of the firms in the country are registered under men. The MSME Survey of 2016 reveals that out of 24,164 enterprises that were examined, 11,932 of them (49.38%) were registered under men, 26.94% (6,509) were owned by women, whereas 23.68% (5,723) were jointly owned by women and men. However, a National Baseline Survey for the country carried out in 1999 demonstrates that firms owned by women were 47.4% of all those registered in Kenya (ILO, 2008). Overall, this observation denotes a decrease in participation in trade. I link this fall to differentials in *support*, *owner-specific*, *firm-specific*, and *regulatory factors* that are hypothesized to have disproportionate effect on participating in trade.

Moreover, the survey conducted on MSEs in 2016 demonstrated that firms owned by women usually participate in traditionally feminine activities hotels and hairstyling. Furthermore, socio-cultural biases have encouraged gender inequalities (KNBS, 2019). The evidence also demonstrates that in 2016 firms owned by men earn more on average monthly revenue (Ksh 200,058.00) in comparison to an average of Ksh 41,167.00 that was earned by firms

owned by women (KNBS, 2016). In contrast, firms owned by men earned an average of Ksh 7627.00 in 1999 whereas those owned by women earned an average of Ksh 4344.00 in the same year. Firms owned by men earned 2,623% more in 2016 that they did in 1999 while those owned by women earned 948% more in 2016 compared to what they earned in 1999. Despite the increase in average revenue earned by firms owned by both women and men, earnings for firms owned by men are three times larger than those earned by women. The implication is that firms owned by men are bigger than those owned by women.

The evidence further reveals that enterprises owned by men in 1999 were more likely to trade in permanent structures (32.2%) compared to those owned by women (23.1%). This trend had not changed much by 2016 as firms owned by men continued to enjoy an advantage with 82% trading in permanent structures compared to 79.6% for firms owned by women respectively. Whereas 26.7% of the firms owned by men were registered formally in 2016, 16.5% of the firms owned by women were registered, indicating that male-owned firms participated more in formal trade compared to those owned by women. Pertaining licenses and taxes, the average expenditure by firms owned by women and men was Ksh 964.00 and Ksh 2088.00 in 1999 respectively but this improved drastically to Ksh 5249.00 and Ksh 10,656.00 by 2016.

For training, over 97.8% of the firms owned by men were receiving support in training in 1999 compared to 97.5% of firms owned by women that were receiving the same service. By 2016, this share had changed to 3.1% and 2.7% for firms owned by women and men respectively. Most of the men in 1999 had attained secondary education (45.8%), whereas the largest share of women owning firms (52.6%) had schooled up to the primary level of education. By 2016, this trend had changed drastically as 36.8% of women operating enterprises had secondary education while that for men was 32.5%. The evidence reveals that different factors have had a disproportionate effect on participation in domestic trade by firms owned by women and men in Kenya. Identifying these factors and mainstreaming them in gender-sensitive trade policy could enhance participation in domestic trade and support sustainable development.

On the global scene, scholars have demonstrated that there is a link between firm-specific factors (Wang & Zhao, 2020; Medase, 2020), regulatory factors (Beck & Chaves, 2011; Hersoug et al., 2019; Whalley, 2002), support factors (Cole & Mehran, 2018; Duranton, 2015; Foster & Steinbuks, 2009), owner-specific factors (Cressy, 2006; Khan & Quaddus, 2018), and firm performance. Literature, however, is limited in that it does not specifically elicit the interlink between these factors and participation in domestic trade. This study extends this literature by demonstrating how these factors influence domestic trade participation from a gendered perspective. Theoretically, these factors amount to resource endowment (Heckscher, 1919; (Ohlin, 1933) available to either female or male-owned firms and could be sources of comparative advantage (Krugman et al., 2017) informing differentials in participating in domestic trade as an economic activity by firms owned by men and women among developing countries.

Methodology

Theoretical framework

I follow Krugman et al. (2017) in hypothesizing that participation in trade as an economic activity is influenced by differentials in endowment of resources. The implication is that firms that have limitations in accessing resources are likely to participate less in economic activities like domestic trade. Endowment of resources could also influence comparative advantage enjoyed by firms. Following Heckscher (1919) and Ohlin (1933), this study obtains an analytical framework demonstrating interrelationships between factors that highly influence participation in domestic trade, expected outcomes, and overall impact.

The specific factors examined in the paper are identified from literature both theoretical and empirical, as well as availability of variables on the factors from the utilized data. Disparities in participating in domestic trade as an economic activity are hypothesized as caused by the identified factors. The outcome is reduced participation in trade as an economic activity. Variables on experience, specialization, loyalty of customer, and reputation of firms relate to *firm-specific factors*. Variables on regulations incentivize firms to undertake lawful economic activities, whereas support factors facilitate operations of firms. Variables on skills, knowledge, and competence are specific to the firm-owner and are integral in business management.

Empirical Equations

The paper first presents two empirical equations and then proceeds to detail how the equations are estimated. In Eq. (1), participation in domestic trade by firms owned by women is the dependent variable. It is a binary response variable measured as "1" if a female-owned firm sells its goods and services to the domestic market and "0" if a female-owned firm exports its goods and services. In Eq. (2), domestic trade participation by male-owned firms is the dependent variable. It is similarly a binary response variable measured as "1" if a male-owned firm sells its

goods and services to the domestic market and "0" if a male-owned firm exports its goods and services. In this paper, domestic trade is comprised of firms that are selling goods and services to MSMEs, corporations, individual consumers, and government. The domestic trade participation equations are presented below:

$$\begin{aligned}\text{Domestic trade participation}_{\text{female\_owned firms}} &= \beta_0 \\ &+ \beta_i \text{Firm\_specific factors} \\ &+ \beta_j \text{Regulatory factors} \\ &+ \beta_k \text{Support factors} \\ &+ \beta_l \text{Owner\_specific factors} + \mu\end{aligned} \tag{1}$$

$$\begin{aligned}\text{Domestic trade participation}_{\text{male\_owned firms}} &= \beta_0 \\ &+ \beta_i \text{Firm\_specific factors} \\ &+ \beta_j \text{Regulatory factors} \\ &+ \beta_k \text{Support factors} \\ &+ \beta_l \text{Owner\_specific factors} + \mu\end{aligned} \tag{2}$$

In the two equations, μ is an error term. β_i, β_j, β_k, and β_l represent vectors of estimated parameters.

The probit model

I follow Uzunoz and Akcay (2012) in applying the discrete choice probit model for binary outcomes (1,0) for domestic trade participation to estimate Eqn. (1) and (2) above. It is based on cumulative normal probability distribution where the dependent variable takes the values of 1 and 0. The probit model is suitable for this analysis because the outcome variable is binary (1,0). Applying the model, participation in domestic trade is assigned a value of "1" if a female-or male-owned firm sells goods and services in the domestic market and "0" if the firm sells goods and services to export market. From this understanding, I take the probability p_{fm} of participating in domestic trade to be expressed as in Eqn. (3) and (4), where Φ represents the cumulative distribution of domestic trade participation, **f** and **m** are vectors of female and male-owned firms respectively:

$$p_{fm} = \text{prob}\left(Y_{fm} = 1|X\right) = \int_{-\infty}^{xf'\beta} (2\pi)^{-1/2} \exp\left(-\frac{t2}{2}\right)dt \tag{3}$$

$$= \Phi\left(\text{xfm}'\beta\right) \tag{4}$$

Furthermore, the relationship between the factors and the probability of a random female-or male-owned firm participating in domestic trade is interpreted in terms of marginal effects. The marginal effects for the continuous independent variables X_k on the probability $p(Y_{fm}=1|X)$, with the other variables unchanging, are derived in Eq. (5):

$$\frac{\partial y}{\partial x}\frac{pfm}{xfm_k} = \Phi\left(\text{x}_{\text{fm}}{}'\beta\right)\beta_k, \tag{5}$$

where Φ stands for probability density function of domestic trade participation and the marginal effects on the dummy variables are obtained as in Eq. (6):

$$\Delta = \Phi\left(\overline{x_{fm}}\beta, d_{fm} = 1\right) - \Phi\left(\overline{x_{fm}}\beta, d_{fm} = 0\right) \tag{6}$$

where *d* stands for dummy variable and "1" represents female-or male-owned firm participating in domestic trade and "0" if the firm participates in export trade. The marginal effects obtained explain how the policy variables shift the probability of domestic trade participation.

Controlling for endogeneity and heterogeneity

Since the paper uses cross-sectional data, it is susceptible to endogeneity and heterogeneity problems. Endogeneity arises when at least one policy variable explains domestic trade participation while at the same time domestic trade participation influences that policy variable. In this paper, *firm size* was deemed endogenous because a firm's size could determine whether it participates in domestic trade; yet participating in domestic trade could influence a firm to grow into a large enterprise. According to Stone and Rose (2011), while carrying out socio-economic research, it is important to understand how and why variables take certain values if valid and reliable policy inference is to be made.

Wooldridge (2013) proposes instrumental variables approach into addressing endogeneity. Particularly, a good instrument must be exogenous and relevant. For the model on domestic trade participation by female-owned firms, I instrument firm size with *monthly expenditure on rent* and *current gross business worth*. For the model on domestic trade participation by male-owned firms, firm size is instrumented by the firm's value of stocks. The inclusion and exclusion criteria are used to control for endogeneity and heterogeneity. The instrumental variables are included in the reduced form models after which the residuals and the interaction term between the endogenous variable and the residuals are included in the structural models (Mwabu, 2008). The reduced form models are presented in Eqs. (7) and (8) while the structural models are contained in Eqs. (9) and (10):

Table 1 Measurement and definition of variables

Dependent variables	Definition
Domestic trade participation-women	1 if enterprise owned by woman sells domestically, 0 if female-owned firm sells goods and services to export market.
Domestic trade participation-men	1 if enterprise owned by men sells domestically, 0 if male-owned firm sells goods and services to export market.
Independent variables	
Firm-specific factors	
Firm size	1 if firm is either Micro, Small or Medium enterprise, 0 if firm is Large.
Goodwill obligation	Expenditure by enterprise on goodwill in Kenyan Shillings.
Age of firm	Firm's age in years
Regulatory factors	
Tax obligation	Firm's monthly expenditure on taxes
Licenses obligation	Monthly expenditure by enterprise on licenses
Firm registration status	1 if firm is registered, 0 otherwise
Support factors	
Access to credit	1 if enterprise applied credit in last 3 years, 0 otherwise.
Access to mobile money platform	1 if firm has a mobile money platform, 0 otherwise.
Firm structure-permanent	1 if structure is permanent, 0 if no structure.
Firm structure-semi-permanent	1 if the structure is semi-permanent, 0 if no structure.
Firm structure-temporary	1 if the structure is temporary, 0 if no structure.
Training support	1 if firm received training support, 0 otherwise.
Membership to a trade association	1 if member, 0 if not a member.
Firm labor	Firm's total number of hours worked per week by employees aged 16 years and above.
Road status	1 if road status is good, 0 if bad.
Internet access	Firm's monthly expenditure on internet costs.
Access to water	1 if firm has access to piped water, 0 otherwise.
Access to electricity	1 if firm has access to electricity, 0 otherwise.
Owner-specific factors	
Primary level of education	1 if primary, 0 if none
Secondary level of education	1 if secondary, 0 if none
Vocational level of education	1 if vocational, 0 if none
University level of education	1 if university, 0 if none

$$\begin{aligned} Firm\ size_{females} &= \beta_0 \\ &+ \beta_i Firm_{specific} factors \\ &+ \beta_j Regulatory\ factors \\ &+ \beta_k Support\ factors \\ &+ \beta_l Owner_{specific} factors \\ &+ Instrument + \mu \end{aligned} \tag{7}$$

$$\begin{aligned} Firm\ size_{males} &= \beta_0 \\ &+ \beta_i Firm_{specific} factors \\ &+ \beta_j Regulatory\ factors \\ &+ \beta_k Support\ factors \\ &+ \beta_l Owner_{specific} factors \\ &+ Instrument + \mu \end{aligned} \tag{8}$$

$$\begin{aligned} Domestic\ trade\ participation_{female\_owned\ firms} &= \beta_0 \\ &+ \beta_i Firm_{specific} factors \\ &+ \beta_j Regulatory\ factors \\ &+ \beta_k Support\ factors \\ &+ \beta_l Owner_{specific} factors \\ &+ Residuals + Interaction + \mu \end{aligned} \tag{9}$$

$$\begin{aligned} Domestic\ trade\ participation_{male\_owned\ firms} &= \beta_0 \\ &+ \beta_i Firm_{specific} factors \\ &+ \beta_j Regulatory\ factors \\ &+ \beta_k Support\ factors \\ &+ \beta_l Owner_{specific} factors \\ &+ Residuals + Interaction + \mu \end{aligned} \tag{10}$$

Table 2 Descriptive statistics

	Women owned					Men owned				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Dependent variable										
Domestic trade participation	6509	.9933938	.0810161	0	1	11,932	.9875126	.1110519	0	1
Firm-specific factors										
Firm size	6509	.9110462	.2846989	0	1	11,932	.9055481	.2924686	0	1
Goodwill	6355	8852.062	118,190.4	0	5,000,000	11,503	11,276.7	148,459.2	0	10,000,000
Firm age	6509	7.319711	6.913791	0	66	11,932	8.25	8.182548	0	96
Regulatory factors										
Taxes	6150	4568.31	196,837	0	15,000,000	10,892	9060.468	312,584.3	0	21,000,000
Licenses	6442	681.8315	29,971.73	0	2,400,004	11,708	1596.493	37,174.47	0	1,462,502
Firm registration	6509	.1651559	.3713498	0	1	11,932	.2672645	.4425501	0	1
Support factors										
Credit access	6509	.309725	.4624157	0	1	11,932	.2509219	.4335618	0	1
Mobile money	6509	.4043632	.4908061	0	1	11,932	.4663091	.4988845	0	1
Trading structure-permanent	6509	.7961284	.4029056	0	1	11,932	.8198123	.3843598	0	1
Trading structure-semi-permanent	6509	.1682286	.3740979	0	1	11,932	.12588	.331728	0	1
Trading structure-temporary	6509	.0268859	.1617622	0	1	11,932	.0414013	.1992248	0	1
Training support	6509	.031034	.1734228	0	1	11,932	.0270701	.1622944	0	1
Trade association membership	6509	.3435244	.4749211	0	1	11,932	.1756621	.3805484	0	1
Labor	6345	58.09929	50.4773	0	588	11,679	69.37777	58.92747	0	560
Status of road	6509	.7111692	.453254	0	1	11,932	.7228461	.4476119	0	1
Access to internet	6447	96.86116	3072.44	0	225,000	11,743	271.9147	6609.713	0	429,581.1
Access to water	6509	.1037026	.3048977	0	1	11,932	.1030003	.3039721	0	1
Access electricity	6509	.8116454	.3910251	0	1	11,932	.8708515	.3353783	0	1
Owner-specific factors										
Education-primary	6509	.2624059	.4399759	0	1	11,932	.2310593	.4215279	0	1
Education-secondary	6509	.3679521	.4822853	0	1	11,932	.3250922	.4684289	0	1
Education-vocational	6509	.1929636	.394655	0	1	11,932	.169125	.374878	0	1
Education-university	6509	.0490091	.2159035	0	1	11,932	.115823	.320026	0	1

Table 3 Variance inflation factor (VIF) test for multicollinearity

Model	Mean VIF
Domestic trade—women	3.07
Domestic trade—men	2.41

Measurement of variables

Data and description

Since the 1999 National MSE Baseline Survey, the 2016 MSME Survey provides the most recent data on the factors that are thought to influence participating in domestic trade by firms owned by women and men. The data captures variables on aspects like starting a business, ownership structure of the firms, support factors, and general challenges encountered by firms in Kenya.

Probability sampling design was used in selecting the sample size. I use a sample of 11,932 firms that are owned by men and 6509 firms owned by women and are participating in domestic trade. In effect, factors that influence participation in domestic trade by firms that owned by men and women are sorted around those two samples respectively. Disparities are due to missing values. Tables 1, 2, and 3 present measurement and definition of variables, descriptive statistics, and variance inflaiton factor for multicollinearity respectively.

Table 2 presents the summary statistics for all the variables used. Particularly, the likelihood of participating in domestic trade was slightly higher among firms owned by women (99.34%) compared to those owned by men (98.75%). Most of the firms owned by women (91.10%) were more likely to be a micro and small enterprise (MSE) compared to those owned by men (90.55%). On average, firms owned by women spent less (Ksh 8852)

on goodwill than those owned by men (Ksh 11,276) with highest expenditure on goodwill being Ksh 5,000,000 and Ksh 10,000,000 among firms owned by women and those owned by men respectively. On average, firms owned by women were younger (7.3 years) than those owned by men (8.23 years) with the oldest female- and male-owned firms being 66 and 96 years respectively. The average expenditure on taxes made by firms owned by women was lower (Ksh 4568) than expenditure on taxes by those owned by men (Ksh 9060) with highest expenditure being Ksh 15,000,000 and Ksh 21,000,000 among female-and male-owned firms respectively. The implication is that tax burden is born disproportionately by female-and male-owned firms. Similarly, expenditure on licenses was lower (Ksh 681) among firms owned by women compared to those owned by men (Ksh 1596). This could mean more female-owned firms operate without licenses in comparison to male-owned firms.

Female-owned firms had a higher likelihood of accessing credit (46.24%) compared to male-owned firms (25.09%). This reflects current initiatives aimed at empowering women through enhanced access to credit. Access to mobile money platforms was higher among male-owned firms (46.63%) compared to 40.44% among female-owned firms. Firms owned by men had a higher likelihood of trading in permanent structures (81.98%) compared to female-owned firms (79.61%). In contrast, female-owned firms had a higher likelihood of trading in semi-permanent structures (16.82%) compared to those owned by men (12.59%).

Regarding access to business training support, female-owned firms were more likely to access training support (3.10%) compared to their male counterparts (2.71%). Notably, access to training support remains low among both female-and male-owned firms in Kenya. Female-owned firms performed better in terms of membership to trade associations (34.35%) compared to those owned by men (17.57%). Pertaining to the hours spent on work, female-owned firms worked for fewer hours in a week (58.10) compared to those owned by men (69.38).

In terms of access to internet connectivity, male-owned firms spend more on internet on average per month compared to female-owned firms. Expenditure on internet is an indicator of how much firms use or rely on internet to execute trade transactions. This could mean male-owned firms rely more on internet to undertake trade transactions compared to female-owned firms. Access to piped water was nearly the same among female-owned firms (10.37%) and male-owned firms (10.30%). However, there are slightly larger disparities in access to electricity among female-owned firms (81.16%) and male-owned firms (87.09%).

Table 4 Breusch-Pagan heteroscedasticity test

Breusch-Pagan heteroscedasticity test	*chi2(1)*	*Prob>chi2*
Domestic trade—women	3309.89	0.0000
Domestic trade—men	6346.35	0.0000

On education attainment, 26.24% of female-owned firms had owners with primary level of education compared to 23.11% of male owners. More female owners (36.79%) had secondary level of education compared to male owners (32.51%), while 19.30% of the female owners had vocational level of education compared to 16.91% of the male owners. University level of education attainment had the highest disparities with only 4.90% of female owners having attained university level of education compared to 11.58% of the male owners who had attained university level of education. Although women have made strides in education attainment, more needs to be done to incentivize more women to achieve the highest level of educational attainment (university level of education).

Diagnostic tests

Normality test

Several diagnostic tests were conducted for this study. Table 6 of Appendix presents the Shapiro-Wilk normality test results for participating in domestic trade. The continuous variables especially the logarithm of number of hours worked per week, logarithm of expenditure on licenses, logarithm of firm's age in years, logarithm of expenditure on goodwill, logarithm of expenditure on internet, and logarithm of expenditure on taxes followed a normal distribution.

Multicollinearity

I tested for multicollinearity using the variance inflation factor. The mean VIF was 3.07 and 2.41 for participating in domestic trade by firms owned by women and men respectively. Since the mean VIF was less than the conventional VIF mean of 10 that is considered acceptable, multicollinearity was not a major problem in each of the two models estimated.

Table 5 Marginal effects from probit regression

Firm-specific factors	Women owned			Men owned		
	Coefficient	Robust SE βi	*p*-value	Coefficient	Robust SE βi	*p*-value
Firm size	.2445706***	.0906419 (2.70)	0.007	− .1333765**	.0601612 (− 2.22)	0.027
Log of goodwill	− .0002449	.0001501 (− 1.63)	0.103	− .0008184***	.0003078 (− 2.66)	0.008
Log of firm age	− .0012044	.0008101 (− 1.49)	0.137	.0000889	.001297 (0.07)	0.945
Regulatory factors						
Log of taxes	− .0003585	.000254 (− 1.41)	0.158	.0000653	.0003932 (0.17)	0.868
Log of licenses	− .0001488	.0004288 (− 0.35)	0.729	.0009603	.0006983 (1.38)	0.169
Firm registration	.0000769	.0019684 (0.04)	0.969	.0043515*	.0025849 (1.68)	0.092
Support factors						
Credit access	.0048705***	.001468 (3.32)	0.001	− .0002766	.0020949 (− 0.13)	0.895
Mobile money	− .0000123	.0009675 (− 0.01)	0.990	.0021556	.0020754 (1.04)	0.299
Trading structure-permanent	.0039501	.0029227 (1.35)	0.177	.003318	.0065119 (0.51)	0.610
Trading structure-semi-permanent	.0043199	.0030505 (1.42)	0.157	.0047518	.0069138 (0.69)	0.492
Trading structure-temporary	.0042963	.0037755 (1.14)	0.255	− .0035406	.0079165 (− 0.45)	0.655
Training support	− .0027899	.0034612 (− 0.81)	0.420	− .0009159	.0046301 (− 0.20)	0.843
Trade association membership	− .0010457	.0012384 (− 0.84)	0.398	.0040019	.0028501 (1.40)	0.160
Log labor	− .0000067	.0003708 (− 0.02)	0.986	.0008146	.0006254 (1.30)	0.193
Status of road	.0000568	.0010345 (0.05)	0.956	− .0016583	.00221 (− 0.75)	0.453
Log of internet access	.0004366	.0004592 (0.95)	0.342	− .0001336	.0005221 (− 0.26)	0.798
Access to water	.0005609	.001802 (0.31)	0.756	.0001154	.003225 (0.04)	0.971
Access to electricity	− .0009218	.0017651 (− 0.52)	0.602	− .0013152	.0028666 (− 0.46)	0.646
Owner-specific factors						
Education-primary	.001024	.0014699 (0.70)	0.486	.0038446	.0037186 (1.03)	0.301
Education-secondary	.0004285	.0013124 (0.33)	0.744	− .0023667	.0032893 (− 0.72)	0.472
Education-vocational	.0019369	.0017192 (1.13)	0.260	.000088	.0036719 (0.02)	0.981
Education-university	− .0004803	.0019235 (− 0.25)	0.803	− .0066476*	.0036495 (− 1.82)	0.069
Endogeneity						
Residuals	.3352435***	.1003035 (3.34)	0.001	.118622*	.0698939 (1.70)	0.090
Interaction	− .2835905***	.1029376 (− 2.75)	0.006	.1462233**	.0635343 (2.30)	0.021
Observations	5324			8062		

*, **, and *** indicate significant at 10%, 5%, and 1%

Heteroscedasticity

Table 4 presents the Breusch-Pagan test for heteroscedasticity for participating in domestic trade. OLS regressions were first estimated after heteroscedasticity tests were carried out. The obtained *p*-values were less than the 5% level of significance ($p < .05$), leading to rejection of the null hypothesis of homoscedasticity. The error terms were non-constant. The presence of heteroscedasticity meant that the obtained parameter estimates were unbiased, but inference was inefficient. Because the cause of heteroscedasticity was unknown, robust standard errors were obtained to aid in carrying out hypothesis testing on significance of parameter estimates (Gujarati & Porter, 2009).

Results

Endogeneity and heterogeneity were controlled as in Eqs. (7), (8), (9), and (10) to ensure that empirical results were valid and reliable. The condition on relevancy of the instruments was satisfied as indicated in Tables 7 and 8 of Appendix. In Table 7 of Appendix, the instrument (log of expenditure on rent and gross business worth) was a relevant instrument for firm size. This was achieved by testing the null hypothesis that the instrument's coefficient was not statistically different from zero. The hypothesis was rejected ($z = -3.71$, $p = 0.000$) indicating the instrument was statistically different from zero and thus relevant. Also in Table 7 of Appendix, the instrument (log of firm's stock value) was equally relevant ($z = 5.49$, $p = 0.000$).

The control function approach (Wooldridge, 2015) was utilized in controlling for endogeneity and heterogeneity. The approach requires inclusion of the instrumental variable in the reduced form equation (see Table 7 of Appendix) after which the residuals and the interaction between the endogenous variable and the residuals are obtained and included in the structural Eqs. (9) and (10) estimated[1]. Following Mwabu (2008), if the coefficient for the residuals is statistically significant, then endogeneity was present, but it was resolved. That condition was satisfied ($z = 2.85$, $p = 0.004$) and ($z = 1.74$, $p = 0.082$) for the models on participating in domestic trade by firms that are owned by women and men respectively. If the interaction between firm size and residuals is statistically significant, then there was heterogeneity, but it was resolved (Mwabu, 2008; Mwatu, 2022). This condition was equally satisfied ($z = -2.26$, $p = 0.024$) and ($z = 2.34$, $p = 0.020$) for the two models used, respectively.

I interpret the marginal effects for the two models estimated (Eqs. (9) and (10)). Only the results for variables with significant effect on participating in domestic trade are interpreted. Although the statistically insignificant results have underlying theoretical rationale, they are of less policy value as policy attention should be directed to only significant variables.

Firm-specific factors

Firm size had a significant effect on domestic trade participation among both female-and male-owned firms. Goodwill, however, had a significant effect on domestic trade participation among male-owned firms only. Firm size is a measure of firm's experience and specialization among firms in Kenya and other developing countries. Specifically, I find that a female-owned firm is 24.46% more likely to participate in domestic trade if it is an SME compared to what would happen if it was a large enterprise. Similarly, I observe that a male-owned firm is 13.34% less likely to engage in domestic trade if it is an SME compared to what would happen if the firm was large. Since female-owned firms have competitive disadvantage in terms of managerial skills, experience, and even educational attainment in Kenya if they are SMEs, they participate less in international trade and more in domestic trade. With appropriate support and capacity building, the SMEs owned by females in the country could transition to large enterprises enjoying economies of scale.

Goodwill, which is an intangible asset related to firm reputation and customer loyalty, matters more among firms owned by men than it does among those owned by women. Particularly, I note that a 1% increment in firm's expenditure on goodwill by male-owned firms translates to 0.08% shrinkage in the likelihood of engaging in domestic trade. As the stock of goodwill as an intangible asset rises, enterprises owned by men have a higher likelihood of engaging in international trade than domestic trade. In Kenya, male-owned firms have a competitive advantage compared to female-owned ones in terms of managerial experience, skills, and even size.

Regulatory factors

Registration status of firms significantly influenced participating in domestic trade among firms owned by men in Kenya. The registration status of a firm matters more among firms owned by men than among those owned by women. Particularly, a male-owned firm is 0.44% more likely to participate in domestic trade if the firm is formally registered compared to what would happen if the firm was not formally registered. In Kenya, just as it is among other developing countries, consumers have confidence in goods and services traded by formal enterprises in that registration is a signal that the firms are trading in lawful goods and services that do not compromise their health and safety. Indeed, registration enhances access to better equipment that supports trade, increases scale of operation, and makes the business environment more conducive.

Support factors

Access to credit had a significant effect on domestic trade participation among firms owned by women only. Indeed, access to credit matters more to female-owned firms than it does to male-owned ones. Particularly, I find that a female-owned firm is 0.49% more likely to participate in domestic trade if the firm had access to credit compared to what would happen if credit was inaccessible. In Kenya, women face challenges related to access to collateral and good business management skills such as bookkeeping and retention of updated financial statements. These limitations dampen the prospects of female-owned firms to access credit.

Owner-specific factors

The university level of education influences participating in domestic trade among firms owned by men only. Indeed, the university level of education matters more among firms that are owned by men compared to those owned by women. Categorically, I observe that a male-owned firm is 0.66% less likely to participate in domestic

[1] See Table 5 and Table 8 of Appendix for estimation results.

trade if the owners had the university level of education attainment compared to what would happen if the owners of the firm had no education at all. Since participation in international (export) trade is the reference for the dependent variable, this means male-owned firms whose owners have university level of education are more likely to engage in export trade compared to what would happen if they had no education attainment. Specifically, higher levels of education attainment indicate higher capability and experience which is key in managing firms.

Conclusion and policy implications

The study sought to assess how firm-specific, regulatory, support, and owner-specific factors affect domestic trade participation by firms owned by men and women in Kenya with policy implications for enhanced domestic trade activity. The study used dataset from the 2016 Micro, Small and Medium Enterprise (MSME) Survey. Probit regression was used to estimate two sets of equations. The first was on domestic trade participation by female-owned firms and the second was on domestic trade participation by firms owned by men. I further used the control function approach to estimate the relationship between the dependent and independent variables.

The study fills existing knowledge gaps on the factors determining gendered participation in domestic trade and how social roles and cultural identities drive disparities among women and men in the economic sphere. Moreover, study contributes to knowledge in numerous ways. First, the findings reveal that firm size matters most in influencing participation in economic activities especially domestic trade among firms owned by men and women. Specifically, increase in size raises participate in domestic trade by women but increases the likelihood of male-owned firms to participate in international trade.

Secondly, access to credit is more important in influencing domestic trade participation among female-owned firms. Specifically, female-owned firms are more likely to participate in domestic trade if they have access to credit facilities. Third, whereas enterprises owned by women are likely to engage in domestic trade more if they are informal, male-owned firms are more likely to participate in the activity if they are formal entities. Fourth, tertiary education is more important in domestic trade participation among male-owned firms. Specifically, as education level increases to university level, a male-owned firm reduces its participation in domestic trade, thereby increasing its participation in international trade.

The study contributes to the theory by confirming that disparities in engaging in trade among enterprises owned by women and men are driven by differentials in resource endowments and that social roles and cultural identities and the associated biases and prejudices in favor of or against economic activities like trade and who participates in them explain observed differentials in gendered participation in domestic trade.

Lastly, the findings policy practice not only in Kenya, but also among other developing countries. From the results, gender issues could be mainstreamed in the making of trade policies with aim of gradually reforming the social roles and cultural identities assigned to being male or female and the inherent limitation in accessing and participating in economic activities. Specifically, legal reforms should be instituted to ensure women have improved access to property rights as enablers of enhanced access to credit that empowers participation in domestic trade.

Appendix

Table 6 Shapiro-Wilk normality test result

	Women owned					Men owned				
	Obs.	W	V	Z	Prob>Z	Obs.	W	V	Z	Prob>Z
Trade participation	6509	0.95472	154.993	13.339	0.00000	11,932	0.98713	74.607	11.598	0.00000
Firm-specific factors										
(i) Firm size	6509	0.99732	9.188	5.866	0.00000	11,932	0.99865	7.844	5.540	0.00000
(ii) Log goodwill	6355	0.97928	69.455	11.208	0.00000	11,503	0.98443	87.451	12.014	0.00000
(iii) Log firm age	6509	0.99733	9.123	5.847	0.00000	11,932	0.99867	7.730	5.500	0.00000
Regulatory factors										
(i) Log taxes	6150	0.94217	188.274	13.830	0.00000	10,892	0.97937	110.535	12.625	0.00000
(ii) Log licenses	6442	0.88856	377.985	15.692	0.00000	11,708	0.90698	530.363	16.865	0.00000
(iii) Registration status	6509	0.99861	4.746	4.119	0.00002	11,932	0.99970	1.738	1.487	0.06847
Support factors										
(i) Access to credit	6509	0.99964	1.244	0.578	0.28153	11,932	0.99965	2.020	1.892	0.02927
(ii) Mobile money	6509	0.99989	0.390	− 2.488	0.99358	11,932	0.99998	0.112	− 5.882	1.00000
(iii) Trading structure-permanent	6509	0.99929	2.445	2.365	0.00902	11,932	0.99950	2.891	2.856	0.00215
(iv) Trading structure-semi-permanent	6509	0.99865	4.611	4.043	0.00003	11,932	0.99888	6.483	5.027	0.00000
(v) Trading structure-temporary	6509	0.98860	39.038	9.692	0.00000	11,932	0.99599	23.256	8.463	0.00000
Training support	6509	0.99014	33.751	9.307	0.00000	11,932	0.99379	36.005	9.638	0.00000
Trade association membership	6509	0.99975	0.865	− 0.383	0.64900	11,932	0.99931	3.982	3.716	0.00010
Log labor	6345	0.80583	649.826	17.117	0.00000	11,679	0.80947	1084.026	18.785	0.00000
Road status	6509	0.99972	0.954	− 0.123	0.54907	11,932	0.99983	1.012	0.033	0.48673
Log internet access	6447	0.97479	85.556	11.764	0.00000	11,743	0.98784	69.535	11.404	0.00000
Water access	6509	0.99737	8.989	5.808	0.00000	11,932	0.99855	8.389	5.720	0.00000
Electricity access	6509	0.99916	2.876	2.794	0.00260	11,932	0.99913	5.057	4.359	0.00001
Owner-specific factors										
(i) Education-primary	6509	0.99943	1.966	1.787	0.03694	11,932	0.99958	2.417	2.374	0.00880
(ii) Education-secondary	6509	0.99981	0.646	− 1.156	0.87610	11,932	0.99983	0.981	− 0.051	0.52039
(iii) Education-vocational	6509	0.99893	3.676	3.443	0.00029	11,932	0.99927	4.231	3.879	0.00005
(iv) Education-university	6509	0.99386	21.008	8.053	0.00000	11,932	0.99875	7.232	5.321	0.00000

Table 7 Reduced equation

Reduced form equation firm size (women owned)				*Reduced form equation firm size (men owned)*		
	Coefficient	SE βi	*p*-value	Coefficient	SE βi	*p*-value
Firm-specific factors						
Log goodwill	.0107674	.0107753	0.318	.0221595*	.0114728	0.053
Log firm age	.0594842	.0397984	0.135	.0174352	.0382724	0.649
Regulatory factors						
Log of taxes	.0032	.0199607	0.873	− .0286164**	.0116974	0.014
Log of licenses	.0460718**	.0233101	0.048	− .0699331***	.0219485	0.001
Firm registration	− .2658435***	.0802832	0.001	− .1982329***	.0710169	0.005
Support factors						
Credit access	− .0571103	.0656378	0.384	.0388687	.0698891	0.578
Mobile money	0.0648865	.0629969	0.303	− .1609019***	.0612955	0.009
Trading structure-permanent	.1208852	.3632581	0.737	.2571261	.2001398	0.199
Trading structure-semi-permanent	− .0730839	.3684488	0.843	.1947307	.2157875	0.367
Trading structure-temporary	− .3684012	.4021681	0.360	.5150567**	.2546255	0.043
Training support	.5151034**	.2467842	0.037	− .1010018	.1532368	0.510
Trade association membership	.2112519***	.0665212	0.001	− .0317528	.0785588	0.686
Log labor	.0247918	.019321	0.199	.0221129	.0194438	0.255
Status of road	.0134547	.0658842	0.838	.0516799	.0668429	0.439
Log access to internet	− .0116902	.0234239	0.618	− .0307413**	.0139543	0.028
Access to water	.0775722	.1013954	0.444	− .0348672	.0955635	0.715
Access to electricity	− .2474405***	.0905772	0.006	.1082125	.0886763	0.222
Owner-specific factors						
Education-primary	.0437115	.1084945	0.687	.1625624	.100847	0.107
Education-secondary	.0974411	.1049999	0.353	.2171599**	.0945354	0.022
Education-vocational	− .0028291	.1138194	0.980	.1201147	.1022016	0.240
Education-university	.008094	.16454	.961	.1543784	.1126179	0.170
Instruments						
Rent and firm's gross worth	− .0372904***	.0100634	0.000			
Log stock				.0294133***	.0053595	0.000
Constant	1.932199***	.4211449	0.000	1.644175***	.2601212	0.000
Pseudo-R^2	*0.0342*			*0.0642*		
Model p-value (chi-square)	*0.0000*			*0.0000*		
Observations	*5324*			*8062*		

Regresses the endogenous variable against the instrumental variable and all the other independent variables. An instrument is deemed valid if it is non-trivial, that is different from zero or statistically significant (this condition was met as indicated by $p = 0.000$)

*, **, and *** indicate significant at 10%, 5%, and 1% respectively

Table 8 Structural equation—probit regression

	Women owned			Men owned		
	Coefficient	Robust SE βi	*p*-value	Coefficient	Robust SE βi	*p*-value
Firm-specific factors						
Firm size	33.17696**	14.99404 (2.21)	0.027	− 5.689412**	2.527968 (-2.25)	0.024
Log goodwill	− .0332187**	.0173112 (− 1.92)	0.055	− .0349115***	.0130749 (-2.67)	0.008
Log firm age	− .1633869*	.0952878 (− 1.71)	0.086	.003794	.0553163 (0.07)	0.945
Regulatory factors						
Log of taxes	− .0486375	.0341638 (− 1.42)	0.155	.0027845	.0167517 (0.17)	0.868
Log of licenses	− .0201856	.0568455 (− 0.36)	0.723	.0409631	.0296087 (1.38)	0.167
Firm registration	.0104364	.2663519 (0.04)	0.969	.1856205*	.1095215 (1.69)	0.090
Support factors						
Credit access	.6607072***	.1900987 (3.48)	0.001	− .0117998	.08937 (− 0.13)	0.895
Mobile money	− .0016635	.1312924 (− 0.01)	0.990	.091949	.0888031 (1.04)	0.300
Trading structure-permanent	.5358491	.3983099 (1.35)	0.179	.1415339	.2777163 (0.51)	0.610
Trading structure-semi-permanent	.586014	.4163185 (1.41)	0.159	.2026952	.2955876 (0.69)	0.493
Trading structure-temporary	.5828108	.5269637 (1.11)	0.269	− .1510304	.3376045 (− 0.45)	0.655
Training support	− .3784648	.4582858 (− 0.83)	0.409	− .0390691	.1976509 (− 0.20)	0.843
Trade association membership	− .1418577	.1613792 (− 0.88)	0.379	.1707102	.1232677 (1.38)	0.166
Log labor	− .0009125	.050255 (− 0.02)	0.986	.0347495	.0267902 (1.30)	0.195
Status of road	.0077007	.1404542 (0.05)	0.956	− .0707356	.0941063 (− 0.75)	0.452
Log of access internet	.0592222	.0633986 (0.93)	0.350	− .0056987	.0223205 (− 0.26)	0.798
Access to water	.0760893	.2466223 (0.31)	0.758	.0049227	.1376003 (0.04)	0.971
Access to electricity	− .1250425	.2454357 (− 0.51)	0.610	− .0561029	.1218207 (− 0.46)	0.645
Owner-specific factors						
Education-primary	.1389085	.1996535 (0.70)	0.487	.1639974	.1605641 (1.02)	0.307
Education-secondary	.0581334	.1794265 (0.32)	0.746	− .1009547	.1406906 (− 0.72)	0.473
Education-vocational	.2627468	.2327075 (1.13)	0.259	.0037543	.1566275 (0.02)	0.981
Education-university	− .065151	.2571194 (− 0.25)	0.800	− .2835672*	.1554302 (− 1.82)	0.068
Endogeneity						
Residuals	45.47708***	15.93746 (2.85)	0.004	5.060031*	2.906701 (1.74)	0.082
Interaction	− 38.47016**	17.03175 (− 2.26)	0.024	6.237415**	2.670848 (2.34)	0.020
Constant	− 37.45549**	14.04855 (− 2.67)	0.008	− 3.319441	2.744351 (− 1.21)	0.226
Pseudo-R^2	*0.0962*			*0.0959*		
Model p-value (chi-square)	*0.0000*			*0.0000*		
Observations	*5324*			*8062*		

*, **, and *** indicate significance at 10%, 5%, and 1%

Data and code availability Data and code for the manuscript is available.

Author contributions The author is the corresponding author.

Declarations

Ethical approval The work has conformed and complied to research ethics and it is approved for consideration.

Informed consent The work is submitted to the journal for consideration with informed consent.

Conflict of interest The authors declare no competing interests.

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