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Crop prices and migration in Vietnam

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Abstract: This paper investigates the effect of commodity prices, in particular rice and coffee, on the individual decision of migrating in Vietnam. As most coffee production is sold by households for exports, we would expect that coffee price shocks would have a direct effect on the probability of migrating. On the other hand, we would anticipate that fluctuations in rice prices have little or no effect on migration decisions, given that rice is mainly produced for household consumption. The results of the analysis confirm our assumptions. We provide evidence that the lower the coffee price, the higher the likelihood of migrating. This evidence seems to suggest that migration acts as a shock-coping strategy. We find that rice prices have no effect on the probability of migrating. We further explore the extent of migrants' self-selection and show that lower coffee prices increase the migration probability of individuals with lower education.

Keywords: migration, price shocks, Vietnam
JEL classification: J6, O15

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1 Introduction

Migration has significantly increased in Viet Nam over the past decades. According to the 2009 Vietnamese Census, over 6 million people migrated within Viet Nam between 2004 and 2009. This paper analyses the effects of commodity price shocks on the individual decision to migrate in Viet Nam, focusing in particular on rice and coffee. As most coffee production is sold by households for exports, we would expect that coffee price shocks would have a direct effect on the individual decision to migrate. On the other hand, we would expect fluctuations in rice prices to have little or no effect on migration decisions given that rice is mainly produced for household consumption. In a recent paper, Beck et al. (2016) investigate the effect of coffee price volatility on intra-household labour supply in Viet Nam and—using the Viet Nam Access to Resources Household Survey (VARHS)—find that households increase wage labour supply of adults in the presence of lower coffee prices. The authors find that international coffee prices do not affect the household decision to send a migrant away. The additional round of VARHS data collected in 2016 allows us to complement the work by Beck et al. (2016) and focus more specifically on migration, in particular by analysing the *individual*, rather than household, decision to migrate.

This paper contributes to two strands of the literature. First, it contributes to the recent literature that analyses migration within Viet Nam. Phan and Coxhead (2010) analyse the relationship between inequality and migration in Viet Nam: they provide evidence of labour immobility caused by poverty, which may lead to persistent poverty in certain provinces. Using the Viet Nam Household Living Standard Surveys, Coxhead et al. (2016) present evidence that migrants are more likely to be male, young, and from the ethnic majority. The authors also show the existence of a positive selection among migrants: individuals with higher education are more likely to move. This positive migrants' selection is also found in the work by Nguyen et al. (2008), as individuals who are financially better off are more likely to migrate. A recent paper by Nguyen et al. (2015) investigates the relationship between shocks and rural–urban migration: the study shows that migration acts as a risk-coping mechanism. Gröger and Zylberberg (2016) provide further evidence that internal labour migration could be considered as a shock-coping strategy in rural economies when households cannot rely on remittances. Indeed, the analysis shows that after a severe weather shock (typhoon), household members are more likely to migrate and support their relatives through remittances. Finally, Narciso (2017) shows how remittance-recipient households respond better to shocks and use remittances to counter-balance the need for formal borrowing.

Second, this paper contributes to the literature analysing how price shocks and import competition affect the decision to migrate. In a recent paper, Bazzi (2017) analyses the effect of rice price shocks in Indonesia on the individual decision to migrate. The author finds that positive rainfall and rice price shocks lead to greater international migration, especially in communities with a large mass of small landowners. On the other hand, rice price shocks decrease international migration from rural developed villages, due to higher opportunity costs. A recent strand of literature has also focused on the effect of international import competition on labour markets and the individual decision to migrate. In particular, Majlesi and Narciso (2018) investigate the impact of import competition on Mexican migration and provide evidence that import competition raises domestic migration within Mexico, but lowers international migration to the US. The authors find that import competition reduces migrants' negative self-selection: international competition is found to decrease the likelihood of low-educated, low-income people migrating to the US by making them more financially constrained.

The Viet Nam Access to Resource Household Survey (VAHRS) provides the ideal data set to examine the relationship between commodity prices and migration for three reasons. First, the

VAHRS contains detailed information on crop production at plot level for an extensive time period. This allows us to control for any change in agricultural production over time, differentiating between coffee and rice. Second, a section on migration was added to the survey instrument of the VARHS in 2012. Therefore, migration behaviour is now available for three rounds of VARHS (2012, 2014, and 2016), allowing us to follow individual migrant experiences. Third, the three survey rounds allow the analysis of the effect of price volatility of different agricultural goods on migration over an extensive period, thus capturing the changing environment within the Vietnamese economy and the rapid changes in migration experience.

In the presence of a sustained economic growth in Viet Nam and a constant process of urbanization, it is of utmost importance to investigate the push and pull factors of migration. The recent literature on migration within Viet Nam has analysed the role of migration as a coping mechanism in response to natural, rather than economic shocks. This paper contributes to this literature and to the policy debate by investigating the effect of price shocks of agricultural products on the migration decision at the individual level. The paper also contributes to the policy debate about the *ho khau* registration system. According to a recent World Bank report (Demombynes and Vu, 2016), the strength of the registration system has lessened over the past few years, but it may still lead to significant economic costs by reducing migration opportunities, especially for ethnic or vulnerable communities. We provide evidence that the likelihood of migrating increases as coffee prices decrease. This evidence seems to suggest that migration acts as a shock-coping strategy in the face of negative economic shocks. We find no effect of rice price shocks on the probability of migrating. We further explore the extent of migrants' self-selection and show that lower coffee prices increase the probability of migration among individuals with a lower education.

This paper is organized as follows. Section 2 presents the motivation and the econometric specification. Section 3 discusses the data, while section 4 presents the estimation results. Section 5 investigates migrants' self-selection and section 6 concludes.

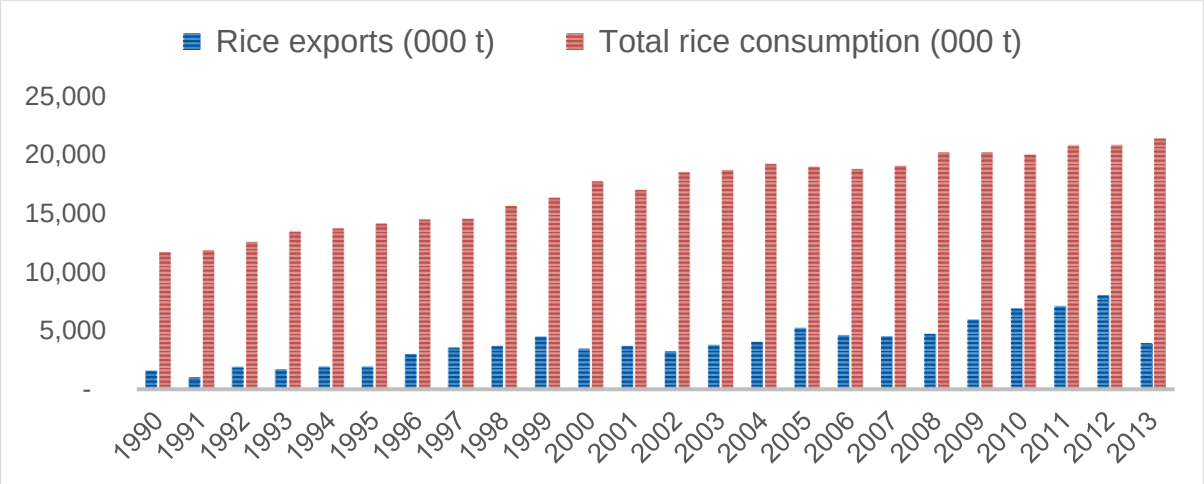
2 Motivation and econometric specification

Domestic migration within Viet Nam significantly increased over time between 1999 and 2009, with an annual migration rate within provinces rising from 0.6 per cent in 1999 to 4.2 per cent in 2009 (Narciso, 2017; GSO, 2010). However, the sharp increase in the level of migration in the period 2004–09 was followed by a slight decrease in the period 2009–14 (GSO, 2015). Migration across Vietnamese regions declined the most, from 30 migrants per 1000 people in 2009 to 21 migrants per 1000 people in 2014. Inter-provincial migration also declined over the same time period, from 43 migrants per 1000 people in 2009 to 31 migrants per 1000 people in 2014. Migration across districts remained relatively stable (from 22 migrants per 1000 people in 2009 to 20 migrants per 1000 people in 2009), while migration within districts slightly declined. Comparisons between migration movements within Viet Nam show that during the period 1999-2014 intra-province migration accounted for the highest proportion, raising from 34.5 per cent in 1999, to 37.4 per cent in 2009 and reaching 42.1 per cent in 2014 (GSO, 2015).

Although migrants are expected to comply with the regulations on migration (the *ho khau* system), it is estimated that over 5 million Vietnamese do not have permanent registration in their place of residence (Demombynes and Vu, 2016). The lack of registration would exclude migrants from accessing health-care provision, schooling, and social protection more generally. While the literature has mainly focused on household or individual characteristics of migrants in Viet Nam, little attention has been given to the role of crop price fluctuations on the individual decision to

migrate. The only exception is the work by Beck et al. (2016), who focus on the effect of coffee price volatility and household labour-supply. In their analysis, the authors also explore the effect of coffee prices on the household migration decision, but find no statistically significant effect of coffee prices. We depart from their work to analyse the *individual*, rather than household, decision of migrating. Rather than focusing on coffee only, we also extend our analysis to rice prices. The reasons for focusing on these two crops is twofold: first, the two crops differ in the extent of exports. Viet Nam is a major player in coffee exports, in particular for the type of *robusta* coffee. Figures 1 and 2 present the comparison between consumption in Viet Nam and exports of rice and coffee over time.

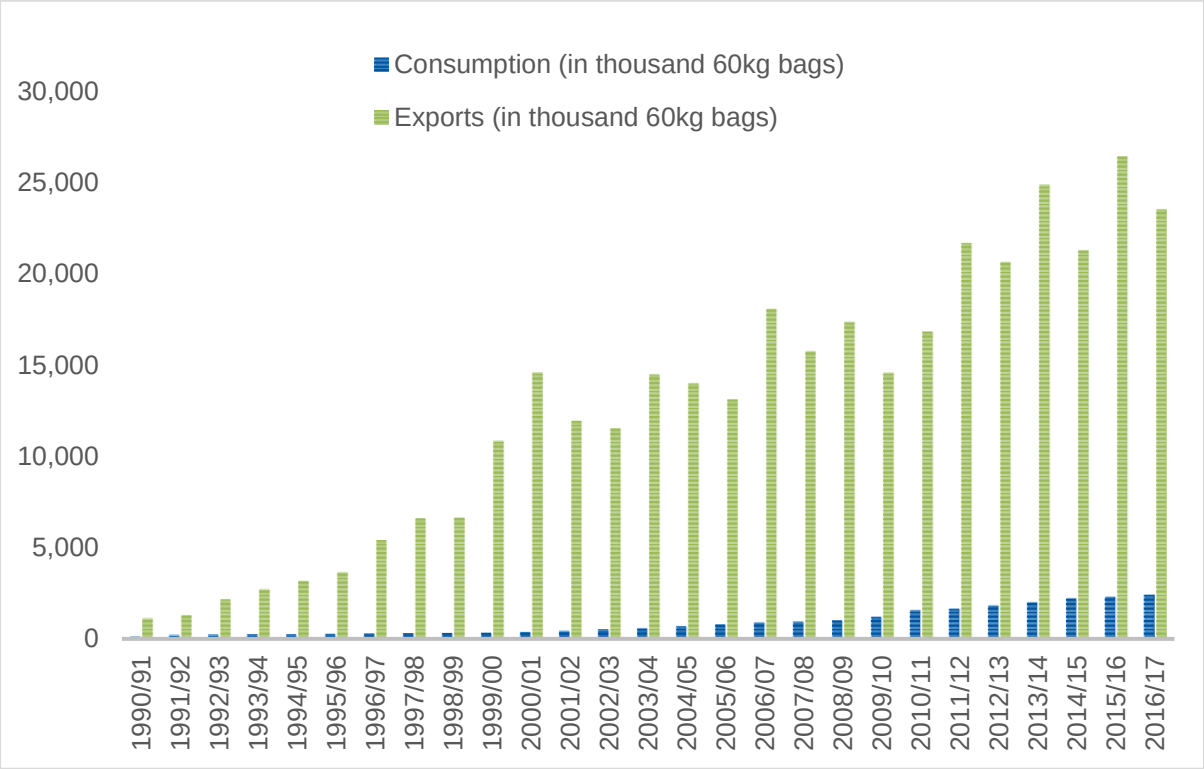
Figure 1: Rice consumption and exports in Viet Nam



Source: Author's illustration based on data from the Global Rice Price Partnership.[1]

[1] http://ricecrp.org/about-rice/ (accessed 27 November 2017).

Figure 2: Coffee consumption and exports in Viet Nam



Source: Author's illustration based on data from the International Coffee Association.[2]

Although coffee is consumed in Viet Nam, the greatest share of coffee production is exported. On the other hand, rice is mainly produced *and* consumed in Viet Nam. Indeed, according to a report by the Asian Development Bank (2012), about 90 per cent of rice produced in Viet Nam is consumed by the Vietnamese population. In the VARHS data, only 4.85 per cent of the rice-producing households sell all of their rice, while 83.52 per cent of the coffee-producing households sell all of their coffee. This provides an interesting comparison of how price fluctuations in the two crops would affect the individual decision to migrate. We would expect rice prices to have little or no effect on the decision to migrate: ultimately, the shock to the price of rice should not affect households that, on average, consume most of their rice production. Unlike rice, we would expect a strong effect of coffee prices on the individual decision to migrate. As most of coffee production is sold by households for exports, coffee prices would have a direct impact on household and individual incomes. In terms of the direction of the effect of coffee prices, *i.e.* whether coffee price affects the migration decision in a positive or in a negative way, the answer is mainly an empirical one. If migration plays a role as a shock-coping mechanism, then a decrease in coffee prices may lead to an increase in migration. However, coffee prices could also be positively related to migration: as incomes from crop sales decrease, individuals may find themselves locked in and unable to face the costs of migrating. This is indeed the finding shown by Majlesi and Narciso (2018) in relation to the effect of international import competition on the probability of Mexicans migrating to the US. The more exposed individuals are to international trade shocks, the less likely they are to migrate to the US, due to financial constraints.[3] The comparison between rice and coffee is relevant also for a second motive: while it is easier to switch

[2] http://www.ico.org/new_historical.asp (accessed 27 November 2017).

[3] Gray et al. (2017) provide similar evidence for the Italian migration during the Age of Mass Migration: Italians were poverty-trapped and lacked the funds to migrate unless agricultural incomes reached a sufficient level.

crop production in relation to rice, it is more difficult and relatively more time-consuming to switch in or out of coffee production. Hence, in the case of coffee, households may find themselves locked in the production of coffee, while rice-producing households may switch out of rice production in the case of negative price shocks.

We provide evidence using two different measures of crop prices. First, we follow Beck et al. (2016) and construct an index of crop prices given by the average international crop price in the 12 months preceding the survey, divided by its standard deviation. We compute the index for the two crops, rice and coffee, separately. Second, we provide an alternative measure on the basis of the VARHS data, computed as the average crop price at district and survey round level, to capture the extent of price shocks that households may experience. As before, we compute this measure for the two crops separately.

Our baseline specification is as follows:

$$migr_{ihdt} = \beta_1 Crop\_price_{ht(dt)} * Crop\_prod_{hdt} + \beta_2 Crop\_price_{ht(dt)} + \beta_3 Crop\_prod_{hdt} + + \boldsymbol{X}'_{hdt}\boldsymbol{\gamma} + \delta_i + \tau_t + \varepsilon_{ihdt} \quad (1)$$

where $migr_{ihdt}$ is an indicator variable that takes the value 1 if individual *i* in household *h,* in district *d,* is a migrant at time *t* and 0 otherwise. The variable $crop\_price_{dt}$ is either the international crop price measure, as defined previously (Beck et al. 2016) or the crop price, averaged at district and survey round. The variable $Crop\_Prod_{hdt}$ is an indicator that measures whether household *h*, in district *d*, produces the specific crop at time *t*, *i.e.* rice or coffee. We estimate the effect of coffee price shocks separately from the effect of rice price shocks. The coefficient β_1 captures the impact of the specific crop price fluctuations that crop-producing households face. $\boldsymbol{X}_{hdt}$ represents a vector of controls at the household level at time *t*, such as a crop production indicator for either rice or coffee, food expenditure per capita, family size, gender of the household head, whether the household experienced any natural shock in the preceding year and whether the household has accumulated savings in the previous year. The specification also includes individual fixed effects (δ_i) and survey rounds fixed effects (τ_t). We cluster standard errors at the household level.

We also perform an analysis of the impact of crop price volatility on the probability of migrating. Crop price volatility is measured as the standard deviation of crop prices, measured at district and round level, over a 3-year window. The specification is as follows:

$$migr_{ihdt} = \beta_1 Crop\_price\_vol_{ht} * Crop\_prod_{hdt} + \beta_2 Crop\_price\_vol_{ht} + \beta_3 Crop\_prod_{hdt} + + \boldsymbol{X}'_{hdt}\boldsymbol{\gamma} + \delta_i + \tau_t + \varepsilon_{ihdt} \quad (2)$$

Where $Crop\_price\_vol_{dt}$ measures crop price volatility as the standard deviation of crop prices at district level over a three-year window. As in equation 1, the specification includes household characteristics, survey rounds and also individual fixed effects.

3 Data

The data used in this paper come from three rounds of the VARHS, which provides extensive information on crop production, assets and landholding of households in rural Viet Nam. A migration section was added to the survey instrument in 2012, and information on migration decisions at individual level is now available for three rounds of the VARHS (2012, 2014, and 2016). Due to data reporting, not all the individuals reported as migrants can be matched with the individual panel data set. We exclude these individuals for the analysis, as it is not possible to match

them to the main panel dataset. When we include these individuals, the share of migrants over the entire sample is just above 6 per cent. However, when we drop these observations from the analysis, about 4 per cent of the individuals in the sample have moved between the three rounds of the survey. Table 1 presents the summary statistics of the panel sample. About 4 per cent of the sample is made up of individuals who moved their residence between the three rounds of the survey once the matching between the migration section of the questionnaire and the overall household roster is completed. Women make up 50.75 per cent of the sample, the average age is 33 years. About 30 per cent of the sample has a diploma.

As for the summary statistics at household level, about 8.9 per cent of the households in the sample produce coffee. The majority of coffee production takes place in Dak Lak, Lam Dong and Dak Nong provinces, although coffee-producing households can be found in other provinces as well, such as Dien Bien, Long An, Nghe An. As expected, rice production is more widespread, as about 62 per cent of the households in the sample produce rice. Over 22 per cent of the households have a woman as a household head. The average household size is 4 members and about 24 per cent of the sample has experienced a natural shock in the preceding period of the interview. The majority of the households in the sample (79 per cent) belong to the Viet (or Kinh) ethnic group. In terms of crop prices, coffee prices per kg, measured as averages at a district level, are much higher than rice prices. Table 2 investigates the features of households producing either coffee or rice and comparing them to the rest of the sample.[4]

Table 1: Summary statistics

Variable	Mean	SD	Min	Max
		Individual characteristics		
Migrant	3.78%	0.19	0	1
Female	50.75%	0.50	0	1
Age	33.39	21.40	0	101
Diploma	29.50%	0.46	0	1
Married	50.98%	0.50	0	1
		Household characteristics		
Coffee production	8.92%	0.28	0	1
Rice production	62.71%	0.48	0	1
Food expenditure pc	467.56	351.15	0	5,913.56
Female household head	22.47%	0.42	0	1
Viet	79.50%	0.40	0	1
Household size	4.13	1.73	0	14
Natural shock	24.27%	0.43	0	1
		Crop prices (000s VND per kg) at district level		
Coffee	27.02	36.21	0.22	381.94
Rice	6.28	22.22	0.19	236.91

Source: Author's calculations based on survey data from VARHS 2012–16.

[4] About 2.7% of the households in the sample produce coffee and rice.

Table 2: Household characteristics by crop production

Panel A	Coffee producing households (1)	Non-Coffee producing households (2)	Difference (2)-(1)
Food expenditure pc	449.83	469.30	19.47
Female HH head	14.83%	23.22%	0.084***
Household size	4.62	4.09	-0.53***
Viet	66.76%	80.75%	13.99***
Natural shock	27.20%	23.98%	-0.032*
Number of plots	3.44	4.02	0.58***
Panel B	**Rice producing households (1)**	**Non-rice producing households (2)**	**Difference (2)-(1)**
Food expenditure pc	417.61	551.61	134.00***
Female HH head	18.07%	29.86%	0.12***
Household size	4.40	3.69	-0.71***
Viet	72.65%	91.02%	0.18***
Natural shock	32.15%	11.01%	-0.21***
Number of plots	4.95	2.32	-2.63***

Note: *** significant at 1%, ** significant at 5%, * significant at 1%.

Source: Author's calculations based on survey data from VARHS 2012–16.

Panel A explores the features of coffee-producing households with respect to the rest of the sample. We find no difference between coffee producing households and non-coffee producing households in terms of food expenditure. On average, coffee-producing households are less likely to have a woman as household head and have on average a larger household size. Given the geographical distributions of coffee-producing households, it is not surprising that the share of households of Viet ethnicity is lower than the rest of the sample. On average coffee-producing households have a lower number of plots and they are more likely to have been affected by a natural shock.

Panel B presents the characteristics of rice-producing households comparing them with the rest of the sample. On average, rice-producing households tend to have a lower food expenditure per capita, are less likely to be headed by a woman and are also less likely to belong to the majority ethnic group Viet. As for coffee-producing households, natural shocks seem to affect rice producing households more than the rest of the sample. They also tend to have a larger number of plots.

What are the characteristics of the migrants for whom we have information over the three rounds of the survey? Table 3 explores the features of migrants and compare them to the rest of the individuals in the sample. On average migrants tend to be men, young, single, and better educated than the rest of the sample. This latter result would suggest that migrants are positively selected in the population. Migrants also are more likely to belong to the ethnic majority and they are more likely to be single. In terms of their households of origin, they are slightly more likely to come from households that produce coffee, while we find no statistically significant difference with respect to rice production.

Table 3: Migrant characteristics

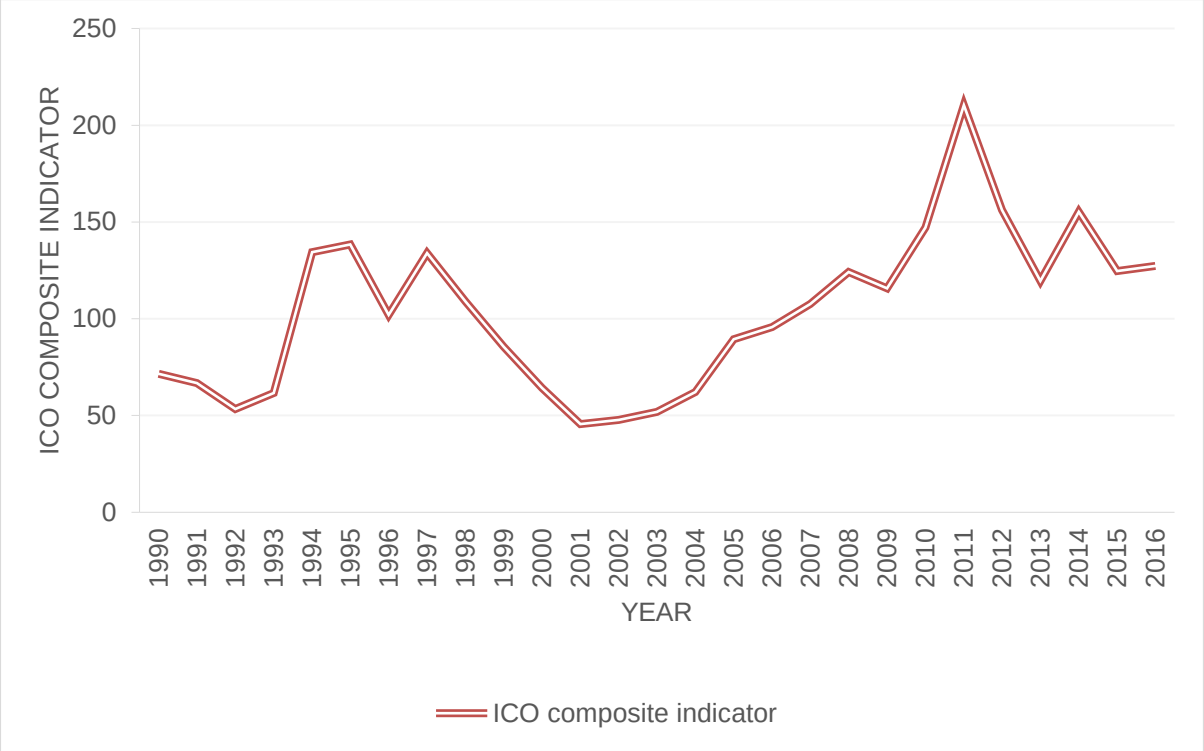
	Migrant (1)	Non-migrant (2)	Difference (2)-(1)
Female	46.79%	50.91%	0.041***
Age	24.77	33.73	8.96***
Diploma	34.92%	29.28	-0.056***
Viet	85.34%	74.71%	-0.106***
Married	18.73%	52.25%	0.335***
Coffee producing HH	11.44%	9.90%	-0.015*
Rice producing HH	66.77%	66.71%	-0.000

Note: * significant at 10%; ** significant at 5%; *** significant at 1%.

Source: Author's calculations based on survey data from VARHS 2012–16.

The international coffee price measure is constructed on the basis of the data made available by the International Coffee Organization, for the period considered in the analysis (2011–16). Figure 3 presents coffee price data as reported by the International Coffee Price Organization.[5] The coffee price indicator experienced a spike in 2011, followed by a large decrease in 2013. Overall, international coffee prices show a remarkable volatility, particularly in more recent years. Figure 4 presents the trend of rice indicators, as documented by FAO.[6] International rice prices show an upward trend between 2001 and 2008, followed by a rather consistent downward trend over the subsequent period. In particular, international rice prices experienced a significant drop after 2014.

Figure 3: Coffee price

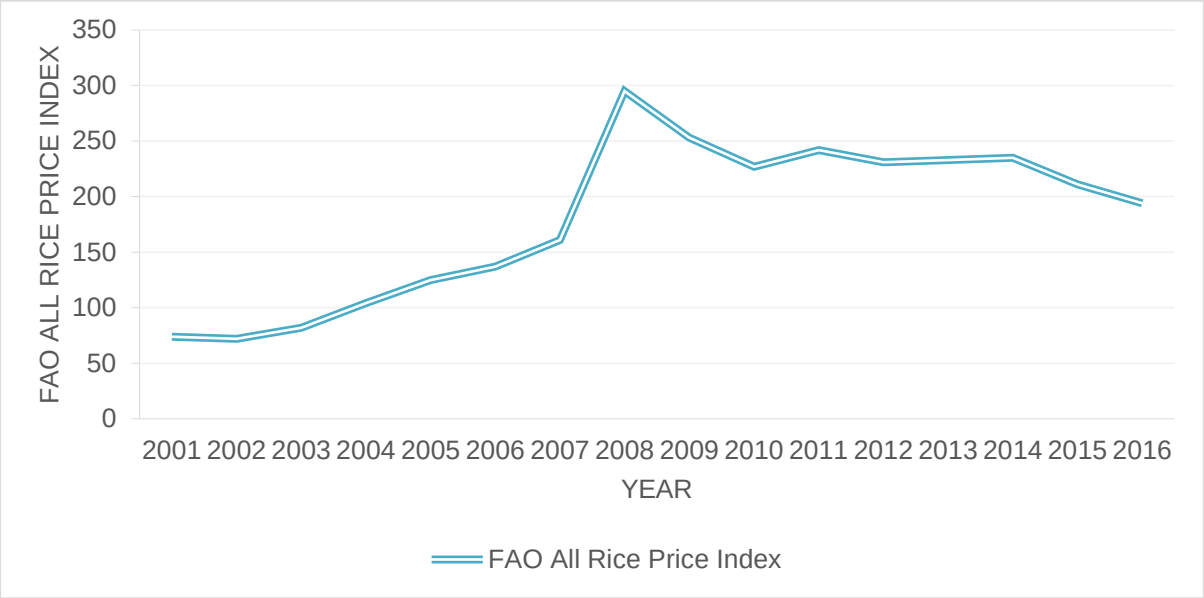


Source: Author's illustration based on data from the International Coffee Price Association.

[5] http://www.ico.org/coffee_prices.asp?section=Statistics (accessed 27 November 2017).

[6] http://www.fao.org/economic/est/statistical-data/en/ (accessed 27 November 2017).

Figure 4: Rice prices



Source: Author's illustration based on data from FAO.

4 Estimation results

Do crop prices affect the decision to migrate? Table 4 presents the results of the estimation analysis. As a first specification, we explore the role of the interaction between coffee production and international coffee prices on the probability of migrating between survey rounds. The analysis of the effect of international crop prices on the likelihood of migrating would capture the extent, if any, of the push or pull factors of migration. The specification presented in Column 1 includes survey-fixed effects and household-fixed effects. We find that on average, individuals coming from households producing coffee are no more likely to migrate (column 1). However, once we interact the variable measuring international coffees price with the indicator that captures coffee-producing households, we find that a rise in international coffee prices decreases the probability of migrating. The coefficient is negative and statistically significant at the 5 per cent level. This result seems to support the hypothesis that an increase in international coffee prices may make coffee production more lucrative and thus reducing the attractiveness of migration. Column 2 introduces individual characteristics to the analysis, *i.e.* age, education, gender, and marital status as well as household-fixed effects. A pattern similar to the one presented earlier emerges: international coffee prices are negatively correlated with the probability of short-run migration. Column 2 allows us also to investigate some of the migrants' characteristics. In line with the migration literature, migrants are more likely to be young, male, and single. We do not find any statistically significant relationship between education and the probability of migrating; we will explore further the impact of crop price on migrants' self-selection in section 5.

Table 4: International coffee prices and migration

VARIABLES	(1)	(2)	(3)	(4)
	Migrant			
Intl. coffee price*Coffee-producing HH	-0.00421**	-0.00458**	-0.00566***	-0.00586***
	(0.00213)	(0.00213)	(0.00207)	(0.00205)
Coffee-producing HH	0.0473	0.0522*	0.0658**	0.0704**
	(0.0292)	(0.0291)	(0.0278)	(0.0276)
Intl coffee price	0.0174**	0.0168**	0.00114	0.000476
	(0.00854)	(0.00858)	(0.00731)	(0.00730)
Age		-0.000509***		
		(7.38e-05)		
Diploma		-0.00384		
		(0.00374)		
Female		-0.00538**		
		(0.00231)		
Married		-0.0417***		
		(0.00350)		
Food consumption pc				4.53e-05***
				(6.82e-06)
Female HH head				-0.00481
				(0.0124)
HH size				-0.00109
				(0.00142)
Savings				0.000185
				(0.00284)
Natural shock				-0.000893
				(0.00338)
Constant	-0.231*	-0.181	0.0112	0.00722
	(0.130)	(0.131)	(0.111)	(0.111)
Observations	33,733	33,639	33,733	33,733
Adjusted R-squared	0.088	0.108	0.005	0.011
Round FE	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	No	No
Individual FE	No	No	Yes	Yes
Number of ind_id			13,272	13,272

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at household level.

Source: Author's calculations based on survey data from VARHS 2012–14.

Although Column 2 introduces the role of observable characteristics in explaining the migration decision, it is plausible to assume that many of the drivers of the migration decision may rely on unobservable individual features. The wealth of data that the VARHS offers allows us to conduct the analysis by including individual fixed effects. Column 3 reports the estimated coefficient of the analysis. Higher prices are negatively correlated with the probability of migrating. Similar estimation results emerge when we include household time varying regressors to the analysis, while still controlling for individual fixed effects (column 4).

The estimation results presented in Table 4 seem to indicate that migration may play a role as a shock-coping mechanism: as international coffee prices decrease, the likelihood of migrating increases.

Next, we conduct an analysis similar to the one of Table 4, but focusing on rice production and international rice prices, rather than coffee. As discussed in section 2, given the intrinsic differences between these two crop products in terms of their exports and domestic consumption, we would not expect rice prices to have any impact on the probability of migrating. This is indeed the result that emerges very strikingly from Table 5: on average rice production does not seem to be correlated to the individual decision to migrate. In line with our assumption, rice prices do not

affect the decision to migrate. This is due to the different nature of the rice production, which is mainly used by households for consumption rather than for sale to the exporting market.

Table 5: International rice prices and migration

VARIABLES	(1)	(2)	(3)	(4)
	Migrant			
Intl. rice price*Rice-producing HH	-0.000100	-0.000315	-0.000213	0.000211
	(0.00129)	(0.00129)	(0.00118)	(0.00117)
Rice-producing HH	0.0101	0.0124	0.00901	0.00509
	(0.0164)	(0.0164)	(0.0152)	(0.0152)
Intl. rice price	0.000616	0.00260	0.0131	0.0111
	(0.0182)	(0.0183)	(0.0165)	(0.0164)
Age		-0.00051***		
		(7.37e-05)		
Diploma		-0.00376		
		(0.00374)		
Female		-0.00536**		
		(0.00231)		
Married		-0.0418***		
		(0.00350)		
Food consumption pc				4.52e-05***
				(6.88e-06)
Female HH head				-0.00461
				(0.0124)
HH size				-0.00128
				(0.00141)
Savings				0.000114
				(0.00281)
Natural shock				-0.000314
				(0.00338)
Constant	0.0170	0.0292	-0.172	-0.157
	(0.269)	(0.270)	(0.245)	(0.243)
Observations	33,733	33,639	33,733	33,733
Adjusted R-squared	0.088	0.108	0.004	0.010
Round FE	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	No	No
Individual FE	No	No	Yes	Yes
Number of ind_id			13,272	13,272

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at household level.

Source: Author's calculations based on survey data from VARHS 2012–16.

The analysis so far highlights that the two crops are related to the individual decision to migrate in very different ways: a decrease in coffee prices acts as a push factor for migration, as it is shown to be negatively linked with the probability of migrating. On the other hand, we find no relation between rice prices and the probability of migrating.

Table 4 and 5 present the results of the analysis using the international measures of coffee and rice prices. As mentioned in Section 2, we also measure crop prices using the information provided by the VARHS on the price received by households for each crop. We average the reported price at district level for each survey round.[7] This measure more accurately captures the actual price received by farmers for their crops. The estimation results based on this measure are reported in Table 6. A similar pattern emerges also when we consider the reported prices: a decrease in coffee

[7] Crop prices are expressed in natural logarithm. Due to the presence of outliers, we drop the top 1% of the average crop price at district level.

prices acts as a push factor for migration, while no similar pattern arises when we consider rice prices. These results are robust to the inclusion of individual fixed effects and the addition of time-varying household characteristics (column 2 and 4).

Table 6: Crop prices and migration

VARIABLES	(1) Migrant	(2) Migrant	(3) Migrant	(4) Migrant
Coffee Price*Coffee-producing HH	-0.02094*	-0.02110*		
	(0.01107)	(0.01131)		
Coffee-producing HH	0.05946*	0.06191*		
	(0.03564)	(0.03639)		
Coffee price	-0.00669	-0.00613		
	(0.00626)	(0.00628)		
Rice Price*Rice-producing HH			0.00646	0.00662
			(0.00569)	(0.00555)
Rice-producing HH			-0.00167	-0.00110
			(0.00776)	(0.00765)
Rice price			-0.00330	-0.00170
			(0.00474)	(0.00463)
Constant	0.03049***	0.01682*	0.02510***	0.00846
	(0.00318)	(0.00932)	(0.00652)	(0.01040)
Observations	33,419	33,419	33,444	33,444
Number of ind_id	13,260	13,260	13,266	13,266
Adjusted R-squared	0.00457	0.01040	0.00444	0.01022
Round FE	Yes	Yes	Yes	Yes
Household controls	No	Yes	No	Yes
Individual FE	Yes	Yes	Yes	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at household level.

Source: Author's calculations based on survey data from VARHS 2012–16.

In a recent paper on Indian indentured servitude, Persaud (2017) analyses the role of volatility in crop prices as a proxy for income uncertainty, and finds evidence of crop price volatility as a potential push-factor driving migration. Higher uncertainty in crop prices could decrease the marginal profits of small landowners, who may then decide to migrate. We would then expect that higher volatility increases the incentives for affected workers and landholders to migrate. Table 7 presents the estimation results of equation 2. The results presented in Table 7 confirm this assumption: coffee price volatility increases the likelihood of migration for individuals in coffee-producing households. An increase in coffee price volatility is associated with an increase in the likelihood of individuals coming from coffee-producing households to migrate. This result holds when we control for individual fixed effects (column 1) and individual fixed effects and household regressors (column 2). We conduct a similar exercise for rice – our assumption would be that rice can be consumed by the household, fluctuations in rice prices would not affect the individual probability of migrating. Indeed, we find no effect of rice price volatility on the probability of migrating.

Table 7: Crop price volatility and migration

VARIABLES	(1)	(2)	(3)	(4)
	Migrant			
Coffee-producing HH*Price Vol	0.00108**	0.00102**		
	(0.00044)	(0.00042)		
Coffee-producing HH	-0.01105	-0.00920		
	(0.01948)	(0.01891)		
Coffee price volatility	-0.00058	-0.00050		
	(0.00036)	(0.00035)		
Rice-producing HH*Price Vol			-0.00003	-0.00004
			(0.00023)	(0.00024)
Rice-producing HH			0.00690	0.00806
			(0.00675)	(0.00663)
Rice price volatility			0.00009	0.00005
			(0.00020)	(0.00022)
Constant	0.02928***	0.01384	0.02327***	0.00690
	(0.00256)	(0.01023)	(0.00515)	(0.01110)
Observations	29,245	29,245	29,132	29,132
Number of ind_id	12,954	12,954	12,920	12,920
Adjusted R-squared	0.00476	0.01097	0.00423	0.01045
Round FE	Yes	Yes	Yes	Yes
Household Controls	No	Yes	No	Yes
Individual FE	Yes	Yes	Yes	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at household level.

Source: Author's calculations based on survey data from VARHS 2012–16.

5 Migrants' self-selection

Next, we explore the mechanism at play. In particular, we focus on the role of education in the migration decision. Although we find that education, measured with the indicator of whether the individual has a diploma, is not statistically significant in the analysis presented so far, it is important to understand whether crop price shocks affect the probability of migrating, once interacted with education. Therefore, the scope of the next table is to explore whether we observe differential impact of coffee prices once we interact it with the education level of the individual. The question is whether crop price shocks affect migrants' self-selection. We include in the analysis the interaction between the indicator variable, diploma, which takes the value 1 if the individual has a diploma, and value 0 otherwise, with the crop price interaction term. As before, we distinguish between the two measures of coffee prices.

Column 1 of Table 8 presents the results of the estimation related to coffee using the two measures for coffee price: the international coffee price measure (columns 1 and 2) and the measure based on the reported price value, averaged at district level (column 3 and 4). All the specifications include individual fixed effects. As before, we find that individuals coming from coffee-producing households are more likely to migrate, while coffee prices are negatively related to the likelihood of migrating. This result holds irrespective of the measure of prices used, or the econometric specification, *i.e.* with or without time-varying household controls.

Do we find a differential effect of coffee price volatility depending on the education level? We include a triple interaction term in the specification, based on the interaction between coffee prices, coffee-producing household and the education level of the individual measured by the *diploma* dummy variable. We find that coffee prices affect the self-selection of migrants. Coffee prices have a differential impact on individuals: individuals with no diploma experience the push factor

observed in the previous tables. As coffee prices decrease, individuals with no diploma become more likely to migrate away. The results appear different for those with a diploma. When using the international coffee price measure, a drop in coffee prices has no overall impact on individuals with a diploma (the p-values of the marginal effects are reported in the bottom panel of Table 8). These results suggest that coffee price drops may affect migrants' self-selection by acting as push factor or shock-coping strategy for individuals with lower education levels. We interpret this result as showing that the increase in risk associated with negative coffee price shocks is smoothed out for individuals with higher education. The results are confirmed when we include household time-varying control variables, as specified in equation 1.

Table 8: Coffee prices and migrants' self-selection

VARIABLES	(1)	(2)	(3)	(4)
	Migrant			
Intl. coffee price	-0.0014	-0.0019		
	(0.0064)	(0.0065)		
Intl. coffee price*Coffee-producing HH	-0.006***	-0.007***		
	(0.0020)	(0.0020)		
Intl. coffee price*Coffee-producing HH*Diploma	0.0101**	0.0105**		
	(0.0042)	(0.0042)		
Intl. coffee price*Diploma	0.0072***	0.0067***		
	(0.0013)	(0.0013)		
Coffee-producing HH*Diploma	-0.1191*	-0.1264*	-0.0544	-0.0537
	(0.0660)	(0.0661)	(0.0538)	(0.0540)
Diploma	-0.105***	-0.099***	-0.0108*	-0.0109*
	(0.0189)	(0.0188)	(0.0059)	(0.0059)
Coffee-producing HH	0.0738***	0.0805***	0.0858***	0.0879***
	(0.0258)	(0.0258)	(0.0319)	(0.0323)
Coffee Price*Coffee-producing HH			-0.031***	-0.031***
			(0.0102)	(0.0104)
Coffee price*Coffee-producing HH*Diploma			0.0032*	0.0032
			(0.0019)	(0.0019)
Coffee price*Diploma			-0.0007	-0.0008
			(0.0010)	(0.0010)
Coffee price			-0.0057	-0.0051
			(0.0060)	(0.0060)
Constant	0.0489	0.0409	0.0341***	0.0208**
	(0.0981)	(0.0990)	(0.0038)	(0.0087)
Marginal effects (p-value) Coffee price*Coffee-producing HH+ Coffee price *Coffee-producing HH*Diploma=0	*0.3389*	*0.3272*	*0.0029*	*0.0033*
Observations	33,645	33,645	33,331	33,331
Number of ind_id	13,266	13,266	13,254	13,254
Adjusted R-squared	0.0070	0.0127	0.0049	0.0107
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Household controls	No	Yes	No	Yes

Note: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors are clustered at household level.

Source: Author's calculations based on survey data from VARHS 2012–16.

We repeat the same exercise using the coffee price measure averages at district level, as reported in the VARHS data. Again, individuals with no diploma are found to be more affected by coffee price shocks with respect to individuals with a higher education level.

6 Conclusions

Viet Nam has experienced a rapid surge in internal migration over the past two decades. Although the pace of this process has decreased, migration is still a major phenomenon, involving millions of people in Viet Nam. This paper contributes to the literature by providing evidence on the effect of crop prices, in particular rice and coffee, on the individual decision to migrate. Using the VARHS data, this paper is able to track individuals in their migration decision over the period 2012 to 2016. Due to the intrinsic differences between the two crops, we provide evidence that drops in coffee prices act as a push factor for internal migration. No evidence is found in relation to rice, which is mainly produced for household consumption. We further explore the extent, if any, of migrants' self-selection. We provide evidence that coffee price shocks mainly affect the likelihood of migrating of individuals with lower education levels. The evidence seems to suggest that the effect of lower coffee prices is smoothed out for individuals with higher education levels. This evidence is of utmost relevance in terms of policies aiming to support ethnic minorities and individuals from the lower end of the income distribution in facing economic shocks, such as crop price shocks.

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