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DISCUSSION PAPER

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DISCUSSION PAPER NO. 664

July, 2012

ISSN: 1442-8636
ISBN: 978-1-921693-45-8

Monetary transfers from children and the labour supply of elderly parents: evidence from Vietnam

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Abstract: In the absence of a broad-based pension scheme, the elderly in developing countries may rely on monetary transfers made by their children and on their own labour supply. This paper examines whether monetary transfers from children help to reduce elderly parents' need to work. Taking the possible endogeneity of children's transfers in the parents' labour supply into account and using maximum likelihood methods and Vietnamese data, we find that monetary transfers help the elderly cope with risks associated with old age or illness. At the same time, however, monetary transfers are not sufficient to fully substitute for parents' labour supply.

Keywords: old-age support, labour supply, inter-generational transfers, endogenous variable, maximum likelihood.

JEL classification: J14; J22; J26

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Acknowledgements: We would like to thank the editor, Richard Palmer-Jones, two anonymous referees, Trevor Breusch, Deborah Cobb-Clark, Vella Francis, Tue Gorgens, Huong Le, Suiwah Leung, Quynh Nguyen, David C. Ribar, Hung Pham, and seminar participants at the Australian National University, the 2009 Far East and South Asia Meeting of the Econometric Society (FESAMES 2009) and the adjunct Young PAFTAD Fellows Conference 33 for useful comments. The usual disclaimers apply.

1 Introduction

In many developing countries, economic growth and social and demographic changes are weakening informal systems of old-age support (World Bank 1994). Vietnam is no exception. Over two decades of *Doi Moi* (Renovation) have sustained a dramatic transformation of Vietnam, from a poor economy to a middle-income country, and from a centrally planned to a market-oriented economy. Its transformation to a market economy has substantially improved living standards for most of the population. Although such achievements have been widely acknowledged, some vulnerable groups including the elderly are left behind and find it hard to cope with risks on their own. Currently, the majority of the old-age population in Vietnam is living without pensions (World Bank 2007).[1] In the absence of pensions, the elderly have to rely on informal support sources such as income from their accumulated earnings, their own labour supply, monetary transfers from or coresidence with their children (Bui *et al.* 1999, Friedman *et al.* 2001). Unlike the elderly in most developing countries, the Vietnamese elderly spent their working life prior the *Doi Moi* when incomes were held artificially low so that they could not accumulate assets to directly support themselves (Glewwe *et al.* 2004). In addition, rapid aging of the population[2] and the decline in coresidency (Giang and Pfau 2007) further put the elderly at risks, and increase the importance of own labour supply and monetary transfers from their children as the sources of support at old age. While public policies in developed countries attempt to increase their old age citizens' participation in the labour force, there has not been much discussion of this in developing countries.

An understanding of the determinants and interaction of informal forms of elderly support is crucial to the development and success of social protection policies. This paper contributes to this understanding by examining two informal forms of elderly support: own labour supply and financial transfers from children. In particular, it focuses on (1) what determine the labour supply of the elderly and (2) to what extent transfers from children respond to the needs of elderly parents and the degree to which monetary transfers reduce the labour supply of the elderly. In doing so it also will inform the current policy debate occurring across South East Asian countries.

As labour supply of and monetary transfers to elderly parents are not likely to be determined separately, this paper follows a theoretical framework proposed by Wolff

(2006) to account for the endogeneity of children's transfers in the parents' labour supply in a developing country context. We use a comprehensive cross-section data set from the Vietnam Living Standard Survey conducted in 1997/98 (97/98 VLSS) to empirically study the impact of monetary transfers from children on the labour supply of Vietnam's elderly. The empirical results indicate that monetary transfers appear to be motivated by the desire to provide old age support in that they are strongly responsive to the needs of parents and the ability of children to provide. Transfers from children, however, are far from fully substituting for income generated by own labour supply of elderly parents since they have small or insignificant impact on reducing labour supply. Overall, our results do not support the view that informal support is sufficient to reduce or replace social protection policies that aim at improving the welfare of the elderly.

The rest of this paper is structured as follows. Section 2 reviews the literature dealing with transfers to and labour supply of the elderly in developing countries. Section 3 describes the data set. Section 4 introduces the empirical model and econometric strategy. Empirical results are introduced in Section 5. Concluding comments are in Section 6.

2 Literature on intergenerational transfers to and the labour supply of the elderly

There have been growing interests in studying the motives of intergenerational transfers within the family. The motivations for transfers from children to their parents can be classified into altruism, exchange and demonstration motives or some mixture of the three. The well-known work of Becker (1974) considers altruism as a key factor in children-to-parent transfers. In this model children transfer money to their parents because they care for their parents' well-being. In another type of model, inter-generational transfers would occur under exchange motivations. Bernheim *et al.* (1985) show that parents can derive attention from their children through strategic bequest motives. They find that children are more likely to care for their parents when the parents have assets to bequeath in exchange. The exchange motive is further supported by Cox (1987) and Cox and Rank (1992) who find that recipient earnings and transfer amounts received are positively correlated. Exchange motives can also be extended to explain monetary transfers from children to their parents in exchange for services such as child care (Bernheim *et al.* 1985); repayment for parental investments in the child's education (Becker and Tomes 1976); risk and

insurance mechanism to smooth consumption among family members across uncertain states (Besley 1995, Morduch 1995, Townsend 1995). The motives of inter-generational transfers can also be explained by the demonstration effect (Cox and Stark 1996) where adults take care of their elderly parents in order to elicit a future support from their children.

There is a growing interest in the labour supply of the elderly in developing countries. For example, Mete and Schultz (2002) and Benjamin *et al.* (2003) study elderly labour supply in Taiwan and China, respectively. While Mete and Schultz (2002) focus on the impact of the establishment of a national health insurance program on the labour supply of the elderly in Taiwan, Benjamin *et al.* (2003) examine the impact of health on labour supply of the Chinese elderly. Recently, Ranchhod (2006) and de Carvalho Filho (2008) provide empirical evidence that a sudden increase in public old-age pensions could reduce the elderly incentive to work in South Africa and Brazil, respectively.

There are few studies on the effects of transfers from children in terms of coresidence and monetary transfers on the elderly labour supply. Agree and Clark (1991) study labour force participation decisions of the elderly in four developing countries in the Western Pacific. They find that living with children significantly reduces the probability of being in the labour force for the elderly. Kochar (2000) contributes to the research on the benefits from intergenerational coresidence by showing the negative relationship between the days of work reported by fathers in rural Pakistani households and the incomes earned by their coresiding adult sons. A study by Cameron and Cobb-Clark (2008) is one of few studies modeling elderly labour supply in the context of a developing country while taking account of the endogeneity of coresidence with and financial transfers from children. Using Indonesian data, they jointly estimate a system of labour supply and inter-generational transfers for coresiding and non-coresiding elderly. They find little evidence that support from children – either through coresidence or transfers – reduces the elderly parents' labour supply.

This paper contributes to current literature by providing empirical evidence on the impact of financial transfer from children on the labour supply of Vietnam's elderly. Vietnam, as a transitional country, is appreciably different from Indonesia so that the empirical impact of transfers on the labour supply of Vietnam's elderly deserves further investigation.

3 Data

For our empirical analysis, we use the Vietnam Living Standard Survey undertaken in 1997/98 by the Vietnamese General Statistical Office (GSO). The 97/98 VLSS is nationally representative and consists of 6000 households. Its rich information on the parents' and children's characteristics and transfers makes this study possible.[3]

A particularly attractive feature of the 97/98 VLSS is that it provides information about remittances from non-members to members of the household on an individual level. In addition, since the relationship between the sender and the recipient is reported, we are able to calculate the amount of money that own children or children in-law have transferred to their parents in the 12 months prior to the survey. However, a limitation of the 97/98 VLSS is that the questionnaire channels married couples receiving transfers to report these transfers as being received by only one spouse. In particular, in part A – section 13 of the 97/98 VLSS questionnaire, a question asks "What are the names of the people who sent money or goods to members of your household in past twelve months?". Then for each listed sender, the following question asks "To which member of the household did (name of the sender) send money?". As the name of the sender is listed first and the interviewer's manual does not give a clear instruction on how to record in the case where a non-coresiding[4] child sends money to both parents, the interviewer might have assigned the transfer to one person only. In addition, in Vietnam, "parents" is synonymic to "father and mother", with the father listed first. It is therefore expected that in such a case most solo transfer receivers are fathers.[5] In order to overcome this shortcoming, where both parents are living in the same household we calculate transfers received by each elderly parent as the average of total transfers from their children.

Another attractive feature of the 97/98 VLSS is that it also provides information on all children of parents. Thus the availability of information on the donor (non-coresiding children) in relation to the recipient (elderly parents) may help this study avoid some misleading conclusions when explaining transfer behavior (Altonji *et al.* 1997).

Besides providing detailed information on children and intergenerational transfers, the 97/98 VLSS also gives employment information for all individuals. In particular, it documents whether each individual works outside the household for pay, works in agriculture for the household, works in a household business, or participates in housework.

We focus on the aggregation of time spent on outside work, inside household agriculture work or household business to define the labour supply of the elderly.

Since we are interested in the impact of children's transfers on the labour supply of the elderly in the absence of broad-based pension schemes, we define the elderly as residents whose age is equal or over the mandatory retirement age. In Vietnam, it is 55 for females and 60 for males at the time of the survey.[6] In addition, as we only observe monetary transfers from non-coresiding children, we restrict the sample to include those elderly with at least one non-coresiding child. This sample restriction is essential as it helps identify the empirical model (see Section 4 for details). After excluding those elderly without non-coresiding children, we have a total sample of 2,843 elderly, of whom 62 per cent are females.[7] Variable definitions and summary statistics are provided in online Appendix Table 1. Descriptive statistics are presented in Table 1.

Table 1 shows that more than half Vietnam's elderly remain economically active. Among those working elderly, the majority (84 per cent) are involved in self-employment. Not surprisingly, ability to work deteriorates with age and male elderly have higher participation rate and longer average working hours than female elderly (see online Appendix Figure 1 and 2). On average, 31 per cent of elderly parents receive transfers from their non-coresiding children. Male and female elderly have the same chance to receive transfers but female elderly receive slightly more transfers than male elderly. Transfers from children represent a major share of total private transfers to the elderly (95 per cent). Although the transfer amount is not large, for those elderly receiving transfers, transfers from children constitute 58 per cent of per capita household expenditure.

[Table 1 about here]

In Table 1, we observe a negative relationship between monetary transfers and labour supply since non-working elderly have a higher probability of receiving transfers and receive more transfers than working ones. Furthermore, the coefficient of correlation between parents' labour supply and children's transfers is negative and statistically significant at the 1 per cent level.

4 Empirical model

4.1 Theoretical framework

In order to structure the empirical analysis, our starting point is a theoretical framework as suggested in Wolff (2006) for a joint determination of parental financial transfers and young children's labour supply. However, unlike previous research on transfers in developed countries where parents support their children (Wolff 2006, Dustmann *et al.* 2009, Kalenkoski and Pabilonia 2010), in developing countries, especially Asian countries, adult children are supposed to be the main source of support to their elderly parents. Accordingly, we consider a simple setting where children are altruistic toward their parents. In this model, there are two decision makers. On the one hand, the parent is to choose labour supply given transfers from the child. On the other hand, the child is expected to take the parent's welfare into account to determine transfers given information on previous labour supply of the parent. Accordingly, we assume that the child makes the decision to transfer first then the parent chooses labour supply.[8] Similar to the model in Wolff (2006), the resulting hypotheses of this theoretical framework include (1) children's transfer should be treated as endogenous in the parent's labour supply but not vice versa, (2) transfers made by the child are positively associated with the child's ability to give and negatively associated with the parent's ability to support themselves; and (3) higher children transfer is expected to reduce the parent's work hours. This paper will empirically test these hypotheses using data from Vietnam.

4.2 Empirical econometric framework

The theoretical model suggests that children's transfers are endogenous in the elderly parents' labour supply but not vice versa. Therefore, we have to account for the endogeneity of children's transfers and estimate the impact of transfers on parents' labour supply. The econometric model includes two equations: one for the parents' labour supply and the other for transfers made by non-coresiding children to their parents. In particular, the labour supply equation is given by:

$$H_i^{P*} = \gamma_0 + \gamma_1 T_i^{*} + \gamma_2 Z_i^{P} + \gamma_3 Z_i^{CC} + u_i \qquad (1)$$

where H^{P*} is a latent variable measuring parents' labour supply, T^* is a latent variable indicating the amount of transfers made to the parents by non-coresiding children, Z^P is a vector of parental characteristics, and Z^{CC} contains household characteristics. The inclusion of Z^{CC} which include own children into the parents' labour supply equation is to capture the ability of coresiding members to support elderly members.

As suggested by the theoretical framework, the children's transfers depend on a set of exogenous variables but not on the parent's labour supply:

$$T_i^* = \phi_0 + \phi_1 Z_i^P + \phi_2 Z_i^{NC} + \phi_3 Z_i^{CC} + \varepsilon_i \qquad (2)$$

where Z^{NC} is a vector of non-coresiding children's characteristics. It is assumed that the characteristics of non-coresiding children do not affect the parent's labour supply while those of coresiding children do. The inclusion of household characteristics (Z^{CC}) in the transfer equations accounts for the resources that coresiding members are able to provide elderly members. The inclusion of coresiding members' (including own children) characteristics is also to test for possible interaction between non-coresiding and coresiding children in transfers to their parents.

By definition, desired labour supply and transfers are not observed in the data but we have some information on the actual counterparts of these variables (Maddala 1983). We therefore apply a Tobit model to estimate the actual working hours and transfers. Our empirical model comprises two equations: a Tobit equation for the parent's decisions to work, with transfers from children as an endogenous explanatory variable and a Tobit equation for transfers from non-coresiding children.

It is crucial for the system of equations to be identified. Although the above system is identified without any exclusion restriction due to non-linearity of the dependent variables, in this paper, we consolidate its identification by imposing an exclusion restriction. In particular, the labour supply equation is identified by the exclusion of non-coresiding children's characteristics from that equation. This exclusion restriction seems reasonable as non-coresiding children affect the parents' labour supply through their financial transfers only. Having taken this restriction into consideration, non-coresiding children's characteristics do not have direct effects on the parental labour supply. Recall that our

restriction of the sample to the elderly with at least one non-coresiding child also helps to ensure the labour supply equation identified.

The respective residuals of labour supply and transfer equations are assumed to follow a bivariate normal distribution. We use the Full Information Maximum Likelihood (FIML) technique to estimate the system of two equations. Since we expect the determinants of labour supply and transfers by gender to differ, we estimate the system of two equations separately for males and females.

4.3 Empirical model specification

We use weekly working hours in the main job in the past 12 months as the dependent variable in the labour supply equations. As suggested by the theoretical framework, explanatory variables include parental characteristics associated with the market reservation wage (age, gender, education and health status), household characteristics (coresiding with own children, living with spouse, number of coresiding members of various age cohorts, average education of coresiding adult members, farm or non-farm household) and regional characteristics. Furthermore, as suggested by the standard labour theory, we use other non-labour income, type of dwelling and pension[9] to control for wealth effect on the elderly labour supply. We also control for differences in working conditions and labour demand across regions by including regional and rural/urban variables in the labour supply equations. As we expect religion and ethnicity to play some role in explaining labour supply of the elderly, we include these variables in all equations.

In the transfer equations, we use monetary transfers from non-coresiding children as the dependent variable. We include most explanatory variables affecting the elderly parents' labour supply in the transfer equations. The inclusion of parents' characteristics (such as age and health status) is to test for whether transfers are targeted at parents in need. In addition, we control for the size and quality of the transfer network with the number, average years of schooling and residential location of non-coresiding children.

5 Estimation results

The results from joint estimations of labour supply and transfer equations are reported in Tables 2 and 3, respectively. The coefficients of correlation between the two equations,

which are shown at the bottom of Table 2, are significant at 5 and 10 per cent level for mothers and fathers, respectively. The significance of the correlation coefficient thus supports the earlier theoretical model prediction about the endogeneity of transfers from children in the elderly parent's labour supply equation. This significance also means that a separate estimation of the two equations would produce less efficient estimates. It is interesting to note that the correlation between the labour supply and transfer equations has opposite signs for fathers and mothers. Before turning to the influence of transfers on labour supply, we discuss factors determining the optimal choices of labour supply and monetary transfers.

5.1 The labour supply of Vietnamese elderly

We begin with the parent's decision to undertake outside working activities (Table 2). As expected, the labour supply of Vietnamese elderly declines with age and poor health status. Estimates of labour supply demonstrate the labour division within the household and show a significant gender difference in labour supply of the elderly in Vietnam. One aspect of the labour division within households can be seen through the effect of the number of grandchildren on labour supply of their coresiding grandparents. Coresiding grandmothers tend to take care of their grandchildren, hence their hours worked outside decrease by about two with each grandchild aged 1 to 5 present in the household.[10] In contrast, we do not find a significant impact of the grandchildren at this age cohort on the working time of their grandfathers. Combining with the negative relationship between the number of grandchildren aged from 6 to 17 and the labor supply of mothers, the positive correlation observed for fathers may suggest the following. While grandmothers care for grandchildren (including grandchildren aged from 6 to 17) by spending more time on housework and hence less time on outside work, grandfathers may have to work outside more to support older grandchildren (aged from 6 to 17). This gender difference demonstrates the traditional role of grandmothers in taking care of grandchildren in Vietnam and elsewhere in Asia (Chang *et al.* 2011).

[Table 2 about here]

Another aspect of work sharing within households is reflected by the effect of living with a spouse on the partner's labour supply. Our estimate indicates that, an elderly parent living

with a spouse in the same dwelling tends to work six hours per week more than one without a spouse in the house. The advantages, such as better care for each other, of living with a spouse may explain higher hours worked by the coresiding elderly partner. Alternatively, one may expect that living with a (probably old) spouse means more financial responsibilities.

Characteristics that other household members at prime age possess also influence the elderly member's labour supply. In particular, education of coresiding adults reduces the elderly female member's need to work as an additional year of schooling of adults is associated with 0.3 fewer hour of outside work for mothers. This finding is in line with that in the study of Kochar (2000) where the elderly parents' labour supply is negatively correlated with their son's income in Pakistan. Coresiding with own children, as measured by a dummy variable, however, does not reduce the parental need to work since the estimate of this variable is insignificant for fathers and mothers.

Variables that capture non-labour income play little role in explaining the need of the elderly to work. In particular, public transfers, as measured by having health insurance or pension income, are found to facilitate marginally the retirement of Vietnamese elderly as their estimates are only significant at the 10 per cent level. These results may reflect the fact that pension is not sufficient for Vietnamese elderly to rely on (Bui *et al.* 1999). However, the insignificant association between pension receipt and working behavior of Vietnamese elderly is in line with the study of Friedman *et al.* (2001). Other factors reflecting wealth of the household as measured by other non-labour income or type of housing are not found to have a significant impact on the elderly parental labour supply either.

Other variables have their expected sign. For example, elderly household heads work significantly more than non-household heads as the former are supposed to be the bread-winners for the household. Female elderly in a farm household are expected to work two hours fewer than those in a non-farm household. The impact of work type on labour supply is, however, insignificant for male elderly. Residential location also has some impact on labour supply where the elderly in urban areas are expected to work from three to five hours fewer than their rural counterparts. Also in line with other studies on the labour supply of the elderly in the developing world (for example, Kocha (2000) for Pakistan) we

also find that education of the elderly is not an important determinant of their labour supply.

5.2 Monetary transfers from children to Vietnamese elderly parents

The estimates for transfer equations suggest that transfers are targeted at the elderly in need (Table 3). In particular, transfers respond significantly to elderly parents' difficult situations since those with bad health (both fathers and mothers) or at older age (for fathers) are likely to receive more transfers from their children. Furthermore, elderly living in the Central Coast, South East and Mekong Delta regions are likely to receive more transfers than their counterparts in other regions. Since the higher transfer received by elderly in these regions is coincident with an occurrence of a devastating typhoon there, one may expect that non-coresiding children of the elderly in affected regions may transfer money to partly compensate for losses due to the typhoon.[11] All in all, these findings suggest that monetary transfer from children is an efficient informal mechanism to manage the risks associated with old age, illness or natural disasters in Vietnam. In comparison with other Asian countries, our findings are in line with China where Chinese elderly parents in low income households receive significantly more private transfers than those in better off households (Cai *et al.* 2006) but opposed to Indonesia where monetary transfers from children are not responsive to the elderly parents' needs (Cameron and Cobb-Clark 2008).

[Table 3 about here]

The estimates for transfer equations suggest an interaction between coresiding members and non-coresiding children in transfers to the elderly. Non-coresiding children tend to send fewer transfers to their parents if the parents are living with more adult members. One explanation is that non-coresiding children may view coresiding adult members as a source of support for their parents hence they make fewer transfers. It could also be possible that non-coresiding children expect parental wealth to be inherited by these coresiding adult members at death hence the former transfer less. The impact of the coresidence dummy is insignificant, indicating that there is no difference in the quantity of transfers received by parents whether they live alone or with other adult children.

With regard to the relationship between public and private transfers, our estimates show evidence of "crowding out" effect in Vietnam.[12] A significantly negative estimate for the health insurance variable for fathers suggests that there would be a "crowding out" effect (Barro 1974, Becker 1974) in which receiving public transfer reduces fathers' chances of getting more transfer from non-coresiding children. However, we do not find the evidence of "crowding out" effect for the female group since estimates for all variables representing public transfers are insignificant.

Other factors reflecting household characteristics also influence the amount of transfers received by elderly parents. For example, Kinh or Chinese female elderly are expected to receive more transfers than other ethnic minority elderly. The higher transfers among the Kinh or Chinese communities are likely to be linked with higher ability to give of these ethnic groups than other ethnic minority groups in Vietnam. In addition, the elderly (both male and female) living in farm households receive fewer transfers than their counterparts in non-farm households. Similarly, lower transfers received by the elderly in farm households may be attributed to lower ability to give of their non-coresiding children. Furthermore, wealthier parents (as measured by living in a permanent house) are expected to receive more transfers from their probably wealthy non-coresiding children.

Regarding the source of transfers, our estimation results also show a consistent picture where transfers are closely related to the ability of children to give. In particular, transfers to elderly parents increase with the number of non-coresiding children. In addition, education of non-coresiding children is an important contributing factor to increase transfers to the elderly. Furthermore, non-coresiding children living in cities or overseas are likely to make more financial transfers to their elderly parents.

We next investigate the impact of children's transfers on parents' labour supply. Our results show that financial transfers from non-coresiding children have some impact in reducing the parental need to work. In particular, one million VND (USD 83) of transfers per year is expected to reduce the elderly mother's working hours by 0.54 per week.[13] This impact is relatively small in comparison with the magnitude of one million VND transfers, which accounts for one fifth of GDP per capita at the survey time. In contrast, transfers from non-coresiding children have insignificant impact on fathers' labour supply. It is interesting to observe that the impact of transfer on labour supply depends on whether the recipient is the father or mother. This gender difference may reflect the difference in

preference toward leisure and hence labour between the father and mother. Our finding of a gender difference in the impact of transfer on labour supply is consistent with the findings in the literature that cash transfers to women may increase their bargaining capacity within the household and result in a pattern of expenditures that better reflects their preferences (World Bank 2011).

The finding of the small or insignificant impact of private transfers on the labour supply together with the earlier findings on the impact of other sources of income (such as pensions or other non-labour income) suggest a certain income inelasticity of labour supply of the Vietnamese elderly. The income inelasticity of labour supply of the elderly seems to be common in other Asian developing countries (for example, China (Benjamin *et al.* 2003) and Indonesia (Cameron and Cobb-Clark 2008)).

5.3 Robustness check

Above, we used the mandatory retirement age to define old age. We also experimented with using a symmetric definition for elderly (online Appendix Table 2 - Check 1). When the age threshold is raised to 60 for females, the sample size is smaller (1327 observations) and the estimates differ slightly.[14] However, the gender differences in the impact of transfers on labour supply remain – one million VND transfer per year reduces the elderly mother's working hours by 0.63 per week (significant at the 10 per cent level).

We experimented with a different transfer rule between spouses (that is we do not adjust the transfer data). Results (online Appendix Table 2 - Check 2) indicate that, while the impact of transfer on labour supply remains insignificant and negative for fathers, it becomes insignificant but still negative for mothers.

The inclusion of the coresidence dummy in the labour supply and transfer equations may raise issues of endogeneity. When elderly individuals choose whether to coreside, they compare the indirect utility received from living with children and that derived from living alone (McElroy 1985). Thus parents may consider both their own labour supply and transfers under each living arrangement alternative. To account for this, we estimate a system of three equations: a Tobit equation for the parent's labour supply, with transfers and coresidence as endogenous explanatory variables, a Tobit equation for the transfer value provided by non-coresiding children, with coresidence as an endogenous explanatory

variable and an additional Probit equation for the parent's choice to live with their children. We assume that the three error terms are distributed according to a trivariate normal distribution.

We use variable restrictions to identify the system of three equations. The identification of the labour supply and transfer equations is the same as before. The identification of the coresidence equation is achieved by using local housing prices. Local housing prices proxy for the transaction cost associated with alternative living arrangements and are assumed to affect the coresidence decision but not children's transfers or parents' labour supply.[15]

In the coresidence equations, covariates include characteristics of the elderly (age, age squared, gender, education to control for differences in living preferences), house ownership and pensions (proxy for ability to buy privacy), the parent's marital status and the number of children (proxy for availability of coresidence opportunities), household total living area, regional house prices, and residential regions.[16]

We also use the FIML method to estimate the system of three equations. For brevity, we only report the estimates of those endogenous variables in labour supply and transfer equations and the coefficients of correlation between the three equations in Table 4.

[Table 4 about here]

The statistical significance of most of the correlation coefficients supports the joint estimation approach. Table 4 also shows that controlling for the endogeneity of coresidence in the labour supply and transfer equations does not change our earlier findings on the impact of transfers on the labour supply. As before, transfers are insignificant determinant of fathers' labour supply but significant determinant of mothers' labour supply. The impact of transfers on mothers' labour supply is, however, smaller in the system of three equations than in the system of two equations since one million VND of transfers is now associated with only 0.43 fewer hour in mothers' labour supply.[17]

The estimates for coresidence equations (online Appendix Table 3) operate in the expected direction. For example, the parental propensity to coreside first declines with their age then flattens out. In addition, the probability of coresiding increases with more opportunities (as measured by the marital status, the number of children or living area) available. Furthermore, elderly parents of more educated children are less likely to coreside. We also

find that parents' assets as measured by home ownership or having health insurance are negatively correlated with their probability of coresiding, Finally, a positive relationship between local housing prices and coresidency suggests that living in regions with high housing prices makes it more costly for parents and their children to live separately.

6 Conclusion

In this paper, we examined the impact of monetary transfers from non-coresiding children on the labour supply of their elderly parents. The transfer equation results indicate that transfers from non-coresiding children are strongly correlated with their elderly parents' needs as well as the children's ability to give. We also find interactions between coresiding and non-coresiding children in transfers to their elderly parents. Results from the labour supply equations reaffirm earlier findings in the literature that elderly labour supply decreases with age and poor health. A division-of-labour within households is also found as elderly mothers tend to work outside less with more grandchildren present. We also find that Vietnamese elderly tend to work more when they live with their spouses under the same roof. In addition, education of coresiding children is found to have some disincentive impact on their parents' labour supply. Perhaps, one of the most important findings of this paper is the small or insignificant impact of transfers on labour supply of the elderly. One million VND (USD 83) of transfers per year is found to reduce the labour supply of elderly mothers by half an hour per week. In contrast, monetary transfers from children have no significant impact on the labour supply of elderly fathers.

With regard to using monetary transfers from children as a substitute for the formal public social protection programs, our findings confirm that the extended family contributes importantly to helping the elderly cope with risks associated with old age or illness. Policy may be formulated to further encourage financial transfers from children to their elderly parents through use of tax concessions to children making such transfers. Complementary policies might also be designed to assist those less fortunate elderly with fewer family members to provide support or with less affluent children. Furthermore, social security policies need to focus on older elderly and the elderly with bad health because they lack the capacity to support themselves. Finally, while intergenerational transfers offer some insurance, they are not large enough to fully substitute for the labour supply of the elderly. Thus, our findings give support for an increase in the public role in improving old-age

welfare in developing countries. The design of public policies such as non-contributory old age pension needs further investigation in the future.

[1] As yet Vietnam still has no public pension scheme or mandatory contributions by workers into pensions, except for 18 per cent of the labour force who work in the formal sector.

[2] Currently Vietnam has a young population. However, with declining fertility and growing life expectancy, the Vietnamese population is projected to age quickly. While only 10 per cent of the population will be over the age of 60 by 2020, this number will have doubled by 2040 (United Nations 2007).

[3] The other recent VLSSs, undertaken in 2002, 2004, 2006 and 2008, do not provide information about monetary transfers on an individual level, nor do they have information on non-coresiding children of elderly parents.

[4] We define children as coresiding if they are living together with their elderly parents. Similarly, parents are defined as coresiding if they are living together with their children.

[5] In our sample, of 590 elderly parents receiving transfers from non-coresiding children, 52 per cent are living with their spouses. Among those parents living together, only 20 per cent of them report that they both receive transfers from non-coresiding children. Interestingly, they all receive exactly equal amount of transfers. Meanwhile, the remaining four fifths of parents are solo receivers of transfers from non-coresiding children even though they are living with their spouse in the same household. As expected, 85 per cent of solo receivers are fathers. A further investigation into the purposes of transfers shows that 94 per cent of transfers are for consumption. Therefore, it is odd to see that in the case where the parents are living together, non-coresiding children send money to the father (or mother) only and the coresiding spouse does not benefit from those transfers.

[6] This mandatory retirement age was set by the 1994 Labour Code, taking life expectancy (69 for males and 72 for females) and general physical status of Vietnamese into consideration. It has not been changed since.

[7]The number of elderly without non-coresiding children is 518 (15 per cent of the elderly population). As compared with elderly with at least one non-coresiding child, those without are of particular attention since they are older, more likely to be in bad health, less likely to live with their children, less likely to work, and receive lower pensions. This study focuses on the elderly with at least one non-coresiding child for the model identification purpose.

[8] This model is a Stackelberg leader-follower model for the strategic interaction between the child (the leader) and the parent (the follower). Alternative model for the interaction between the child and the parent can be a Cournot simultaneous bargaining framework where both players have bargaining power. Under the Cournot bargaining framework, the child takes the current labour supply of the parent into account when making decisions about transfers. As a result, the labour supply of the parent appears as an endogenous explanatory variable in the transfer equation. Since the leader-follower model provides clearer testable conclusions than the simultaneous framework (Wolff 2006, p 861), we follow Wolff (2006) to use the former as our theoretical framework. In addition, in our empirical model, since we cannot find a reasonable exclusion restriction for the labour supply equation to estimate a system of two simultaneous equations, we opt out to use the Stackelberg leader-follower model. Our empirical model does not take into account the possibility of a structural relationship between children transfer and parental labour supply. The bias that such a relationship will cause will reduce the estimated impact of transfer on labour supply. To the extent that a negative relationship is observed between transfer and labour supply, our empirical finding would underestimate the true negative impact of transfer. We thank an anonymous referee for suggesting this point.

[9] Since the 97/98 VLSS only reports whether the household receives any income from the government's Social Insurance Fund (pension or disability benefits) we cannot identify who receives this fund. We expect that some of the eligible elderly in the household may receive this pension. Therefore, we calculate average pension received per eligible individual. We also experimented with information about whether the elderly individual has health insurance to identify a possible pension receiver since at the survey time health insurance holders (most of them are former state sector workers and state benefit receivers) are likely to be pensioners. In 1999, about 25 per cent of eligible elderly received pensions (GSO, 2001). At the same time, our data show that the proportion of elderly had health insurance is 20 per cent. Therefore, having health insurance may be a good proxy for receiving old age pensions for Vietnamese elderly at the survey time.

[10] We check this hypothesis by estimating a separate Tobit equation for the hours the elderly spend on housework each week. The housework regression model includes all explanatory variables similar to those in the labour supply equation. Estimates from the housework equations show that an additional grandchild age 1

to 5 is associated with one hour more spent on housework of grandmothers. The results of the separate housework equations will be available upon request.

[11] In early November 1997, Typhoon Linda, which was the strongest typhoon ever recorded in the southernmost areas of Vietnam during the last 100 years, tore through southern Vietnam. The typhoon swept away tens of thousands of homes and caused the death of more than 600 people. This argument is also mentioned in the study of Cox (2004) who finds that transfers are higher for households in those affected regions.

[12] It is well-known in the literature of public economics that public transfer can be endogenous in the private transfer and labour supply equations (see Cox and Jakubson (1995) for a discussion). At the time of the study, the elderly Vietnamese received pension and health insurance mostly on the basis that they had worked for the state sector (including state owned enterprises) for certain duration. These two types of public transfers are provided for the elderly regardless of their current situation so they are expected to be exogenous in the labour supply and transfer equations. The data limitation (see footnote 9) and the lack of strong instrumental variables prevent us from addressing possible endogeneity of public transfers in the labour supply and transfer equations. Therefore, interpretation of the results regarding public transfers should be taken with caution.

[13] For comparison purposes we also experimented with separate estimations of the labour supply (with transfers as exogenous variables) and transfer equations. The magnitudes and significance of coefficient estimates differ slightly across the jointly and independently estimated equations. In particular, in separate estimations, one million VND of transfers is expected to reduce the elderly mother's working hours by only 0.34 per week. In addition, the impact of transfers on the labour supply is statistically significant (at a 5 per cent level) for mothers but insignificant for fathers. The remaining regression results will be available upon request.

[14] Full results are not reported here for brevity but will be available upon request.

[15] Our exclusion restriction for the coresidence equation is similar to those suggested in the literature (for example Pezzin and Schone (1999), Martínez-Granado & Ruiz-Castillo (2002) and Cameron & Cobb-Clark (2008)). They all use a proxy for the transaction costs of switching between coresidency statuses to identify the coresidence equation. We empirically test for the possibility that the local housing price would affect children's transfers or parents' labour supply by including the local housing price in these two equations. The Wald test indicates that in all cases we cannot reject the null hypothesis that the local housing price has no impact on transfer and labour supply (P value > 0.14).

[16] The 97/98 VLSS provides information about the dwelling price (estimated by the interviewee) for each surveyed household. The average housing price per square meter for each commune/ward is calculated by combining the price and total living area of each house and the number of houses in the commune/ward.

[17] The correlation structure between errors in the coresidence and the other two equations also translates into significant changes in the estimates of the coresidence variable in the labour supply and transfer equations (see Table 4).

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Table 1 **Labour supply and transfers of Vietnamese elderly**

	Male	Female	Total
Labour supply			
Proportion working (in self-employed or wage work) (%)	60	59	59
Proportion working on wage if working (%)	20	23	22
Proportion working on self-employment if working (%)	86	82	84
Mean of weekly hours worked (hours / week)	22	22	22
Mean of weekly hours worked if > 0 (hours / week)	36	37	37
Transfer			
Proportion receiving transfers from children (%)	31	31	31
Mean annual transfers from children (mil. VND)	0.66	0.73	0.70
Mean annual transfers from children if >0 (mil. VND)	2.15	2.38	2.29
Transfers from children / total private transfers if transfers > 0 (%)			95
Transfers from children / per capita household expenditure if transfers >0 (%)	54	60	58
Transfer and labour supply			
Proportion receiving transfers from children (%) if:			
Working	26	29	28
Not working	39	33	35
Mean annual transfers from children (mil. VND) if:			
Working	0.33	0.45	0.41
Not working	1.16	1.13	1.14
Correlation between transfers and labour supply	-0.11[(a)]	-0.10[(a)]	-0.10[(a)]

Notes: - Population means weighted to reflect sampling weights.
- [(a)] denotes pair wise significance at 1 per cent.

Table 2 **Determinants of labour supply of Vietnamese elderly**

Variables	Male	Female
Transfers	-0.15	-0.54**
	(-0.32)	(-2.46)
Coresiding with own children	2.29	1.19
	(1.54)	(1.07)
Individual characteristics		
Pension	-0.20*	-0.02
	(-1.72)	(-0.23)
Other non-labour income	-0.09	0.14
	(-0.45)	(0.69)
Health insurance	0.65	-2.27*
	(0.42)	(-1.90)
Age	-0.88***	-1.00***
	(-9.66)	(-15.53)
Year of schooling	0.14	-0.13
	(0.79)	(-0.79)
Kinh or Chinese	-3.14	0.03
	(-1.57)	(0.02)
Religious	0.15	-0.66
	(0.13)	(-0.79)
Number of days ill	-0.30***	-0.28***
	(-4.63)	(-5.68)
Household characteristics		
Household head	6.01***	7.40***
	(4.51)	(5.76)
Semi-permanent house (temporary house is the base)	-0.07	0.48
	(-0.05)	(0.48)
Permanent house (temporary house is the base)	0.07	-1.8
	(0.03)	(-1.21)
Number of grandchildren age under 6 coresiding	-0.81	-1.88***
	(-0.90)	(-2.89)
Number of grandchildren age from 6 to 17 coresiding	1.00*	-0.65
	(1.80)	(-1.52)
Number of adult members coresiding	-0.86*	-0.58
	(-1.67)	(-1.49)
Number of old members coresiding	-1.5	0.6
	(-1.02)	(0.66)
Education of coresiding adults	-0.1	-0.30***
	(-1.13)	(-4.45)
Living with spouse	6.20***	6.07***
	(3.72)	(4.44)
Farm	0.65	-1.98**
	(0.44)	(-1.99)
Regional characteristics		
Urban	-5.37***	-3.38***
	(-3.80)	(-3.13)
Coefficients of correlation : $\rho(H,T)$	-0.13 *	0.04 **
	(1.88)	(2.32)

Notes: Robust asymptotic t statistics in brackets; Seven dummy regional variables are included. Marginal effects are calculated at mean and conditional on positive outcomes; for dummy variables: the marginal effect is for discrete change from 0 to 1.
***, ** and * denote significance at 1, 5 and 10 per cent, respectively.

Table 3 **Determinants of transfers to Vietnamese elderly**

Variables	Male	Female
Coresiding with own children	0.07	-0.07
	(0.54)	(-0.55)
Individual characteristics		
Pension	0.01	0.00
	(0.86)	(-0.51)
Other non-labour income	-0.02	0.00
	(-1.54)	(0.05)
Health insurance	-0.25**	-0.07
	(-2.04)	(-0.67)
Age	0.02**	0.01
	(2.17)	(1.39)
Year of schooling	0.00	0.00
	(-0.18)	(0.07)
Kinh or Chinese	0.25	0.51***
	(1.34)	(3.14)
Religious	0.19*	-0.05
	(1.75)	(-0.54)
Number of days ill	0.01***	0.02***
	(2.65)	(3.21)
Household characteristics		
Household head	0.33***	0.17
	(2.81)	(1.32)
Semi-permanent house (temporary house is the base)	0.15	0.25**
	(1.29)	(2.14)
Permanent house (temporary house is the base)	0.75***	0.66***
	(2.64)	(3.03)
Number of grandchildren age under 6 coresiding	0.07	-0.10
	(0.89)	(-1.18)
Number of grandchildren age from 6 to 17 coresiding	-0.02	-0.02
	(-0.48)	(-0.37)
Number of adult members coresiding	-0.26***	-0.26***
	(-3.83)	(-4.37)
Number of old members coresiding	-0.22	0.05
	(-1.14)	(0.42)
Education of coresiding adults	0.00	0.00
	(-0.11)	(-0.41)
Living with spouse	0.29	-0.1
	(1.46)	(-0.59)
Farm	-0.18*	-0.20*
	(-1.70)	(-1.77)
Non-coresiding children characteristics		
Number of non-coresiding children	0.05**	0.07***
	(2.23)	(2.99)
Non-coresiding children education	0.06***	0.06***
	(3.33)	(3.69)
Number of non-coresiding children in cities	0.09***	0.09**
	(2.96)	(2.51)
Number of non-coresiding children overseas	0.68***	0.88***
	(7.41)	(5.57)

Notes: See Table 2.

Table 4 **Selected results from joint estimations of labour supply, transfer and coresidence equations**

	Male	Female
Coefficients of correlation		
$\rho(H,T)$	-0.09*	0.13 **
	(1.93)	(2.20)
$\rho(H,C)$	-0.10	0.38 *
	(1.40)	(1.81)
$\rho(T,C)$	-0.59 ***	0.65 ***
	(4.45)	(4.19)
Impact of transfers on labour supply		
	-0.18	-0.43**
	(0.37)	(2.72)
Impact of coresidence on		
Labour supply	5.20 **	-7.74
	(2.01)	(1.39)
Transfers	1.25 ***	-1.52 ***
	(2.95)	(3.20)

Notes: See Table 2.

Appendix Table 1 **Definition of variables and statistics summary**

Variables	Definition	Male	Female	Total
Dependent or endogenous variables				
Labour supply	Average weekly working hours in the main job (the job individual devotes the most time doing) in the past 12 months	21.27	21.24	21.25
Transfer	Transfer from non-coresiding children in the past 12 months (in million VND)	0.76	0.82	0.80
Coresidence	= 1 if living with at least one own child, = 0 if otherwise (the base group)	0.76	0.76	0.76
1. Parent's characteristics				
Age	Age at time of survey (in years)	68.47	65.88	66.85
Year of schooling	Years of completed schooling (in years)	5.19	2.46	3.49
Number of days ill	Number of days suffering from illness or injuries during the past 4 weeks (days/4 weeks)	6.12	6.45	6.33
Married	= 1 if married, = 0 if widowed, divorced, separated or never married (the base group)	0.86	0.56	0.67
Spouse in house	= 1 if spouse is living in the same dwelling, = 0 otherwise (the base group)	0.83	0.54	0.65
Household head	= 1 if the household head, = 0 otherwise (the base group)	0.77	0.34	0.51
House owner	= 1 if owns the dwelling, = 0 otherwise (the base group)	0.79	0.34	0.51
Pension	Pension income per elderly individual (mil VND)	2.45	1.65	1.95
Other income	Other non-labour income (other than pensions and transfers from children) per capita (mil VND)	0.65	0.56	0.59
Health insurance	= 1 if having health care insurance, = 0 otherwise (the base group)	0.27	0.13	0.18
Number of children	Number of own living children (both coresiding and non- coresiding)	5.71	5.34	5.48
Children's education	Average years of schooling of all children	8.16	7.82	7.95
Number of non-coresiding children	Number of children not living in the same dwelling with the parent	4.26	3.98	4.08
Number of non–coresiding children in cities	Number of non-coresiding children reporting living in town or city	0.87	0.85	0.86
Number of non–coresiding children overseas	Number of non–coresiding children overseas	0.11	0.11	0.11
Non-coresiding children's education	Average years of schooling of non-coresiding children	8.41	7.96	8.13
2. Household characteristics				
Ethnicity	=1 if Kinh or Chinese, = 0 otherwise (the base group)	0.90	0.89	0.90
Religion	= 1 if Buddhist' Catholic, Protestant, Hoa Hao, Cai Dai, or Muslim; = 0 if otherwise (the base group)	0.28	0.32	0.30
Semi-permanent house	= 1 if semi-permanent, = 0 if otherwise (temporary house as the base group)	0.64	0.62	0.63
Permanent House	= 1 if permanent, = 0 if otherwise (temporary house as the base group)	0.15	0.15	0.15
Housing area	Total housing area used by the household (100 square meters)	0.78	0.74	0.75
Grandchildren aged under 6	Number of children aged under 6 coresiding	0.34	0.41	0.38
Grandchildren aged between 6 and 17	Number of children aged between 6 and 17 coresiding	0.67	0.70	0.69
Number of coresiding adults	Number of other people (other than spouse) age between 18 and 59 for male and between 18 and 54 for female coresiding	1.80	1.89	1.86
Number of coresiding elderly	Number of other people (other than spouse) age 60 or over for male and 55 or over for female coresiding	0.77	0.48	0.59
Adults' schooling	Average years of schooling of coresiding adults	7.50	7.67	7.61
Farm	= 1 if the household main economic activity is farm, = 0 if otherwise (the base group)	0.63	0.60	0.61
3. Community characteristics				
Local housing price	Commune or ward average housing price per square meter (Mil VND/sq m)	0.89	0.88	0.88
Urban	Dummy = 1 if the residential location is classified as urban, = 0 if rural (the base group)	0.29	0.29	0.29
Region	Regional location of the household (7 regions): Northern Uplands (the benchmark group); Red river Delta; North Central Coast; South Central Coast; Central Highlands; Southeast; Mekong Delta			
Number of observations		1072	1771	2843

Appendix Table 2 **Determinants of labour supply of Vietnamese elderly – Robust checks**

Variables	Male	Female	
	Check 2	Check 1	Check 2
Transfers	-0.26	-0.63*	-0.26
	(-1.04)	(-1.65)	(-1.60)
Coresiding with own children	2.30	0.79	1.17
	(1.54)	(0.67)	(1.05)
Individual characteristics			
Pension	-0.20*	-0.06	-0.02
	(-1.78)	(-0.51)	(-0.18)
Other non-labour income	-0.08	0.05	0.14
	(-0.43)	(0.22)	(0.69)
Health insurance	0.76	-1.91	-2.22*
	(0.49)	(-1.58)	(-1.86)
Age	-0.88***	-0.93***	-1.00***
	(-9.65)	(-12.70)	(-15.55)
Year of schooling	0.14	-0.15	-0.14
	(0.76)	(-0.72)	(-0.82)
Kinh or Chinese	-3.13	0.16	0.02
	(-1.57)	(0.11)	(0.02)
Religious	0.10	-1.40	-0.65
	(0.09)	(-1.61)	(-0.78)
Number of days ill	-0.30***	-0.24***	-0.28***
	(-4.67)	(-4.91)	(-5.67)
Household characteristics			
Household head	6.10***	8.24***	7.50***
	(4.58)	(5.93)	(5.82)
Semi-permanent house (temporary house is the base)	-0.11	0.33	0.41
	(-0.08)	(0.31)	(0.41)
Permanent house (temporary house is the base)	-0.15	-1.36	-2.01
	(-0.07)	(-0.89)	(-1.37)
Number of grandchildren age under 6 coresiding	-0.81	-2.22***	-1.87***
	(-0.90)	(-3.26)	(-2.87)
Number of grandchildren age under from 6 to 17 coresiding	1.03*	-0.56	-0.65
	(1.84)	(-1.23)	(-1.53)
Number of adult members coresiding	-0.84	-0.53	-0.56
	(-1.63)	(-1.19)	(-1.43)
Number of old members coresiding	-1.50	1.80	0.57
	(-1.02)	(1.39)	(0.62)
Education of coresiding adults	-0.09	-0.25***	-0.30***
	(-1.09)	(-3.62)	(-4.43)
Living with spouse	6.28***	5.15***	6.11***
	(3.78)	(2.97)	(4.46)
Farm	0.73	-1.12	-1.95*
	(0.49)	(-1.08)	(-1.95)
Regional characteristics			
Urban	-5.46***	-1.70	-3.44***
	(-3.87)	(-1.52)	(-3.19)
Number of observations	1072	1327	1771

Notes: - Check 1: Raise the age threshold to 60 for mothers.
- Check 2: Use unadjusted transfer data.
- Estimates based on joint estimations of labour supply and transfer equations
- Marginal effects are calculated at mean and conditional on working positive hours; for dummy variables: the marginal effect is for discrete change from 0 to 1.
- ***, ** and * denote significance at 1, 5 and 10 per cent, respectively.
- Seven dummy regional variables are included.

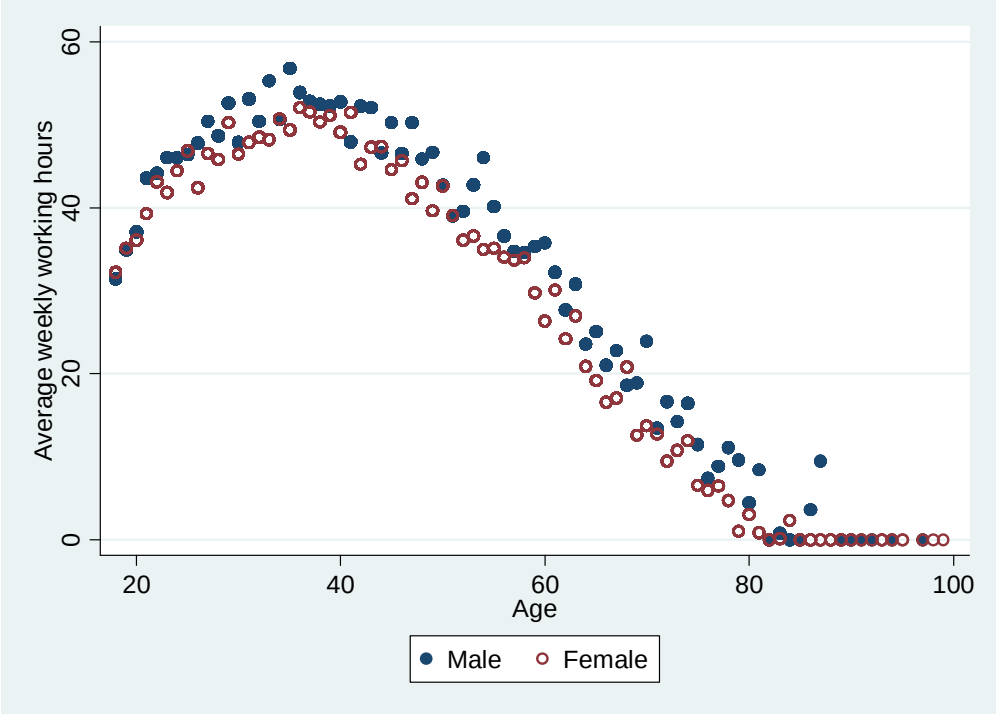
Appendix Table 3 **Determinants of coresidency of Vietnamese elderly**

(Marginal effects based on joint estimations of labour supply, transfer and coresidence)

Variables	Male	Female
Age	-0.11***	-0.07***
	(-2.72)	(-3.29)
Year of schooling	0.01***	0.01
	(2.87)	(1.22)
Married	-0.08**	-0.18***
	(-2.10)	(-6.27)
Kinh or Chinese	-0.06	-0.06
	(-1.16)	(-1.63)
Religious	-0.06*	-0.04
	(-1.87)	(-1.57)
House owner	-0.13***	-0.14***
	(-3.58)	(-4.50)
Health insurance	-0.11***	-0.07**
	(-2.89)	(-2.07)
Number of children	0.03***	0.04***
	(4.03)	(6.71)
Children' education	-0.02***	-0.02***
	(-3.13)	(-3.86)
Living area	0.18***	0.17***
	(3.18)	(4.06)
Local housing price	0.07***	0.05***
	(3.56)	(3.36)
Urban	-0.07	0.02
	(-1.46)	(0.73)
Regional dummies	Yes	Yes

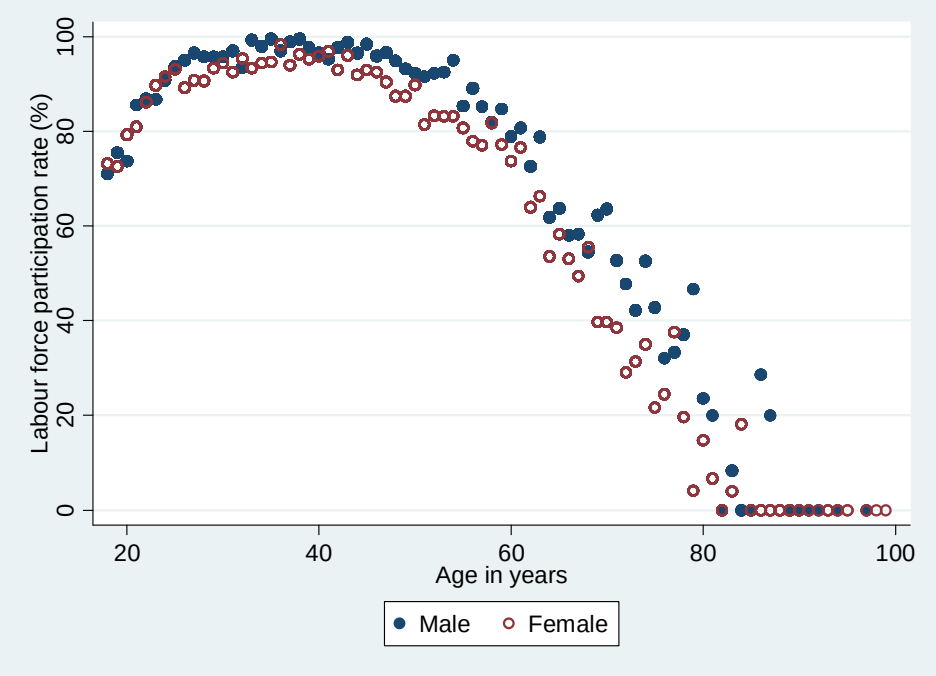
Notes: Robust asymptotic t statistics in brackets; Regression results are weighted for sampling.
Marginal effects are calculated at mean; for dummy variables: the marginal effect is for discrete change from 0 to 1.
***, ** and * denote significance at 1, 5 and 10 per cent, respectively.

Appendix Figure 1 **Labour supply by gender and age**



Source: own-calculation from the 97/98 VLSS.

Appendix Figure 2 **Labour force participation rate by gender and age**



Source: own-calculation from the 97/98 VLSS.