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Effects of internal rural-urban migration on rural non-farm enterprises: Evidence from Thailand and Vietnam

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Abstract

Migration is a phenomenon of increasing global relevance as year by year a growing number of individuals is leaving their home driven by the pursuit to improve the well-being of their households through additional income. While the drivers of international migration and its effect on the left-behind households have been well researched, less focus has been put on the effects of internal, rural-urban migration (and its concomitant remittances). This paper analyses the net effects of remittances from internal, rural-urban migrants on self-employment and on investments of the left-behind households by using a rich household level panel data set from Thailand and Vietnam. The findings indicate that individuals from households receiving remittances from internal, rural-urban migrants are less likely to be self-employed – both in Thailand and Vietnam. The channels through which remittances affect the labor supply of the receiving households cannot be determined with certainty, yet one of the potential reasons might be that left-behind household members need to compensate for the lost labor of the migrant who was previously engaged in farm activities. Moreover, the results show for some specifications lower investments of migrant households into farm and non-farm assets, while the expenditure on consumption is higher compared to households without migrants. This might be an indication that non-farm activities are less important for rural left-behind households, while remittances might be directly used to increase the consumption level – which might have been low before the migration.

Keywords: Internal migration, Remittances, Rural non-farm enterprises, Thailand, Vietnam.
JEL Codes: D22, F24, O15, Q12, R23.

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1 Introduction

Migration is a growing phenomenon that can be observed globally and that is often motivated by the migrant's pursuit to earn a higher income and, among others, to be able to support the left-behind household members through remittances. While some countries, especially in (South-)Eastern Europe (e.g., Bulgaria and Poland), Latin America (e.g., Mexico and Colombia) and Asia (e.g., India and the Philippines) experience high rates of international migration, other countries such as Thailand and Vietnam have a rather pronounced internal, rural-urban migration (UN DESA, 2020). These internal migration flows might, on the one hand, indeed lead to higher available income, induce increased consumption and improve the well-being of both the migrant and the left-behind household members. On the other hand, remittances sent by the migrant might also (adversely) affect the decisions of the left-behind household members on their labor supply and asset investment, and thus ultimately alter the economic environment in the rural areas. This paper attempts to answer the question on the effects of internal, rural-urban migration in Thailand and Vietnam on labor supply and investment behavior in the rural areas. More specifically, I investigate how remittances of internal migrants affect the decision of the left-behind household members to become self-employed and analyze whether remittances are directly used for consumption or transformed into asset investments (e.g., for farm or non-farm activities).

Most research on migration has focused on international migration, its drivers and its effect on both the migrant and the left-behind household (see e.g., Bang et al., 2016; Catrinescu et al., 2009). Considerably less attention has been paid to internal migration, with the majority of the studies analyzing its determinants and drivers (see e.g., Rhoda, 1983; Agesa and Kim, 2001; de la Brière et al., 2002; Nguyen et al., 2015), exploring the effects of remittances sent by the migrant on the left-behind household's consumption (see e.g., Taylor et al., 2003; Adams and Cuecuecha, 2010) or studying the income, poverty and welfare effects of remittances (see e.g., Lipton, 1980; Nguyen et al., 2015; Amare and Hohfeld, 2016; Grote and Waibel, 2017). Lesser empirical studies have analyzed the effects of remittances on labor supply and occupational choices of the left-behind household, with most research focusing on international remittances (see e.g., Mendola, 2012). Hereby, the majority of the studies find – as neoclassical theory might suggest – that receiving remittances leads to a reduction in the labor supply of the receiving household (see e.g.,

Killingsworth, 1983; Funkhouser, 1992; Rodriguez and Tiongson, 2001; Acosta, 2007; Amuedo-Dorantes and Pozo, 2006a and 2006b; Funkhouser, 2006). For instance, Funkhouser (1992) studies the effects of international migration on labor force participation in the home country. Using a cross-sectional data set from Nicaragua he observes a negative effect of remittances on labor force participation as well as a positive effect of remittances on the probability to become self-employed. On the contrary, Amuedo-Dorantes and Pozo (2006b) find, using household level panel data from the Latin American Migration Project (LAMP) and estimating a simultaneous equation probit model, that households in the Dominican Republic are less likely to engage in self-employment when receiving remittances from migrant household members. This effect is confirmed by a study of Demirgüç-Kunt et al. (2011) who observe, employing a probit model and using panel data from the World Bank Living Standard Measurement Survey, a negative effect of remittances on self-employment in Bosnia and Herzegovina. Limited research has been done analyzing the effects of internal migration on investment into non-farm enterprises by the left-behind households, with the study of Woodruff and Zenteno (2007) being a notable exception. Using a data set with information on more than 6,000 business owners in Mexico, Woodruff and Zenteno (2007) analyze the effect of remittances from internal migrants on capital investment, capital-output ratio, sales and profit of the left-behind households' enterprises. They apply an instrumental variable approach (using distance to railway lines as instrument for migration rates) and find that internal migration leads to higher investment levels (especially in automobiles, tools, and inventories) as well as higher profits of the rural enterprises. Also Amare and Hohfeld (2016) observe, studying the effects of remittances on poverty in rural areas and applying a linear fixed effects model as well as an instrumental variable approach, a positive impact of remittances on asset growth, while the impact differs with welfare status and ethnicity.

This paper attempts to add to the research on the effects of internal, rural-urban migration on labor supply and self-employment as well as on asset investment in rural areas. While the motivation for both types of migration – international and internal – might be comparable (i.e., the search for employment opportunities and the pursue to earn additional income), the effects on the left-behind households, their labor supply and investment behavior, might be different and internal migration might lead to a diversification of the economic environment in urban and rural areas within a certain country. With both Thailand and Vietnam being

characterized by a large number of small-scale family farms, and low under- and unemployment rates in rural areas, specifically rural-urban migration might lead to a lack of agricultural labor supply in the left-behind households and thus the need to shift the household's resources to agricultural activities (and potentially away from non-farm self-employment) to compensate for the migrant's labor (Rigg et al., 2018; ILO, 2020). Moreover, it is uncertain whether households can or want to use the received remittances to invest into productive farm or non-farm assets. Assets might be scarce and households not able to achieve the optimal asset level – for instance Rigg et al. (2018) show that there is a scarcity of land in both Thailand and Vietnam. Households might also perceive the expected rates of return to investment as too low and use remittances for consumption expenditures. Subsequently, internal migration might further increase economic imbalances between rural and urban areas within the countries – with increased labor supply and a boost of non-farm micro-enterprises in the urban areas on the one hand, and lower levels of non-farm self-employment and investments in agricultural capital goods and other productive assets in the rural areas on the other (see e.g., Mendola, 2012; ILO, 2020; Nguyen et al., 2020; Rigg et al., 2020). These potential net effects of internal, rural-urban migration in Thailand and Vietnam on self-employment and investment are empirically investigated in this paper, using a rich panel data set covering more than 4,400 households located in six rural provinces of Thailand and Vietnam surveyed over five waves from 2007 to 2016. This dataset allows to investigate the long-term effects of internal migration and to conduct cross-country comparisons between Thailand and Vietnam. Moreover, by analyzing the effect of remittances on both self-employment and investment, it is possible to comprehensively assess the effects of internal, rural-urban migration on the economic environment, specifically the non-farm sector in rural areas of Thailand and Vietnam.

Measuring the effects of migration and remittances on households is known to bear several challenges of simultaneity, endogeneity, selection bias, and reverse causality (see e.g., McKenzie and Sasin, 2007; Adams et al., 2012). To deal with these problems and increase the robustness of the results, different empirical strategies are applied. First, I exploit the panel nature of the data set by applying a linear probability model with fixed effects to control for unobserved heterogeneity. Second, propensity score matching is used to reduce the potential problem of endogeneity and self-selection bias by building a counterfactual for the migrant household. This method was in a similar way applied in a paper of Grote and

Waibel (2017). Third, I apply a two-step instrumental variable estimation approach to reduce potential issues of endogeneity.

In my analysis, I find that individuals from rural households that receive remittances from internal, rural-urban migrants have a lower probability to be self-employed – both in Thailand and Vietnam. Moreover, the findings also show that left-behind households do invest less into non-farm assets, while consumption goes up and – in some specifications – investment into farm assets increases compared to non-migrant households.

The remainder of the paper is structured as follows: Section 4.2 describes the context this study is conducted in as well as the data that is used. Section 4.3 outlines the theoretical and conceptual framework as well as the research question. Section 4.4 explains the empirical strategy of this paper. Section 4.5 presents and discusses the results, while Section 4.6 concludes the findings of the analysis.

2 Context and data

2.1 Internal migration in Thailand and Vietnam

Internal migration is of particular relevance in countries with substantial regional economic disparities such as Thailand and Vietnam (see e.g., Adams et al., 2012). While both countries experienced strong economic growth – combined with a decrease of poverty and inequality – in the last decades, they are characterized by an overall high income inequality and differing labor market participation opportunities between the rural areas on the one hand and the urban economic centers on the other. Driven by a growing industrial and service sector in urban areas, Thailand experienced a significant flow of internal migrants from the poor Northeastern provinces to Bangkok over the last decades (Chamratrithirong, 2007; IOM, 2011; UNESCO et al., 2018). Similarly, in Vietnam many workers seeking for a job migrated from the poorer rural areas to the megacities in the South, Ho Chi Minh City, and the North, Hanoi – in addition to the large share of international migrants that moved to other countries (Vietnam General Statistics Office, 2016; UN DESA, 2020).

In 2018 in Thailand the share of the urban population was 49.9% – after a boost of internal migration rates in the early 2000s – while in 1990 and in 2000 only 29.4% and 31.4%, respectively, of the population lived in urban areas (UNESCAP, 2019). In the last years,

internal migration rates in Thailand are stagnating, decreasing from e.g., 2.1% of the population in 2012 to 1.1% in 2016. Increasing economic growth also in rural areas, partly driven by ongoing governmental efforts for decentralization, might be one of the reasons. Yet the overall number of internal migrants is rather large compared to other Southeast Asian countries. In the 2010 Census in Thailand more than 8% of the surveyed individuals indicated to have internally migrated in the five years previous to the census (mainly rural-urban and only a relatively small share rural-rural), and more than 20%, i.e., around 15 million people, did not live in their home town and can thus be qualified as internal migrants. This compares to around 770 thousand international migrants which correspond to 1% of total population (National Statistical Office, 2010; UN DESA, 2020). Most internal migrants in urban areas stem from the poor Northeastern provinces, are male (between 2005 and 2010 around 51.5%) and are between 25 and 29 years old (in 2016 around 55%). Driven by the search for a job, the destination of most of the internal migrants is Bangkok and other urban areas in the Central region, and migrants are – often informally – working in the construction, manufacturing, or services sector (IOM, 2011; National Statistical Office, 2016; UNESCO et al., 2018; UNESCAP, 2019). According to a national migration survey, almost all of the internal migrants are able to send remittances to the left-behind households, contributing in particular to expenses for food, but also non-food goods and services such as healthcare and education (National Statistical Office, 2016).

Vietnam has comparably lower rates of urbanization. While in 2018 more than one third of the population lived in urban areas, this was only 20.3% in 1990, 24.4% in 2000 and 30.4% in 2010 (UNESCAP, 2019). Similar to Thailand, in the 2009 Census of Vietnam around 8% (i.e., 6.6 million of the 86 million population) indicated to have been internally migrated in the previous 5 years (Vietnam General Statistics Office, 2011). Compared to Thailand, however, Vietnam also has a relatively large share of international migrants. With East Asian countries such as Taiwan, Japan and Korea being among the top destinations, the total number of Vietnamese emigrants in 2010 corresponded with around 2.5 million to almost 3% of the total population of Vietnam (UN DESA, 2020). Focusing on internal migration, half of the migrants in Vietnam are female (52.4% of migrants between 15 and 59 years in 2015), the majority is between 15 and 39 years old (85%) and is married (56% compared to 71% of non-migrants in the same age group). Internal migration is mainly driven by economic factors (34.7% in 2015) and most migrants stem from the North and

South Central Coast Areas and the Mekong River Delta. While most of internal migrants are more qualified than non-migrants (e.g., 23.1% with college or university qualification compared to 17.4% for non-migrants), 40.2% of internal migrants work – similar to Thailand – in the industrial or construction sector. Hereby, foreign companies are with 19.3% a major source of employment for internal migrants, yet internal migrants on average have a lower income than their non-migrant counterparts (Vietnam General Statistics Office, 2011; United Nations Vietnam, 2014; Vietnam General Statistics Office, 2016). In contrast to Thailand a relatively lower share of internal migrants sends remittances to the left-behind household, i.e., only around 30%. Similar to Thailand the received remittances are, according to a national migration survey, mostly spent on food and non-food items and services, rather than on assets or as investment (Vietnam General Statistics Office, 2016).

While internal migration flows in Thailand and Vietnam likely contribute to an improvement of the income level of migrants and to a decrease of income inequality between rural and urban areas (for Thailand see e.g., Yang, 2004; Chamratrithirong, 2007), the effects of internal migration on the rural labor supply, in particular self-employment, and on micro-enterprises are largely unclear (see e.g., Amare and Hohfeld, 2016; Grote and Waibel, 2017).

2.2 Thailand Vietnam Socio Economic Panel (TVSEP) data

To analyze the effects of internal migration on self-employment I use a panel data set from six provinces in Thailand and Vietnam. The so-called Thailand Vietnam Socio Economic Panel (TVSEP) focuses on rural households and includes observations of more than 4,400 households (and 22,000 individuals). The survey is an ongoing project conducted by the Universities of Hanover and Göttingen and covers to date eight waves from 2007 to 2019, of which five waves (2007, 2008, 2010, 2013 and 2016) are considered in this paper.[1] A three-stage sampling design, taking into account districts, sub-districts and villages, has been used in the first wave to select a representative sample of the population within the six provinces. Besides a comprehensive set of variables on socio-demographic and -economic characteristics of the rural households and individuals (e.g., number of family members, age and education), the survey contains rich data on both employment (e.g., type of first occupation and income) and migration (e.g., location of migrant and remittances received).

[1] Data from the 2011 wave is not included in this analysis, as in 2011 the survey was conducted in only one province instead of three provinces per country. Moreover, also the data from 2017 and 2019 is not included in this analysis as it was not yet available when the research for this paper has been started.

Table 1 and Table 2 depict the descriptive statistics for both Thailand and Vietnam, respectively, focusing on key characteristics of the surveyed individuals and households as well as details on self-employment and non-farm enterprises. Turning to the descriptive statistics of Thailand (Table 1) one can observe that across all five waves half of the surveyed individuals are male. The age of the individuals is increasing over the years, from 32.8 years in 2007 over 34.2 years in 2010 to 38.1 years in 2016, which is owed to the fact that the same individuals are surveyed throughout the waves. While in 2008 41% of the individuals indicate to not have any formal education, this share is decreasing over the years – to 36% in 2013 and 21% in 2016.[2] The share of individuals who have farming as main occupation is across all waves – except for 2016 – around 35%, while around 20% and 5% indicate to have off-farm employment or self-employment as main occupation, respectively.[3] The number of individuals from a household that receives remittances from internal rural-urban migrant family members is fluctuating over time and ranges between 16% and 38%. In this analysis I focus on internal migration from household members and the effect of the remittances that are sent to the left-behind household. Thus, when considering remittances, I only consider remittances that are received from internal migrants who are also members of the household; remittances received from international migrants or from friends are not accounted for.

Households consist of around 5 to 6 members and in the majority have a male head (around 75% across all waves). More than 80% of the households are engaged in crop production and have an income of above 7,500 USD which is increasing over the years. Expenditure for investment into assets ranges between 220 and 390 USD per household member, while consumption expenditure is more than triple the amount (between 980 and 1,670 USD per capita). More than three quarter of the sampled households have savings and health insurance.

[2] The decrease in the share of individuals with no education cannot be related to a change in the survey questionnaire. Yet as I control for year effects, these changes should not affect the findings of the analysis.

[3] The shares do not add up to 100% as also individuals are considered who are unemployed, not able to work or not part of the labor force (i.e., below 16 years old or attending school). The share of individuals that have farming as main occupation is in 2016 with 24% relatively low compared to the other years, in which the share is around 35%. The reason for this drop can neither be related to changes in the survey questions nor to an actual change in the economic or labor market situation in Thailand. However, as the empirical estimations are conducted using year effects, this change in the shares should not impact the estimation results.

Table 1: Descriptive statistics of TVSEP data – Thailand

Variable	2007	2008	2010	2013	2016
Individuals	N = 10,822	N = 11,349	N = 11,797	N = 11,811	N = 11,872
Male (dummy)	0.5	0.5	0.5	0.49	0.49
Age (years)	32.8	33.2	34.2	36.1	38.1
Married (dummy)	0.65	0.66	0.55	0.66	0.43
No education (dummy)	0.33	0.41	0.38	0.36	0.21
Farming main occupation (dummy)	0.35	0.33	0.33	0.34	0.24
Off-farm employment main occupation (dummy)	0.18	0.20	0.20	0.20	0.17
Self-employment main occupation (dummy)	0.05	0.06	0.06	0.05	0.05
Receiving remittances from internal rural-urban migrant family member (dummy)	0.27	0.19	0.16	0.24	0.38
Households	N = 2,186	N = 2,135	N = 2,105	N = 1,994	N = 1,936
Number of household members	4.95	5.32	5.60	5.95	6.12
Male household head (dummy)	0.77	0.78	0.76	0.72	0.68
Engaged in crop production (dummy)	0.83	0.87	0.86	0.85	0.87
Total income of household (USD)	7,603	7,645	9,090	10,008	12,565
Investment expenditure into assets per household member (USD)	301	244	387	224	230
Consumption expenditure per household member (USD)	1,092	982	1,668	1,004	1,091
Savings (dummy)	0.89	0.83	0.85	0.78	0.77
Health insurance (dummy)	0.82	0.89	0.92	0.82	0.76
Self-employment (self-employed individuals)	N = 853	N = 849	N = 921	N = 680	N = 730
Male enterprise owner (dummy)	0.50	0.52	0.53	0.51	0.50
Age of enterprise owner (years)	45.2	44.8	46.1	47.4	49.0
Age of enterprise (years)	9.34	8.77	9.38	10.79	10.48
Start-up capital (USD)	3,194	3,481	4,052	4,958	3,785
Employees – family members (no.)	0.41	0.44	0.54	0.55	0.41
Employees – non-family members (no.)	0.76	0.66	0.78	0.98	0.58
More than 10 customers total (dummy)	0.74	0.75	0.75	0.79	0.77
Sales revenues (USD)	1,688	1,685	2,538	2,158	2,014

Note: Some of the variables are not available for all individuals. USD measured in USD 2005 PPP.

The descriptive statistics also provide details on the self-employed and their non-farm enterprises. Half of the enterprise owners are male and are on average between 45 and 50 years old, while the enterprises are on average between 9 and 11 years old. The average number of family and non-family employees is below 1 which indicates that most of the enterprises in Thailand are rather small with on average between 1,700 and 2,500 USD of revenues per year.

Table 2: Descriptive statistics of TVSEP data – Vietnam

Variable	2007	2008	2010	2013	2016
Individuals	N = 10,753	N = 10,804	N = 11,201	N = 11,404	N = 8,568
Male (dummy)	0.50	0.50	0.49	0.50	0.50
Age (years)	28.6	29.3	30.6	32.7	34.4
Married (dummy)	0.54	0.53	0.46	0.54	0.47
No education (dummy)	0.16	0.15	0.15	0.14	0.08
Farming main occupation (dummy)	0.35	0.35	0.33	0.34	0.35
Off-farm employment main occupation (dummy)	0.08	0.09	0.10	0.12	0.15
Self-employment main occupation (dummy)	0.05	0.04	0.05	0.06	0.06
Receiving remittances from internal rural-urban migrant family member (dummy)	0.11	0.16	0.14	0.30	0.25
Households	N = 2,187	N = 2,146	N = 2,095	N = 2,008	N = 1,892
Number of household members	4.895	5.03	5.31	5.70	5.94
Male household head (dummy)	0.87	0.85	0.84	0.83	0.85
Engaged in crop production (dummy)	0.90	0.92	0.92	0.91	0.90
Total income of household (USD)	5,223	6,720	5,937	7,107	9,909
Investment expenditure into assets per household member (USD)	252	207	151	134	213
Consumption expenditure per household member (USD)	962	826	630	659	1,008
Savings (dummy)	0.38	0.10	0.36	0.41	0.58
Health insurance (dummy)	0.38	0.44	0.60	0.75	0.75
Self-employment (self-employed individuals)	N = 652	N = 674	N = 789	N = 808	N = 724
Male enterprise owner (dummy)	0.43	0.42	0.41	0.39	0.39
Age of enterprise owner (years)	41.0	42.5	43.8	45.7	46.2
Age of enterprise (years)	7.77	7.85	8.97	9.39	9.94
Start-up capital (USD)	2,388	3,120	4,552	2,551	1,955
Employees – family members (no.)	0.29	0.28	0.22	0.23	0.42
Employees – non-family members (no.)	0.38	0.27	0.26	0.37	0.34
More than 10 customers total (dummy)	0.78	0.93	0.93	0.82	0.79
Sales revenues (USD)	2,172	2,430	2,859	2,076	1,540

Note: Some of the variables are not available for all individuals. USD measured in USD 2005 PPP.

For the Vietnam data subset, the findings are comparable (see Table 2) and only the major differences will be outlined in what follows. The individuals in Vietnam are slightly younger and on average more educated than the surveyed individuals in Thailand. A comparably lower share of individuals receives remittances from internal rural-urban migrant family members, with the share increasing from 11% in 2007 over 14% in 2010 to 25% in 2016. Expenditures for asset investment are smaller than in Thailand (the same holds true for consumption expenditures), ranging between 130 and 250 USD over the years, and enterprise owners are mostly female (between 57% and 61% across the waves).

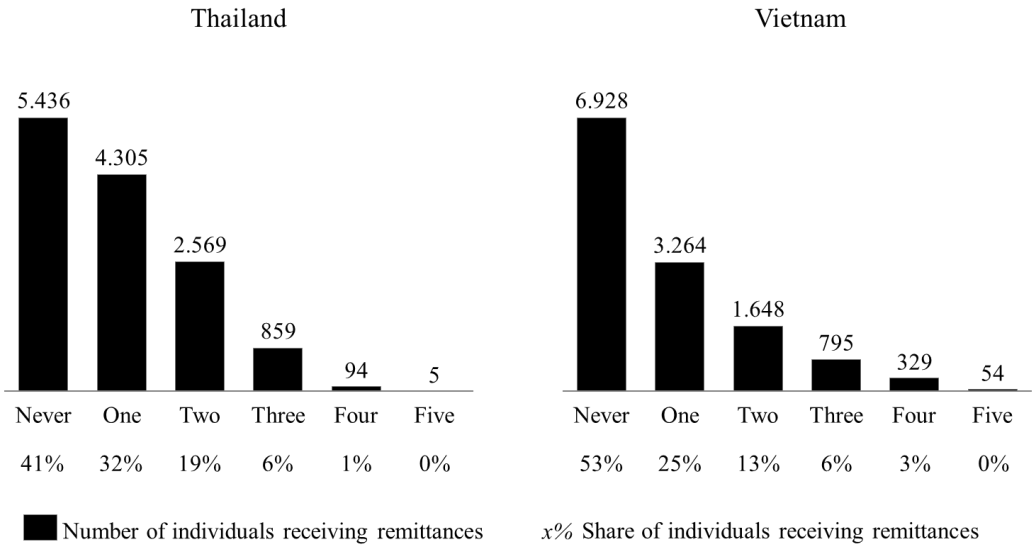

Figure 1: Number (and share) of individuals from households receiving remittances from internal rural-urban migrant family members in up to five waves – Thailand and Vietnam

Note: Considering individuals with at least one observation across all five waves.

Taking a closer look at remittances I find that in Thailand compared to Vietnam a larger share of households received remittances from internal rural-urban migrants in at least one of the five waves (see Figure 1). For instance, while in Thailand 51% of the individuals are from a household that received remittances from internal migrant family members in one or two waves, in Vietnam the same holds true for only 38% of the individuals. In Vietnam 53% did never receive remittances from internal rural-urban migrant family members, while the corresponding share in Thailand is 41%. This might indicate that internal migration as well as the receipt of remittances is of higher relevance in the context of Thailand – while it is smaller but potentially increasing in Vietnam. This is also in line with the findings of the national migration surveys in Thailand and Vietnam (National Statistical Office, 2016; Vietnam General Statistics Office, 2016).

In the next section, I will present the theoretical and conceptual framework, explain the channels through which remittances might affect self-employment and investment, and present the two research questions I empirically analyze in this paper.

3 Theoretical framework and research question

3.1 Theoretical framework

The theoretical framework that is used to analyze the effects of remittances on self-employment in the left-behind household is based on the New Economics of Labor Migration (NELM) theory, which was developed by Stark and Bloom (1985) as an explanatory framework for both the migration decision and the effects of migration on the sending household. It assumes that households are driven by three main objectives, i.e., to maximize their income, to diversify their income sources to mitigate risk, and to eliminate constraints due to market failures. Hereby, migration is considered as a potential strategy to achieve all three of these objectives. The decision on whether an individual should migrate or not is, consequently, not assumed to be solely made by the individual her-/himself, but rather a collective decision on the household level. This is in stark contrast to earlier neo-classical migration theory (see e.g., Lewis, 1954; Hicks, 1963; Todaro, 1969; Harris and Todaro, 1970), which considers migration as the result of a rational, utility-maximizing decision that is made on the level of the individual and that is mainly driven by existing wage differences between the country of origin of a migrant and the receiving country. Moreover, while neo-classical migration theory builds a sound theoretical basis for the analysis of macroeconomic effects of (international) migration on the receiving economy (e.g., its labor market and economic growth), NELM theory also incorporates remittances into the theoretical framework. As described above, future remittances are considered as an integral part of the initial migration decision of the household and are predicted to have positive effects on the sending household. Remittances might lead to an increase of income and thus also reduce potential capital constraints of the household, being a source of liquidity to finance new investments. Migration is therefore also not seen as a strategic decision to improve the human capital of the migrating individual, but rather the result of the household's need to increase income. Consequently, the NELM theory is particularly suited for the analysis of internal migration and the effects of remittances on left-behind households.

For the theoretical framework underlying this analysis I assume a household which has different production, consumption and investment opportunities, and which maximizes its

utility through the allocation of time and income.[4] In line with NELM theory, decisions on production and expenditures are made at the household level.

Households are assumed to have an endowment of time, T, which can be spent on different production activities, l, as well as leisure, n. Available production activities comprise labor supply to farm activities, l_f, off-farm employment, l_o, and non-farm self-employment, l_s. The time constraint reads as follows:

(1) $T = l_f + l_o + l_s + n.$

Additional to time, households are endowed with tangible assets (e.g., agricultural land, buildings and capital), Z, and have fixed household and individual characteristics (e.g., number of members, gender, age and education), X.[5] Moreover, the production of goods and services through farm activities or non-farm self-employment, as well as off-farm employment might involve further inputs (e.g., hired labor, machinery, intermediaries, or the cost for transportation to the employer), i, at particular cost, c (with i_f and c_f for farm activities, i_o and c_o for off-farm employment, and i_s and c_s for non-farm self-employment). Goods and services of the farm, q_f, or the non-farm enterprise, q_s, are sold in the market at prices p_f and p_s, respectively. The wage earned through off-farm employment is w_o. Thus, the earnings (i.e., income minus cost), π, the households receive through their production activities are:

(2) Earnings from farm activities: $\pi_f = p_f q_f - c_f i_f,$

(3) conditional to the production function $g_f = g_f(l_f, q_f, i_f; Z_f, X_f).$

(4) Earnings from off-farm employment: $\pi_o = w_o - c_o i_o,$

(5) conditional to the production function $g_o = g_o(l_o, w_o, i_o; Z_o, X_o).$

(6) Earnings from non-farm self-employment: $\pi_s = p_s q_s - c_s i_s,$

[4] As this paper analyzes the effects of remittances on self-employment, the theoretical framework will not consider the decision on migration and the factors influencing this decision but will focus on the labor supply, the investment and consumption behavior of the left-behind household.

[5] Tangible assets and resources are likely to be affected by the total earnings of the household, as part of the earnings could be invested into farm activities and non-farm self-employment. However, for simplicity I will not consider this as part of the production decision, rather as part of the consumption and investment decision of the current time period. Investment, e.g., due to higher household earnings through remittances, will thus affect the production decision in the following time period.

(7) conditional to the production function $g_s = g_s(l_s, q_s, i_s; Z_s, X_s)$,

with households pursuing to maximize their total earnings:

(8) $\max \pi = \pi_f + \pi_o + \pi_s$,

while at the same time trying to diversify the sources of earnings, i.e.,

(9) $0 < \pi_f < 1$, $0 < \pi_o < 1$ and $0 < \pi_s < 1$.

In a perfect market, a household's decisions on production as well as on consumption and investment would be separable. Both decisions would be taken successively – first the production and then the consumption and investment decision – while remittances would only effect the latter (see e.g., Singh et al. 1986; Beaudouin 2006). However, in line with the NELM theory, I assume that markets are imperfect and that the decisions are not separable; production constraints (e.g., a lack of assets) might exist and migration (as well as remittances) of a household member might also affect the production and labor supply decision. Thus, I assume that for households with migrants, M, the time endowment will be constrained by the absence of the migrant, as the migrant's labor is not part of the household labor supply anymore (and remittances of the migrant are considered as non-wage earnings). The structural form of the time endowment, T^m, of a migrant household must be adapted as follows:

(10) $T^m = l_f + l_o + l_s + n - M\left(l_f^i + l_f^i + l_f^i + n^i\right) = l_f^m + l_o^m + l_s^m + n^m$,

where i stands for the migrating individual and m for the migrant household.

It should be noted that migration does not per se have to lead to a sub-optimal labor supply in the household. For instance, if there was surplus labor before the migration, it might be possible to withdraw the labor supply of the migrant without substitution while having no or only a minimal effect on the output of the household. Yet this only holds true if the marginal labor productivity of the migrant was previous to the migration very low (or even zero) or, more broadly, if the household is able to compensate for the lost labor through changes in labor allocation or improved technologies (see e.g., Fei and Ranis, 1964; Sen, 1967; Lewis, 1972; Ranis, 2004).

Additional to earnings from farm activities, off-farm employment and non-farm self-employment of the left-behind household members, migrant households also receive remittances, which are conditional on migration, i.e., $r^i = r^i(M)$, and which enter the

earnings maximization function as non-wage income. The adapted earnings maximization function for a migrant household reads as follows:

(11) $\max \pi^m = \pi_f^m + \pi_o^m + \pi_s^m + r^i.$

Thereby, also the production functions must be adapted for the changed labor supply, i.e., l_f^m, l_o^m, l_s^m.

Given that the remittances a migrant household receives exceed the earnings that are lost due to the migration of the household member, remittances will lead to an increase in the total earnings of the household, which could be used for increased consumption or investment – and could also affect the labor supply of the household.[6] To model this relationship, I draw on the neoclassical labor-leisure choice model. The (potentially higher) available earnings of a migrant household, π^m, can be spent either on the consumption of goods and services (e.g., food and non-food goods), C, or they can be invested in assets for farm or non-farm activities (e.g., to increase productivity and future income), I. Thus, the total expenditure of a household, E, reads as follows:

(12) $E = C + I.$

For simplicity, I assume that households do not have any significant savings, but excess income that is not spend on consumption will directly be invested into assets and resources for production. Moreover, I assume – in line with the NELM theory, which claims that markets are imperfect and that households might be credit constrained – that households are not able to borrow money. This means that a household's expenditure for consumption and investment cannot exceed the earnings it receives in the current period, i.e., $E \leq \pi^m$ for a given time period needs to hold.

The household's utility maximization function, which considers next to consumption and investment also leisure, N, thus reads as follows:

(13) $\max_{C,I,N} U\,(C, I, N; Z, X),$

conditional to the available earnings $\pi^m = \pi_f^m + \pi_o^m + \pi_s^m + r^i$.

[6] Additional to indirect effects on the left-behind household, remittances might also have a multiplier effect on the hometown. For instance, they might lead to increased sales of enterprises (due to higher consumption) as well as to higher employment (e.g., due to an investment in a non-farm enterprise) in the home town (see e.g., Lewis, 1954; Stark and Bloom, 1985; Beaudouin, 2006; McKenzie and Sasin, 2007).

3.2 Research question

The theoretical framework outlined in the previous sub-section does not allow to predict with certainty a-priori how remittances will affect the occupational and the investment choices of the left-behind household members. Also previous empirical literature (see e.g., Funkhouser, 1992; Amuedo-Dorantes and Pozo, 2006b; Brown and Leeves, 2007; Demirgüç-Kunt et al., 2011) showed that there is no evidence for a clear-cut relationship between remittances and self-employment as well as investment. Yet there are different channels for potential effects.

On the one hand, if households are indeed facing credit constraints, the level of assets might be below the optimum, i.e., $Z < Z^*$. Considering a utility maximizing household, households might keep consumption, C, and leisure, N, at a constant (or minimum) level and spend any additional income through remittances on investment into assets and resources, I, until the optimal level is reached, i.e., $Z + I = Z^*$. Hereby households would choose to invest first into assets that promise the highest marginal returns; whether this might be for farm activities (e.g., farm land, machinery, irrigation systems or infrastructure such as barns), Z_f, off-farm employment (e.g., a motorbike), Z_o, or self-employment (e.g., kitchen tools and furniture, motorbike), Z_s, cannot be determined a priori. Overall, one would observe higher investments into certain assets – and potentially also a corresponding shift of household labor supply. The household could decrease the labor supply to an occupation due to increased productivity after the investment (e.g., replacement of manual labor by a machine). If the household has invested in a new occupation, the household, however, might also need to increase labor supply to this occupation (e.g., required labor supply after investment in a new non-farm enterprise).

Yet, if the optimal asset level, Z^*, is already reached, households could use remittances for consumption, C, instead of transforming them into investments, I. If remittances are higher than the income previously earned by the migrant, one might observe an increase of consumption expenditure of the household, while investment and labor supply would remain constant. Households might also decide against an increase in consumption and maximize their utility by decreasing labor supply and substitute labor with leisure, N.

On the other hand, if there was no previous labor surplus and remittances do not compensate for the lost earnings due to migration, households might need to shift labor supply even without new investments. If the migrant has previously worked in off-farm

employment or has been self-employed, left-behind household members might not have the ability to substitute the migrant's labor supply. However, if the migrant previously to migrating has been active in farm activities, substitution of the migrant's labor might be required to keep production on a constant level. With suitable hired labor being scarce, the left-behind household members might have to shift more of their labor towards farm activities – and potentially either away from, or not towards off-farm employment and non-farm self-employment. In such a situation, individuals from migrant households might have a higher propensity to engage in farm activities (instead of off-farm employment or non-farm self-employment) than non-migrant households.

Contrarily, remittances might also lower the need of the household for labor participation. This might be the case, if remittances sent by the migrant (over-)compensate for the income lost due to migration (especially when there was labor surplus previous to migration), and if households are not capital constrained and/or the optimal level of assets and resources has already been reached, i.e., $Z \geq Z^*$. In such a situation, households might substitute labor with leisure; one would observe lower overall household labor participation, a decrease of labor supply to a certain occupation (potentially non-farm self-employment) and more time spent on leisure.

To better understand the potential channels and effects of remittances on self-employment and investment in the empirical study at hand, it is crucial to take a closer look at the labor market and the agricultural sector in Thailand and Vietnam. Rural households in both countries are still largely dependent on agricultural activities, e.g., based on the TVSEP data at hand, more than 80% of the households in Thailand and 90% in Vietnam are engaged in crop production. Hereby, the agricultural sector in both countries is characterized by smallholders and subsistence farming. Land for tenancy is scarce and the size of the already small landholdings is even more decreasing over the last years (see e.g., Rigg et al., 2018). This has different potential implications on the channels through which remittances might affect self-employment and investment. On the one hand, most of the farmers rely on family members to, at least partly, support in agricultural production. Farm activities and the yielded output is to a large share used for own consumption and the generated profit with the sold production is small, and due to global market prices even further diminishing. Yet, even if farm households would like to use hired labor to support in agricultural activities – which would induce additional cost and most likely less flexibility and commitment – this would

be difficult (Wiggins et al., 2010; Rigg et al., 2018; Nguyen et al., 2020; Rigg et al., 2020). Thailand and Vietnam have comparably low unemployment as well as underemployment rates in rural areas. For instance, in 2018 the unemployment rate in rural areas was 0.7% in Thailand and 0.8% in Vietnam, while the combined underemployment and unemployment rate was 2.1% and 2.5% for rural Thailand and Vietnam, respectively (ILO, 2020). Even though the actual underemployment might not be fully captured by official statistics or estimates, both countries are most likely not characterized by significant labor surplus. Applying this to my analysis, it means that internal migration might lead to reduced labor supply in the sending household, while hired labor to off-set this lower labor supply (to farm as well as to non-farm activities) might be scarce (see e.g., Mendola, 2012). Farm households that send migrants might thus need to further shift their labor supply towards agricultural activities. On the other hand, small-scale farmers might not be able to (optimally) invest additional capital into productive farm assets. With land being scarce, farmers are in many cases unable to expand their agricultural activities and with advanced agricultural technology often not being suited for small-scale farms (and not affordable), it is challenging for farmers to increase the productivity of existing landholdings through assets (see e.g., World Bank, 2016; TDRI, 2017; Rigg et al., 2020). Thus, even if households are not capital constrained, remittances might not lead to increased investment into farm assets. The left-behind households in Thailand and Vietnam might therefore use the additional income from remittances for other forms of assets or for consumption, even though the optimal farm asset level is not yet reached.

Nevertheless, given the diverse channels through which remittances might affect self-employment and investment, and considering the dependency of these effects on various pre-conditions of both the left-behind household and the socio-economic environment (e.g., labor and capital markets), it is difficult to a-priori define hypotheses on these effects. Therefore, in this paper I intend to empirically analyze the net effects of remittances from internal rural-urban migrants on (R1) the labor supply of the left behind household members to self-employment, and on (R2) the investment into farm and non-farm assets as well as on total consumption of the left behind household, drawing on empirical data from the TVSEP project.

4 Empirical strategy

Measuring the effect of (internal) migration and remittances on labor supply and investment of the left-behind household bears some well-known challenges. On the one hand, there might be omitted variable bias through unobserved factors affecting (internal) migration and non-farm self-employment as well as investment. As an example, agricultural shocks or policy interventions might lead to an overall reduction of agricultural activities in rural areas – and potentially an increase in non-farm self-employment – and at the same time also trigger (internal) migration flows. In such a case one might observe a significant positive effect of (internal) migration on non-farm self-employment even though there is no causality, but the effect is rather triggered by the shock/ policy intervention. Moreover, due to the potential simultaneity of the decision on labor supply and migration the causality of effects (e.g., the effect of remittances a household receives from one household member on the decision to become self-employed of another household member) cannot be observed with certainty. This might lead to problems of reverse causality, e.g., a disadvantageous economic situation with only limited opportunities for self-employment in the rural home village might drive the decision of a household member for internal migration – and not the other way around. On the other hand, migration is prone to self-selection bias, as migrant and non-migrant households might be systematically different. For instance, households with certain characteristics such as an on average higher education level of the household members or a comparably higher business sense might be more or less likely to send migrants than other households. All of these potential issues might lead to wrong interpretation of the results when using a simple OLS regression estimation to identify effects of remittances on self-employment and investment (see e.g., Taylor and Mora, 2006; McKenzie and Sasin, 2007; Adams et al., 2012). Consequently, I intend to encounter the identification issues and enhance the robustness of my results by using different and complementary empirical strategies which can be applied with the data at hand.

4.1 Net effects of remittances on self-employment

4.1.1 Linear probability model with fixed effects

First, I apply a linear probability model with fixed effects to analyze the net effect of internal remittances on self-employment, exploiting the panel nature of the data used.[7] The model takes the following form:

(14) $$Self_{ihkt} = \alpha + \beta Re_{hkt} + \partial W_{ihkt} + \mu Z_{kt} + \delta_k + \theta_t + \varepsilon_{ihkt},$$

where i denotes the individual, h the household, k the village, and t the year.

The probability that an individual engages in non-farm self-employment, $Self_{ihkt}$, enters the equation as dependent variable. It is a dummy variable which takes the value 1 if the individual has non-farm self-employment as main occupation, and 0 otherwise. As an explanatory variable I construct a dummy variable for remittances, Re_{hkt}, which equals 1 if the individual is member of a household that receives remittances, and 0 otherwise. Hereby, only remittances from migrants that are family members and only from internal rural-urban migrants are taken into consideration. I further include controls for individual, household and village level characteristics. W_{ihkt} is a vector of controls containing information on gender, age, education level, and marital status of the individual. Village characteristics, Z_{kt}, enter the equation controlling for the share of self-employment as well as the overall income level in the village; village fixed effects, δ_k, and year effects, θ_t, are included. In a robustness check, I considered all remittances (also from international migrants) and did not restrict them to internal migrants only. I, moreover, also tested the effect of the amount of remittances (i.e., Re_{hkt} is constructed as the log of total remittances received) on self-employment. The estimated results for both robustness checks led to the same findings and conclusions as from the chosen estimation strategy as described above.

[7] When analyzing effects on binary outcome variables, logit and probit, as well as linear probability models (LPM) are the most common estimation strategies of choice. As I intend to include fixed effects in the estimation strategy, non-linear logit and probit models cannot be applied due to the incidental parameters problem. Yet, also the LPM has two shortcomings: First, it imposes the risk of heteroscedasticity and second, it allows outcome variables to take values above 1 or below 0. The first shortcoming can be addressed by introducing fixed effects and robust standard errors. The second shortcoming is highly debated but especially in recent debates researchers perceived it as less severe problem and not comprising the results. For instance, Wooldridge (2001) argues that if the objective of the estimation is to analyze the partial (causal) effect of the explanatory variable on the outcome variable, the fact that some of the predicted probabilities might be outside the interval is not an issue. I thus chose to apply an LPM as being most suitable for my analysis and moreover test its robustness by also estimating the effects using a conditional fixed effects logistic regression model.

4.1.2 Propensity score matching

As a second empirical strategy a propensity score matching method is applied. As it is not possible to observe how the probability for self-employment would be in a particular migrant household without having an internal migrant, the propensity score method can be used to manually construct a counterfactual.[8] This means that based on household characteristics such as average level of education, household size and housing situation (see e.g., Acosta, 2006; McKenzie and Sasin, 2007), non-migrant households that do not receive remittances (control group) are matched with almost identical migrant households that receive remittances (treatment group). As both have – due to comparable socio-economic characteristics – the same propensity for sending a migrant, the self-selection bias is reduced and the average treatment effect due to remittances can be evaluated also in a non-experimental framework. Hereby, I select a household as control group that did not receive remittances in any of the five waves and keep the same control household as counterfactual for a certain migrant household over all five waves.

The propensity score matching follows two steps. In a first step, the propensity of a household to receive remittances is estimated by regressing the treatment variable, $Treat_{hkt}$, on several household and village level characteristics using a logit model. The propensity score, P(·), is defined as follows:

$$(15) \quad \mathrm{P}\,(X_{hkt}, Z_{kt}) = \Pr\,(Treat_{hkt} = 1),$$

where h denotes the household, k the village, and t the year.

The propensity score, P(·), takes a value between 0 and 1, and is conditional on household and village characteristics. Household characteristics such as household size, average level of education, age and share of male household members, engagement in crop production, savings, health insurance, as well as economic situation are accounted for in vector X_{hkt}. Vector Z_{kt} contains village characteristics such as overall income level and share of self-employment. The treatment variable, $Treat_{hkt}$, is a dummy variable which takes the value 1 if a household receives remittances, and 0 otherwise. Based on this propensity score treated (i.e., received remittances) and untreated (i.e., did not receive remittances) households are matched.

[8] For more details on the propensity score matching method see for instance Rosenbaum and Rubin (1983), who first introduced this method to account for unobserved heterogeneity.

In a second step, the effect of remittances on self-employment is analyzed, by observing the difference in outcomes, E, between matched – treated and untreated – households, i.e., the average treatment effect on the treated (ATT):

$$\text{ATT} = \text{E}\left(Self_{ihkt} | Treat_{hkt} = 1\right) - \text{E}\left(Self_{ihkt} | Treat_{hkt} = 0\right). \quad (16)$$

4.1.3 Instrumental variable approach

Third, I use an instrumental variable approach. While the propensity score matching method specifically reduces the risk of self-selection bias, issues of endogeneity might still be prevalent. Finding an instrument that is correlated with remittances, but does not affect self-employment (other than through remittances), allows to reduce this potential problem (see e.g., McKenzie and Sasin, 2007). In previous research on the effects of migration, variables such as historic migration rates (see e.g., Hildebrandt and McKenzie, 2005) or migration networks (see e.g., Acosta, 2006; Beaudouin, 2006; Agwu et al., 2018) have been used as instruments. Moreover, also shocks such as rainfall shocks (see e.g., Munshi, 2003; Yang and Choi, 2007; Bang et al., 2016) or economic shocks (see e.g., Yang and Martinez, 2005; Yang, 2008) served as valid instruments. Further often used instrumental variables include spatial distances, such as distance to borders, consulates or railroads (see e.g., Woodruff and Zenteno, 2007; McKenzie et al., 2010). While most of these instruments can only be used when analyzing international migration or the effects of migration on the receiving countries (e.g., distance to borders or a consulate, and rainfall shocks), only a few can serve as instruments when analyzing effects of internal migration.

In this paper, I use the experience of the village with internal migration as an instrumental variable. Experience with migration – whether it is in the family, among relatives or within the home village – has often found to be a push factor for migration and already been used as instrument in previous empirical research (see e.g., Acosta, 2006; Beaudouin, 2006; Quinn, 2009; Redegehn et al., 2019). Experience of the village with internal migration might provide the opportunity for an individual to learn from other village members that had previously migrated and drive the propensity of an individual to migrate due to the access to social networks in the migration destination, which might ease the decision to leave the home town and facilitate the access to job opportunities in the urban areas (see e.g., Hildebrandt and McKenzie, 2005; Acosta, 2006). The identifying assumption is that the experience with migration in the home village is directly and positively correlated with the propensity of a

household to send a migrant (and thus to receive remittances) and only through this channel indirectly affects the probability of an individual of the left-behind household to become self-employed. Yet the instrument could become invalid if the migration experience of the village directly affects the individual's propensity for self-employment. On the one hand, the experience of a village with migration might be an indicator for the labor market status of a village. High levels of migration could be the result of limited opportunities for individuals for paid employment or self-employment. Low self-employment rates in villages with high internal migration levels might thus not be the result of the migration (and remittances) but driven by the state of the labor market itself. On the other hand, high levels of migration might affect both the labor market and the economic environment of the home village. Migration might lead to a scarcity of human capital in the village and increase the opportunities for an individual in the village to become a successful entrepreneur (due to limited competition) or it might decrease the attractiveness of self-employment due to improved employment opportunities (considering lower labor supply in the home village) and a lack of available employees for non-farm enterprises. Also, the overall income level of a village could increase due to high levels of migration (and remittances), thus driving the business opportunities for non-farm self-employment. To control for potential labor market and economic environment effects, I include controls for the share of self-employment as well as the overall income level of the village in my analysis. Nevertheless, as endogeneity of the instrument cannot be fully ruled out, the results of the instrumental variable approach need to be interpreted with caution and considered as an additional robustness check complementing the findings of the other estimation techniques.

In the first stage of the 2SLS estimation, our explanatory (and potentially endogenous) variable for remittances, Re_{hkt}, is regressed on the instrumental variable, $Inst_{hkt}$. The instrumental variable is defined as the share of households with at least one migrant in a village as proxy for migration experience. In the second stage, the predicted variable of remittances, $\widehat{Re_{hkt}}$, is included in the original regression as explanatory variable:

(17) 2nd stage: $Self_{ihkt} = \alpha + \beta\, \widehat{Re_{hkt}} + \partial W_{ihkt} + \gamma X_{hkt} + \mu Z_{kt} + \delta_k + \theta_t + \vartheta_{ihkt}$,

where i denotes the individual, h the household, k the village, and t the year.

As before, controls for socio-economic characteristics of the individual, W_{ihkt} (i.e., gender, age, education level, health, and marital status), for the households, X_{hkt} (i.e., savings and engagement in crop production), and for the village, Z_{kt} (i.e., share of self-

employment, overall income level in the village) are included. Additionally, I control for village fixed effects, δ_k, and year effects, θ_t.

4.2 Net effect of remittances on investment

Analyzing the net effect of remittances on investment, I construct a dummy as dependent variable, $InvFarm_{hkt}$, which takes on the value 1 if the household has invested in farm assets such as tractors, water pipes and pumps or other farm tools, and 0 otherwise. For non-farm investment I construct a dummy, $InvNonFarm_{hkt}$, which equals 1 if the household has invested in non-farm productive assets such as kitchen tools and furniture for restaurants, food processing machines or motorbikes for provision of services, and 0 otherwise. To understand the channels of remittances, I also test the effect of remittances on consumption using the log of the total consumption expenditure in the previous twelve months, $Consum_{hkt}$, as a proxy. A vector of household level controls, X_{hkt}, contains variables on the share of males and the average education level of the household members, controls for the number of household members in the labor force, savings, housing size, and engagement in crop production, as well as a dummy equaling 1 if the household head is male. As before, a vector of village characteristics, Z_{kt}, controlling for the share of self-employment and the overall income level in the village, as well as village fixed effects, δ_k, and year effects, θ_t, are included. Analogous to the analysis of the effect of remittances on self-employment, different estimation strategies are applied, i.e., a linear probability model with fixed effects, propensity score matching and an instrumental variable approach. The specifications are as before; for instance, for the linear probability model with fixed effects the model takes the following form to test the effect of remittances on farm asset investment:

(18) $InvFarm_{hkt} = \alpha + \beta Re_{hkt} + \gamma X_{hkt} + \mu Z_{kt} + \delta_k + \theta_t + \varepsilon_{hkt}$,

where i denotes the individual, h the household, k the village, and t the year.

In the following, I present and compare the results of these different estimation strategies, for the full dataset as well as distinguishing between Thailand and Vietnam.

5 Results

5.1 Net effect of remittances on self-employment

First, I apply a linear probability model with fixed and year effects. The results of the estimation are shown in Table 3, for details the reader can refer to Appendix, Table A.1. We can observe a negative net effect of remittances on the likelihood of being self-employed. Taking the full dataset including both countries (column 1) the results imply that individuals from households that receive remittances from internal migrants are -2.3 percentage points less likely to be self-employed compared to individuals from households that do not receive such remittances. Considering the overall small share of self-employment from total labor supply in both countries of 4% to 6% across all waves, the effect can be perceived as sizeable. Moreover, the effects in Thailand (column 2) and Vietnam (column 3) are with -2.3 percentage points comparable. The coefficients in all three estimations are significant at the 1% level.

Table 3: Net effect of internal remittances on self-employment – Linear probability model with fixed effects

Estimation model	Linear probability model with fixed effects		
Dependent variable	Self-employment as main occupation (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.023***	-0.023***	-0.023***
	(0.003)	(0.004)	(0.005)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	70,081	39,713	30,368
Number of villages	440	220	220
R-squared	0.040	0.026	0.072

Note: All three specifications include the controls male (dummy), age, age squared, married (dummy), no education (dummy), sick (dummy), savings (dummy), crop production (dummy), share self-employment village, and average income village (USD, log). Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Moreover, I also test the robustness of the results by estimating the linear probability model with fixed effects excluding all potentially endogenous controls. These estimations generate comparable results, e.g., indicating that remittances lead to a reduction of self-employment in Thailand and Vietnam by -1.7 and -1.6 percentage points, respectively (see Appendix, Table A.2). As a further robustness check, I also estimate the net effect of remittances on self-employment using a conditional logistic regression model (see

Appendix, Table A.3 showing marginal effects). The results indicate a lower negative effect of remittances on the probability to be self-employed, with -0.6 percentage points for the full dataset and Thailand (at 1% and 5% significance level, respectively) and -1.6 percentage points for Vietnam (at 5% significance level) compared to -2.3 percentage points with the linear probability model.

In a second step, I test the robustness of these results by applying a propensity score matching method using nearest neighborhood matching without replacement.[9] The results are shown in Table 4 and are in line with the results of the linear probability model. The average treatment effect on the treated (ATT), i.e., the difference between the matched treatment and control groups, indicates a negative effect of remittances from internal migrants on self-employment of individuals in the left-behind household. For the full dataset remittances appear to lead to a decrease of the probability of being self-employed by -1.6 percentage points. The results for the sub-sets of Thailand and Vietnam are – with -1.1 percentage points for Thailand and -1.5 percentage points for Vietnam – slightly lower yet comparable. All results are significant at the 1% level.

Table 4: Net effect of internal remittances on self-employment – Propensity score matching

Estimation model	Propensity score matching		
Dependent variable	Self-employment as main occupation (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Treatment	0.047	0.050	0.049
Control	0.063	0.061	0.064
Difference (ATT)	-0.016***	-0.011***	-0.015***
	(0.002)	(0.003)	(0.003)

Note: The propensity scores are predicted based on the variables household size, average level of education, age and share of male household members, engagement in crop production, savings, health insurance, proxies for economic situation of the household, as well as village characteristics such as overall income level and share of self-employment. The regressions include the controls male (dummy), age, age squared, married (dummy), no education (dummy), share self-employment village, and average income village (USD, log). Robust standard errors in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

In a third and last step, the net effect of remittances on self-employment is estimated using an instrumental variable approach. The results of the estimations are shown in Table 5; for details on the 2nd stage results the reader can refer to the Appendix, Table A.4. The first stage results (second part of the table) indicate a high correlation between the explanatory variable (i.e., received remittances) and the instrument (i.e., migration experience of the village), with

[9] As a robustness check also Kernel matching method has been applied which generated comparable results.

the F statistics being well above 10 for all three estimations. We can therefore assume that migration experience of the village is a relevant instrument for the likelihood of a household to receive remittances. The second stage results are shown in the first part of the table, indicating for the full dataset and Thailand a slightly higher effect of remittances on the probability of being self-employed compared to the results from the linear probability model or the propensity score matching. Taking the full dataset, I observe a decrease of the probability to be self-employed by -3.0 percentage points. Taking the sub-sets, it has to be noted that the effect is more than four times the size for Thailand (-6.5 percentage points) than for Vietnam (-1.5 percentage points). The results for all estimations are significant at the 5% level.

Table 5: Net effect of internal remittances on self-employment – Instrumental variable approach

Estimation model	Instrumental variable approach		
	(1) Full dataset	(2) Thailand	(3) Vietnam
2nd stage: Self-employment as main occupation (dummy)			
Received remittances (dummy)	-0.030**	-0.065**	-0.015**
	(0.014)	(0.029)	(0.009)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	70,114	39,730	30,384
Number of villages	440	220	220
R-squared	0.039	0.025	0.122
1st stage: Received remittances (dummy)			
Migration experience of village (share)	0.551***	0.345***	0.860***
	(0.031)	(0.040)	(0.029)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
F statistic on instrument	322	73	876

Note: All three specifications include the controls male (dummy), age, age squared, married (dummy), no education (dummy), sick (dummy), savings (dummy), crop production (dummy), share self-employment village, and average income village (USD, log). Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Even though the estimated effects applying the instrumental variable approach are comparable to the results of the linear probability model and the propensity score matching method, these results must be interpreted with caution. As lined out in the section on the empirical strategy, migration experience of the village might also directly affect the propensity to become self-employed and the instrument could potentially not meet the exclusion restriction. For instance, high levels of migration in a village could be driven by a

weak labor market and thus indicate an overall lower level of self-employment, or they might lead to a decreased population and lower purchasing power in a village, thus reducing the attractiveness of non-farm self-employment. Even though village-level controls for self-employment and income have been included in the estimation to control for potential endogeneity, the observed effects could overstate the actual effects and rather reflect the upper bound of the impact of remittances on self-employment. Nevertheless, the instrumental variable approach can be considered as an additional robustness check, providing complementing evidence for the results of the other estimation strategies.

Overall, the results of all three econometrical specifications show that individuals from households that receive remittances from internally migrated family members are less likely to engage in non-farm self-employment. Drawing on the theoretical framework, this could indicate that left-behind households might indeed need to substitute for the labor that has been previously supplied by the migrant to farm activities and therefore are not able to engage in non-farm activities. Moreover, households that receive remittances might also choose to not supply (additional) labor to the labor market yet increase their leisure time. This might be especially the case when remittances lead to an overall higher income level (compared to pre-migration) and additional earnings are not required.

5.2 Net effect of remittances on investment

Additional to the net effect of remittances on self-employment, I analyze the net effect of remittances on investment into farm and non-farm assets (R2). Moreover, I also check the net effects of remittances on consumption expenditures of left-behind households. The results are shown in Table 6 to Table 8 (for details on the linear probability model see Appendix, Table A.5 to Table A.7; for details on the instrumental variable approach see Appendix, Table A.8 to Table A.10).

The results of the linear probability model with fixed effects show a negative net effect of remittances from internal, rural-urban migrants on *farm asset* investments of the left-behind households (first part of Table 6). They suggest that receiving remittances leads to a -2.0 percentage points lower probability to invest in farm assets compared to households that do not receive remittances (significant at the 1% level). For Thailand the effect is higher, with a -5.0 percentage points lower probability at the 1% significance level, while for Vietnam the coefficient is positive, yet smaller and not significant.

Table 6: Net effect of internal remittances on investment into farm and non-farm assets as well as on consumption – Linear probability model with fixed effects

Estimation model	Linear probability model with fixed effects		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Investment into farm assets (dummy)			
Received remittances (dummy)	-0.020***	-0.050***	0.004
	(0.007)	(0.013)	(0.008)
Number of observations	18,128	8,428	9,700
R-squared	0.097	0.109	0.095
Investment into non-farm assets (dummy)			
Received remittances (dummy)	-0.064***	-0.100***	-0.025*
	(0.010)	(0.015)	(0.013)
Number of observations	18,128	8,428	9,700
R-squared	0.118	0.167	0.127
Total per capita consumption (log)			
Received remittances (dummy)	0.109***	0.047**	0.156***
	(0.014)	(0.023)	(0.017)
Number of observations	17,330	8,011	9,319
R-squared	0.476	0.407	0.547
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of villages	440	220	220

Note: All three specifications include the controls male (dummy), age, age squared, married (dummy), no education (dummy), sick (dummy), savings (dummy), crop production (dummy), share self-employment village, and average income village (USD, log). Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

When applying the propensity score matching method, a significant positive effect of remittances on farm asset investment can be observed for the full dataset and Vietnam (first part of Table 7). The results indicate that receiving remittances leads to a 1.3 and 3.1 percentage points higher probability to invest in farm assets, respectively (significant at the 5% and 1% level). I cannot find any significant effects for Thailand. The results of the instrumental variable analysis are comparable (first part of Table 8), indicating a 1.0 percentage point increase for the full dataset (not significant) and a 7.8 percentage points increase for Vietnam (significant at the 5% level).

For *non-farm assets*, the results of the linear probability model and the propensity score matching method show a clear indication of a significant negative net effect of remittances on non-farm asset investments for all three datasets. For instance, the linear probability model indicates that remittances lead to a decrease of the probability for non-farm asset investments by -6.4 percentage points for the full dataset, by -10.0 percentage points for Thailand, and by -2.5 percentage points for Vietnam (second part of Table 6). This is

compared to a -4.1, -6.7 and -2.4 percentage point decrease, respectively, when applying the propensity score matching method (second part of Table 7). Yet, the instrumental variable approach does not show significant effects on non-farm assets for any of the data subsets (second part of Table 8).

Table 7: Net effect of internal remittances on investment into farm and non-farm assets as well as on consumption – Propensity score matching

Estimation model	Propensity score matching		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Investment into farm assets (dummy)			
Treatment	0.878	0.851	0.915
Control	0.865	0.859	0.885
Difference (ATT)	0.013**	-0.008	0.031***
	(0.006)	(0.009)	(0.007)
Investment into non-farm assets (dummy)			
Treatment	0.486	0.550	0.424
Control	0.527	0.617	0.448
Difference (ATT)	-0.041***	-0.067***	-0.024***
	(0.008)	(0.012)	(0.012)
Total per capita consumption (log)			
Treatment	6.983	7.147	6.890
Control	6.930	7.164	6.715
Difference (ATT)	0.053***	-0.018	0.175***
	(0.014)	(0.020)	(0.019)

Note: The propensity scores are predicted based on the variables household size, average level of education, age and share of male household members, engagement in crop production, savings, health insurance, proxies for economic situation of the household, as well as village characteristics such as overall income level and share of self-employment. Robust standard errors in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Summed up, these findings indicate for most of the estimations and data subsets that increased income through remittances by internal, rural-urban migrants does not trigger investment into non-farm assets. Given the previous finding that the probability to be self-employed is lower for migrant households, this is not surprising. Remittances might lead to a lower propensity for engaging in non-farm activities – both in supplying labor but also in investing into it. Yet, as the results for investment into assets, specifically farm assets, are somewhat mixed for the different econometrical methods, the question arises how the additional income through remittances might be used by the household (if not for investment). Therefore, I additionally test the net effect of remittances on the consumption expenditure. The results show a robust positive effect across all specifications and datasets,

i.e., households that receive remittances appear to have a comparably higher consumption expenditure than non-migrant households.

Table 8: Net effect of internal remittances on investment into farm and non-farm assets as well as on consumption – Instrumental variable approach

Estimation model	Instrumental variable approach		
	(1) Full dataset	(2) Thailand	(3) Vietnam
2nd stage: Investment into farm assets (dummy)			
Received remittances (dummy)	0.010	-0.205	0.078**
	(0.043)	(0.156)	(0.036)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.097	0.107	0.096
2nd stage: Investment into non-farm assets (dummy)			
Received remittances (dummy)	0.116	-0.038	0.098
	(0.075)	(0.252)	(0.068)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.116	0.163	0.127
2nd stage: Total per capita consumption (log)			
Received remittances (dummy)	0.376***	0.706**	0.396***
	(0.090)	(0.300)	(0.084)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	17,330	8,011	9,319
Number of villages	440	220	220
R-squared	0.475	0.407	0.544
1st stage: Received remittances (dummy)			
Migration experience of village (share)	0.517***	0.213***	0.768***
	(0.029)	(0.038)	(0.025)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
F statistic on instrument	327	31	958

Note: All three specifications include the controls male (dummy), age, age squared, married (dummy), no education (dummy), sick (dummy), savings (dummy), crop production (dummy), share self-employment village, and average income village (USD, log). 1st stage results are equal for all three dependent variables. Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

For instance, the linear probability model indicates a 10.9 percentage points increase of the logged consumption expenditure for the full dataset, 4.7 percentage points for Thailand and 15.6 percentage points for Vietnam (third part of Table 6). Applying the propensity score

matching method the results are comparable, indicating a 5.3 and 17.5 percentage points higher consumption expenditure for the full dataset and for Vietnam, respectively (third part of Table 7). These results are significant at the 1% level, while the results for Thailand are not significant. Also the instrumental variable approach shows a significant positive effect of remittances on consumption expenditure – the coefficients are substantially higher than for the previous estimation methods and indicate a 37.6, 70.6 and 39.6 percentage point increase of the logged consumption expenditure for the full dataset, Thailand and Vietnam, respectively (third part of Table 8). The results are significant at the 1% or 5% level. Even though controls for the labor market and economic environment in the village have been included in the estimation, the village's migration experience could potentially not meet the exclusion restriction for an instrument. The results of the instrumental variable approach thus need to be interpreted with caution (see also discussion of potential threads to the exclusion restriction in the empirical strategy chapter).

To test the robustness of the results, I also run the linear probability model with fixed effects excluding individual, household or village level controls (see Appendix, Table A.2). The results are comparable, for instance, they indicate a decrease of investment into non-farm assets by -4.5 percentage points and an increase of consumption by 9.5 percentage points for the full dataset (compared to -6.4 and 10.9 percentage points when including controls).

These findings might be an indication that households receiving remittances from internal, rural-urban migrants do not use the additional income for investment, but rather increase their expenditure on consumption. One explanation could be that the optimal investment level for farm assets, Z_f^*, is already reached and no additional investment is required. Yet considering that most of the surveyed farm households are small-scale farmers and that additional land is scarce, farmers might simply not be able to optimally invest additional income or perceive the expected returns on investment as too low. Moreover, as the level of consumption expenditure of rural households in Thailand and Vietnam might have been sub-optimal before the migration of the household member, it is reasonable to assume that they use any additional income rather for consumption. This is also in line with the findings of many (earlier) studies that remittances sent by migrants are often not invested yet used for consumption (see e.g., Rempel and Lobdell, 1978; Chandavarkar, 1980; Lipton, 1980; Mines and de Janvry, 1982; Taylor, 1999).

6 Conclusion

Throughout the last decades Thailand and Vietnam have been experiencing a high level of internal migration flows, particularly from poorer rural to urban areas and large megacities such as Bangkok and Ho Chi Minh City. Following the New Economics of Labor Migration (NELM) theory, this decision to migrate is mainly driven by the household's objective to maximize income and to diversify the sources of income – with the ultimate goal to increase the welfare of the household. While the majority of migration research has focused on the determinants and drivers of (international) migration and its effect on the well-being of the left-behind household, only a few have analyzed the effects of internal, rural-urban migration and its impact on the labor supply and occupational choices of the left-behind household members. I contribute to this literature by empirically analyzing the net effects of remittances sent by internal, rural-urban household members on self-employment, investment behavior and consumption of the receiving households in the rural areas. Drawing on a comprehensive panel dataset of 4,400 households across six provinces in Thailand and Vietnam and over five years, I apply different econometrical estimation techniques to counteract potential issues of selection bias and endogeneity, and to enhance the robustness of the results.

The results indicate a negative net effect of remittances on self-employment, i.e., individuals from left-behind households that receive remittances from rural-urban migrants have a lower propensity to be self-employed compared to individuals from households that do not receive such remittances. This holds true across all econometrical specifications and data subsets, and for both Thailand and Vietnam. A potential reason for this finding could be that internal migration leads to a reduction of the labor supply to agricultural activities (assuming that there was no surplus labor and hired labor is not available or inferior). In such a case, the left-behind household members might need to substitute for the migrant and thus would not be able to engage in non-farm self-employment activities. Additionally, I investigate the net effects of remittances on asset investment and consumption of the left-behind household. While the results for farm asset investment are mixed, I observe a robust negative net effect of remittances on non-farm asset investment for the linear probability model and the propensity score matching method. This is in line with the findings on self-employment: left-behind household members are less likely to be self-employed and thus are also less likely to use remittances to invest into such a business (for start-up or expansion). As remittances, which might constitute additional earnings for the household,

appear to not be used for asset investment, I also analyze how they affect the consumption of the left-behind households. Here I observe a robust positive effect, i.e., remittances lead to an increase of consumption expenditure. A potential reason for this finding could be that households that send family members to earn additional income in urban areas might have a relatively low consumption level pre-migration. In such a case any additional income, for instance through remittances, might be used to increase consumption and in the short-term improve the household's utility – and not be invested into assets for farm or non-farm activities even though this could potentially increase utility in the long-term. Another reason could be that wealthier households are more likely to send migrants and have an overall higher consumption level than non-migrant households. Yet by applying a linear fixed-effects model and a propensity score matching method, problems of self-selection bias should be largely reduced.

Even though the empirical results need to be interpreted with caution as the exact channels cannot be identified with certainty and as there might be remaining issues of endogeneity, the results indicate that internal, rural-urban migration and the (potential) subsequent flow of remittances to the left-behind households might not naturally lead to a flourishing of non-farm activities and self-employment in rural areas. In contrast, while some of the rural-urban migrants in Thailand and Vietnam are becoming self-employed in the (often informal) non-farm sector in the big megacities (e.g., as a taxi driver or food stall operator), the likelihood of non-farm self-employment in the left-behind rural households is relatively lower compared to non-migrant households. Moreover, remittances seem also not to lead to asset investment, e.g., to increase productivity or to start up a business – in contrast, households receiving remittances are less likely to invest (long-term) into assets yet seem to spend additional income on consumption. Policies aiming to drive the establishment of non-farm enterprises may have to take these effects into account, e.g., through specific subsidies for the start-up of non-farm enterprises, eased access to financial capital and educational programs to improve business and financial literacy for households in rural areas. Future research should further focus on the channels through which internal, rural-urban migration and remittances affect the labor market, specifically self-employment, and the investment behavior in rural areas. While economic theory provides some potential answers, it is difficult to a-priori determine the effects of remittances. This is mainly due to the lack of appropriate data. While there is an increasing availability of individual- and household-level

panel data, the data often misses the required details to disentangle the complex interdependencies of migration and self-employment while being able to control for potential problems of endogeneity. Capturing variables such as the use of remittances, pre-migration characteristics (including labor supply), migration history of a household as well as the reasons for certain labor supply or investment decisions, might enable researchers to shed more light on this complex phenomenon.

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Appendix

Table A.1: Net effect of internal remittances on self-employment – Linear probability model with fixed effects – Details

Estimation model	Linear probability model with fixed effects		
Dependent variable	Self-employment as main occupation (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.023***	-0.023***	-0.023***
	(0.003)	(0.004)	(0.005)
Male (dummy)	-0.022***	-0.005	-0.043***
	(0.003)	(0.004)	(0.005)
Age	0.006***	0.006***	0.006***
	(3.9e-4)	(4.9e-4)	(0.001)
Age squared	-6.2e-5***	-5.7e-5***	-6.6e-5***
	(4.1e-6)	(5.1e-6)	(6.2e-6)
Married (dummy)	0.029***	0.019***	0.044***
	(0.004)	(0.005)	(0.007)
No education (dummy)	-0.017***	-0.021***	-0.015**
	(0.005)	(0.007)	(0.007)
Sick (dummy)	-0.021***	-0.013**	-0.025***
	(0.004)	(0.006)	(0.005)
Savings (dummy)	0.027***	0.018***	0.036***
	(0.003)	(0.005)	(0.004)
Crop production (dummy)	-0.096***	-0.058***	-0.177***
	(0.009)	(0.009)	(0.017)
Share self-employment village	0.480***	0.448***	0.610***
	(0.037)	(0.048)	(0.054)
Average income village (USD, log)	0.011***	0.007	0.003
	(0.003)	(0.004)	(0.004)
Constant	-0.088***	-0.111***	0.054*
	(0.020)	(0.031)	(0.030)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	70,081	39,713	30,368
Number of villages	440	220	220
R-squared	0.040	0.026	0.072

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.2: Robustness check excluding individual, household and village level controls – Net effect of internal remittances on self-employment, investment and consumption

Estimation model	Linear probability model with fixed effects excluding control variables		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Table 3: Self-employment as main occupation (dummy)			
Received remittances (dummy)	-0.017***	-0.017***	-0.016***
	(0.002)	(0.003)	(0.004)
Number of observations	106,234	55,706	50,528
R-squared	0.001	0.001	0.002
Table 6: Investment into farm assets (dummy)			
Received remittances (dummy)	0.010	-0.022**	0.043***
	(0.007)	(0.011)	(0.009)
R-squared	0.010	0.021	0.010
Table 6: Investment into non-farm assets (dummy)			
Received remittances (dummy)	-0.045***	-0.064***	0.025**
	(0.010)	(0.012)	(0.013)
R-squared	0.094	0.245	0.085
Table 6: Total per capita consumption (log)			
Received remittances (dummy)	0.095***	0.009	0.191***
	(0.014)	(0.020)	(0.019)
R-squared	0.435	0.388	0.492
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of villages	444	220	224

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.3: Net effect of internal remittances on self-employment – Conditional logistic regression model (marginal effects)

Estimation model	Conditional logistic regression model (marginal effects)		
Dependent variable	Self-employment as main occupation (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.006***	-0.006**	-0.016**
	(0.002)	(0.003)	(0.008)
Male (dummy)	-0.006***	-0.001	-0.035**
	(0.002)	(0.001)	(0.016)
Age	0.002***	0.002**	0.008**
	(0.001)	(0.001)	(0.004)
Age squared	-2.5e-5***	-2.0e-5**	-8.7e-5**
	(7.4e-6)	(8.4e-6)	(3.9e-5)
Married (dummy)	0.007***	0.004**	0.028**
	(0.002)	(0.002)	(0.014)
No education (dummy)	-0.004***	-0.005**	-0.012*
	(0.001)	(0.002)	(0.007)
Sick (dummy)	-0.005***	-0.003*	-0.019**
	(0.002)	(0.002)	(0.010)
Savings (dummy)	0.006***	0.004**	0.025**
	(0.002)	(0.002)	(0.011)
Crop production (dummy)	-0.016***	-0.010**	-0.068**
	(0.005)	(0.004)	(0.033)
Share self-employment village	0.089***	0.077**	0.313**
	(0.027)	(0.034)	(0.147)
Average income village (USD, log)	0.002***	0.002***	0.001
	(3.2e-4)	(3.7e-4)	(0.003)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	65,190	39,048	26,142
Number of villages	405	216	189

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.4: Net effect of internal remittances on self-employment – Instrumental variable approach – 2nd stage regressions results – Details

Estimation model	Instrumental variable approach		
Dependent variable	Self-employment as main occupation (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.030**	-0.065**	-0.015*
	(0.014)	(0.029)	(0.009)
Male (dummy)	-0.022***	-0.006	-0.043***
	(0.003)	(0.004)	(0.003)
Age	0.006***	0.006***	0.006***
	(3.9e-4)	(4.9e-4)	(3.3e-4)
Age squared	-6.2e-5***	-5.8e-5***	-6.5e-5***
	(4.1e-6)	(5.1e-6)	(3.6e-6)
Married (dummy)	0.029***	0.019***	0.045***
	(0.004)	(0.005)	(0.004)
No education (dummy)	-0.017***	-0.021***	-0.009**
	(0.005)	(0.007)	(0.004)
Sick (dummy)	-0.021***	-0.014**	-0.025***
	(0.004)	(0.006)	(0.004)
Savings (dummy)	0.027***	0.018***	0.036***
	(0.032)	(0.005)	(0.003)
Crop production (dummy)	-0.096***	-0.058***	-0.171***
	(0.009)	(0.009)	(0.009)
Share self-employment village	0.478***	0.438***	0.870***
	(0.037)	(0.048)	(0.029)
Average income village (USD, log)	0.011***	0.007	-0.003
	(0.003)	(0.004)	(0.003)
Constant	-0.090***	-0.101***	0.063***
	(0.019)	(0.032)	(0.021)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	70,114	39,730	30,384
Number of villages	440	220	220
R-squared	0.039	0.025	0.122

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.5: Net effect of internal remittances on investment into farm assets – Linear probability model with fixed effects – Details

Estimation model	Linear probability model with fixed effects		
Dependent variable	Investment into farm assets (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.020***	-0.050***	0.004
	(0.007)	(0.013)	(0.008)
Share of male household members	0.029*	0.032	0.033
	(0.016)	(0.024)	(0.021)
Male household head (dummy)	0.035***	0.034***	0.036***
	(0.007)	(0.009)	(0.009)
Number of household members in labor force	0.009***	0.003	0.012***
	(0.002)	(0.004)	(0.002)
Share of household members with no education	-0.007	0.011	-0.053***
	(0.010)	(0.013)	(0.016)
Health insurance (dummy)	0.053***	0.061***	0.043***
	(0.006)	(0.013)	(0.007)
Crop production (dummy)	0.305***	0.321***	0.282***
	(0.015)	(0.018)	(0.026)
Share self-employment village	0.406***	0.441***	0.271**
	(0.083)	(0.128)	(0.112)
Average income village (USD, log)	0.001**	0.001	0.001**
	(2.9e-4)	(4.8e-4)	(3.3e-4)
Constant	0.432***	0.385***	0.487***
	(0.020)	(0.030)	(0.030)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.097	0.109	0.095

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.6: Net effect of internal remittances on investment into non-farm assets – Linear probability model with fixed effects – Details

Estimation model	Linear probability model with fixed effects		
Dependent variable	Investment into non-farm assets (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	-0.064***	-0.100***	-0.025*
	(0.010)	(0.015)	(0.013)
Share of male household members	0.061***	0.047	0.083***
	(0.022)	(0.032)	(0.029)
Male household head (dummy)	0.052***	0.032***	0.065***
	(0.009)	(0.010)	(0.014)
Number of household members in labor force	0.012***	0.006	0.011**
	(0.003)	(0.005)	(0.004)
Share of household members with no education	-0.071***	-0.053***	-0.103***
	(0.012)	(0.015)	(0.017)
Health insurance (dummy)	0.115***	0.078***	0.112***
	(0.009)	(0.017)	(0.011)
Crop production (dummy)	0.112***	0.166***	0.040*
	(0.015)	(0.019)	(0.023)
Share self-employment village	0.616***	0.687***	0.333**
	(0.114)	(0.175)	(0.150)
Average income village (USD, log)	0.001*	0.001*	0.002***
	(0.000)	(0.001)	(0.001)
Constant	0.418***	0.545***	0.361***
	(0.025)	(0.035)	(0.035)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.118	0.167	0.127

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.7: Net effect of internal remittances on consumption expenditure – Linear probability model with fixed effects – Details

Estimation model	Linear probability model with fixed effects		
Dependent variable	Total per capita consumption (log)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	0.109***	0.047**	0.156***
	(0.014)	(0.023)	(0.017)
Share of male household members	-0.155***	-0.239***	-0.061
	(0.036)	(0.055)	(0.045)
Male household head (dummy)	0.103***	0.118***	0.064***
	(0.015)	(0.022)	(0.019)
Number of household members in labor force	0.078***	0.094***	0.067***
	(0.005)	(0.010)	(0.006)
Share of household members with no education	-0.166***	-0.133***	-0.207***
	(0.019)	(0.027)	(0.026)
Health insurance (dummy)	0.221***	0.190***	0.251***
	(0.013)	(0.024)	(0.016)
Crop production (dummy)	0.013	0.090***	-0.093***
	(0.024)	(0.031)	(0.035)
Share self-employment village	0.104	0.538***	0.049
	(0.152)	(0.177)	(0.240)
Average income village (USD, log)	-0.016***	-0.020***	-0.013***
	(0.001)	(0.001)	(0.001)
Constant	6.977***	7.155***	6.834***
	(0.035)	(0.053)	(0.046)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	17,330	8,011	9,319
Number of villages	440	220	220
R-squared	0.476	0.407	0.547

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.8: Net effect of internal remittances on investment into farm assets – Instrumental variable approach – 2nd stage regressions results – Details

Estimation model	Instrumental variable approach		
Dependent variable	Investment into farm assets (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	0.010	-0.205	0.078**
	(0.043)	(0.156)	(0.036)
Share of male household members	0.029*	0.033	0.034*
	(0.016)	(0.024)	(0.021)
Male household head (dummy)	0.036***	0.030***	0.037***
	(0.007)	(0.011)	(0.009)
Number of household members in labor force	0.008***	0.007	0.008**
	(0.003)	(0.005)	(0.003)
Share of household members with no education	-0.001	0.014	-0.055***
	(0.010)	(0.013)	(0.016)
Health insurance (dummy)	0.053***	0.062***	0.044***
	(0.006)	(0.013)	(0.007)
Crop production (dummy)	0.306***	0.319**	0.283***
	(0.015)	(0.018)	(0.026)
Share self-employment village	0.410***	0.387***	0.268**
	(0.083)	(0.142)	(0.112)
Average income village (USD, log)	0.001**	-0.001*	0.001***
	(2.9e-4)	(4.8e-4)	(3.3e-4)
Constant	0.432***	0.397***	0.491***
	(0.020)	(0.033)	(0.030)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.097	0.107	0.096

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.9: Net effect of internal remittances on investment into non-farm assets – Instrumental variable approach – 2nd stage regressions results – Details

Estimation model	Instrumental variable approach		
Dependent variable	Investment into non-farm assets (dummy)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	0.116	-0.038	0.098
	(0.075)	(0.252)	(0.068)
Share of male household members	0.062***	0.047	0.086***
	(0.022)	(0.032)	(0.029)
Male household head (dummy)	0.057***	0.034**	0.067***
	(0.009)	(0.012)	(0.015)
Number of household members in labor force	0.005	0.004	0.004
	(0.004)	(0.009)	(0.005)
Share of household members with no education	-0.076***	-0.054***	-0.107***
	(0.012)	(0.016)	(0.017)
Health insurance (dummy)	0.117***	0.077***	0.114***
	(0.009)	(0.017)	(0.011)
Crop production (dummy)	0.114***	0.166***	0.041*
	(0.015)	(0.019)	(0.023)
Share self-employment village	0.640***	0.709***	0.328**
	(0.116)	(0.206)	(0.151)
Average income village (USD, log)	0.001*	0.001*	0.002***
	(4.5e-4)	(0.001)	(0.001)
Constant	0.416***	0.541***	0.367***
	(0.025)	(0.042)	(0.036)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	18,128	8,428	9,700
Number of villages	440	220	220
R-squared	0.116	0.163	0.127

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table A.10: Net effect of internal remittances on consumption expenditure – Instrumental variable approach – 2nd stage regressions results – Details

Estimation model	Instrumental variable approach		
Dependent variable	Total per capita consumption (log)		
	(1) Full dataset	(2) Thailand	(3) Vietnam
Received remittances (dummy)	0.376***	0.706**	0.396***
	(0.090)	(0.300)	(0.084)
Share of male household members	-0.153***	-0.243***	-0.055
	(0.036)	(0.055)	(0.045)
Male household head (dummy)	0.109***	0.136***	0.068***
	(0.015)	(0.023)	(0.019)
Number of household members in labor force	0.067***	0.078***	0.055***
	(0.006)	(0.012)	(0.007)
Share of household members with no education	-0.174***	-0.144***	-0.215***
	(0.019)	(0.028)	(0.027)
Health insurance (dummy)	0.223***	0.184***	0.254***
	(0.013)	(0.024)	(0.016)
Crop production (dummy)	0.017	0.098***	-0.091**
	(0.024)	(0.032)	(0.035)
Share self-employment village	0.141	0.768***	0.039
	(0.152)	(0.193)	(0.239)
Average income village (USD, log)	-0.016***	-0.020***	-0.012***
	(0.001)	(0.001)	(0.001)
Constant	6.974***	7.104***	6.845***
	(0.035)	(0.055)	(0.047)
Village fixed effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Number of observations	17,330	8,011	9,319
Number of villages	440	220	220
R-squared	0.475	0.407	0.544

Note: Robust standard errors clustered at village level in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

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