

Female rural–urban migrants and online marketplaces in emerging economies: Evidence from Thailand and Vietnam

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Abstract

This research aimed to examine the factors affecting the participation of female rural–urban migrants in online marketplaces, and the welfare gains and their distribution. Our analysis was based on a unique dataset of rural households, villages, and rural–urban migrants in Thailand and Vietnam. Online market participation is classified into three activities: financial transactions, trading, and business. We accounted for the endogeneity issue of online market participation in the assessment of welfare impact by using an instrumental variable approach. Our results show that participation has a positive effect on the consumption of female migrants only when they participate in the complete bundle of online market activities. In addition, we find that the poor benefit insignificantly from online marketplaces. This raises a concern about increasing welfare inequality and suggests the poor should be supported so they are not left behind.

KEYWORDS

endogenous, heterogeneity, impact, instrumental variable, poverty, welfare

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1 | INTRODUCTION

The rapid increase in the use of online marketplaces has brought new economic opportunities in the developing world, especially in emerging economies where it is facilitated by advances in digital technologies and the expansion of internet access (Goldfarb & Tucker, 2019). This digital transformation has created a virtual place in which information, goods, and services are exchanged to boost economic growth (Greenstein, 2020). An online market is an internet-based interorganizational information system that provides participating buyers and sellers with opportunities to exchange information about prices and product offerings (Bakos, 1991). It thus plays an intermediary role in facilitating and matching buyers and sellers (Troy & Michael, 1999). According to a recent report of the Asian Development Bank (ADB), digital platform business-to-consumer revenues reached US\$3.8 trillion—equivalent to 4.4 per cent of global gross domestic product (GDP)—in 2019. Asia accounted for 48 per cent of this total sales revenue (US\$1.8 trillion—equivalent to 6 per cent of its regional GDP). It is expected that Asia will continue its rise as a major player in the world's digital platform market as wider access reaches more users and generates higher revenue growth (ADB, 2021).

At the same time, rapid economic growth in several Asian countries has created opportunities for employment and education in urban centres, with the financial returns expected to be higher than those in rural areas characterised by a high dependence on agriculture and high exposure to extreme climatic events. This has led to a considerable movement of labourers from rural areas to urban centres within their countries for work and education, even on a temporary basis. This is known as domestic migration. According to the World Bank (WB, 2016), there were about 756 million domestic migrants globally in 2015, which was roughly three times the number of international migrants. Rural–urban migrants are vulnerable in their new urban setting due to their low level of education and limited access to social services. Consequently, many of them fall into poverty (Cao & Liu, 2015; Lee et al., 2021). Among them, female migrants are more disadvantaged than males (Llácer et al., 2007); they are even paid less than male migrants for the same job (Obermann et al., 2021). The expansion of online marketplaces could offer additional benefits to domestic migrants in several ways. They could use these online platforms to look for employment opportunities and accommodation, to participate in various online purchasing activities, or to undertake their own online business. This is especially relevant for female migrants because their time is constrained due to their various family obligations such as taking care of children and purchasing food. However, so far, no empirical evidence is known about the factors facilitating or hindering the participation of female rural–urban migrants in online marketplaces, the welfare gains for them from that participation, and the distribution of the welfare gains.

Thailand and Vietnam are suitable places to examine these issues. Both countries are emerging economies that, before the COVID-19 pandemic, had relatively high rates of economic growth (Waibel et al., 2020). Thus, a relatively high number of migrants moved from rural areas to urban centres (that is, the Bangkok metropolitan area in Thailand and Ho Chi Minh City in Vietnam) for employment and education (Nguyen et al., 2019). Both countries are members of the Association of Southeast Asian Nations (ASEAN) and are implementing the ASEAN Information and Communication Technology (ICT) Master Plan 2020. Thailand is undertaking its Thailand 4.0 strategy, which is aimed at achieving economy-wide growth and innovation by creating an integrated digital economy. Vietnam has also identified ICT as an important factor for economic growth. Both countries have experienced rapid growth in online market development (ADB, 2021; ITU, 2020). Nevertheless, these two countries are also distinct in several aspects. Thailand is an upper middle-income economy while Vietnam is a lower middle-income

one. However, the share of internet users in the population has been higher in Vietnam than in Thailand since 2006 (ITU, 2020).

Against this background, our research thus aims to address the following research questions: (i) What are the factors affecting the participation of female migrants in online marketplaces? (ii) How great are the welfare gains from online marketplace participation? (iii) How are the welfare gains distributed? Addressing these questions provides useful information for the design of specific programs to help this vulnerable population group further benefit from online market development for efficient and inclusive economic growth. We used a unique migrant dataset linked to rural households and villages from which the migrants come to examine these issues. One of our key interests is how the characteristics of the households and villages from which the migrants come impact on their participation in online marketplaces. We employed an econometric estimation strategy that accounts for endogeneity in welfare impact assessment to achieve robust estimation results.

The rest of the paper is structured as follows. Section 2 outlines the conceptual framework in which potential factors affecting the decision to participate in online markets and the mechanisms through which online marketplaces affect the welfare of the participants are conceptualised, reviews the evidence from the previous literature, and highlights our contributions. Section 3 describes the study sites and data. Section 4 explains the methodology. Section 5 presents the results and discusses the findings, while Section 6 concludes.

2 | CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 | Conceptual framework

We start with a female rural–urban migrant. Her decision to migrate depends on several factors, which, in the migration literature, are classified as ‘push’ factors from the area of origin (her rural household and village) and ‘pull’ factors from the destination (the city to which she moved). Several authors find that the decision to migrate from a rural area to an urban centre reflects not only the goals or needs of the migrant, but also a livelihood strategy of the rural household (Rozelle et al., 1999; Stark & Bloom, 1985). Once in the city, her participation in online marketplaces is dependent on her perceived net benefit from that participation, which is assumed to be positive when the decision to participate is made. The perceived net benefit is, in turn, dependent on several factors, including characteristics such as her age, education level, marital status, wealth, and employment (Santouridis & Kyritsi, 2014). This conceptualisation allows us to link the activities undertaken by the migrant (that is, participation in online marketplaces) not only to her characteristics, but also to the characteristics of the places of origin and destination (Nguyen et al., 2019; Taylor et al., 2003). For example, how does a migrant from a relatively well-off background (for example, having the internet at home) use the opportunities provided by online marketplaces?

One of the most visible differences between men and women is the time they devote to unpaid care work for their families. This unpaid work is both an important aspect of economic activity and an indispensable factor contributing to the wellbeing of individuals, their families, and society (Stiglitz et al., 2007). According to a report of the Organisation for Economic Co-operation and Development (OECD), women spend two to 10 times more time on unpaid care work than men (OECD, 2014). This work includes not only activities in the home such as cooking, cleaning, and caring for children, the ill, and the elderly, but also outside activities such as purchasing

food, clothes, and other items needed for their families. This is in addition to their paid activities, thus creating the ‘double burden’ of work for women. Moreover, women are in several cases paid less than men for doing the same job (Obermann et al., 2021). The situation could even be worse for rural–urban migrants due to the lack of support from their relatives who are still in rural villages. In this regard, the development of the internet in general and online marketplaces in particular offers new opportunities especially for women as such development enables women to purchase needed items online, access a wealth of information for improving work skills, expand and strengthen social networks, and improve employment opportunities—all of which could improve their welfare.

Compared with conventional markets, online markets can help save their participant’s time and money, both of which are more limited for women than for men. Online financial transactions such as sending or receiving money help save women’s limited time and money as they do not need to visit a bank. When they offer something to sell in online markets, it is easier for potential buyers to find out about their offers; and when they need to buy something, it is also more convenient for them to look for the goods or services, to search for lower prices, and to settle the purchases. When women undertake their own business, it is also easier for them to look for and meet with their business partners and reduce the costs of search and trade settlement (Troy & Michael, 1999; Zanello et al., 2014). One of the potential mechanisms through which participation in online marketplaces helps improve the welfare of participants is that it reduces transaction costs (Garicano & Kaplan, 2001; Goldfarb & Tucker, 2019), which include those for search, price discovery, and trade settlement (Lee & Clark, 1996). Consequently, this increases one’s disposable income. The welfare gains should be different due to the nature of online market activities. For example, the gains from purchasing online for personal use are different from the gains from becoming an online merchant. The former is purely mechanical when better-off households have more disposable income and thus can spend more in online transactions, while the latter is productive and expected to bring a certain level of income. However, participation in online markets also involves a higher risk of fraud or cheating (Bilen & Matros, 2021), which can lead to welfare losses. Thus, examining whether participation in online markets has a welfare-improving effect and how the welfare gains are distributed is an empirical question.

2.2 | Literature review

Even though online marketplaces have become increasingly popular in our daily lives, previous studies seem to have focused more on the factors affecting internet use and its welfare impact. This is because participation in online marketplaces is only possible if access to the internet is available (Howard & Mazaheri, 2009). For the determinants of internet use, previous studies show it is driven by various characteristics of the internet users (Lera-López et al., 2011; Ojo et al., 2019). Education is found to be positively associated with internet use (Briggeman & Whitacre, 2010; Yang et al., 2021), which is explained by the lack of knowledge or computer skills that could demotivate individuals with low education levels from using the internet. In addition, better-educated individuals could take advantage of educational resources and information on the internet to strengthen their knowledge, improve employment opportunities, and enhance their income. Meanwhile, results on the relationship between age and internet use are mixed. Chang and Just (2009) find that age is positively correlated with the probability of using the internet, whereas Lera-López et al. (2011) show that the probability of internet use decreases when age increases. Nguyen et al. (2022) demonstrate a nonlinearity in the effect of age on internet use.

Briggeman and Whitacre (2010) show that higher income is positively associated with a higher probability of using the internet. Occupations are found to significantly affect the decision to use the internet. Mesch and Talmud (2011) find that people working in sales sectors are more likely to use the internet than those working in the agricultural sector. Lera-López et al. (2011) point out that urbanisation is one of the key determinants of internet use. In developing countries, urbanisation is usually accompanied by infrastructure development for production, transportation, and telecommunication. Regarding the welfare impact of internet use, the evidence is mixed. Some authors find a positive and significant effect of internet use on income in developing countries (Bailur & Masiero, 2017), which helps to reduce poverty (Chang & Just, 2009; Chen et al., 2020). Others find a significant but negative income effect as labour productivity is negatively affected by adjustment costs related to learning and the relocation of labour and other activities. In addition, internet diffusion tends to benefit more people with high education levels, consequently, exacerbating income inequality (Nguyen et al., 2022).

Even though previous studies on the drivers and welfare impacts of internet use provide important insights, there are several issues that need further attention. First, there is a lack of studies on the factors affecting the participation in online marketplaces of rural–urban migrants, despite some previous studies of the effectiveness of e-business on the empowerment of women (Hossain, 2018). In rapidly growing economies, rural–urban migrants have increasingly contributed to economic growth, not only at the place of destination, but also at the place of origin. Second, even less attention has been paid to female rural–urban migrants even though they are more disadvantaged than male migrants (Llácer et al., 2007; Pujazon-Zazik & Park, 2010). Third, the impact of internet development in general and online market development in particular should be examined from both efficiency and equity perspectives. The efficiency perspective is concerned with whether these developments bring gains in total welfare. Meanwhile, the equity perspective is about how the welfare gains are distributed. Making economic growth more efficient and inclusive has always been a norm in formulation of development policies. The previous literature seems to have focused more on the efficiency issues, largely ignoring the equity issues. Last, from a methodological point of view, the decision to migrate, to use the internet, or to participate in online marketplaces is endogenous. Participants in online marketplaces could be systematically different from non-participants. Thus, failure to account for this endogeneity results in biased estimates of the welfare impacts.

Our study contributes to filling these research gaps. We used a unique dataset that includes the characteristics of not only the migrants but also the rural households and villages from which they come to identify the determinants of female migrants' participation in online marketplaces. This allows us to see how the characteristics of the place of origin influence participation in online marketplaces. We then examined the welfare impact of online marketplace participation on the level of consumption and poverty status of migrants. We controlled for the potential endogeneity of participation by using an instrumental variable (IV) approach. Last, we employed a quantile regression to examine the distribution of the gains in consumption from participation, which enabled us to see who benefits the most. Our findings are thus expected to enrich the literature on online marketplace participation and its welfare impact and distribution, and provide solid evidence for formulating policy responses to support female rural–urban migrants to take the opportunities of online marketplace development. For example, which policy interventions in rural areas would facilitate female rural–urban migrants to participate in and benefit from online marketplaces? Our findings are, therefore, expected to be relevant not only to Thailand and Vietnam, but also to other rapidly growing economies in the developing world.

3 | STUDY SITES AND DATA DESCRIPTION

3.1 | Study sites and sample

We used the data from the 'Poverty dynamics and sustainable development: A long-term panel project in Thailand and Vietnam (TVSEP)' funded by the German Research Foundation (DFG-FOR 756/2) and administered by Leibniz University Hannover, Germany. The aim of the project is to establish a long-term database to examine and compare trends and drivers of long-term development dynamics in these two emerging economies, including economic transformation and rural–urban migration. Northern Thailand and central Vietnam were targeted because these regions have low average incomes and poor infrastructure (Nguyen et al., 2021). In these regions, three Thai provinces (Buri Ram, Nakhon Phanom, and Ubon Ratchathani) and three Vietnamese provinces (Dak Lak, Ha Tinh, and Thua Thien Hue) were selected as study sites as these provinces are rural and agriculture is the primary livelihood of the population. The selected provinces are highly representative of the rural population of northern Thailand and central Vietnam (Klasen & Waibel, 2015). The sampling procedure included three stages following the guidelines of the United Nations Department of Economics and Social Affairs (UN, 2005) and is described in Nguyen et al. (2017). In the first stage, sample subdistricts (in Thailand) or communes (in Vietnam) were selected. Two villages per sampled subdistrict or commune were chosen in the second stage, based on the size of the human population. At the third stage, 10 households in each sampled village were randomly chosen with equal probability. The total number of sampled households was predetermined at 2,200 in 220 villages in each country.

There have been several survey waves since 2007. In each wave, enumerators were carefully selected based on their experience with rural household surveys. They were then intensively trained. During the survey, each enumerator carried out face-to-face interviews at respondents' homes. Each interview took, on average, 2.5 hours. Since 2013, the computer-assisted personal interview (CAPI) technique using tablets has been used to record data, which are then cross-checked for any inconsistent and implausible content by survey team leaders on the spot, data-checking assistants, and staff members of the data centre headquarters. During these checks, if any missing or implausible data were found, the enumerator responsible for that interview had to correct them by revisiting (if possible) or calling the respondent.

Two survey instruments for the rural surveys were used for data collection: the household questionnaire for household heads and the village questionnaire for village heads. The village questionnaire records information on the economy of the village such as the distance to the provincial centre and the share of households with internet access, including cable internet at home. The household questionnaire contains nine sections recording information on many aspects of the household, including the education level and health of household members, and income-generating activities. A specific subsection was designated for migration and remittances in which information about household members who had migrated to other provinces or cities was recorded, including contact details. A migrant was defined as: (i) a household member who was at least 13 years old at the time they left home; (ii) living in the place of destination at the time of the rural survey; and had left home at the place of origin for at least one month during the reference period (from May of the previous year to April of the survey year). The most recent rural survey wave undertaken in both Thailand and Vietnam was in 2017 for 1,914 rural households in Thailand and 1,898 rural households in Vietnam.

A migrant tracking survey was conducted in 2018. From the rural survey in 2017, 1,690 individuals were identified as migrants (998 in Thailand and 692 in Vietnam) from the rural household

sample. Using the contact information (addresses or phone numbers) recorded in the household survey in 2017, the enumerators contacted the migrants to arrange an interview in the urban areas in which they were living. Like the rural household survey in 2017, this migrant tracking survey also used CAPI on tablets to record data; the collected data were also cross-checked as in the rural household survey. The project aimed to interview all migrants identified from the rural survey; however, only 760 migrants (388 in Thailand and 372 in Vietnam) were successfully interviewed, of whom 373 were female. Most of the interviewed migrants were in the Bangkok metropolitan area in Thailand and in Ho Chi Minh City, Da Nang City, and Hanoi in Vietnam (see Figure 1). The reasons for this low response rate include changes in the contact details so that it was not possible to reach some migrants, time constraints, and the high mobility of respondents.



FIGURE 1 Study sites of the rural survey (inside red lines) and rural–urban migrant tracking survey (green dots)

A separate section (Section 9) in the migrant survey instrument is designed to record information on whether the migrant used the internet during the previous 12 months and for which activities, including financial transactions (for example, transferring or receiving money, internet banking), communication with family members and friends, entertainment (for example, playing games, listening to music, or watching movies), online business (for example, working with business partners online), finding information about job opportunities, online trading (for example, online buying or selling), and searching for medical or health information. Based on the definition that online markets are virtual places that allow participating buyers and sellers to exchange information or facilitate their transactions (Bakos, 1991; Troy & Michael, 1999), three activities are classified as online market participation: (i) financial transactions (online banking), (ii) trading (buying and selling), and (iii) undertaking business. The village, household, and migrant survey questionnaires are available for download at the TVSEP homepage (www.tvsep.de).

3.2 | Data description

Table 1 stacks the characteristics of migrants, the rural households, and the villages from which they come, and the place of destination for the whole sample (including male and female migrants), by gender (male and female), and by country (Thailand and Vietnam). The average age of migrants is 30 years. Female migrants are younger than males (29 years versus 31 years), and migrants in Vietnam are younger than those in Thailand (26 years versus 33 years). The cross-country difference in migrants' age is possibly because more Vietnamese than Thai migrants first migrated for educational purposes. Migrants' average years of schooling is 11.4 years, with no significant difference between females and males. Vietnamese migrants have a higher education level than Thai migrants. There are also more Vietnamese migrants than Thai migrants who first left their place of origin for education (41 per cent in Vietnam versus 15 per cent in Thailand). About one-third of Vietnamese migrants are married, while this number is 61 per cent among Thai migrants. However, the number of migrants living with their own family (spouse and children) in the place of destination is higher in Vietnam than in Thailand (23 per cent versus 10 per cent). The average asset value of migrants for the whole sample is 3,900 purchasing power parity dollars (PPP\$), with Thai migrants owning more assets than Vietnamese migrants (PPP\$5,600 versus PPP\$2,100).

Regarding the characteristics of the rural households from which migrants come, more than 90 per cent belong to the majority ethnic group in their country (Thai majority in Thailand and Kinh majority in Vietnam). The average schooling of adult members of rural households is 5.68 years. This shows that the migrating household members are better educated than those who stay at home. In the rural villages, the share of households with cable internet at home is relatively low, at about 7 per cent, with Vietnam having a higher share than Thailand (10 per cent versus 3 per cent). The average distance from the village to the provincial centre is 41 km in Vietnam and 60 km in Thailand. There are no differences in this regard between female and male migrants. Regarding the place of destination, nearly 50 per cent of migrants are in metropolitan cities (that is, Bangkok in Thailand or Ho Chi Minh City in Vietnam), and there are no differences between male and female migrants in this aspect.

Table 2 reports the descriptive statistics of migrants' consumption and online market participation by gender and country. The average annual consumption expenditure is PPP\$4,300 for the whole sample. Although the expenditure of male migrants is slightly higher than that of females, the difference is not statistically significant. Regarding participation in online marketplaces,

TABLE 1 Descriptive statistics of the characteristics of migrants and their places of origin and destination

	Whole sample (n = 760)	By gender		By country	
		Male (n = 387)	Female (n = 373)	Vietnam (n = 372)	Thailand (n = 388)
Migrants' characteristics					
Age of migrant (years)	29.84 (8.76)	30.53 (8.90)	29.12** ^a (8.56)	26.17 (6.14)	33.35*** ^a (9.43)
Education of migrant (years)	11.41 (3.65)	11.20 (3.63)	11.62 ^a (3.66)	12.27 (3.39)	10.59*** ^a (3.71)
Marital status of migrant [†] (married = 1)	0.49 (0.50)	0.51 (0.50)	0.46 ^b (0.50)	0.35 (0.48)	0.61*** ^b (0.49)
Living with family in the city [†] (yes = 1)	0.16 (0.37)	0.17 (0.38)	0.16 ^b (0.36)	0.23 (0.42)	0.10*** ^b (0.30)
Left for educational purposes [†] (yes = 1)	0.28 (0.45)	0.25 (0.44)	0.30 ^b (0.46)	0.41 (0.49)	0.15*** ^b (0.36)
Adults sharing accommodation (persons)	2.51 (1.68)	2.49 (1.68)	2.54 ^a (1.68)	2.84 (1.84)	2.20*** ^a (1.45)
Asset value (PPP\$)	3,920.46 (7,910.02)	4,127.53 (7,853.02)	3,705.61 ^a (7,973.59)	2,152.89 (5,713.85)	5,615.14*** ^a (9,248.29)
Rural household characteristics					
Ethnic majority [†] (yes = 1)	0.96 (0.20)	0.96 (0.19)	0.96 ^b (0.20)	0.96 (0.19)	0.96 ^b (0.20)
Mean adult education (years)	5.68 (1.93)	5.74 (1.99)	5.61 ^a (1.87)	5.54 (1.98)	5.81* ^a (1.88)
Rural village characteristics					
Share of cable internet at home (%)	6.86 (9.86)	6.97 (9.45)	6.75 ^a (10.28)	10.63 (11.95)	3.25*** ^a (5.19)
Distance to provincial centre (km)	51.36 (31.43)	50.27 (30.41)	52.49 ^a (32.45)	41.67 (27.26)	60.64*** ^a (32.38)
Place of destination					
Metropolitan [†] (yes = 1)	0.46 (0.50)	0.43 (0.50)	0.49 ^b (0.50)	0.47 (0.50)	0.46 ^b (0.50)

Note: Standard deviation in parentheses; statistic tests between gender groups and countries.

^aTwo-sample *t*-test.

^bNon-parametric two-sample rank-sum test.

[†]Dummy variable.

****p* < 0.01, ***p* < 0.05, **p* < 0.1.

more female than male migrants participate in financial transactions and trading activities, whereas the difference in business activities is not statistically significant between males and females. There are more Vietnamese than Thai migrants participating in online trading activities. Meanwhile, the differences between Vietnamese and Thai migrants in financial transactions and business activities are not statistically significant.

TABLE 2 Descriptive statistics of migrants' consumption and their online market activities

	Whole sample (n = 760)	By gender		By country	
		Male (n = 387)	Female (n = 373)	Vietnam (n = 372)	Thailand (n = 388)
Annual consumption expenditure (PPP\$)	4,364.89 (2,991.65)	4,509.31 (2,948.30)	4,215.06 ^a (3,032.66)	4,286.90 (2,738.36)	4,439.67 ^a (3,217.60)
Financial transaction [†] (yes = 1)	0.44 (0.50)	0.39 (0.49)	0.50*** ^b (0.50)	0.44 (0.50)	0.45 ^b (0.50)
Trading [†] (yes = 1)	0.47 (0.50)	0.41 (0.49)	0.53*** ^b (0.50)	0.52 (0.50)	0.42*** ^b (0.49)
Business [†] (yes = 1)	0.25 (0.44)	0.25 (0.43)	0.26 ^b (0.44)	0.24 (0.43)	0.26 ^b (0.44)
At least 1 activity [†] (yes = 1)	0.64 (0.48)	0.61 (0.49)	0.67* ^b (0.47)	0.68 (0.47)	0.60** ^b (0.49)
At least 2 activities [†] (yes = 1)	0.38 (0.49)	0.33 (0.47)	0.43*** ^b (0.50)	0.38 (0.49)	0.37 ^b (0.48)
All 3 activities [†] (yes = 1)	0.15 (0.36)	0.12 (0.33)	0.18** ^b (0.38)	0.14 (0.35)	0.16 ^b (0.37)

Note: Standard deviation in parentheses; statistic tests between gender groups and countries.

^aTwo-sample *t*-test.

^bNon-parametric two-sample rank-sum test.

[†]Dummy variable.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3 shows the descriptive statistics of female migrants by their participation in online marketplaces. About two-thirds of female migrants participate in at least one activity. Participants have higher expenditure, are younger, have a higher educational level, and a higher asset value than non-participants. The share of migrants from the ethnic majority, the average number of years of schooling of adult household members, and the distance from the village to the provincial centre do not show significant differences between participants and non-participants. However, female migrants from rural villages with a higher share of households with cable internet at home are more likely to participate in online marketplaces than those from villages with a lower share of households with cable internet at home.

Regarding poverty, we used both absolute and relative levels. For absolute poverty, we used a daily consumption threshold of PPP\$5.50 per capita, following the World Bank (WB, 2018) for urban residents in middle-income countries. A migrant is defined to be in absolute poverty if their consumption is lower than this threshold. For relative poverty, a migrant is defined to be in relative poverty if their consumption is in the lowest 20 per cent of the consumption distribution in each country. Table 4 reports the descriptive statistics of consumption level and shares of absolute and relative poverty for all migrants and for female migrants. There are no significant differences in daily consumption per capita or in the share of absolute consumption poverty between male and female migrants. However, there are more female migrants in relative poverty than males. For female migrants, participants in at least one online market activity tend to have a higher level of consumption and a lower incidence of poverty than non-participants.

TABLE 3 Descriptive statistics of female migrants by their participation in online marketplaces

	Non-participants (n = 122)		Participants (n = 251)	
	Mean	Std dev.	Mean	Std dev.
Migrants' characteristics				
Consumption expenditure (PPP\$)	3,278.02	1,782.05	4,670.52***,a	3,392.84
Age of migrant (years)	32.81	10.91	27.32***,a	6.45
Education of migrant (years)	9.67	3.76	12.57***,a	3.21
Marital status of migrant [†] (married = 1)	0.58	0.50	0.40***,b	0.49
Living with family in the city [†] (yes = 1)	0.22	0.42	0.12***,b	0.33
Left for educational purposes [†] (yes = 1)	0.17	0.38	0.37***,b	0.48
Adults sharing accommodation (persons)	2.60	1.68	2.52 ^a	1.69
Asset value (PPP\$)	2,495.17	5,435.17	4,293.95***,a	8,901.90
Rural household characteristics				
Ethnic majority [†] (yes = 1)	0.93	0.25	0.97 ^b	0.18
Mean adult education (years)	5.46	1.60	5.68 ^a	1.98
Rural village characteristics				
Share of cable internet at home (%)	4.90	7.62	7.65***,a	11.26
Distance to provincial centre (km)	54.21	35.11	51.65 ^a	31.12
Place of destination				
Metropolitan [†] (yes = 1)	0.44	0.50	0.51 ^b	0.50
Thailand [†]	0.58	0.50	0.57 ^b	0.50

^aTwo-sample *t*-test.

^bNon-parametric two-sample rank-sum test.

[†]Dummy variable.

****p* < 0.01, ***p* < 0.05, **p* < 0.1.

4 | METHODOLOGY

4.1 | Identifying the factors affecting the participation of female rural–urban migrants in online marketplaces

Our first step was to identify the factors affecting the participation of female rural–urban migrants in online marketplaces. As conceptualised and reviewed in Section 2, the decision of a migrant to participate is theoretically affected by several factors, representing not only her characteristics, but also the characteristics of her places of origin and destination. The decision to participate can be represented by a dummy variable, *R*, which is equal to 1 if she participates and equal to zero otherwise. Thus, the probability of the participation of migrant *i* can be estimated via a probit regression as follows:

$$P(R_i = 1) = \alpha + \beta X_i + \gamma O_i + \delta D_i + \varepsilon_i \tag{1}$$

where *P* is the probability of participation; *X_i* is a vector representing the migrant's characteristics; *O_i* is a vector characterising the origin (rural) village and household from which migrant *i*

TABLE 4 Consumption, absolute poverty, and relative poverty of migrants

	By gender			Only female migrants	
	Whole sample (n = 760)	Male migrants (n = 387)	Female migrants (n = 373)	Non-participant (n = 122)	Participant (n = 251)
Daily consumption (PPP\$)	11.96 (8.20)	12.35 (8.08)	11.55 ^a (8.31)	8.98 (4.88)	12.80 ^{***,a} (9.30)
Absolute consumption poverty at PPP\$5.50 per capita per day [†]	0.14 (0.35)	0.13 (0.33)	0.16 ^b (0.37)	0.25 (0.43)	0.12 ^{***,b} (0.33)
Relative consumption poverty (In the 20% lowest consumption distribution) [†]	0.20 (0.40)	0.18 (0.39)	0.22 ^b (0.42)	0.33 (0.47)	0.17 ^{***,b} (0.38)

Note: Standard deviation in parentheses; statistic tests between gender groups and female migrants' participation in internet markets.

^aTwo-sample *t*-test.

^bNon-parametric two-sample rank-sum test.

[†]Dummy variable.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

comes; D_i is a vector characterising the migrant's (urban) destination where the migrant is living and working; and ε_i is the error term.

We include the following characteristics of the migrant: gender, age, education level, marital status, whether she left home for educational purposes, whether she is living with her own family in the destination, the number of adults with whom she is currently sharing accommodation, and the value of her assets. For the place of origin, we included two variables at the household level (the ethnicity dummy and the average years of schooling of rural household adults), and two variables at the village level (the share of village households with cable internet at home and the distance from the village to the provincial centre). For the place of destination, we used a dummy variable indicating whether it is the Bangkok metropolitan area in Thailand or Ho Chi Minh City in Vietnam. We also included a country dummy variable to account for the unobserved differences between Thailand and Vietnam. These variables are described in more detail in Table A1.

As we were able to interview only about half of the migrants from the surveyed rural households, the attrition rate is high and raises concern about our estimated results, so we took a closer look at this issue. As we did not have information on the un-interviewed migrants, we were not able to compare them with those interviewed. Instead, we compared the characteristics of the rural households and villages of these two groups. It appears that the un-interviewed migrants are from households with older heads, male-headed households, and poor households (daily per capita income less than PPP\$3.20 for rural areas in middle-income countries). The interviewed migrants are more likely to belong to households owning a phone. This characteristic is reasonable because the TVSEP survey contacted migrants mostly by phone. It appears that more migrants from households with heads with higher levels of education and from more remote villages participated in the survey (see Table A2). Since we pooled the data over two years (data of rural households and villages in 2017 and data of migrants in 2018), it could suffer from a sample selection problem. We tried to mitigate this by bootstrapping our estimation on the determinants

of the participation with 500 replications. We also checked for multicollinearity among our independent variables in estimating Equation (1). The variance inflation factor (VIF) values signal no serious problems of multicollinearity (Table A3). For robust standard errors and to prevent spatial autocorrelation, the standard errors of our estimations were clustered at the village level.

4.2 | Examining effects of online market participation on female migrants' welfare

In the second step, the welfare effects from female migrants' participation in online marketplaces were estimated via the following equation:

$$Y_i = \theta + \vartheta R_i + \varrho X_i + \int D_i + \eta_i \tag{2}$$

where Y_i represents a measure of the welfare of the female migrant, i . We used three indicators to represent migrants' welfare: (i) annual consumption expenditure; (ii) absolute poverty status; and (iii) relative poverty status. R_i , X_i , and D_i are defined as in Equation (1); η_i is the error term.

One of the challenges of estimating Equation (2) is that variable R_i is endogenous, as explained in Equation (1). We addressed this issue by employing an instrumental variable (IV) approach based on the heteroscedasticity-based identification strategy developed by Lewbel (2012) and Baum and Schaffer (2012). The endogeneity of migrants' participation in internet marketplaces can be expressed as:

$$R_i = \phi + \Omega X_i + \mathcal{E} D_i + \omega_i \tag{3}$$

As well as the usual regression assumption that ω_i is independent from X_i , this approach assumes the existence of heteroscedasticity in ω_i , and hence in R_i . Lewbel (2012) and Baum and Schaffer (2012) suggest using $[X_i - E(X_i)] \hat{\omega}_i$ as an internal IV for R_i in estimating Equation (2), where $\hat{\omega}_i$ is the predicted residual obtained by estimating Equation (3) excluding Y_i on the right-hand side. This is a valid instrument because $[X_i - E(X_i)] \hat{\omega}_i$ is uncorrelated with η_i (Nguyen et al., 2021).

We checked for the multicollinearity problem of independent variables in estimating Equation (2). The VIF values show there is no such problem (Table A4). To validate the appropriateness of the method and IVs for our estimation, we first checked for the presence of heteroscedasticity in Equation (2) using two tests—namely, the Breusch–Pagan/Cook–Weisberg test for heteroscedasticity and White's test for homoscedasticity. The results of these tests (Table A5) confirmed the presence of heteroscedasticity. Next, we carried out several quality tests: the under-identification test (an LM test based on Kleibergen & Paap, 2006), the weak-identification test (Kleibergen–Paap rk Wald F statistics), and the overidentification test (Hansen J statistic test). The results of these tests, presented in the lower panel of Tables 6 and 7, show that the IVs generated are valid (modestly weak for financial transactions and trading). The robust standard errors were also clustered at the village level to prevent spatial autocorrelation.

4.3 | Determining the distribution of welfare effects

The welfare effects identified from Equation (2) provide only a mean-based estimation of the effect of participation on migrants' consumption level and poverty status. Thus, in the last step,

we further examined who benefits most in terms of consumption expenditure. We followed Firpo et al. (2009) to employ an unconditional quantile regression model that included robust and clustered standard errors for this purpose. Unconditional quantile regression considers the effects of changes in independent variables on unconditional quantiles of dependent variables (Baltagi & Ghosh, 2017). Its main advantage is that, in the presence of multiple covariates, it provides more reliable and robust results than the conventional quantile one (Borah & Basu, 2013). The procedure includes two steps, as explained by Borgen (2016). The first step was to obtain the recentred influence function (RIF) as:

$$RIF(Y; q_\tau, F_Y) = q_\tau + \frac{\tau - 1 \{Y \leq q_\tau\}}{f_Y(q_\tau)} \quad (4)$$

where q_τ is the value of the outcome variable, Y , at the quantile τ . In our case, Y is the per capita expenditure of female migrants, F_Y is the cumulative distribution function of outcome variable Y , and $f_Y(q_\tau)$ is the density of Y at q_τ . The indicator function, $1\{Y \leq q_\tau\}$, identifies whether the value of outcome variable Y is below q_τ .

In the second step, the impact of online marketplace participation on the consumption level of each consumption quantile was estimated as follows:

$$I[RIF(Y_i; q_\tau) | X, R] = \epsilon + \xi_i R_i + \psi_i X_i + \vartheta D_i + \mu_i \quad (5)$$

We addressed the endogeneity concerns in Equation (5) by using the same procedure as in estimating Equation (2). First, we obtained the generated internal IVs from the estimation of Equation (2) using the heteroscedasticity-based method. In the next step, these generated internal IVs were included in probit models to predict the probability of participation in online marketplaces. In the final step, the instrumented and predicted probabilities were included in estimating Equation (5).

5 | RESULTS AND DISCUSSION

5.1 | Factors affecting migrants' decision to participate in online marketplaces

We estimated Equation (1) first for the whole sample (including male and female migrants) and then for the subsample of female migrants. For the whole sample, in addition to the variables described in Equation (1), we included a dummy variable for gender. The results of the whole sample estimation are reported in Table A6. The coefficient of the gender dummy variable shows that female migrants (compared with male migrants) use online platforms more for financial transactions and trading activities, by 9.6 per cent and 8.8 per cent, respectively. Meanwhile, male migrants use the platforms for business activities more than females by 7.6 per cent. This confirms the findings from previous studies that women and men use the internet for different purposes (Lera-López et al., 2011; Ojo et al., 2019). Regarding household and village characteristics (place of origin), ethnic majority and the education level of rural households are positively associated with migrants' use of internet platforms for transactions and for at least two market activities. The development of rural education is considered an engine for rural transformation (Ninh, 2021). Furthermore, the share of village homes with cable internet is positively associated with use of the internet for trading and for at least one market activity.

Table 5 presents the marginal effects of the determinants of female migrants' participation in online marketplaces by activity. We find that first migration for educational purposes is positively associated with participation in online business. Migrants' age is negatively associated with participation in online marketplaces. An increase in age of 1 year leads to a decrease in the probability of participation in at least one activity by 1.4 per cent, in at least two activities by 1.1 per

TABLE 5 Factors affecting the participation of female rural-urban migrants in online market activities (marginal effects)

	Financial transaction	Trading	Business	At least 1 activity	At least 2 activities	All 3 activities
Educational purposes [†]	-0.095 (0.065)	0.032 (0.066)	0.108* (0.055)	-0.032 (0.059)	0.008 (0.067)	0.068 (0.043)
Age of migrant	-0.010*** (0.003)	-0.018*** (0.004)	-0.004 (0.003)	-0.014*** (0.003)	-0.011*** (0.004)	-0.007** (0.004)
Years of schooling of migrant	0.046*** (0.008)	0.018** (0.009)	0.018** (0.008)	0.027*** (0.007)	0.027*** (0.008)	0.029*** (0.008)
Marital status of migrant [†]	-0.134** (0.057)	-0.032 (0.061)	-0.020 (0.055)	-0.054 (0.052)	-0.096* (0.057)	-0.037 (0.045)
Living with family in the city [†]	0.138* (0.076)	0.004 (0.082)	0.062 (0.079)	0.015 (0.064)	0.121 (0.084)	0.078 (0.067)
Adults sharing accommodation	-0.013 (0.015)	-0.017 (0.017)	-0.032* (0.017)	-0.011 (0.014)	-0.023 (0.017)	-0.038** (0.015)
Asset value (ln)	0.034* (0.018)	0.036* (0.018)	0.042*** (0.014)	0.036** (0.015)	0.042** (0.021)	0.038** (0.015)
Ethnic majority [†]	0.175* (0.102)	0.123 (0.142)	0.065 (0.095)	0.107 (0.104)	0.258** (0.120)	0.002 (0.082)
Mean adult education	0.019 (0.014)	-0.003 (0.014)	0.004 (0.012)	0.007 (0.013)	0.023 (0.015)	-0.007 (0.010)
Share of cable internet at home	0.002 (0.002)	0.004 (0.003)	0.005** (0.002)	0.005 (0.003)	0.004 (0.003)	0.003** (0.001)
Distance to provincial centre	-0.001 (0.001)	-0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	0.001 (0.001)
Thailand [†]	0.268*** (0.059)	0.128* (0.077)	0.140** (0.068)	0.165** (0.068)	0.219*** (0.072)	0.144*** (0.049)
Metropolitan [†]	0.091* (0.052)	0.098* (0.059)	0.206*** (0.046)	0.111** (0.048)	0.204*** (0.054)	0.088** (0.038)
Number of observations	373	373	373	373	373	373
Wald Chi ² (13)	73.35	49.94	72.70	59.75	65.28	48.68
Prob. > Chi ²	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R ²	0.202	0.152	0.210	0.201	0.185	0.266

Note: Robust standard errors bootstrapped with 500 replications and clustered at rural villages in parentheses.

[†]Dummy variable; ln natural logarithm.

****p* < 0.01, ***p* < 0.05, **p* < 0.1.

cent, and in all three activities by 0.7 per cent. An increase in age of 1 year results in a decrease in the probability of participation in financial transactions by 1.0 per cent and in trading by 1.8 per cent. These results are consistent with the findings of Fang and Yen (2006) and Ojo et al. (2019) that the older the migrants, the less likely they are to use the internet and thus participate in online markets. The number of years of schooling of migrants has a positive and significant effect on their participation. This finding is in line with Lera-López et al. (2011) and Ojo et al. (2019). Married migrants have a lower likelihood of using the internet for financial transactions, while those living with family in the city have a higher probability of using the internet for this activity. The higher the number of adults sharing accommodation, the less likely it is that the female migrant participates in business and in all three online market activities. Better-off migrants in terms of asset value participate more in online marketplaces. This is understandable as wealthier people have better access to ICT and the internet than poorer ones. Our finding is also in line with Shoma (2019), who reports that female entrepreneurs in Bangladesh face many obstacles, and a combination of legislative and regulatory reforms can mitigate many of the issues that prevent women contributing to and gaining from economic growth.

Regarding the characteristics of places of origin and destination, our results show that female migrants from the ethnic majority are more likely to use internet platforms for at least two online market activities, by 25.8 per cent. The higher the share of rural village households with cable internet at home, the higher is the probability that female migrants from that village will participate in online business and in all three online activities. Female migrants in metropolitan areas participate more in online business than those in the other places, and female migrants in Thailand participate more in online financial transactions, trading, and business than those in Vietnam. It also appears that female migrants living in metropolitan cities are more likely to participate in online business and have higher probabilities of participating in at least one activity, at least two activities, or all three activities.

5.2 | Effects of participation in online marketplaces on female migrants' consumption and poverty

Tables 6 and 7 report the impacts of participation in online marketplaces on female migrants' welfare with regard to: (i) per capita consumption expenditure; (ii) absolute poverty status (daily consumption per capita less than PPP\$5.50); and (iii) relative poverty status (belonging to the 20 per cent poorest in each country) by type and by number of activities (the estimations for the whole sample of male and female migrants are presented in Table A7 for type of activity and Table A8 for number of activities). The results from the estimations on each type of activity show that participation in online business significantly increases female migrants' consumption and reduces relative consumption poverty, while the effects of online financial transactions and trading are not significant. Further, the results from the estimations on the number of activities show that participating only in one or two activities does not have any significant effects on consumption and poverty status. However, participating in all three online market activities has positive and significant effects in increasing consumption and reducing the poverty status of female migrants. This finding remains consistent when we exclude the country dummy variable (see Tables A9 and A10), which allows us to generalise the finding to a larger extent. Thus, it is important to facilitate female migrants' participation in the complete bundle of online market activities to improve their welfare. Our findings are consistent with several previous studies (Bailur & Masiero, 2017; Chen et al., 2020; Galperin & Fernanda Vicens, 2017; Nguyen

TABLE 6 Effects of online market participation on welfare of female migrants by type of activities

	Expenditure (ln)	Absolute consumption poverty	Relative consumption poverty
Financial transaction [†]	0.397 (0.312)	0.027 (0.164)	-0.105 (0.192)
Trading [†]	0.299 (0.314)	-0.026 (0.191)	-0.019 (0.212)
Business [†]	0.382*** (0.143)	-0.139* (0.077)	-0.157* (0.085)
Educational purposes [†]	0.180** (0.085)	-0.047 (0.048)	-0.067 (0.053)
Age of migrant	0.005 (0.007)	0.002 (0.003)	0.003 (0.004)
Years of schooling of migrant	0.028* (0.019)	-0.011 (0.010)	-0.004 (0.012)
Marital status of migrant [†]	-0.227** (0.096)	0.043 (0.052)	0.066 (0.059)
Living with family in the city [†]	0.293*** (0.100)	-0.075 (0.064)	-0.133* (0.070)
Adults sharing accommodation	-0.124*** (0.022)	0.072*** (0.016)	0.075*** (0.016)
Asset value (ln)	0.060** (0.024)	-0.026** (0.012)	-0.027** (0.012)
Thailand [†]	0.156 (0.114)	-0.050 (0.061)	-0.077 (0.066)
Metropolitan [†]	0.098 (0.070)	-0.063* (0.037)	-0.044 (0.044)

(Continues)

TABLE 6 (Continued)

	Expenditure (ln)		Absolute consumption poverty		Relative consumption poverty				
Constant	7.434*** (0.270)	7.219*** (0.289)	7.445*** (0.256)	0.299** (0.137)	0.306* (0.157)	0.263* (0.138)	0.318* (0.167)	0.347* (0.195)	0.303* (0.169)
Number of observations	373	373	373	373	373	373	373	373	373
R ²	0.301	0.294	0.328	0.166	0.166	0.157	0.165	0.170	0.174
Prob. > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Under identification	0.019	0.008	0.000	0.019	0.008	0.000	0.019	0.008	0.000
Over identification	0.911	0.479	0.496	0.705	0.146	0.656	0.554	0.172	0.753
Weak identification	5.873	5.534	15.586	5.873	5.534	15.586	5.873	5.534	15.586

Note: Robust standard errors clustered at rural villages in parentheses. † Dummy variable; ln natural logarithm. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The under-identification test is an LM test relying on the rk LM statistics (Kleibergen & Paap, 2006) with the null hypothesis stating that the model is under-identified. The overidentification test is based on the Hansen J test with the null hypothesis stating that all instruments are valid in the model. The reported values of under-identification and overidentification tests are p -values. The report of the weak-identification test uses the Kleibergen–Paap rk Wald F statistic.

TABLE 7 Effects of online market participation on welfare of female migrants by number of activities

	Expenditure (ln)	Absolute consumption poverty	Relative consumption poverty
At least 1 activity	-0.196 (0.343)	0.039 (0.264)	-0.042 (0.254)
At least 2 activities	0.453 (0.318)	0.023 (0.175)	-0.017 (0.191)
All 3 activities		0.310** (0.125)	-0.106* (0.055)
Educational purposes [†]	0.143 (0.088)	0.113 (0.087)	-0.037 (0.049)
Age of migrant	-0.001 (0.007)	0.002 (0.005)	0.003 (0.005)
Years of schooling of migrant	0.040** (0.017)	0.026** (0.012)	-0.008 (0.006)
Marital status of migrant [†]	-0.292*** (0.093)	0.042 (0.052)	0.078 (0.057)
Living with family in the city [†]	0.345*** (0.097)	0.072*** (0.062)	-0.147** (0.067)
Adults sharing accommodation	-0.132*** (0.022)	0.073*** (0.016)	0.075*** (0.016)
Asset value (ln)	0.082*** (0.023)	-0.026** (0.011)	-0.029* (0.015)
Thailand [†]	0.280*** (0.081)	-0.049 (0.058)	-0.099 (0.063)
Metropolitan [†]	0.145** (0.068)	-0.064 (0.040)	-0.048 (0.046)

(Continues)

TABLE 7 (Continued)

	Expenditure (ln)		Absolute consumption poverty		Relative consumption poverty				
Constant	7.436*** (0.260)	7.394*** (0.274)	7.434*** (0.258)	0.279* (0.169)	0.295** (0.140)	0.269** (0.136)	0.354* (0.191)	0.336** (0.167)	0.301* (0.167)
Number of observations	373	373	373	373	373	373	373	373	373
R ²	0.289	0.280	0.332	0.162	0.169	0.162	0.173	0.170	0.170
Prob. > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Under identification	0.038	0.006	0.000	0.038	0.006	0.000	0.038	0.006	0.000
Over identification	0.815	0.924	0.278	0.363	0.278	0.757	0.401	0.709	0.711
Weak identification	7.803	7.943	47.664	7.803	7.943	47.664	7.803	7.943	47.664

Note: Robust standard errors clustered at rural villages in parentheses. † Dummy variable; ln natural logarithm. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The under-identification test is an LM test relying on the rk LM statistics (Kleibergen & Paap, 2006) with the null hypothesis stating that the model is under-identified. The overidentification test is based on the Hansen J test with the null hypothesis stating that all instruments are valid in the model. The reported values of under-identification and overidentification tests are p -values. The report of the weak-identification test uses the Kleibergen–Paap rk Wald F statistic.

et al., 2022) that internet use improves the welfare and reduces the poverty of its users. However, our findings differ from these studies in that the effect is dependent on the extent of participation.

Other factors that have a significant effect on consumption, poverty status, or both include the education level, whether they are living with their own families in the place of destination, value of assets, whether they live in a metropolitan city, their marital status, and the number of adults sharing their accommodation.

5.3 | Distribution of consumption effects of participation in online marketplaces

We further examined the distribution of consumption effects from the participation of female migrants in online marketplaces. We ran separate regressions for the participation by type and number of activities (full results reported in Tables A11–A16). We summarise the results of these estimations regarding the effects of online marketplace participation on consumption expenditure in Table 8.

Considering each activity separately, participation has a positive and significant effect for female migrants in the higher-consumption quantile groups. More specifically, financial transactions have a positive and significant effect only for the fiftieth and seventy-fifth groups. The effect of trading is significant only for the ninetieth group, whereas the effect of business is significant for the fiftieth, seventy-fifth and ninetieth groups. The effects of each of these activities for the tenth and twenty-fifth groups are insignificant. Considering the combination of these activities, participation in one activity has no significant effect on all groups. Meanwhile, participation in at least two activities or in all three activities brings no significant effects for the poorest group. The

TABLE 8 Distribution of consumption effects from online market participation for female migrants

	Expenditure per capita (PPP\$)				
	10 th group	25 th group	50 th group	75 th group	90 th group
By type of activity					
Financial transaction	−1,443.966 (1,254.271)	−8.217 (1,102.315)	3,302.045*** (1,232.112)	4,024.028** (1,969.097)	5,303.799 (4,593.143)
Trading	−1,684.309 (1,474.413)	88.852 (1,225.904)	839.310 (1,292.788)	2,906.132* (1,631.600)	7,071.414* (3,616.711)
Business	−505.104 (536.059)	524.974 (502.308)	1,344.201** (620.907)	2,391.106** (1,045.001)	5,694.411* (2,933.960)
By number of activities					
At least 1 activity	−2,510.860 (2,136.222)	950.984 (1,729.533)	2,061.193 (1,677.825)	2,369.769 (2,228.366)	−2,079.420 (4,926.135)
At least 2 activities	−1,245.415 (873.075)	−959.504 (753.564)	2,009.499** (1,004.743)	4,619.254*** (1,472.466)	9,899.557*** (3,312.235)
All 3 activities	−108.569 (246.949)	594.840** (252.556)	1,145.878*** (361.124)	2,069.616*** (658.166)	3,211.991* (1,869.692)

Note: Robust standard errors clustered at rural villages in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Full results are presented in Tables A11–A16.

results suggest that online market participation is benefiting those who are better-off, rather than the poor.

The insignificant effects on poorer quantiles raise the concern that it is not clear to what extent the results are driven by lack of variation in participation in the lower quantiles of consumption. For example, if very few migrants in the lowest quantile use the internet, there would not be enough variation in the data to estimate the impact of participation on consumption. Thus, we checked the variation of internet use in different quantiles (see Table A17) and saw that the results were not driven by the lack of variation in participation in lower quantile groups of expenditure per capita. The numbers of female migrants who do not use and who do use the internet for online market activities are balanced in the cases of financial transactions, trading, at least one activity, and at least two activities.

While these results seem plausible because better-off individuals could be more capable of making use of the opportunities, it raises a concern that the disparity between the better-off and the poor is enlarged. Similar to our results, Ma and Wang (2020) and Nguyen et al. (2022) show that internet access has positive and significant effects on the income of individuals in the middle and the upper tail of the income distribution, whereas the impact on the poor is not significant. Furthermore, internet markets could exacerbate inequality (Galperin & Fernanda Viegens, 2017).

6 | CONCLUSION

Understanding the drivers and welfare effects of participation in online marketplaces in emerging countries is important to take advantage of ICT development. In this study, we examined the factors affecting the participation of female rural–urban migrants in online marketplaces, the effects on consumption and poverty, and the distribution of the consumption effect. We used a dataset of 373 female migrants in Thailand and Vietnam and linked it with a dataset of the rural households and villages from which they came. We employed a probit model to examine the determinants of participation, a heteroscedasticity-based approach to account for endogeneity concerns to investigate the effects on consumption and poverty, and an unconditional quantile regression model to examine the distribution of the consumption effect. Our analysis provides several important findings.

First, the participation of female migrants in online markets is driven by several characteristics of the migrant herself, her place of origin, and her destination. A higher education level and a higher asset value are among the factors facilitating participation, whereas being older and sharing accommodation with a higher number of adults are among the factors hindering participation. Migrants who left home for educational purposes are more likely to participate in online business and in all three activities. Living with family in the city appears to increase the probability of female migrants using the internet for financial transactions, whereas married migrants are less likely to undertake online financial transactions. Migrants from villages with a higher share of households with cable internet at home and migrants living in a metropolitan area are more likely to participate in online marketplaces.

Second, a positive effect on consumption and poverty reduction can only be realised if female migrants use the internet for business activities or participate fully in all online market activities. However, the consumption effect of online market participation is not equally distributed, with the effect being significant only for the better-off. This could enlarge the consumption gap between the rich and the poor. Our findings thus suggest that, on the one hand, migrants should

be facilitated to fully participate in online market activities. This can be done through developing rural education and supporting rural households to use the internet. On the other hand, specific programs should be established to support poor female migrants to improve their welfare so they are not left behind.

Although our study provides important insights, it has several limitations. First, our data are cross-sectional and cover only three provinces in each country. Second, our samples of rural–urban migrants in both countries have a high attrition rate, which obviously affects the estimation results. Thus, our results should be interpreted with care. Third, we are unable to account for migrants' unobservable factors such as talent and ability. Extending the coverage of the data in both temporal and spatial aspects is thus strongly suggested. In addition, after the COVID-19 pandemic, participation in online marketplaces and its welfare impact are certain to be completely different. The strict lockdowns in Thailand and Vietnam in response to the pandemic could have forced migrants back to their place of origin and decreased their welfare significantly; at the same time, since conventional markets and supermarkets were closed, it could have facilitated participation. These issues should be considered in future studies.

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CONFLICT OF INTEREST

No conflict of interest/competing interest is reported by the authors.

DATA AVAILABILITY STATEMENT

The data that supports this study is available upon request from the Thailand–Vietnam Economic Panel Project (www.tvsep.de).

ETHICS STATEMENT

This research does not involve human participants or harm any animals.

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SUPPORTING INFORMATION

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