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Asian Growth Research Institute and Osaka University

Working Paper Series Vol. 2018-10

November 2018

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Temporary migrants and gender housework division among left-behind household members

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Acknowledgements

We gratefully acknowledge financial support from the Japan Society for the Promotion of Science (JSPS) KAKENHI, grant number 18K12784; and a project grant from the Asian Growth Research Institute.

Abstract: We examine whether Vietnamese migrant workers induce different gender roles in housework division among their left-behind household members. Using two waves of Vietnamese Household Living Standard Surveys (2006-2008), we apply the first-difference method and deploy a simple household fixed effects model with instrumental variables for robustness check. We find temporary female migrants are associated with a higher probability of undertaking housework by left-behind male members and there is a reduction in the gender gap of time spent on chores. However, we find little evidence for a similar reduction in the gender gap where household size is altered for other reasons.

Keywords: Gender, Housework, Housework division, Migration, Vietnam

JEL Classification Codes: J16, D13, O15

1. Introduction

Between the years 2000 and 2010, structural changes and free trade created probably the greatest job opportunities for Vietnamese people far away from their hometowns. The proportion of workers in agriculture, aquaculture, and forestry among total salary workers decreased from about 9% in 2002 to (less than) 3% in 2006 (2010)¹ (Vu and Yamada 2018). The bilateral trade agreement with the US effective in 2002 and especially access to the World Trade Organization (WTO) in early 2007 boosted growth in the Vietnamese private sector. Vu and Yamada (2018) report that the private sector, including foreign-owned enterprises (FOEs), surpassed state-owned enterprises (SOEs) in terms of employment by 2005. As wages increase, Vietnamese people have incentive to leave their hometown to find jobs in other provinces and large cities. In our calculation using Vietnamese Household Living Standard Survey (VHLSS) 2008, 10.88% of households report at least one member migrating for work, among which 50.66% have at least one female migrant.

Meanwhile, we observe evidence for gains in gender equality in Vietnam in certain aspects. Vu and Yamada (2018) find Vietnamese women gain some gender equality in wage, thanks to increasing education attainments and higher participation rates in some industries. In particular, FOEs in Vietnam have a higher growth rate of female workers than of male workers (Vu and Yamada 2018). Thus, the “price,” or bargaining power, of female workers may also have changed in their households. Still, using VHLSS 2008, Vu (2017) finds a persistent gender gap in housework division between husbands and wives regardless of their economic leverage. In contrast, despite the son preference common in Vietnam (Vu 2014b), Vu (2014a) shows that a gender gap in housework division between sons and daughters does not

¹ The calculation of Vu and Yamada (2018) is based on a selection of individuals who did only one job in a year but excluded students, state-employees, self-employed, and working for other households.

emerge immediately when Vietnamese children first start doing their chores. These findings call for a thorough investigation into intra-household gender equality.

Our study examines the gender gap in housework division among left-behind family members in the absence of temporary migrants, using Vietnamese rotating household surveys between 2006 and 2008. To the best of our knowledge, our study would be the first to examine this gender gap. We extend existing literature with three questions: First, we ask whether the average gender gap in housework division among existing members would be altered after a decrease/increase in the household size. Second, we ask whether female and male migrants have different effects on this gender gap. Third, we ask whether temporary migration and traditional reasons for household size changes produce different results in this gender gap.

More specifically, we use individual fixed effects with robust household clustered variance and regress linear probability of hour of undertaking housework on reasons for the household size change. We create interaction terms between these reasons and the gender of the individual to examine the gender gap on the housework division. We also deploy a simple robustness check using a household fixed effects model with two instrumental variables, the number of migrants in the district of the household and the number of foreign affiliated firms located in the province. We find the gender gap in housework division varies inversely with households having temporary female migrants. Left-behind males increase their involvement in housework and spend more time on it. However, we find little evidence for a reduction in this gender gap arising from other reasons for household size changes. We propose several possible explanations for the statistical results.

Our paper is organized as follows: Section 2 reviews the related literature. Section 3 explains the data and our sample selection strategy, and Section 4 covers our econometric methods and specifications. We report the results in Section 5 and discuss the results and conclude in Section 6.

2. Related literature

Rich literature has investigated the bargaining power and the division of time on housework between husband and wife. Two famous models in economics to explain the division of time are intra-household bargaining power (Becker 1981; Hersch and Stratton 1994) and the collective model (Browning and Chiappori 1998; Browning et al. 2014)². However, the two models are not always able to explain for a persistent gender gap. Alvarez and Miles (2013) find the majority of the gender gap among Spanish dual-earner couples can be explained by gender-specific factors instead of their observable characteristics. In Vietnam, even where the husband has lower education/income than his wife, the gender gap on chores is persistently significant (Vu 2017). Moreover, in developing countries where household size is commonly larger than 2 and various in composition, the average gender gap on chores among household members is less likely to be explained at all.

² See Foster and Stratton (2018) (and Vu 2017) for further literature review on the division on housework among couples including sociologists' theory.

Besides, substantial existing literature examines left-behind members in the household with migrant workers. Left-behind members can be children and/or parents of the migrants. Outcomes are education, consumption, time-use, and health of the left-behind members.

In the short run, however, left-behind members suffer negative outcomes (Gibson et al. 2011). Antman (2011b) suggests that financial hardship during the father's migration (to the U.S.) decreases study hours and increases work hours among Mexican children. The effect is the most significant for boys aged 12-15. Studies using Chinese household data find similar stories. Parental migration has a negative effect also on children's school enrollment (Wang 2014), cognitive achievement (Zhang et al. 2014), and height and weight, particularly among young children and where both parents migrated (Lei et al. 2017).

However, the consequences might not be the same in all countries. Gibson et al. (2011) do not find significant effects on the probability of studying, literacy, and health measures among left-behind Tongan children, likely due to country-specific factors, such as a high human development index. Similarly, the consequences also depend on whether the mother or the father migrates (Rizzica 2018). Rizzica (2018) finds either remittances or the reallocated consumption from a migrating Indonesian mother would maintain the same household expenditure for her children. In contrast, Cortes (2015) shows children of a migrating Philippina mother lagged behind in school even after accounting for remittance.

Impacts can, however, be positive in the long run because remittances can offset the negative impact on left-behind members. Antman (2012) indicates a Mexican father's migration to the U.S. during his daughter's early life correlates with an additional year of schooling for her. Antman (2012) also argues that migrant remittances compensate the daughter in the long term. Antman (2011a) suggests an additional insight about how the remittance works: The left-behind wife controls the household expenditure and gains more power in allocating household resources. Antman (2011a), Duflo (2003), and Thomas (1994) suggest the gain is associated with benefits for girls rather than for boys.

Meanwhile, studies on time-use, especially on chores among left-behind members, to the best of our knowledge, are rather limited in number compared with studies on education. All find an increase in domestic work (unpaid housework) among left-behind members. Mendola and Carletto (2012) show international migration by family members reduces a female's paid work but increases her unpaid work in Albania. Meanwhile, Mu and Van de Walle (2011) show left-behind Chinese women do more farm work. Similarly, left-behind Chinese elderly and children do more both farm work and domestic work (Chang et al. 2011).

We note here that previous studies often consider locations where male migrants are dominant compared to female migrants; therefore, the left-behind member making household expense decisions is more likely to be female. As the result, her bargaining power increases because of missing "important" male member at home. Upon the return of the male migrant, he takes over the decisions and sets back the previous condition, as Antman (2011) suggests. Thus, the gain in female bargaining power may be temporary. In contrast, we are interested in investigating whether this gain is more stable where migration occurs with less gender-specific selection – Vietnam.

3. Data

We analyze data from two waves (2006 and 2008) of the Vietnam Household Living Standard Survey (VHLSS), whose design is the same as the Living Measurement Survey Study of the World Bank. The General Statistics Office of Vietnam (GSO) conducted this country-representative survey based on a master sample every two years. The master sample is based on two-stage stratified sampling³ and consisted of 3,063 communes/wards. All enumeration areas (EA) in the two VHLSSs are randomly selected from EAs of Vietnam Population and Housing Census 1999.

The nature of the VHLSS is a rotating basis. Its subset samples (for different statistical purposes) are also country representative. Fifty percent of EAs in each commune/ward are designed to have all their households re-surveyed in the following wave. The re-used EAs should not have been used in the preceding wave. Since EAs are randomly chosen, the old fifty percent and the new fifty percent would be also country representative⁴. We take subset samples dedicated for Household Income and Expenditure⁵ questionnaires in both 2006 and 2008. There are 9,189 such households in both VHLSS 2006 and 2008.

VHLSS 2006 and 2008 required information from each household member. The key information for this study is from Question 26 and 27 in Section 4A of VHLSS 2006 and 2008⁶. The former question asked whether the individual (age>5) did any housework. If the answer is yes, the latter question asked how many hours on average the individual worked per day in the 12 months prior to the survey. GSO defined housework as “cleaning, shopping, cooking, washing clothes, fetching water and wood, and repairing tools” in both waves.

VHLSS 2008 (Section C) collected information on individuals who were living away from the household to work for (at least) 6 months in last 12 months prior to the survey. GSO indicated that these people might return to the household in the future. Therefore, we define those people as temporary migrants (TM). We find Vietnamese TMs are a young generation⁷ since 86.8% of them are children of the household heads. 10.7% TMs are international migrants while the rest are internal migrants (9.1% to other districts of the same province, 7.8% to Hanoi, 37.2% to Ho Chi Minh city, and 35.2% to other provinces). If the destinations are other provinces (abroad), the number of male TMs almost doubles that of female

³ GSO selected communes first, then enumeration area. It is stratified on province and urban/rural areas, proportional to the square root of the number of households (See detailed explanation at microdata.worldbank.org/index.php/catalog/2306/download/34486)

⁴ We also do a simple check by comparing some key information such as age, gender, province, urban/rural, probability of doing housework, hours spent on housework using Kolmogorov-Smirnov equality-of-distributions test between individuals in my identified-repeated households and the initial 9,189-household sample (2006 and 2008). The test results do not show a statistically significant difference between the two.

⁵ The information on housework is on the questionnaires.

⁶ The two questions were no longer included in VHLSS 2010-2016.

⁷ 90% of them < 35 years of age, 75% < 29 years of age, and 50% < 25 years of age.

TMs. For other destinations, the number is almost the same between male and female TMs. Besides, 48.9% TMs migrated alone while 30.1% (15.4%) among households with TM(s) had two (three) TMs.

The two waves also have information about new household members (compared with 2006) including newborns, people moving in for marriage, etc. GSO also collected information on household members who are not TMs but have moved out of the household. GSO specified cases such as household split (to set up new household): moving to another household for marriage, deceased, and leaving the household for studying.

In VHLSS 2008, GSO recorded the household identity coded in VHLSS 2006 in Section 1D and provided reasons why those people surveyed in 2006 are not in the household⁸. GSO recorded the individual identity used in VHLSS 2006 in the data 2008 and even kept a record in the VHLSS 2008 for checking the consistency of the individual/household to avoid input errors. We can therefore identify households with its members who were picked up twice by the GSO⁹. In addition, we also re-check the consistency among GSO-matched households by using the gender, year, and month of birth of the individual in addition to GSO household and individual identities. We omit households with missing and/or unverified information. We are able to identify who appears in both waves, and who are newborns (age<2), newcomers, temporary migrants, and gone members (other than temporary migrants) in 2008.

We omit all individuals that moved in and out of the household after 2006, including temporary migrants in 2008, and mark the corresponding households with a set of dummies as in Table 1, so our selected sample of individuals are a balanced “panel.” Furthermore, we remove children aged < 6 in 2008 and their corresponding information in 2006 because they were not asked about housework, but we do put a dummy for those families having children in this age cohort (between 2 and 5). Finally, we have 3,484 households (with 11,578 individuals¹⁰, which we define as “left-behind household members”) as seen in Table 1. Among 379 households with TMs, 192 households (about 50%) have female TMs.

[Insert Table 1 here]

⁸ In the raw VHLSS 2008, among GSO-recorded individuals, about 10.3% is due to “deceased” and 77% is due to moving to other household or household split (among which, 26% for marriage, 37.6% for household split, and 24.3% for working). However, we note that GSO did not completely cover all individuals of households surveyed in 2006 in VHLSS 2008 in the Section 1D. To the best of our knowledge, the records are about one third of total cases. Therefore, we assume composition of reasons for gone members (as our definition) in the selected sample is similar to the GSO-recorded sample.

⁹ GSO recorded 0.15% of individuals among households surveyed in 2006 was not able to be identified in 2006. GSO identified 3,926 households in both 2006 and 2008.

¹⁰ Besides, we find some members who appeared in 2008 but were not asked in 2006 and not marked with the reasons to appear in 2008 survey. This might be because GSO asked for the reasons that individuals stayed less than 6 months in last 12 months prior the time of survey. We put them also as newcomers.

The VHLSS 2006 and 2008 also contain rich information on paid work including working hours, ownership of the employers, illness and absent days (when the individual cannot do routine work), and household appliances. We use the information of appliances purchased only during 2007-2008¹¹.

We compare stable household members (left-behind members) among two groups – households without TMs and households with TMs – with the detailed descriptive statistics as in Appendix 1. We acknowledge that the real monthly per capita income and age composition are statistically significant between the two groups in the baseline 2006 and will discuss this in a later section.

In addition, we compare the case of households without any TMs and households with female TMs in Table 2.

[Insert Table 2 here]

We note the difference is minor between the two groups in the baseline 2006 in terms of the probability to do housework and of hours spent on housework. Even when dividing male and female left-behind members, we find the differences are statistically insignificant in both the baseline mean and distribution of the two outcomes. As seen in Table 2, t tests and Kolmogorov-Smirnov tests for the equality of mean and distribution among the two groups support our arguments. However, in 2008, left-behind male members among household with female TMs in 2008 have a higher probability to undertake housework and spent more time on housework.

4. Econometric methods and specifications

4.1 Individual fixed effects with robust household clustered variance and its specifications

We use individual fixed effects and robust household clustered variance to estimate an association between changes in the number of hours per day and the probability of doing housework and a set of independent variables among left-behind members in both 2006 and 2008.

More specifically, linear probability of doing housework ($Prob(do)_{ijt}$) and similarly hours doing housework ($Hour_{ijt}$) of an individual i in family j can be specified in reduced form equations as

$$Prob(do)_{ijt} = \beta_1 X_{ijt} + \alpha_1 X_{ij} + \gamma_1 household_{jt} + \mu_1 household_j + \varepsilon_{ijt}, \quad (1)$$

$$Hour_{ijt} = \beta_2 X_{ijt} + \alpha_2 X_{ij} + \gamma_2 household_{jt} + \mu_2 household_j + \varepsilon_{ijt}, \quad (2)$$

where X_{ijt} (X_{ij}) and $household_{jt}$ ($household_j$) are vectors of time-variant (time-invariant) characteristics belonging to the individual and his/her household, correspondingly.

We consider the changes during 2006-2008 in the individual fixed effect model

$$\Delta Prob(do)_{ijt} = \beta_1 \Delta X_{ijt} + \gamma_1 \Delta household_{jt} + \Delta \varepsilon_{ijt}, \quad (3)$$

¹¹ Correlations among new household appliance variables are not an issue (<0.11). Perhaps, households have difficulty affording several new appliances at the same time.

$$\Delta Hour_{ijt} = \beta_2 \Delta X_{ijt} + \gamma_2 \Delta household_{jt} + \Delta \epsilon_{ijt}, \quad (4).$$

Decisions to send a member out for work are endogenous. The individual fixed effect will remove time-invariant factors (both observable and unobservable), including some influenced by the TM's decision to migrate. However, we acknowledge that some time-variant factors might remain, which requires at least some instrumental variables (IV) to lessen the issue. We propose additional models with IV later in this section for robustness-checking purpose.

Besides, we add a set of interaction terms between the gender of the individual ($gender_{ij} = 1$ if female, 0 if male) and the changes in the household occurring during 2006-2008.

$$\Delta Prob(do)_{ijt} = \beta_1 \Delta X_{ijt} + \gamma_1 \Delta household_{jt} + \vartheta_1 gender_{ij} \times \Delta household_{jt} + \Delta \epsilon_{ijt}, \quad (5)$$

$$\Delta Hour_{ijt} = \beta_2 \Delta X_{ijt} + \gamma_2 \Delta household_{jt} + \vartheta_2 gender_{ij} \times \Delta household_{jt} + \Delta \epsilon_{ijt}, \quad (6).$$

The interaction terms indicate average differences between female and male left-behind members corresponding to the change in the household during 2006-2008. It shows changes in hours doing housework and the probability of doing housework by female compared with male members. For example, if $\vartheta_2 < 0$, the female left-behind member does less housework compared with the male left-behind member.

As seen in Table 1, X_{ijt} provides information on serious illness and other reasons leading to individual's absence in routine work (including housework). X_{ijt} also covers ownership types of individuals' employers. During 2006-2008, Vu and Yamada (2018) show the rise of private sector over public sector in employment. They also indicate work hours in a year are increasing in the private sector. Therefore, we predict that changes in the ownership of their employers (possibility of moving to a new job) would change the individual's available time spent on things other than working, including time on housework. The changes might also alter time allocation settings in the family. Therefore, we add an interaction term between ownership of employers and gender of the individual to estimate how the gender division of housework has changed. We include number of hours of paid work in last 12 months prior to the survey as another control variable.

The variable $household_{jt}$ contains information on the household with possibility of change in 2006-2008. For example, whether the household has TMs for work, new-born members, children age < 6, newcomers (due to marriage/merging household), gone members (due to decease, studying far way, setting up new households and other reasons), and information for each new home appliance the household purchased during 2007-2008 (including freezer, washing machine, gas cooker, rice cooker, vacuum cleaner, microwave oven, water pump, power generation and sewing machine). Vu (2017) reports the electrification rate in Vietnam was almost 98% by 2008. Therefore, sample selection bias (home appliances are purchased conditional to the availability of housing space and electrification) could be assumed to be minor.

4.2 Gender gap estimation using household fixed effects with instrumental variables

We use instrumental variables to deal with the endogeneity of female migrants. However, this is just for robustness check of our previous estimations.

We calculate an outcome as an average gender gap in hours spent on housework per person in each household. This gender gap is among left-behind members only. The outcome (*Gender gap_{jt}*) is formed from the total hours spent by female left-behind members on housework minus the corresponding time spent by male left-behind members, then divided into total number of left-behind members. The independent variable includes a dummy whether the household has a female migrant (*Female migrant_{jt}*).

$$Gender\ gap_{jt} = \omega_1 Female\ migrant_{jt} + \zeta_{jt}, \quad (7).$$

Following suggestions by Atman (2011), Chang et al. (2011), and Mendola and Carletto (2012), we deploy two IVs. *Migration in the district_{jt}* is the average number of migrants in the district where the household is located (calculated from the VHLSS). We use *Total number of foreign affiliated firms_{jt}* located in the province of the household but lagged for a year prior the survey. This information is similar to the calculation from Vu and Yamada (2017b), using the data of Vietnamese Enterprise Survey (VES) 2005 and 2007. We count firms having more than 9 employees.

5. Results

5.1 Gender of temporary migrants and gender housework division among left-behind members

In general, a temporary migrant is associated with a reduction in time spent on housework among left-behind household members. This is 15 minutes or about 25% lower.

However, whether migration is a burden/loss in terms of housework for left-behind members depends on gender of the TM. Interestingly, where TM is female, the gender-specific re-allocation of time shows a compensation from left-behind male members. The interaction term (Female TM × Gender), as seen in Column 7 of Table 3, shows that left-behind male members become more likely to do housework. In terms of time, the gender gap is improved by about 17.5 minutes for the left-behind women, as in Column 8 of Table 3. We have strong evidences as shown in Table 2 that left-behind male members, rather than left-behind female members, altered their behaviors.

[Insert Table 3 here]

Whether TMs can influence the left-behind members by remittance should be considered. One of possible mechanisms is that the family uses received remittances to buy home appliances. We check the correlation between appearance of newly purchased appliances and the event of temporary migration, but the correlations are apparently low (-0.025 to 0.06). In addition, we also consider whether net remittance by TMs might help households to buy new appliances. However, the net remittance (remittance received by the household minus from-the-household-to-temporary-migrant money) were less likely positive. About two thirds of TMs have negative or zero net remittances. The mean net remittance is about VND 2 million (USD 123) per year while the average price at the time of purchase (for all appliances) was approximately VND 860,000 (the survey has information on the price of each item at the time of purchase). Even correlations between gross remittance and newly purchased appliances are low (<0.043). TMs

probably have just left home, so they might not have enough income or savings to offset the initial cost from their families.

Certainly, the household may have used the gross remittance for purposes other than buying new appliances with a female TM involved in the decision of her left-behind family. By raising female bargaining power in her family, a female TM can indirectly/directly influence the housework division among left-behind members. The results of a small-scaled survey (600 migrants to Hanoi in 2010) by Tran (2011) supports this argument. Tran (2011) found 82% of migrants' left-behind families used up all or part of the remittance for daily expense purposes, while 52% spent on buying furniture. Other purposes of spending the remittance had even lower percentages (wedding, funeral: 51.1%; education: 41.9%; constructing and repairing houses: 26%; paying debts: 24.5%). Besides, Tran (2011) also found that rather than use postal or banking services, migrants were more likely to bring remittances in person when they came home¹². Indeed, Tran (2011) recorded that female migrants participated as much as male migrants in decisions about how remittances should be spent.

Another possible mechanism is that the perception of female "price" might have changed. This is because a female TM can generate a higher economic value than she could when she was in the household. However, we acknowledge that limited information in the household data on how remittances were used prevent us from further extrapolation.

Furthermore, we note that the majority of migrants (86.8%) are children of the household head, so it is less likely that the one who controlled and decided household expenditure has changed. Therefore, the gain in gender equality in this specific context may last longer than the case where male migrants are dominant.

5.2 Temporary migrants and other reasons of household size changes

In this part, we compare other reasons for household size changes, including gone members, newcomers, and newborn children (<2 years old).

In contrast with the case of TMs, if some members have left the household for other reasons, the remaining members have to spend approximately 20 minutes more on housework (as seen in Column 4 of Table 3) with little evidence for a gain in equality in gender housework division. First, the difference in housework hours among left-behind members between the case of female and the case of male gone member is statistically insignificant (column 5 and 6 of Table 3). The same is true for the probability of doing housework. Second, gender housework division shows different results. Left-behind male members do not compensate. Instead, left-behind female members are more likely to do the housework (see the interaction term between Female gone-member \times Gender in column 7 of Table 3).

As mentioned in footnote 8, the majority of cases other than TMs are marriage and split-household, which does not link to direct economic gains or losses. Thus, intra-household bargaining power does not

¹² If this is true nationwide, the recorded remittances from VHLSS might have been underestimated.

alter. As the result, intra-household rule for gender specific housework division would stay the same. This agrees with the persistent gender gap found by Vu (2017). Remaining female members are more likely to take up the chores left-behind by female gone members.

Also, if household has newcomers, we find a decrease by about 7.4 minutes of housework (13.4 %) (see corresponding coefficients at column 4 of Table 3) among any existing members in the family. However, the gender gap might not have any connection with the gender of the newcomers. Existing female members enjoy 12.8 minutes less of housework if the newcomer is female. However, we argue that this reduction would not be due to an increase in time or involvement from existing male members. Instead, that could be thanks to the new female members. The basis for our conjecture is as follows: About 20% “gone member” is for marriage. As seen in Table 1, 73% (0.247/0.339) of newcomers are female. Therefore, the newcomers are very likely new brides. When a new bride comes, she might play her gender role and do gender-specific housework. As the result, the burden of housework on existing members, especially females, reduces.

We also have different results and interpretations in the cases of newborns in 2007-2008 and of children aged 2-5. In both two cases, we find increased work for female members. Having a newborn is associated with a higher probability of doing housework among existing female members (see column 7 of Table 3). Perhaps maternal leave plus the burden of caring for the newborn fall on the mother. She might have more time to be at home and more reasons to participate in housework related to her child, which is one possible explanation. Additionally, having a child aged 2-5 is associated with more time on housework for existing female members but does not necessarily need more involvement of all members¹³.

5.3 Other results and simple robustness check

As mentioned, the period 2006-2008 also witnessed job movements as the private sector rocketed and structural changes took place. If individuals are newly employed by the private sector, they are less likely to do housework. Their time on housework is reduced. Especially if they are female, they are released significantly from their housework burden (see column 7 and 8 of Table 3).

Interestingly, individuals do not alter their housework if they are newly employed by SOEs. Perhaps the work schedule in SOEs is limited to 40 hours per week. Vu and Yamada (2017a) report the mean total work hours during 2002-2014 of non-SOE employees is more than 40 hours per week and increasing, while that of SOE employees is closer to the standard 40 hours per week and stable. This statistical point would support our conjecture. Another possibility is that time spent in SOEs may not be well monitored, so SOE employees might have more free time compared with non-SOE employees.

The result of using household fixed effects with IVs and robust household clustered variance confirms previous results obtained by using individual fixed effects (see Table 4). We divide these into 2 cases: A) comparing between households with female TMs and households without any TMs (column 2 and 3); and B) comparing between households with female TMs and households without female TMs

¹³ The definition of housework in the survey does not include childcare.

(column 4 and 5). The results are statistically robust in both cases and confirm our previous corresponding estimations.

[Insert Table 4 here]

6. Conclusion and Discussion

In this study, we examine whether temporary migrant household members might cause a shortage of labor for domestic work and induce different gender roles in housework division among left-behind members. We use VHLSS 2006-2008 and individual fixed effects to remove time-invariant observable and unobservable factors. We also deploy a simple household fixed effects model with two instrumental variables to perform the robustness check. We find the gender gap on chores shrinks in the case of female TMs, thanks to more efforts of left-behind male members. However, we have little evidence for similar conclusions in the gender gap due to other reasons for household size changes. Except in the case of TMs, existing male members would not alter their behavior on housework.

Moreover, our results have some policy implications. The gain in gender equality among left-behind members implies that involvement in paid work of females will also raise the “value” of other women in the family. Men, who decided to stay, would involve themselves more in housework. With more paid jobs for women, intra-household gender equality would increase naturally, and the social norm that only women should do housework would change gradually. Thus, policies that facilitate women with paid work would reduce the intra-household gender gap in housework division. Besides, the unchanged time spent on chores among females who have become SOE employees suggests a gap in time-use control between SOEs and other firm ownerships.

Finally, we acknowledge several drawbacks of this study. First, as suggested by Gibson et al. (2011), our study has the potential issue of double sample selection bias (households self-selected to migration and gender selection among migrants). For the first selection bias, we acknowledge a complication in the difference between households with and without TMs, and differences in average monthly per capita incomes in the baseline 2006 are significant (see Table 2)¹⁴. We also have more than one endogenous variable. Our robustness check specification using IVs is just valid for the simplest case, and finding enough IVs for all cases is a luxury. Even if we are lucky to have enough, the issue of time-variant omitted variable bias is just lessened rather than eliminated. Second, we have not yet obtained a sufficient measure to deal with censoring data on number hours on housework. Third, we are unable to have post-migration data to examine whether the gain in gender equality might be reset.

Nevertheless, we still have two reasons to secure our results. First, we test for mean difference in housework hour undertaken by the two groups (and by gender separately) in the baseline 2006 as seen in Table 2. The lowest p-value for H_0 : difference = 0 is 0.201. Thus, the difference between the two groups on housework hours cannot be rejected from being the same in the baseline 2006. In addition, two-sample

¹⁴ Prior to migration, the households with TMs have lower average income but larger household size compared with households without TMs in 2006.

Kolmogorov-Smirnov tests further strengthened that the two outcomes in two groups in the baseline are equally distributed, as in Table 2. This may suggest that the decision on migration does not alter the time allocation on housework per person (or by gender) at the baseline (prior the event of migration), despite significant differences in income and household size. Second, the other selection bias may not be serious. 50.66% (192/379) of households with TMs have at least a female TM. Similar tests show the difference in gender composition among the two groups: households with female TMs and households without TMs in the baseline in 2006 is not strongly rejected (as shown in Table 2, the p-value is 0.098). Thus, we leave all remaining drawbacks for our future agenda.

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Appendix 1. Mean comparison between left-behind members in households without (1) and with (2) temporary migrants in 2008

Variable	2006		2008			
	(1)	(2)	(1) – (2)	(1)	(2)	(1) – (2)
			P-value			P-value
<i>Among left-behind members</i>						
Number of consistent remaining members in 2006 and 2008	10,497	1,081		10,497	1,081	
Number of households	3,105	379		3,105	379	
Doing housework (1=yes, 0 otherwise)	0.671	0.726	0.000	0.682	0.740	0.000
Hour per day for housework	1.254	1.287	0.404	0.795	0.798	0.939
Average gender gap in the same household on hour per day for housework	0.831	0.667	0.107	0.592	0.327	0.000
Year of birth	1973.7	1969.9	0.000			
Gender (=1 if female, 0 if male)	0.508	0.503	0.781			
<i>Among left-behind male members</i>						
Number of members	5,168	537		5,168	537	
Doing housework	0.571	0.631	0.000	0.570	0.680	0.000
Hour per day for housework	0.854	0.912	0.175	0.510	0.585	0.040
<i>Among left-behind female members</i>						
Number of members	5,329	544		5,329	544	
Doing housework	0.768	0.819	0.000	0.790	0.800	0.599
Hour per day for housework	1.643	1.656	0.818	1.072	1.009	0.357

Note: (1)-(2) used two-sample t test.

Table 1 Descriptive statistics for left-behind members and their households

Variables	2006		2008	
	Mean	Std. Dev.	Mean	Std. Dev.
<i>Individual information (11,578 individuals)</i>				
Hour per day for housework	1.257	1.212	0.796	1.244
Doing housework (=1 if yes; =0 if otherwise)	0.676	0.468	0.687	0.464
Gender (=1 if female; =0 if male)	0.507	0.500	0.507	0.500
Year of birth	1973.3	19.4	1973.3	19.4
Paid work hour (in 12 months)	982.0	1017.2	1012.8	1012.3
Working for SOE	0.060	0.237	0.061	0.240
Working for FOE	0.008	0.089	0.012	0.110
Working for private firm	0.023	0.149	0.023	0.149
Absent (Days in a year out of routines)	4.278	15.205	4.091	17.320
(Serious) Illness (Days in a year)	1.321	10.296	1.655	14.744
<i>Household information (3,484 households)</i>				
Household size	4.821	1.683	4.194	1.660
With temporary migrant (TM)	0	0	0.109	0.311
With female temporary migrant (female TM)	0	0	0.055	0.228
New born members	0	0	0.078	0.269
Children <6 years old	0.271	0.445	0.194	0.396
New comers in 2008	0	0	0.339	0.473
New female comers in 2008	0	0	0.247	0.431
Gone-member	0.328	0.470	0.000	0.000
Female gone-member	0.229	0.420	0.000	0.000
<i>Newly bought home appliances 2007–2008</i>				
Freezer	0	0	0.062	0.241
Washing machine	0	0	0.024	0.153
Gas cooker	0	0	0.060	0.238
Rice cooker	0	0	0.088	0.283
Vacuum cleaner	0	0	0.003	0.054
Microwave oven	0	0	0.003	0.051
Water pump	0	0	0.030	0.172
Power generation	0	0	0.003	0.051
Sewing machine	0	0	0.004	0.061

Table 2 Comparison between left-behind members in households without (1) and with (2) female temporary migrants in 2008

Variable	2006				2008			
	(1)	(2)	(1)-(2) P-value	KS test	(1)	(2)	(1)-(2) P-value	KS test
<i>Among left-behind members</i>								
Number of consistent remaining members in 2006 and 2008	10,497	576			10,497	576		
Doing housework (1=yes, 0 otherwise)	0.671	0.693	0.281	A	0.682	0.719	0.063	A
Hour per day for housework	1.254	1.231	0.651	A	0.795	0.828	0.538	A
Year of birth	1973.7	1971.2	0.003					
Gender (=1 if female, 0 if male)	0.508	0.472	0.098					
Average gender gap in the same household on hour per day for housework	0.831	0.464	0.007		0.592	0.123	0.000	
<i>Among left-behind male members</i>								
Number of members (*)	5,168	304			5,168	304		
Doing housework	0.571	0.608	0.201	A	0.570	0.668	0.001	R
Hour per day for housework	0.854	0.898	0.435	A	0.510	0.661	0.000	R
<i>Among left-behind female members</i>								
Number of members	5,329	272			5,329	272		
Doing housework	0.768	0.788	0.471	A	0.790	0.776	0.573	A
Hour per day for housework	1.643	1.603	0.627	A	1.072	1.015	0.543	A
<i>Among households</i>								
Number of households	3,105	192			3,105	192		
Household size (**)	4.307	4.703	0.001		4.210	3.927	0.022	
Average real income/person/month (***)	1103.5	859.1	0.004		1329.2	1086.1	0.108	
Freezer	0.213	0.073	0.000		0.298	0.161	0.000	
Washing machine	0.078	0.015	0.001		0.114	0.026	0.000	
Gas cooker	0.362	0.151	0.000		0.450	0.312	0.000	
Rice cooker	0.591	0.479	0.002		0.679	0.708	0.391	
Vacuum cleaner	0.012	0.010	0.882		0.011	0.026	0.051	
Microwave	0.012	0	0.128		0.017	0.021	0.692	
Water pump	0.270	0.193	0.019		0.363	0.318	0.201	
Power generation	0.007	0	0.242		0.008	0	0.200	
Sewing machine	0.060	0.068	0.673		0.056	0.057	0.949	

Notes:

* (1) contains households without any TMs.

** Number of members surveyed by GSO

*** Unit: VND 1,000. CPI in use was from the World Bank Data (link: <http://data.worldbank.org/indicator/FP.CPI.TOTL?end=2015&locations=VN&start=2000>).

The means of “among households” are calculated with all surveyed members. Dummies for home appliances =1 if the household has, =0 if otherwise.

(1)-(2) used two-sample t test.

KS test: Two-sample Kolmogorov-Smirnov test for equality of distribution functions between sample (1) and (2). A is when H0 (the two samples are the same) is not rejected. R is when H0 is rejected.

Table 3 Probability of doing housework and the number of spent hours

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour
<i>Household related variables</i>								
TM	0.0163 (0.0195)	-0.2463*** (0.0474)	-0.0036 (0.0205)	-0.2927*** (0.0522)	-0.0301 (0.0249)	-0.3791*** (0.0742)	-0.0317 (0.0248)	-0.3774*** (0.0741)
Female TM					0.0896* (0.0474)	0.3397*** (0.0995)	0.0933** (0.0475)	0.3004*** (0.0991)
Female TM × Gender					-0.0833* (0.0481)	-0.3630*** (0.1095)	-0.0883* (0.0483)	-0.2920*** (0.1113)
Gone-member	-0.0572*** (0.0133)	0.2423*** (0.0399)	-0.0196 (0.0202)	0.3313*** (0.0561)	-0.0268 (0.0234)	0.3350*** (0.0750)	-0.0272 (0.0234)	0.3308*** (0.0751)
Female gone-member					0.0088 (0.0242)	-0.0115 (0.0781)	-0.0174 (0.0316)	-0.0553 (0.0780)
Female gone-member × Gender							0.0554* (0.0296)	0.1013 (0.0717)
New comers	-0.0500*** (0.0146)	-0.2039*** (0.0434)	-0.0162 (0.0197)	-0.1228** (0.0600)	-0.0079 (0.0248)	-0.1682* (0.0916)	-0.0085 (0.0248)	-0.1672* (0.0921)
Female new comers					-0.0140 (0.0264)	0.0592 (0.0988)	-0.0376 (0.0347)	0.1484 (0.1025)
Female new comers × Gender							0.0538 (0.0332)	-0.2132** (0.0865)

(to be continued)

Table 3 (Cont.)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour
New born members	0.0040 (0.0210)	-0.1909** (0.0786)	0.0324 (0.0231)	-0.1249 (0.0879)	0.0332 (0.0231)	-0.1295 (0.0877)	-0.0043 (0.0332)	-0.1481* (0.0862)
New born members × Gender							0.0770** (0.0364)	0.0356 (0.1197)
Children <6 years old	0.0031 (0.0155)	0.0441 (0.0584)	0.0126 (0.0157)	0.0673 (0.0629)	0.0117 (0.0158)	0.0670 (0.0609)	0.0275 (0.0236)	-0.0108 (0.0608)
Children <6 years old × Gender							-0.0295 (0.0263)	0.1526** (0.0736)
Household size			-0.0283** (0.0113)	-0.0673** (0.0313)	-0.0278** (0.0116)	-0.0666** (0.0306)	-0.0284** (0.0115)	-0.0674** (0.0305)
New freezer	0.0087 (0.0215)	-0.2359*** (0.0615)	0.0108 (0.0216)	-0.2309*** (0.0614)	0.0122 (0.0217)	-0.2310*** (0.0615)	0.0121 (0.0217)	-0.2339*** (0.0614)
New washing machine	-0.0085 (0.0318)	-0.1529* (0.0878)	-0.0054 (0.0316)	-0.1440 (0.0882)	-0.0071 (0.0319)	-0.1449 (0.0893)	-0.0056 (0.0319)	-0.1459 (0.0892)
New gas cooker	-0.0171 (0.0245)	-0.1402** (0.0599)	-0.0182 (0.0244)	-0.1443** (0.0593)	-0.0188 (0.0243)	-0.1445** (0.0597)	-0.0196 (0.0243)	-0.1414** (0.0601)
New rice cooker	0.0011 (0.0188)	-0.2094*** (0.0550)	0.0007 (0.0187)	-0.2095*** (0.0549)	0.0008 (0.0187)	-0.2137*** (0.0547)	0.0009 (0.0187)	-0.2165*** (0.0548)

(to be continued)

Table 3 (Cont.)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour
New vacuum cleaner	0.0074 (0.1294)	0.0248 (0.2525)	0.0019 (0.1314)	0.0206 (0.2597)	-0.0051 (0.1325)	0.0069 (0.2657)	-0.0052 (0.1326)	0.0224 (0.2622)
New microwave oven	0.1887** (0.0886)	0.4740 (0.5279)	0.1881** (0.0882)	0.4320 (0.5179)	0.1891** (0.0875)	0.4267 (0.5178)	0.1887** (0.0875)	0.4448 (0.5295)
New water pump	0.0185 (0.0351)	-0.1726** (0.0771)	0.0197 (0.0351)	-0.1660** (0.0775)	0.0208 (0.0353)	-0.1623** (0.0779)	0.0208 (0.0350)	-0.1656** (0.0781)
New power generation	0.0438 (0.0455)	0.3070 (0.2325)	0.0412 (0.0451)	0.3141 (0.2204)	0.0427 (0.0455)	0.3164 (0.2223)	0.0404 (0.0462)	0.3186 (0.2193)
New sewing machine	-0.0665 (0.1315)	-0.5891 (0.6117)	-0.0606 (0.1357)	-0.5696 (0.6199)	-0.0631 (0.1331)	-0.5607 (0.6315)	-0.0678 (0.1342)	-0.5422 (0.6267)
<i>Individual related variables</i>								
Paid work hour (in 12 months)			0.0000 (0.0000)	-0.0001** (0.0000)	0.0000 (0.0000)	-0.0001** (0.0000)	0.0000 (0.0000)	-0.0001** (0.0000)
Working for SOE	0.0208 (0.0339)	-0.0527 (0.0844)	0.0194 (0.0338)	-0.0052 (0.0869)	0.0199 (0.0337)	-0.0036 (0.0866)	0.0019 (0.0468)	0.0134 (0.0997)
Working for FOE	-0.0504 (0.0464)	-0.3514*** (0.1271)	-0.0571 (0.0470)	-0.2993** (0.1281)	-0.0563 (0.0470)	-0.2984** (0.1281)	0.0171 (0.0803)	-0.0721 (0.1535)
Working for private firm	-0.1173*** (0.0347)	-0.3362*** (0.0886)	-0.1160*** (0.0348)	-0.2882*** (0.0885)	-0.1172*** (0.0348)	-0.2896*** (0.0886)	-0.1062** (0.0452)	-0.0790 (0.0953)

(to be continued)

Table 3 (Cont.)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour	Prob (do)	Hour
Working for SOE × Gender							0.0636 (0.0627)	-0.0480 (0.1969)
Working for FOE × Gender							-0.1212 (0.0977)	-0.4508* (0.2440)
Working for private firm × Gender							-0.0256 (0.0667)	-0.6147*** (0.2076)
Absent	-0.0004 (0.0003)	-0.0004 (0.0007)	-0.0004 (0.0003)	-0.0005 (0.0007)	-0.0004 (0.0003)	-0.0005 (0.0007)	-0.0004 (0.0003)	-0.0006 (0.0007)
Illness	-0.0007** (0.0004)	-0.0006 (0.0006)	-0.0007** (0.0004)	-0.0006 (0.0006)	-0.0007** (0.0004)	-0.0006 (0.0006)	-0.0008** (0.0004)	-0.0006 (0.0006)
Constant	0.7106*** (0.0061)	1.0474*** (0.0198)	0.8341*** (0.0509)	1.4031*** (0.1390)	0.8322*** (0.0519)	1.4021*** (0.1374)	0.8339*** (0.0517)	1.4088*** (0.1371)
Observations	23,156	23,156	23,156	23,156	23,156	23,156	23,156	23,156
R-squared	0.006	0.054	0.007	0.055	0.008	0.057	0.009	0.060
Number of individuals	11,578	11,578	11,578	11,578	11,578	11,578	11,578	11,578

Robust household clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Individual fixed effect is used in all estimations.

Table 4 Household fixed effects with IVs

Variables	Individual FE	Household FE	Household FE (with IVs)	Household FE	Household FE (with IVs)
	(1)	(2)	(3)	(4)	(5)
Female TM × Gender	-0.292*** (0.111)				
Household with female TM		-0.132** (0.065)	-3.930*** (1.364)	-0.132** (0.065)	-3.784*** (1.384)
Other variables rather than constant term	Yes	No	No	No	No
Number of Observations	23,156	6,968	6,968	6,594	6,594
Number of IDs	11,578	3,484	3,484	3,297	3,297
<i>Under-identification test</i>					
Kleibergen–Paap rk LM statistics			25.321		25.324
Chi-sq(2) P-value			0.000		0.000
<i>Weak identification test</i>					
Kleibergen–Paap rk Wald F statistics			11.617		11.603
Hansen J statistic (Over-identification test of all instrument)			1.496		0.002
Chi-sq(1) P-value			0.221		0.966

Notes:

Dependent variables: (1): individuals' number of hours on chores; (2), (3), (4), and (5): differences between 2008 and 2006 in households' gender gap on number of hours on chores. (4) and (5) are restricted to households with female TMs and households without any TMs.

Instrumental variables: number of migrants in the district of the household; and number of foreign affiliated firms located in the province a year prior the surveys.

We used a Stata command "xtivreg2" by Schaffer (2010) to implement IV-GMM estimation.

Robust household clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.