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Altruistic Care for the Elderly in Thailand: Does the Social Gender Norm on Altruistic Behavior Matter?

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Abstract

Ageing society poses an increasing need for elderly care and the essential role of unpaid family care in developing countries where more care burdens are imposed on women. Literature on the driver of gender care gap is limited and its association with social gender norms is both understudied and hardly measured/quantified. Using time-use data in 2014-15 and Labor Force Survey data in 2013-15 from Thailand, we first construct an altruistic time ratio for the whole sample to measure the extent to which individuals spend time on unpaid activities for others than themselves. We found that significant gender gaps in providing eldercare are associated with gender differences in altruistic time ratio. To consider the non-random selection for the elderly care, we then estimate the Tobit model with propensity score matching (PSM) for both elderly carers and non-carers and found that the social gender norm, defined as the district-level gender difference in the modes of altruistic time ratio, explains why women are more burdened with elderly care than men. To examine the underlying mechanisms behind women's time burden, we estimate a simultaneous equation Tobit consisting of elderly care time, leisure time, and time for paid work. The results show that the social gender norm indirectly reduces elderly care time for women by significantly reducing leisure time and paid work time, while the direct effect is dominant for men. The trade-off between paid work time and elderly care time is similar for men and for women, while that between leisure time and elderly care time is greater for men. Associations between elderly care and altruism or peer pressure imply that behavioural changes with a focus on social norms and social policies inducing such changes are important to achieve more gender-equitable eldercare provision besides the state provision of long-term care.

Keywords: unpaid work, time use, elder care, gender gaps, altruism, behavioral change

JEL Classification : D13, D64, D9, J14, J16, J22

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I. Introduction

The world's population is growing older due to increasing life expectancy and falling fertility rates UNDESA (2019). Over the last decades, many developed and developing countries alike have dramatically aged, posing unprecedented challenges to national health and social care systems (Ogawa et al., 2021). Meanwhile, long-term care (LTC) systems rely heavily on informal carers in both advanced and emerging economies (Courtin et al., 2014). Informal (unpaid) caregiving by family members, friends, and communities remains the primary source of LTC for the elderly in both measures, the numbers of carers and the hours they spend on eldercare (Chari et al., 2015; Courtin et al., 2014). The recent COVID-19 pandemic complicated the practice of informal caregiving in several unique ways where the elderly were among the high-risk groups (Cohen et al., 2021) and placed more burden on family caregivers while the healthcare systems depleted (Pickering et al., 2021; Prime et al., 2020).

Women represent a majority of family caregivers, and their work is likely to be unpaid. Besides running household production, women are also primarily responsible for family care. Across 13 countries in the Asia-Pacific, women spend two to ten times more on unpaid care work than men, and when paid and unpaid work are combined, women work longer hours than men each day in all countries except New Zealand (ILO & UNDP, 2018). Around the world, women and girls are performing more than three-quarters of the total unpaid care work (Addati et al., 2018). Such combined responsibilities of women often lead to restrictions in their labor supply, labor market outcomes, typically low-paid, part-time, precarious jobs (Chari et al., 2015; Charmes, 2019; Coverman, 1983) while also negatively affecting their physical and mental well-being (Kossek et al., 2019). At the household level, the population ageing resulted in a gradual shift of familial care needs from childcare to elder care. Adults may spend more years caring for their parents than caring for their children as society is ageing (Bookman & Kimbrel, 2011). Ample empirical evidence across countries shows the gender gap is biased towards women in providing unpaid care.

However, little is known about the drivers of this gap at the micro level. Using the unique nationally representative time-use data in Thailand in 2014/15, we attempt to fill the gap in the literature with a particular focus on the social gender norm on altruism.

Thailand has experienced a rapid increase in the elderly population. Over 30 years, 1994-2024, the share of elder people aged over 60 years doubled to 14.9 percent of the population in 2014 then continued to rise even faster recently, reaching 20 percent in 2024 (equivalent to 14.03 million people), according to the surveys on older persons by the National Statistical Office (NSO, 2017, 2024). Officially being a complete aged society poses an urgent need for eldercare provision in the economy and society. Although most of the elders in Thailand (99.2 percent) receive medical treatment benefits from universal health insurance and other forms, daily care is critically essential in terms of physical health as well as mental and emotional well-being (NSO, 2017).

Ample anecdotal evidence has been documented on the essential role of familial care in favor of so-far limited formal or institutional care (Ayudhya et al., 2007; Knodel et al., 2013; Knodel et al., 2018; TGRI, 2017). The prevalent preference for family members, especially adult children, over nonrelatives to be caregivers for elderly persons and the dominant tradition of relying on adult children in providing care have caused challenges for long-term care alternatives for the public and private sectors (Knodel et al., 2013). More than being altruistic, in an Asian culture like in Thailand, caring for elderly parents as being *katanyu* in Thai has been rooted in social, cognitive, physical, environmental, and economic factors (Ayudhya, et al., 2007). *Katanyu* is a duty of repayment or an act of reciprocity. *Katanyu*, rooted in Buddhist values, reflects a socially ascribed sense of obligation for adult children to show gratitude to their parents for raising them by taking care of their parents when they grow old. Netiparatanakul (2020) discusses how this social value influences elder care in Thailand.

This study takes advantage of the latest microdata from the nationally representative time-use survey in Thailand in 2014/2015. Our paper is the first study measuring elderly care based on highly accurate time-use records and analysis, while the ageing literature in Thailand has relied on older person surveys or small-scale qualitative surveys. We attempt to understand the distribution and motivation of male and female caregivers for this unpaid care work and the quality/intensity of such work by measuring primary and secondary care due to multitasking. Our study is one of the few in the empirical literature on elderly care to consider both primary and secondary activities.

The major contribution of our study to a larger body of literature in the area is not only about bringing empirical evidence on the gender gap in elder caregiving in Thailand, but we also explain that gap by looking at the origin of these patterns from economic and social perspectives. We assume, drawing upon both economics and sociological literature, that both opportunity costs of market-paid work, altruism and the social norm are taken into account to understand the gender care gap. In this sense, Thailand offers a very special case study thanks to its deeply rooted fundamental cultural values and social norms on filial piety, reciprocity and parental care. More specifically, we address research questions: (i) What is the extent of gender inequality in care work for the elderly? (ii) How does gender difference in altruistic behavior or the relevant social gender norm affect the amount of time people spend caring for older family members? (iii) How are those care burdens traded off with the women's paid work and leisure time for their own well-being? (iv) Does the social gender norm affect the elderly care time directly or indirectly through changes in paid work or leisure time?

The rest of the paper is organized as follows. Section II reviews the relevant empirical and theoretical literature on elderly care, gender, and social gender norms to motivate our empirical hypotheses. Section III summarizes the data and key variables, namely, the altruistic time ratio and the social gender norm on altruism. Section IV explains econometric models, while Section V discusses the results. Section VI offers concluding remarks with a few policy implications.

II. Literature on Elderly Care, Gender, and Social Gender Norms

Care is defined as the activity that provides what is necessary for the health, well-being, maintenance, and protection of someone or something. Care is the creation, development, and maintenance of human capabilities and the quality of life from birth to death (Folbre, 1986).

Unpaid care work refers to all unpaid services provided within a household for its members, including care, housework and voluntary community work (Elson, 2002). The activity involves mental or physical efforts and is costly in terms of time resources.

Motivations for Familial Eldercare

Two main relevant strands of scholarship can be drawn to understand the motivations of family members providing care for their elder ones, namely: (i) economics of unpaid care work and its division within households and (ii) sociological models of intrinsic motives for care provision. The idea of ‘for love or for money’ (Folbre & Nelson, 2000) and the concept of unconditional versus conditional giving (Kohli & Künemund, 2003) provide a common understanding that intergenerational transfers and caring comprise several motivations. The assistance that adult children often provide to their elderly parents may combine prosocial and extrinsic motivations (England et al., 2012). Unconditional motives emphasize altruism, reciprocity, and normative obligation, while conditional motives are more associated with direct exchange (Kohli & Künemund, 2003). Care and assistance can be motivated by both altruistic concerns for the parent’s well-being and an internalized sense of reciprocal obligations or may result from extrinsic motivations, such as direct expectations of payback or bequest from parents.

Theoretically, in economics, the costs of caregiving are often discussed as a loss of time that could be spent on leisure or paid work. Economic analysis on the motivations of care work has focused more on quantitative aspects such as the forgone income, time costs on care or even the low-paid formal care work, i.e. extrinsic motivations, but it often understates the significant nature of care on intrinsic motivations and personal attachment (Folbre, 2012). Unlike other goods,

motivations for care provision go beyond the extrinsic rewards emphasized by economists (wages, benefits, expected bequests) or even sociologists (social approval) to include prosocial motivations with intrinsic rewards, such as gratification to help or a desire to make care recipients better off (England et al., 2012). Hence, the simple contrast between doing something for love and doing something for money is not necessary to be exclusive in familial care work. Instead, they can be combined in enormous variations (Folbre & Nelson, 2000).

Meanwhile, sociological models also theorize motivations for interactions within the family through five primary motivations, including (1) altruism, (2) exchange/reciprocity, (3) trust and common preferences, (4) biological pre-dispositions and (5) social/cultural norms (Bianchi & Joseph McGarry, 2008). In particular, the notions of altruism and reciprocity to motivate intergenerational relationships can also arise from and are maintained by social and cultural norms. Similar conclusions were found in sociological research, which shows that motivation for giving and caring to kin consists of a complex pattern with a large degree of interactions among different motives (Kohli & Künemund, 2003). Intrinsic motivation plays a vital role in care work, and prosocial motivation is uniquely central to the provision of high-quality care (England et al., 2012). Altruistic behaviors, stemming from many motives, are important for family caregiving.

Most countries in the Asia-Pacific region still rely on family to support older persons in terms of financial support, assistance, and care. Altruism and filial piety toward parents remain core values and cultural norms in society underlying intergenerational relations in many Eastern and South Asian societies. Adult children in Eastern Asia typically hold strong beliefs and social norms regarding respect and obligations to assist their parents, sacrificing for parents, co-residing and taking care of parents in return for the parental generation's devotions (Knodel et al., 2018).

In the psychological literature, social connectedness is the degree to which people or groups have relationships that create a sense of belonging and being cared for, valued, and supported. Social connectedness can facilitate the creation and impact of social norms, which are the unwritten rules

of beliefs, attitudes, and behaviors that are considered acceptable in a particular social group or culture (Lapinski and Rimal, 2005). Therefore, humans are strongly influenced by what others do (Cialdini, 2007). Norms have a stronger impact if the target audience is closely related to the group doing the desired behavior (i.e. 'people like you'), which means strong peer effects on behavior (Schultz et al., 2007). In other words, peer effects on caring responsibilities can emerge because social connectedness can increase the exposure and awareness of social norms among people who share similar experiences, culture, and common pursuits, which can also enhance the feeling of belonging to one's family or other people with shared identities (Bayer et al., 2016). Peer effects also emerge because social connectedness can also foster the development and maintenance of social norms by providing feedback and reinforcement for conforming or deviating from the expected behaviors (i.e., people who are socially connected are more likely to receive approval or disapproval from others based on their adherence to social norms).

Similarly, some sociologists emphasize the social construction of norms and values, examining the ways they may be shaped by institutional arrangements of familial caring (Bianchi & Joseph McGarry, 2007). Empirically, the role of women, particularly daughters, as primary caregivers for parents is well documented from the early literature of social work that daughters are more likely than sons to be providing care to an impaired parent (Dwyer & Coward, 1991; Pratt et al., 1989). Historically, women have been the primary and often only caregivers, while the role of sons as primary elder caregivers drew much later attention (Coward & Dwyer, 1990; Dwyer & Coward, 1991). Elderly care is also dependent on the network of siblings, where daughters from mixed-gender networks reported significantly higher levels of stress and burden and more hours spent on caregiving than sons (Checkovich & Stern, 2002; Grigoryeva, 2017).

Silverstein et al. (1995) examined gender differences in the factors that influence middle-aged children to provide instrumental social support to their elderly parents, which indicated that intergenerational affection is the factor that motivates daughters to provide support, while filial

obligation and legitimation of inheritance most motivate sons. Campbell and Martin-Matthews (2000) investigated socio-demographic, family structure and other factors that predict men's filial care involvement with their older parents or parents-in-law. This revealed that living nearby and being without siblings may “default” men into being more involved in care. Gender inequality can be seen even among older people due to the earlier statutory retirement age for women in many countries, which leads to greater inequality in income and caring responsibilities (ILO & UNDP, 2018). In summary, sociocultural research has recognized men's filial care as a more complex issue, which is still a challenge to our understanding of the complex association between gender and patterns of eldercare.

Eldercare in Thailand

Thailand has turned into an ageing society with a rapid increase in the elderly population and a decline in fertility rates (Peek et al., 2015, 2016). At the macro level, the age dependency ratio started to rebound from the trough in 2010 (39%) to 42% in 2020 (World Bank, 2021). Low fertility and high longevity mean a switch of the dependency ratio from the young (0-14 years) to the old (60 years and over), causing an increasing burden on the economy by the elderly population (from 9% in 2002 to 18% in 2020). Equivalently, at the household level, it would constitute a gradual shift of familial care needs from childcare to elder care as in high-income countries (Bookman & Kimbrel, 2011).

Although most of the elderly in Thailand (99%) receive medical treatment benefits from health insurance in one type or another (83% by the universal health coverage scheme (UHC), i.e., the “gold card”) (NSO, 2017), the informal care for older members within households is critically important with regards to physical and mental health as well as emotional well-being in their daily lives. Despite the demographic change described above, financial and non-financial support for older parents remains largely intact (Teerawichitchainan, 2020).

Gender inequality among caregivers is also an important issue in Thailand. Traditional Thai society dictates that women are to care for their homes and families, including both children and ageing relatives (Peek et al., 2015). It is also a deeply entrenched normative acceptance that women (such as daughters and daughters-in-law) are the appropriate gender to provide personal care (Knodel et al., 2018). As for spousal caregiving, women are more likely to be the care providers to their husbands who are typically older than their wives. There has not been a cultural adaption with men adopting larger domestic responsibilities, given the changing role of women both at home and outside their home as breadwinners when few families can afford to survive on a single income, especially in urban areas (Peek et al., 2016).

Hypotheses

Based on the above discussions about the gender bias in eldercare provision due to economic, sociocultural, and behavioral factors in Thailand, we will test the following two novel empirical hypotheses.

H1: Due to a higher level of individual altruism and the gender social norm on altruism, women provide longer daily elder care compared to men.

H2: Engaging in paid work or leisure activities results in a reduction in elderly care time. This reduction is more pronounced among women than among men.

III. Data

Care activities in time-use survey

This study uses a cross-sectional dataset from the most recent nationally representative time-use survey in Thailand conducted from July 2014 to June 2015, sourced from the NSO (2016).

Extensive research on Thai ageing relies extensively on the Older Persons Survey dataset of the NSO. To our knowledge, no studies have analyzed elder care using this Thai time-use survey

dataset.² Our unique approach has not been adopted in the literature to understand the gender differences in elderly care behaviors in Thailand. Since 2009, the NSO of Thailand adopted international standards of the trial ICATUS 2005 (International Classification of Activities for Time Use Statistics) of the United Nations (NSO, 2017). Time diaries are a 24-hour record of respondents' activities, which are typically a description of activities undertaken and the time spent on these activities, including start time and end time, during specified time intervals of 10 minutes. Only until 2016 was there a more official guideline on time-use statistics (United Nations, 2016). Therefore, the dataset in this study follows the old classification of 15 major divisions of activities, of which group 7 covers work providing unpaid caring services to household members (Table A1 in the Appendix). Our analysis focuses on the second class of this group (0712), representing care work for dependent adults (while group 0711 is for childcare). Within this class, there are three categories of care, namely, caring for adults/physical care (07121), caring for adults/emotional support (07122) and accompanying adults to places (07123). In particular, unpaid care services refer to caregiving services for the household and family members and for other households without remuneration.

First, this dataset contains 73,306 cases with complete information.³ We first focus on individuals and their episodes of activities involved with adult care as their main task or a

² A limited number of studies deployed previous rounds of time-use surveys in 2002 and 2009 (Floro & Pichetpongsa, 2010; Pichetpongsa & Floro, 2007; Yokying & Floro, 2020; Yokying et al., 2016), but these studies looked at the overall unpaid work.

³ It was a survey stratified by a three-stage sampling with the Bangkok Metropolitan Area (BMA) and 76 provinces as the first strata. The second and third strata were, respectively, households and individual household members aged from 6 years old.

secondary activity in each time slot as a treatment group, who spent at least 10 minutes in adult care for their family members and those without any episodes of adult care as a control group. The former covers individuals, while the latter spent no time in adult care. The number of observations for the former is 733 individuals aged from 6 to 85 years old. Although our descriptive analysis covers all age groups, the regression analysis is limited only to caregivers aged 15 years old and over - the working age in Thailand, reducing this sub-sample to 664 caregivers. These caregivers are matched with 55,697 non-caregivers based on the individual and household characteristics using PSM. 56,343 individuals are used for the regression analyses.

Second, it should be noted that although we cannot specifically separate elder care from general adult care due to the lack of information on care recipients (and their age). We make a “strong” assumption that these care activities are for elder persons while, including the disabled or sick members of the households who are not in old age. The assumption is based on information from the 2015 older person survey (NSO, 2016) about the perspective of care recipients, those who received care from family members as part of their personal or health/medical care-

Third, as any other activities, adult care is recorded as either a primary (main) or secondary (supplementary) activity, which is carried out simultaneously with the main task, implying multitasking. It is noted that elderly carers are involved in care as their main task or a secondary activity in each 10-minute time slot. The number, hence, is 733 individuals aged from 6 to 85 years. We measure the care workload by the number of episodes (times) and the total duration (minutes) in one day, reflecting the extensity and intensity of the work. There are 1,405 episodes from 633 caregivers doing care work as primary tasks and 171 episodes (135 individuals) as secondary tasks, making a total of 1,564 episodes (733 individuals) involved in adult care. Covering both primary and secondary tasks is an important contribution since time-use studies typically focus solely on primary activities. Although our descriptive analyses cover all age groups,

the regression analyses are limited to caregivers aged above 15 years old - the working age in Thailand, of which 664 are elderly caregivers.

Altruistic Time Ratio

We construct the ratio using the formula below:

$$\text{Altruistic Time Ratio} = \frac{\text{Time spent on others}}{\text{Time spent on self}} = \frac{O_i}{S_i}$$

The subscriptive i in the above formula is for each individual i , O stands for “other”, whereas S stands for “self”. This altruistic time ratio has strong foundations in the behavioral economics literature, as it is analogous to the concept of 'splitting the pie' in dictator games, which are used to measure altruistic social preferences. In these games, individuals are given a certain amount of resources to divide between themselves and others (Forsythe et al., 1994). In our case, the ratio is calculated in terms of 'time for others' versus 'time for oneself,' whereas in a typical dictator game, it involves the proportion of money allocated to others versus oneself. Therefore, we conceptualize altruism as the course of actions beyond just motivations, meaning that the way people spend their time indicates altruistic action. There exists some literature supporting the comparison between “other” and “self” using different types of resources such as money, time, and love, as in Couch et al. (1999). For instance, there is evidence from the literature on experimental games - where altruism was measured in the lab using dictator games. In a standard dictator game, each subject is assigned a role as either a dictator or a recipient. Dictators are given fixed resources (money or tokens), and they are paid for the amount they decide to keep for themselves, while recipients are paid for the amount the dictators decide to pass. On average, dictators give about 28 percent of the pie (Engel, 2011). The modified dictator games (Andreoni & Miller, 2002) were created to identify heterogeneous distributional preferences among populations. Participants in such studies make multiple allocation decisions by playing a series of dictator games that vary both the relative price of giving and the available budget. Varying the price allows measuring selfishness (allocation to

self) while varying the endowment allows measuring efficiency-equality tradeoffs (concerns for increasing total payoffs versus concerns for reducing differences in payoffs between self and others). Therefore, such games measure distributional preferences which have been used to explain issues such as political participation (Dawes et al., 2011), career choices and, more relevant for our study, intergenerational sharing (Porter & Adams, 2016) and gender difference (Eckel, 2008). This literature would justify our altruistic time ratio, which uses the same structure where the agents are supposed to distribute time rather than money or tokens.

The concept of the altruistic time ratio also has a sociological basis, as it reflects broader sociological theories on altruism, social exchange, and time allocation; for example, theories of social exchange explore how individuals invest time and resources in relationships, motivated by altruism and social obligations (Blau, 1964). From a sociological perspective, altruism is often viewed as behavior that benefits others at a cost to oneself, influenced by social norms and cultural expectations, such as caregiving roles. The allocation of time to others versus oneself can be understood through frameworks like *social capital theory*, where time is considered a resource invested in relationships, family, or community, aligning with studies of unpaid labor and caregiving. Sociologists such as Pierre Bourdieu have studied how time, like other resources, can be allocated in ways that reflect social obligations and structures (Bourdieu, 1986). In terms of gender, women are often expected to dedicate more time to caregiving, reflecting socially constructed gender roles and norms, which influence how altruistic time is distributed.

Empirically, based on 15 major divisions of activities in ICATUS used in Thai time use survey data and on the two key questions asked in the survey, we can calculate the amount of time individuals spend on OTHERS (O) and on ONESELF (S) to come up with the “Altruistic proxy” time ratio. The two key questions are:

1. Is this activity PAID or UNPAID?

2. For whom are you doing this activity? The answer can be one of the following: (1) oneself, (2) own family members, (3) other family members, (4) own and other family members, (5) community.

First, we focus strictly on the time spent on *unpaid* activities by excluding the time an individual spends on his/her committed paid work. The core idea here is that, given a certain amount of time left after a committed work/study, how an individual allocates her time on (and for) others versus on oneself (without any expectation of monetary or in-kind remuneration). By this definition, this indicator is not specific to the time spent only on older household members, but it reflects an overall attitude toward people in family, community and society.

Second, to be counted as “time for other”, an activity in the survey must meet two conditions, namely UNPAID for the 1st question and all options except the first for the 2nd question. Therefore, it covers all activities in the major divisions 6 and 7 in Table A1 in the Appendix as well as division 8 if the community work is unpaid. As for “self-time”, two similar conditions include UNPAID and option 1 for the 2nd question. Certainly, all the major divisions of activities from 10 to 15 fall under the “self-time”. However, we also double-checked the purpose of each following question 2. Some examples to clarify this definition are: When you cook a meal at home only for your own consumption but not for other family members, it is counted as “self-time” even though it is unpaid. If a mother of three spends two hours each day preparing breakfast and dinner for the whole family, it will be considered as “time for others” even though she also consumes the meals she made.

The two extreme examples we could imagine are a *very altruistic* man/woman who spends most of their available time caring for their children and their elder parents, cooking, cleaning, laundry or even helping their frail neighbors while spending very minimum time on their sleep, watching TV, let alone playing sports or attending social events, etc. On the other extreme, we have a *very selfish* (self-interested) man/woman who spends no time at all on other people around

them but all their free time after work on their own interests like sleeping, watching TV and social media, and hobbies.

Regarding the quality of time spent on others as an aspect of altruistic behavior, we do not have qualitative information from the time-use survey to evaluate people's satisfaction or happiness when receiving or spending time with others. However, we presume that the amount of attention you dedicate to your activities reflects your effort and level of care. For this, the survey includes information on both primary and secondary tasks, asking respondents, 'What else are you doing at the same time as performing this primary activity?' Multitasking is common in our daily lives. A typical example is young parents working on their computers at home while keeping an eye on their toddlers playing around the house. This is referred to as supervisory care, and we count it as 'time for others' in addition to the same time spent on paid work. Similarly, an individual might watch TV or listen to music while cooking or doing domestic chores. In this case, the time is double counted as 'time for others' and 'time for oneself.' This concept is factored into the second version of the altruistic time measure, which accounts for both primary and secondary activities.

The Social Gender Norm on Altruism

Although our objective is to examine the altruistic motivation of doing elderly care work, the regression of individual's elderly care time on the individual altruistic time ratio can be empirically problematic. There is a risk of endogeneity as elderly care time is part of the unpaid work spent on others. Therefore, the estimated coefficient is likely to be biased upwards. To mitigate this endogeneity problem, we define social gender norm indicator as the difference between the averages of the individual altruistic time ratios for women and men at the district level. The assumption here is that the level of gender difference in altruism in the locality where individuals live is likely to influence the extent to which the individual is altruistic to others because of the interaction or the networking with other people in a particular locality. For example, drawing upon a theory of social heuristics, Rand et al. (2016, p. 389) showed that 'women are expected to behave

altruistically, and are punished for failing to be altruistic, to a much greater extent than men', the result of which is supported by the dictator experiment (Kamas et al., 2008). More specifically, the social gender norm is defined as:

$$\text{Social Gender Norm on Altruism}_k = \left(\frac{\bar{O}_i}{S_i}\right)_{fk} - \left(\frac{\bar{O}_i}{S_i}\right)_{mk}$$

where k stands for district, f stands for females and m stands for males.

Our social gender norm reflects socially constructed expectations and standards of behavior that influence individuals' actions based on their gender, supported by substantial evidence that social gender norms shape behaviors and social systems, including expectations around gendered roles such as caregiving, employment, and leadership (Cislaghi & Heise, 2019). Social gender norms refer to the informal rules and the cultural and societal expectations that dictate how men and women are supposed to behave in altruistic or caregiving roles (West & Zimmerman, 1987). These norms are socially constructed and reinforced through institutions like family, education, and religion (Ridgeway, 2011). In the context of altruism, gender norms can influence how men and women engage in unpaid care work, with women often expected to take on more nurturing roles.

Our model focuses on how the social norm affect time spent on caring for elder family members. Specifically in this context, our assumption is that the level of gender difference in the altruistic behavior at the district level reflects this norm. This norm, in return, influence individuals' behavior through social interactions and networking within a close community, where men and women may face different expectations in terms of providing unpaid care or performing altruistic acts, based on cultural or societal standards.

IV. Econometric Models

Our econometric analyses are based on nationally representative data covering both individual and household variables. The latter is created by merging the LFS aggregated household-level data to the

individual-level time-use data in respective quarters of 2014/2015. It is noted that the individual decision on whether he or she provides any time for elderly care in any form is not random. Empirically, addressing this sample selection problem is a challenge because the factors influencing the decision to take part in elderly care work also affect the amount of care time. For this reason, no instrumental variable seems to be appropriate in this case and we, therefore, need to match the individuals with the elderly care time and those without (non-carers) using Propensity Score Matching (PSM). We then fit the Tobit models to estimate the probability of undertaking unpaid elder care work, taking into account the truncation of the elderly care time at 0, both with and without PSM. That is, we drop the individuals who are not comparable (outside the common support region) and take into account the differential probability of providing elderly care with the sample weight. Explanatory variables represent economic, social and behavioral theories reviewed in Section II. The basic equation for the Tobit model is specified as Equation (1).

$$Elderly\ Caretime_i = \beta_0 + \beta_1 Social\ Gender\ Norm_k + \mathbf{X}_i \boldsymbol{\beta}_2 + e_i \quad (1)$$

where $Caretime_i$ is the duration of elderly care (in minutes) per day as both primary and secondary activities or only main activities. \mathbf{X}_i is a set of control variables, including household and individual characteristics and regional variables.⁴ Household variables range from household composition variables (e.g., the number of children; the number of adult male or female household members) to age, gender and occupation of the household head. The individual variables include

⁴ We cluster standard errors at the individual level and at the district level because only one individual is randomly chosen from each household; that is, there is no more than one individual with time-use information in each household.

age, marital status, relationship to the household head, education level, and employment status. \mathbf{X}_i also includes regional dummies to control where the individual lives. It also includes variables indicating whether people tend to spend more time in elderly care on the day off from their regular/typical schedule (e.g., weekdays for those who work in the labor market from Monday to Friday). In Equation (1)' below, we replace *Social Gender Norm_k* by the individual altruistic time indicator to examine the association between altruism and elderly care time, given the limitations discussed earlier. Equations (1) and (1)' are estimated for all the sample, females or males, to examine the gender difference in the effect of the social gender norm or altruism on elderly care time.

$$Elderly\ Caretime_i = \gamma_0 + \gamma_1 Altruistic\ Time\ Ratio_i + \mathbf{X}_i \gamma_2 + \varepsilon_i \quad (1)'$$

Finally, to measure trade-offs in time allocations, we propose to estimate a simultaneous equation Tobit model with three equations for the elderly care time, leisure time and paid work time with instrumental variables for the latter two (a system of equations (2) below) following the empirical literature (Kimmel & Connelly, 2007; DeGraff & Levison, 2009). Here, we take into account the truncation at 0 for these three variables with the simultaneous equation Tobit model.

It should be noted that these three time-variables form a subset of 24 hours, where the remaining time includes childcare, unpaid volunteer work, self-learning, and personal care, among others. However, there should be substitutions among the three factors because, within the time constraint of 24 hours, people can only do more of one activity by reducing their time on another activity. We explore how time spent on paid work and leisure can be swapped for elder care. Elderly care is time-consuming and often interferes with paid employment, imposing high opportunity costs (Chari et al., 2015) and negatively influencing women's capacities and capabilities (Vasudevan & Raghavendra, 2022). In econometric analysis, this translates to

simultaneous causality between the dependent variable and its predictors, often referred to as the “chicken and egg” problem (Coverman, 1983; Heitmueller, 2007). Such an endogeneity problem would require simultaneous equations with instrumental variables to avoid under or over-estimating the true effects and inconsistent estimators (Carlson, 2021; Sarkisian & Gerstel, 2004).

Elderly Caretime_i

$$= \alpha_0 + \alpha_1 \text{Leisure time}_i + \alpha_2 \text{PaidWork}_i + \alpha_3 \text{Social Gender Norm}_k + X\alpha_4 + \varepsilon_i$$

$$\begin{aligned} \text{Leisure time}_i = & \pi_0 + \pi_1 \text{Peer Leis Mode}_{k,g,a} + \pi_2 (\text{Peer Leis Mode}_{k,g,a})^2 \\ & + \pi_3 \text{Social Gender Norm}_k + X\pi_4 + u_i \end{aligned}$$

$$\begin{aligned} \text{Paidwork}_i = & \theta_0 + \theta_1 \text{ImputedWage}_i + \theta_2 (\text{ImputedWage}_i)^2 \\ & + \theta_3 \text{Social Gender Norm}_k + X\theta_4 + \varepsilon_i \end{aligned} \quad (2)$$

Leisure time is instrumented by the mode of peer’s leisure time in the gender-age-specific cohort at the district level (by excluding those with positive elderly care time), k , denoted

Peer Leis Mode_{k,g,a} where g shows gender and a is the five-year band in the working age. This is based on the theoretical model using the coordination game (Michaeli and Spiro, 2017), which shows that if people are heterogenous in their taste (e.g., sexes), the ‘biased social norm’ which is different from the average taste (e.g., the mode), can be dynamically sustained over time.

Empirically, the instrumental variable defined as the mode of the group, the most frequently observed value, is attractive as it is more likely to be exogenous and meet the exclusion restriction than the group average.⁵ An underlying assumption is that the peer pressure from those in the same age group and gender is important in the individual decision-making process of how long they

⁵ The group mode has been estimated by the user-written Stata command *hsmode* (Cox, 2007).

spend leisure in a day. We also use the squared term of $Peer\ Leis\ Mode_{k,g,a}$, assuming that the marginal effect of the peer pressure is diminishing.

The time for paid work is also estimated by the Tobit model with the instrumental variable, the imputed wage at the province level. The Mincer-type wage equation is estimated separately by using the LFS dataset in 2013 for all individuals aged above 14 years in the survey sample who reported monthly wages from paid work⁶ (either formal or informal employment) with explanatory variables, such as age/age groups, sex, education, location, region, industry, and occupation. The econometric estimates from LFS were used to derive the imputed/predicted wage for each individual with the characteristics mentioned above and working in a specific industry in a specific occupation in a particular area and region (which are inserted as fixed effects).⁷ Imputed wages based on the exogenous individual characteristics and industry/occupation distribution at the province level a year ago are considered exogenous. The higher wage may induce people to work in the labor market (i.e., extensive margin) and to increase hours of work (i.e., intensive margin) under certain circumstances, with high elasticities for married women and low elasticities for married men and with a life-cycle allocation of time (Heckman, 1993). The relationship between imputed wages and labor supply can be non-linear, as a positive effect of the former on the latter can be weaker at the higher level of wages. We, therefore, use the squared term of imputed wage as

⁶ For imputations, we have used the data only for positive wages to make the computation based on the large data easier.

⁷ Individual variables from the time use survey data (e.g., age, sex, education), as well as province averages from LFS (e.g., industry, occupations), were used to derive individual-level predictions. We have used the common variables between LFS and time-use survey data and derived out-of-sample predictions using the estimates of the wage equation.

an instrumental variable. $Social\ Gender\ Norm_k$ is used as one of the explanatory variables as it will affect labor supply differently by gender.

V. Results

Descriptive Analyses

Table 1 shows that care work for older adults is provided more by women than by men, regardless of whether it is the main or secondary activity. In the sample of 663 caregivers doing this primary task, almost two thirds are women. The share of women is more than half for secondary tasks. Women also do elderly care work for a longer duration in a day as the main or secondary task.

[Table 1 to be inserted]

Here, we briefly summarize the average altruistic time ratio by gender, employment and marital status.⁸ The data have shown a significantly higher level of altruistic time ratios among women. We have found in the case only for primary activities (and for both primary and secondary activities) that the average value of 0.149 (0.139) meaning that, on average, for every 100 minutes spent on themselves for their interest, women spend almost 15 (14) minutes on others, while men spend only 3.9 (4.2) minutes. Disaggregating the altruistic time indicators by marital status, we found that married people are more time altruistic than those who are single, divorced or separated, regardless of age or sex. While marriage can increase family commitments and time spent for other family members, including elder in-laws and children, it may burden more women than men as

⁸ Figures will be provided on request.

men remain less altruistic with or without getting married. It is also noted that the largest gender disparity in ratios is found among the prime working-age married people (0.18-0.26).

Employment status can affect the time availability and flexibility of workers. Our classification is based on people's participation in the labor force and their work status. The category "unemployed/inactive" includes the unemployed and those who are not in the labor force, such as homemakers, housewives, full-time students, retirees, etc. Results shows that for both sexes, wage workers seem to be the ones with the lowest time altruism as compared to people who have more free time like the unemployed/inactive or those with more time flexibility like own account workers who are self-employed, people who work for their family business without pay, or employers with their own business. However, such differences are very thin and not statistically significant among men, while, among women, the gap is much wider and a similar pattern is observed for both primary tasks and the sum of primary and secondary tasks.

Econometric Analysis

First, following seminal works by Rosenbaum and Rubin (1984, 1985), we have applied Propensity Score Matching (PSM), where individuals with a positive value for the elderly care for primary and secondary works (or only primary works) are matched with those without by estimating the probit model (Online Appendix Table 2). The covariates consist of individual characteristics (e.g., education, the relation to the household head, marital status) from the time-use survey data in 2014/15, the household characteristics (e.g., household composition by age/gender groups, gender, age and occupation of the household head) sourced from the Labor Force Survey data in 2014/15 and matched into the time-use survey data, region dummies, urban dummies and whether the survey day is a regular/typical day constructed by time use survey data. We have made all the covariates balanced for all the blocks so that the balancing property is satisfied for treated and control groups, making the sets of covariates for the probit and subsequent regressions slightly

different.⁹ The results of the Probit model show that lower-educated, older people, married children of the household head (rather than in-law children) are more likely to be engaged in elderly care, and those in the household with school-age children, married children. These results are used to make treatment and control groups comparable in subsequent regression analyses.

A Single Equation Tobit Model

To test whether the social gender norm (and the individual altruistic indicator) influences the elderly care time and whether the effect differs by gender, we have estimated the single-equation Tobit model with PSM¹⁰ to consider the truncation at 0 using all the samples as well as subsamples for females and males. Tobit results for primary and secondary activities are shown in Table 2, those for primary activities in Online Appendix Table 3.

[Table 2 to be inserted around here]

Cases 1- 3 in Table 2 correspond to Equation (1) with *Social Gender Norm_k* (*SGN*), and Cases 4- 6 in the same table show the estimates of Equation (2). Cases 1 and 4 are based on the entire sample, Cases 2 and 5 are on females, and Cases 3 and 6 are on males. While the social gender norm does not affect the elderly care time in the entire sample (Case 1), it is striking to find that it increases the elderly care time for women and decreases it for men significantly. That is, a stronger

⁹ Online Appendix Table 2, Figure 1, and Figure 2 show that treatment and control groups are broadly balanced.

¹⁰ We have multiplied the sample weight and PS weight adjustment (1 for treatment and $ps/(1-ps)$) for controls after dropping the observations outside the region of common support (Hirano and Imbens, 2001).

social gender norm in a district where women are, or should be, more altruistic women, lead to more elderly care work for women while reduce it for men. If *SGN*, or the gender gap in altruistic time ratio at the district level, increases by 10% relative to a man on average in a district, she tends to spend more time (33.7 minutes) on the elderly care than a man (Case 2).¹¹ On the other hand, the same change in *SGN* decreases the elderly care for a man by 28.2 minutes (Case 3). That is, the social gender norm on altruism tends to make women more burdened on elderly care. On the other hand, *Altruistic Time Ratio_i* (*ATR*) is significantly and positively associated with elderly care time. If an individual spends 10% more time for unpaid work for others rather than for themselves (i.e., *ATR* increases by 10%), they tend to increase the care time by 39.9 minutes (all sample, Case 4), 41.2 minutes (females, Case 5) or 43.7 minutes (males, Case 6). That is, while individual

¹¹ It is noted that the estimated coefficient of the Tobit model does not exactly match the marginal effect of the explanatory variable (X) on the dependent variable (Y) above zero evaluated at the mean of X (McDonald and Moffitt, 1980). However, our discussion here assumes that the Tobit coefficient closely represents the marginal effect because (i) we are interested in comparing the estimated coefficient of the single-equation Tobit and the multiple equation Tobit model (based on the Stata command, *mv Tobit*), while the command '*margins, dydx(*) predict (ystar(0,.))*' is not applicable to the latter, (ii) the marginal effect or the average partial effect derived by that command for the single-equation Tobit is very similar to the Tobit coefficient for the multiple equation Tobit model, and (iii) the small difference between the Tobit coefficient and the marginal effect does not matter if researchers are interested in the effect of X on the expected value of Y of the underlying population (*ibid.*, 1980), which corresponds to both elderly carers and non-carers in our case.

altruism tends to increase elderly care time for both sexes, the social gender norm on altruism shifts the elderly care time from men to women. If we focus only on the primary activities of elderly care, the same pattern of results can be found (Online Appendix Table 3).

The results on control variables show broadly intuitive results. (i) An increase in the number of adult male (female) members is correlated with a decrease (an increase) in elderly care time (Cases 4 and 5); (ii) age of the individual and its squared term are positively associated with elderly care time, implying that the elderly care time increases disproportionately as an individual gets older, (iii) people with primary and secondary education tend to spend more time on elderly care, (iv) married children spend more time on elderly care than unmarried children, (v) people tends to spend less time on the elderly care on the typical/regular day than non-typical days, and (vi) an individual belonging to female-headed households tends to spend longer time on elderly care.

Simultaneous Equation Tobit Model

Table 3 and Online Appendix Table 4 present the results of a simultaneous equation Tobit model where dependent variables are for the elderly care time, the leisure time, and the paid work time. The former is the case where a dependent variable covers only the elderly care time reported as the primary work, whereas the latter is for both primary and secondary work. Case 1 is for the entire sample, Case 2 is for females, and Case 3 is for males.

Leisure time is instrumented by the typical peer leisure time (i.e., the mode of leisure time at gender-age-province cohort) and its squared term. The typical peer leisure time is positive and statistically significant in Cases 1-3, with its squared negative and significant in Cases 1-2 (Table 4). That is, if people surrounding you in the same gender and age group spend more time on leisure, the person tends to spend more time on leisure, but at a higher level of the peer leisure time, the association gets weaker. On the other hand, paid work time is instrumented by the imputed wages using the LFS in 2013 and its squared term. The imputed wage is positive and statistically significant in all cases. If the imputed wage (measured in logarithm) increases by 1%,

paid work time on average increases by 74 minutes for the entire sample, 66 minutes for females, and 86 minutes for males. The squared term of the imputed wage is positive in all cases and significant in only Case 2. That is, the potential wage opportunities with higher wages would induce people to increase paid work time, and its effect is higher at the higher level of wages for women.

[Table 4 to be inserted around here]

Social Gender Norm (*SGN*) on altruism is used as an explanatory variable for all the three dependent variables, elderly care time, leisure time and paid work time, to examine how *SGN* influences elderly care time directly (in the elderly care time equation) and indirectly through changes in leisure or paid work time and their substitutions with elderly care time. On the direct effect, *SGN* is negative and statistically non-significant in Case 1 and positive and non-significant in Case 2 (females); hence, we cannot derive any firm conclusions, although a positive coefficient for females in Case 2 is consistent with the results presented in Table 3. On the other hand, *SGN* is negative and statistically significant in Case 3 (males). This implies that if *SGN* or the gender gap in altruistic behavior is higher by 0.1, then men tend to spend 37.7 minutes less time on elderly care, other factors being unchanged.

On the indirect effects of *SGN*, *SGN* reduces leisure time, where people tend to spend 7.9 minutes less time on leisure on average if *SGN* increases by 10% (Case 1, the entire sample). However, the substitution effect between leisure time and elderly care time is not significant, so we cannot derive any firm conclusion regarding the indirect effect through the reduction in leisure time. *SGN* is statistically non-significant in the paid work equation in Case 1.

In Case 2 for females, *SGN* is negative and significant in the leisure time equation, and leisure time is negative and significant in the elderly care time equation. Therefore, the result implies that

if the gender gap in altruistic time ratio widens by 10%, they tend to reduce their leisure time by 15.1 minutes, which would increase the elderly care time by 10 minutes (-15.1×-0.662), explaining about 30% of the overall positive effect (33.7 minutes) in Case 2 of Table 3. On the other hand, *SGN* is negative and significant in the paid work equation, and paid work time is negative and significant (-0.495) in the elderly care time equation. Hence, the same 10% increase in *SGN* will lead to a reduction in the paid work time by 12.2 minutes on average, leading to an increase in elderly care time by 6 minutes ($= -12.2 \times -0.495$), explaining 18% of the overall positive effect (33.7 minutes) in Table 3. However, there is a statistically significant substitution effect from paid work time to leisure time (-0.345). So, the indirect effect of *SGN* will be reduced by 2.8 minutes ($= -12.2 \times -0.345 \times -0.662$), 8% of the overall effect of 33.7 minutes. Though statistically insignificant, the estimated coefficient of 184.64 would imply that the 10% increase in *SGN* will lead to an increase in elderly care time by 18 minutes (53%). We can thus infer that the change in the social gender norm on altruism, where women are more altruistic than men, would directly increase elderly care time (53%), whereas it also indirectly increases it through the reduction in leisure time and paid work time (40%). 7% is an unexplained component.

The results in Case 3 (males) imply that the direct effect of *SGN* is statistically significant with an estimated coefficient of -377.18 , though it is significant at the 10% level. So, a 10% change in *SGN* directly reduces elderly care time by 37.7 minutes on average. Men's leisure time will not be influenced by *SGN*. On the contrary, a 10% increase in *SGN* increases men's paid work by 7.1 minutes on average, leading to a 3.7-minute reduction in men's elderly care time (7.1×-0.515). However, the same increase in paid work reduces leisure time by 2.9 minutes (7.1×-0.412) through the significant substitution effect from paid work time to leisure time. This will increase elderly care time by 1.5 minutes (-2.9×-0.505), making the indirect negative effect of *SGN* 2.2 minutes. We can infer that, while men reduce elderly care time indirectly through the increase in paid work time (by 2.2 minutes, 8% of the effect of *SGN* on elderly care time, 28.2 minutes, in Case 3 of

Table 3), the direct negative effect of SGN on elderly care time (by 37.7 minutes, 134% of the estimate in Case 3 of Table 3) is dominant.

It is interesting to find that the substitution effect from paid work time to elderly care time is similar between females (-0.495) and males (-0.515) and statistically significant at the 1% level after controlling for the endogeneity, but that from leisure time to elderly care time is larger for females (-0.662) than for males (-0.505) and significant at the 1% level. So, if a woman and a man reduce the same time from leisure time, the woman tends to increase elderly care time 31% more than the man on average.¹²

The above results show how the social gender norm differently influences elderly care time between men and women through their behavioral changes. First, consistent with the results in Table 3, a stronger social gender norm greatly reduces elderly care time directly for men but not for women, while its effect on elderly care time for women is statistically non-significant with a positive sign. Second, although the substitution effects between care time and paid work time are similar among women and men (-0.495 *versus* -0.515), the striking difference is found in how the social gender norm causes men and women to supply their labor in the market in opposite directions (-122.99 *versus* 70.703). If the *SGN* increases by 10%, women tend to work less, about 12 minutes per day, while men tend to work more, about 7 minutes. *SGN* influences women and men in a strikingly different way by significantly reducing women's leisure time (where a 10% increase in *SGN* leads to a 15-minute decrease in leisure time) while it negligibly and insignificantly affects men. Overall, we find that the social gender norm indirectly reduces elderly care time for women by significantly reducing leisure time and paid work time, and the direct

¹² If we consider both primary and secondary activities of elderly care, a similar conclusion can also be derived.

effect is dominant for men. Thirdly, the substitution effect between leisure time and elderly care time is greater for women.

There are many useful insights from the results of control variables. First, the number of small children reduces leisure time for the entire sample and the male sample. Second, as the individual gets older, the paid work time declines significantly (the entire sample, females and males), and the leisure time increases significantly (the entire sample and females), while the elderly care time increases only for women. Third, the household size increases elderly care time significantly for the whole sample, females and males, leisure time for the entire sample and males, and paid work time for the whole sample, females and males. However, if the household has a childcare duty, it significantly reduces the elderly care time (for females only), leisure time and paid work time (for the entire sample, females and males). (iv) If the survey day is a non-typical day (such as a weekend for many wage workers), elderly care time and leisure time increase, while paid work time decreases.

VI. Concluding Remarks and Policy Recommendations

Using microdata from the time-use survey in Thailand in 2014/2015 combined with the Labor Force Survey data in 2013-2015, we found that overall, Thai women tend to do unpaid elder care work many times and longer duration in a day as the main task compared to men, which is consistent with the literature. The proxy for altruism based on time allocation shows that women are more altruistic than men in all dimensions, which is in line with the literature on gender and altruism (England et al., 2012). A single-equation Tobit model with PSM showed that altruistic behavior is a strong determinant for the duration of eldercare. Our analyses confirm altruistic time ratios are among the key drivers for wider gender gaps in providing unpaid eldercare. This is supported by the literature on the role of daughters taking care of elder parents than sons (Coward & Dwyer, 1990; Crawford et al., 1994; Delgado & Tennstedt, 1997; Dwyer & Coward, 1991; Pratt et al., 1989).

We also found that the social gender norm on altruism – which is proxied by the gender difference (i.e., female *minus* male) in the averages of altruistic time ratios at the district level – is also one of the key determinants of elderly care time. In a single equation Tobit model, the social gender norm increases the elderly care time significantly for women while it reduces the elderly care time for men. In a society with social norms on altruistic behavior toward parents, gender differences in altruism would explain a significant difference in the amount of time spent on elderly care. If elder care is a default responsibility of families in society, it is also the default obligation of women, daughters, wives rather than of men, sons and husbands in families. Changing these stereotypes and norms is challenging and takes time.

To analyze time reallocation behaviors of males and females among different daily activities, we estimate a simultaneous equation Tobit model for the elderly care time, the leisure time, and the paid-work time to identify the degrees of substitution effects among those activities and to analyze how the social gender norm on altruism affects the elderly care time through direct or indirect channels. In the female subsample, we have found that the social gender norm decreases leisure time and paid work time significantly, which increases elderly care time through substitution effects, explaining about 40% of the overall effect of the social gender norm on elderly care time. On the other hand, the direct effect of the social gender norm to increase elderly care time explains about 53% of the overall effect for the female subsample with a caveat that it is not statistically significant. In the male subsample, the indirect effects of the social gender norm on elderly care time through the changes in leisure time or paid work time are very small, and the direct effects are dominant.

An important discovery is that reducing paid work time leads to an increase in the time they spend on elder care nearly equally for women (-0.495) and men (-0.515). There is an empirical mixture across countries. Wolf and Soldo (1994) show no evidence of reduced propensities to be employed or conditional hours of work due to eldercare provision. Meanwhile, employed adult

offspring caregivers do not provide significantly less care to their parents than do the unemployed in African American families (Bullock et al., 2003). Sarkisian and Gerstel (2004) found that employed women and men give equal amounts of help to parents, other things equal but the amount of help depends on their employment characteristics. We also found the effects of switching leisure time toward eldercare are different across different genders, with a greater magnitude (-0.662) for women compared to (-0.505) for men.

Both trade-offs mentioned above are important for policy options. If the objective is to reduce the family care burden of women and increase their income-generating opportunities in the labor market, strong policy responses to provide support for both the healthcare system and informal caregivers is imperative. To discuss these issues, we associate our findings with the 3R framework of Elson (2017) toward reducing the burden of elder care on women caregivers. The model consists of three interconnected dimensions to address unpaid care work in the development agenda to signify the role of the state: *Recognition* (of its essential role), *Reduction* (of care work in general and particularly eldercare) and *Redistribution* (among sectors and individuals/men and women to reduce inequality in care work) (*ibid.*, 2017).

In the meantime, with various findings from our analysis on factors determining men's care time for the elderly, we recommend more practical solutions to change their behavior and consequently achieve better equality in this care work distribution. Such interventions may lead to changes in filial behaviors even in cultures and societies with deeply rooted altruism and filial piety (Kohli, 1999). In contrast to traditional economic models choice suggesting rational responses to information and price signals, insights from behavioral economics suggest that human behavior is automatically (and often subconsciously) influenced by the context within which many of our decisions are taken (Kahneman, 2011) – the 'choice architecture' as it is called in the book *Nudge* (Thaler & Sunstein, 2008). The MINDSPACE framework (Dolan et al., 2010) is a summary categorization of such effects on behavior (the effects Messenger, Incentives, Norms, Defaults,

Salience, Priming, Affect, Commitments, Ego, that have been found in laboratory and field experiments). MINDSPACE has already been successfully applied to public policy (Dolan et al., 2012; Vlaev et al., 2016) and can inform interventions to motivate the redistribution of caregiving. For example, the commitments effect suggests that humans seek to be consistent with our public promises, and reciprocate acts, which means that the anticipation of, and inherent value in, reciprocity might drive caregiving behaviors, even in the absence of expected future rewards. Therefore, ‘Give back’ messages could be successfully utilized in persuasive campaigns, given that parents may believe that they have a moral duty to care for their children, and adult children may believe that they have a moral duty to repay that care when their parents need assistance in old age (Ibarra 2010, page 130). According to the Norms effect, individuals are strongly influenced by what others do, which implies campaigners can use messages to reverse the social norms about what educated men should do in Thai society by informing them that men like them are more involved in eldercare. The ego effect posits that individuals act in ways that support the impression of positive and consistent self-image, which implies interventions could use ‘Stand together’ messages that emphasize how our sense of self is rooted in our proud membership of collectives such as families and communities, thus linking caregiving to sense of duty and solidarity. All such messages should come from voices representative of and trusted by the group rather than those perceived as self-interested (Hogg, 2010).

Our findings suggest that economic and social policies for both the healthcare system and informal caregivers - which would support women directly or indirectly, reduce their time burden in elderly care and change the underlying social norm on gender - are important for the sustainable aging population in Thailand. Furthermore, using behavior change theory, we have recommended specific strategies which can underpin inclusive policy conversations in design and interventions for an equitable distribution of eldercare from a gender lens.

In Thailand, it is particularly important to have a better understanding of the current policy debate on the impact of a fast-ageing society. Adequate care will become crucial not only for their own well-being but also for the economy; the government should step into addressing LTC provision and other substantial resources to ensure a friendly-ageing environment for Thai elders. Without an awareness of the informal care value, unpaid work will be underestimated and never be viewed as one type of work, essential household and social reproduction to the economy, building up human capital and labor resources.

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Tables

Table 1: Adult care as primary and secondary activity by gender

| | Primary/main | | Secondary | |
|---|--------------|------|-----------|------|
| | Female | Male | Female | Male |
| No. of caregivers | 406 | 227 | 71 | 64 |
| Share in the caregivers (%) | 64.1 | 35.9 | 52.6 | 47.4 |
| Share in total individuals (%) | 0.58 | 0.33 | 0.08 | 0.07 |
| Total duration of adult care per day (mins) | | | | |
| Min | 10 | 10 | 10 | 10 |
| Max | 1020 | 910 | 790 | 440 |
| Mean | 146 | 112 | 90 | 80 |
| Std. Dev | 142 | 135 | 123 | 85 |

Source: Author calculations from the time-use survey data 2014/15 (NSO, 2016).

Table 2: Tobit Models for Elderly Care (with Social Norm on Altruism or Altruism Time Ratio): Both Primary and Secondary Activities

| | Case 1: all | Case 2: female | Case 3: male | Case 4: all individual altruistic indicator | Case 5: female individual altruistic indicator | Case 6: male individual altruistic indicator |
|--|------------------------|------------------------|------------------------|---|--|--|
| a main explanatory variable | social norm | social norm | social norm | | | |
| VARIABLES | | | | | | |
| Social Gender Norm on Altruism | -15.388 (-0.146) | 337.262* (1.890) | -281.887** (-2.353) | | | |
| Altruistic Time Ratio (Individual level) | | | | 399.490*** (10.683) | 412.532*** (11.020) | 436.905*** (5.808) |
| The number of children (<= 5 years) in the household | -7.442 (-0.605) | -14.278 (-0.766) | -8.784 (-0.526) | -12.137 (-1.027) | 3.051 (0.164) | -38.427* (-1.840) |
| The number of children (6-14 years) | 13.217 (0.656) | 11.930 (1.134) | -0.177 (-0.005) | 0.038 (0.002) | -1.342 (-0.117) | -4.014 (-0.134) |
| The number of adult male members (15-59 years) | -22.305 (-1.371) | -24.984 (-1.317) | -27.886 (-1.583) | -27.374* (-1.955) | -15.455 (-1.044) | -46.212** (-2.514) |
| The number of adult female members (15-59 years) | 20.364 (1.129) | -11.280 (-0.613) | 46.213* (1.886) | 34.489* (1.674) | -7.684 (-0.480) | 65.466** (2.460) |
| The number of elderly members (>=60 years) | -6.563 (-0.764) | -18.575 (-1.406) | 5.003 (0.401) | -5.810 (-0.797) | -26.536* (-1.826) | 10.410 (1.256) |
| Age of the Individual | 1.714*** (2.662) | 2.878*** (4.544) | 0.428 (0.599) | 1.394** (2.472) | 2.000*** (3.935) | 0.825 (1.115) |
| Age Squared | 46.554* (1.767) | 73.260** (2.220) | -13.318 (-0.467) | 43.604* (1.841) | 53.606** (2.154) | 13.020 (0.526) |
| Unmarried | -0.209 (-0.015) | 6.772 (0.247) | 22.593 (0.778) | -7.112 (-0.458) | -12.713 (-0.580) | -1.641 (-0.070) |
| Married | 35.148*** (3.058) | 62.388*** (2.629) | 25.245 (0.928) | 36.479*** (4.924) | 61.900*** (3.490) | 16.924 (1.227) |
| Education Variables *2 | | | | | | |
| Primary education with certificate | 20.625 (1.000) | 38.455* (1.912) | -5.310 (-0.159) | 35.344** (2.068) | 48.475*** (2.931) | 4.534 (0.200) |
| Lower Secondary Education | 42.570* (1.781) | 26.407 (0.534) | 44.321* (1.863) | 33.550 (1.507) | 30.033 (0.818) | 9.977 (0.374) |
| Upper Secondary Education | 40.213** (2.222) | 43.129 (1.314) | 38.840 (1.180) | 26.888 (1.633) | 40.058* (1.750) | 23.365 (0.810) |
| Tertiary Education *3 | 52.665 (1.062) | 41.608 (0.796) | -24.381 (-0.381) | 42.205 (1.102) | 47.630 (1.141) | -35.432 (-0.798) |
| Postgraduate Education | -98.900** (-2.031) | -15.221 (-0.197) | -107.576* (-1.789) | -65.939** (-2.286) | -31.937 (-0.735) | -51.140 (-0.943) |
| Employment Status*4 | | | | | | |
| Employer | -51.426*** (-3.249) | -16.342 (-0.676) | -88.797*** (-5.967) | -21.674 (-1.458) | 6.609 (0.286) | -61.630*** (-5.619) |
| Unpaid family worker | -16.060 (-1.094) | -83.254*** (-3.007) | 48.042** (2.118) | 15.396 (0.717) | -54.314** (-2.237) | 60.516*** (3.147) |
| Unemployed | -87.205*** (-4.247) | -98.230*** (-3.454) | -72.819*** (-3.344) | -40.298** (-2.210) | -64.906*** (-3.325) | -37.086* (-1.896) |
| Wage employee | -32.637 (-1.638) | -38.592 (-1.044) | -35.237 (-1.262) | -52.733*** (-2.597) | -40.781 (-1.477) | 0.666 (0.021) |
| Relation to the household head | | | | | | |
| Spouse of HH head | -77.072** (-3.249) | -76.902** (-3.007) | -39.581* (-1.583) | -63.287** (-1.955) | -63.481** (-1.044) | -33.576 (-2.514) |

| | | | | | | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| | (-2.432) | (-2.132) | (-1.956) | (-2.402) | (-2.161) | (-1.579) |
| Unmarried children | -14.987 | 15.826 | -87.049*** | -17.570 | 10.664 | -33.991 |
| | (-0.570) | (0.411) | (-3.119) | (-0.783) | (0.359) | (-1.511) |
| Married children | -30.734 | 49.824 | -62.127 | -27.774 | 46.916 | -32.385 |
| | (-1.072) | (1.081) | (-0.960) | (-1.115) | (1.139) | (-0.775) |
| In-law children | -119.755*** | -93.231** | -97.966*** | -94.237*** | -73.853* | -54.464* |
| | (-3.562) | (-2.025) | (-3.269) | (-2.770) | (-1.678) | (-1.948) |
| Grandchildren | -28.937 | -39.387 | 48.332 | 21.689 | 25.866 | 48.333 |
| | (-0.552) | (-0.560) | (0.488) | (0.508) | (0.482) | (0.726) |
| Parents of the head | -57.114** | -74.712** | -43.234** | -63.110** | -84.773*** | -33.504 |
| | (-2.092) | (-1.970) | (-2.032) | (-2.363) | (-2.626) | (-1.611) |
| Relatives | -344.524*** | -318.204*** | -986.903*** | -291.332*** | -272.720*** | -879.641*** |
| | (-4.573) | (-3.335) | (-11.082) | (-4.359) | (-3.721) | (-14.181) |
| Others | 60.741* | 77.052** | 26.769 | 26.992 | 36.496 | 1.814 |
| Regions | (1.865) | (2.090) | (0.788) | (1.087) | (1.244) | (0.069) |
| Central Region | 63.175* | 103.014** | 1.179 | 32.789 | 59.850* | -15.611 |
| | (1.860) | (2.512) | (0.031) | (1.127) | (1.834) | (-0.454) |
| Northern Region | 33.228 | 27.054 | 34.018 | 4.288 | 4.071 | 13.532 |
| | (1.127) | (0.701) | (1.039) | (0.164) | (0.133) | (0.460) |
| Northeast | 67.504* | 66.611 | 58.808 | 36.610 | 25.435 | 42.575 |
| | (1.752) | (1.420) | (1.417) | (1.209) | (0.804) | (1.193) |
| Northeastern region | 0.772 | -18.529 | 9.008 | -73.679*** | -110.603*** | -17.916 |
| | (0.040) | (-0.974) | (0.354) | (-3.110) | (-5.140) | (-0.605) |
| Whether an individual spends time in childcare | 13.718 | 35.451** | -6.408 | 2.248 | 22.841* | -17.056 |
| | (1.337) | (1.984) | (-0.349) | (0.238) | (1.717) | (-1.010) |
| Whether in Urban Areas | 8.663 | 7.246 | 15.054 | 2.397 | 9.093 | 3.942 |
| | (0.697) | (0.431) | (0.948) | (0.182) | (0.665) | (0.315) |
| Whether it is the week day | 125.397*** | 130.718*** | 116.831*** | 48.257*** | 35.226* | 62.124*** |
| | (6.326) | (4.103) | (4.235) | (3.063) | (1.894) | (3.760) |
| Whether it is the irregular day | 40.361 | 82.936* | -15.618 | 66.701** | 127.826*** | -2.113 |
| Occupation of household head *4 | (1.049) | (1.891) | (-0.475) | (2.008) | (3.555) | (-0.096) |
| Executives and Managers | -11.054 | -126.547*** | 52.716 | -17.073 | -147.938*** | 9.795 |
| | (-0.265) | (-3.368) | (1.234) | (-0.378) | (-3.647) | (0.215) |
| Science and engineering professionals | -8.858 | 18.845 | -259.450*** | -26.107 | 1.973 | -214.335*** |
| | (-0.116) | (0.254) | (-5.628) | (-0.482) | (0.037) | (-4.726) |
| Professionals | -31.005 | -23.578 | -51.268** | -16.713 | 0.506 | -44.823 |
| | (-0.642) | (-0.406) | (-1.965) | (-0.409) | (0.011) | (-1.455) |
| Customer service clerk | -20.622 | -24.350 | 0.503 | -3.013 | 6.044 | -1.663 |
| | (-0.715) | (-0.500) | (0.019) | (-0.134) | (0.168) | (-0.065) |
| Personal service worker/care worker | 10.993 | -19.337 | 45.118* | 10.437 | -1.734 | 24.878 |
| | (0.589) | (-0.986) | (1.746) | (0.629) | (-0.128) | (1.048) |
| Workers in agriculture, fishing and forestry | -6.978 | -9.670 | -2.555 | -2.752 | -11.160 | 9.618 |
| | (-0.302) | (-0.337) | (-0.082) | (-0.156) | (-0.503) | (0.383) |
| Craftsmen , metal workers | -4.930 | -24.201 | 19.490 | -6.762 | -31.463 | 19.348 |
| | (-0.210) | (-0.833) | (0.702) | (-0.401) | (-1.512) | (0.863) |
| Cleaning workers and assistants | -0.371 | -0.807 | -0.425 | -0.277 | 0.019 | -0.917* |
| | (-0.722) | (-1.282) | (-0.831) | (-0.684) | (0.038) | (-1.944) |
| Age of the household head | 8.119 | 12.384 | 23.414 | -2.931 | 5.291 | 9.915 |
| | (0.544) | (0.892) | (0.883) | (-0.211) | (0.426) | (0.430) |

| | | | | | | |
|----------------------------|-----------------------|-------------------------|---------------------|------------------------|-------------------------|---------------------|
| Whether the head is female | 6.215 (0.419) | 7.656 (0.532) | 21.835 (0.843) | -3.895 (-0.286) | 3.903 (0.313) | 8.344 (0.373) |
| var(e.Class712upAll) | 33,041.270** * | 34,186.191** * | 23,627.252** * | 21,866.857*** | 20,995.502*** | 16,050.130*** |
| Constant | -120.288* (-1.945) | -198.686*** (-3.212) | -34.140 (-0.443) | -139.794** (-2.473) | -202.824*** (-3.498) | -67.067 (-0.993) |
| Observations | 56,343 | 30,446 | 25,897 | 56,355 | 30,456 | 25,899 |

Notes: 1: z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2. Upper secondary is a reference category.

3. Vocational/profession training, college, and university (Bachelor).

4. 'Factory workers' form a reference category.

Table 3: A Simultaneous Equation Tobit Model for the Elderly Care Time, the Leisure Time, and the Paid-work Time Primary Activities Only

| VARIABLES ⁵ | Case 1: All Sample | | | Case 2: Females | | | Case 3: Males | | |
|--|-------------------------|------------------------|------------------------|-----------------------|-------------------------|------------------------|-----------------------|------------------------|-----------------------|
| | Elderly Care time | Leisure Time | Paid-work Time | Elderly Care time | Leisure Time | Paid-work Time | Elderly Care time | Leisure Time | Paid-work Time |
| Leisure Time | -0.395 (-2.682) | | | -0.662*** (-3.719) | | | -0.505** (-2.055) | | |
| Paid-work Time | -0.446*** (-6.614) 1 | -0.343*** (-50.992) | | -0.495*** (-5.425) | -0.345*** (-41.063) | | -0.515*** (-4.540) | -0.412*** (-36.774) | |
| Peer Leisure Time (mode at gender-age-district cohort) | | 0.513*** (10.385) | | | 0.162*** (2.609) | | | 0.366*** (4.391) | |
| (Peer Leisure Time) ² | | -0.001*** (-4.282) | | | -0.000 (-0.151) | | | -0.001** (-2.408) | |
| Imputed wage (2013) | | | 74.049*** (14.183) | | | 66.468*** (8.303) | | | 86.004*** (12.158) |
| (Imputed wage (2013)) ² | | | 0.703 (1.237) | | | 1.757** (1.982) | | | -0.936 (-1.236) |
| Social Gender Norm | -156.188 (-0.950) | -79.183*** (-4.718) | -22.160 (-0.691) | 184.639 (0.944) | -150.515*** (-6.887) | -121.999** (-2.431) | -377.181* (-1.819) | -0.958 (-0.041) | 70.703* (1.766) |
| The number of children (<= 5 years) in the household | 9.666 (0.475) | -5.834** (-2.478) | 6.252 (1.421) | 3.729 (0.128) | -3.827 (-1.193) | 6.758 (0.990) | 10.162 (0.397) | -8.869*** (-2.657) | 4.446 (0.777) |
| The number of children (6-14 years) | -20.404 (-1.127) | 2.429 (1.445) | 0.844 (0.260) | -11.730 (-0.531) | 1.982 (0.884) | -0.954 (-0.209) | -37.275 (-1.569) | 3.176 (1.340) | 3.086 (0.675) |
| The number of adul male members (15-59 years) | -10.252 (-0.485) | 2.575 (1.084) | -12.158*** (-2.643) | -27.526 (-0.792) | 4.335 (1.372) | -8.101 (-1.245) | 1.232 (0.055) | 0.976 (0.283) | -14.387** (-2.220) |
| The number of adul female members (15-59 years) | 20.285 (0.920) | 2.029 (0.878) | -13.294*** (-2.676) | 9.481 (0.294) | 4.562 (1.439) | -10.044 (-1.540) | 29.401 (1.182) | -2.040 (-0.627) | -16.779** (-2.310) |
| The number of elderly members (>=60 years) | 3.500 (0.215) | -1.074 (-0.646) | 1.486 (0.470) | -3.365 (-0.170) | -1.313 (-0.631) | 1.295 (0.299) | 16.429 (0.761) | -0.444 (-0.176) | 1.195 (0.263) |
| Age of the Individual | 0.774 (1.594) | 0.147** (2.324) | -1.043*** (-8.757) | 2.024*** (2.824) | 0.238*** (2.725) | -1.319*** (-7.034) | -0.176 (-0.318) | -0.017 (-0.189) | -0.773*** (-5.030) |
| Lower Secondary Education | -23.154 (-0.852) | 5.938** (2.197) | 0.778 (0.157) | 11.134 (0.292) | -4.447 (-1.105) | -7.166 (-0.861) | -44.932 (-1.281) | 10.026*** (2.829) | 5.619 (0.908) |

| | | | | | | | | | |
|--|------------|------------|------------|-------------|------------|------------|---------------|------------|------------|
| Tertiary Education *3 | 34.427 | 19.070*** | -56.533*** | 35.749 | 15.549*** | -62.338*** | 43.027 | 25.986*** | -50.022*** |
| | (1.185) | (6.932) | (-8.526) | (0.835) | (4.362) | (-6.483) | (1.222) | (6.586) | (-5.432) |
| Postgraduate Education | 6.915 | 79.654*** | -5.458 | -89.869 | 19.792 | -21.076 | 1,429.288 | 169.297*** | 17.776 |
| | (0.039) | (2.631) | (-0.099) | (-0.452) | (0.663) | (-0.273) | (.) | (3.219) | (0.217) |
| MA/PhD/Other | 84.938 | -41.556 | -4.727 | 257.158 | 4.406 | 32.024 | -1,461.487*** | -109.552** | -58.252 |
| Regions | (0.579) | (-1.407) | (-0.088) | (1.581) | (0.152) | (0.428) | (-13.718) | (-2.118) | (-0.743) |
| Central Region | 43.588 | 10.253*** | 5.790 | 45.028 | 6.305 | 6.737 | 51.288 | 14.673*** | 2.781 |
| | (1.221) | (2.635) | (0.752) | (0.898) | (1.140) | (0.597) | (1.112) | (2.795) | (0.266) |
| Northern Region | 4.479 | 0.867 | 24.182*** | 12.099 | -6.408 | 24.841** | -1.335 | -0.215 | 17.265 |
| | (0.115) | (0.218) | (3.039) | (0.216) | (-1.144) | (2.170) | (-0.027) | (-0.040) | (1.567) |
| Northeast | 9.430 | -4.078 | 1.304 | 9.740 | -13.314** | 4.214 | 9.985 | -3.466 | -7.238 |
| | (0.242) | (-1.014) | (0.163) | (0.179) | (-2.348) | (0.362) | (0.194) | (-0.630) | (-0.657) |
| Northeastern region | 67.183* | 8.056* | -25.423*** | 64.695 | 1.865 | -22.228* | 67.354 | 9.604 | -34.418*** |
| | (1.686) | (1.871) | (-3.068) | (1.173) | (0.309) | (-1.821) | (1.309) | (1.634) | (-3.054) |
| child | -40.016 | -78.874*** | -62.382*** | -71.780** | -79.547*** | -74.107*** | -17.250 | -49.892*** | -44.322*** |
| | (-1.551) | (-30.287) | (-13.096) | (-2.060) | (-24.154) | (-11.160) | (-0.544) | (-12.972) | (-6.368) |
| Household Size | 29.645*** | 1.870*** | 6.200*** | 41.718*** | 0.600 | 6.996*** | 15.594** | 2.418*** | 5.233*** |
| | (6.149) | (3.313) | (5.715) | (6.677) | (0.781) | (4.398) | (2.384) | (3.004) | (3.552) |
| Whether in Urban Areas | 10.879 | 4.657*** | 2.623 | 45.089* | 5.264** | -2.211 | -19.795 | 4.690* | 8.868* |
| | (0.618) | (2.668) | (0.747) | (1.776) | (2.311) | (-0.441) | (-0.865) | (1.843) | (1.820) |
| Whether it is the regular/typical days | 25.877 | -17.156*** | - | 25.572 | -11.588*** | - | 14.709 | -23.628*** | - |
| | (1.373) | (-8.617) | - | (1.014) | (-4.227) | - | (0.572) | (-8.583) | - |
| Whether it is the irregular/non-typical days | 117.887*** | 26.457*** | 481.787*** | 161.290*** | 9.827 | 468.956*** | 69.406* | 18.343** | 488.403*** |
| Occupation of household head *4 | (4.172) | (5.308) | (-41.829) | (4.005) | (1.524) | (-26.989) | (1.945) | (2.454) | (-32.445) |
| Executives and Managers | 55.357 | -1.265 | -1.628 | 73.141 | -5.040 | 14.202 | 25.021 | 1.300 | -15.299 |
| | (1.082) | (-0.256) | (-0.158) | (0.993) | (-0.748) | (0.934) | (0.415) | (0.188) | (-1.106) |
| Science and engineering professionals | -53.750 | -2.921 | -7.730 | -149.549*** | 4.439 | -21.174 | 6.175 | -11.939* | 2.989 |
| | (-1.115) | (-0.653) | (-0.832) | (-2.646) | (0.732) | (-1.440) | (0.113) | (-1.861) | (0.253) |
| Professionals | -99.540 | -2.225 | -7.350 | -45.409 | -3.657 | -1.680 | -342.301*** | 0.017 | -11.989 |
| | (-1.579) | (-0.360) | (-0.637) | (-0.593) | (-0.404) | (-0.108) | (-3.723) | (0.002) | (-0.700) |
| Customer service clerk | 25.143 | 5.238 | -22.814 | 55.116 | 7.117 | 2.700 | -3.135 | 3.620 | -48.667* |
| | (0.491) | (0.831) | (-1.391) | (0.749) | (0.869) | (0.146) | (-0.048) | (0.394) | (-1.921) |
| Personal service worker/care worker | -25.670 | -4.028 | 12.204** | -40.119 | -1.348 | 5.687 | -7.460 | -5.383 | 18.165*** |
| | (-0.908) | (-1.431) | (2.335) | (-0.977) | (-0.353) | (0.722) | (-0.213) | (-1.367) | (2.614) |

| | | | | | | | | | |
|--|------------------------|-----------------------|-------------------------|--------------------------|------------------------|------------------------|-------------------------|------------------------|-------------------------|
| Workers in agriculture, fishing and forestry | 8.194 (0.359) | -5.916** (-2.541) | -2.675 (-0.621) | -40.380 (-1.278) | -5.922* (-1.934) | -7.868 (-1.220) | 48.438* (1.682) | -4.843 (-1.437) | 0.341 (0.059) |
| Craftsmen , metal workers | 12.015 (0.396) | 1.211 (0.338) | -1.435 (-0.194) | 43.849 (1.052) | 0.007 (0.001) | 5.341 (0.519) | -21.474 (-0.496) | 2.755 (0.549) | -6.925 (-0.662) |
| Cleaning workers and assistants | 38.296 (1.224) | -1.242 (-0.348) | 7.189 (1.214) | 48.765 (1.054) | 4.087 (0.906) | 13.359 (1.503) | 23.193 (0.618) | -7.329 (-1.319) | 1.920 (0.244) |
| Age of the household head | 0.183 (0.242) | -0.017 (-0.212) | -0.331** (-2.145) | 0.708 (0.702) | -0.036 (-0.345) | -0.278 (-1.264) | -0.619 (-0.635) | 0.009 (0.077) | -0.363* (-1.698) |
| Whether the head is female | 19.674 (1.102) | -1.297 (-0.727) | 2.737 (0.829) | 37.758 (1.565) | -0.848 (-0.353) | 2.209 (0.460) | 3.401 (0.149) | 0.093 (0.037) | 2.801 (0.619) |
| Constant | -828.11*** (-9.413) | 280.44*** (31.349) | -238.47*** (-14.779) | -1,022.61*** (-8.671) | 306.920*** (24.915) | -241.5*** (-10.190) | -464.621*** (-3.784) | 341.658*** (25.442) | 221.132*** (-10.140) |
| Observations | 56,780 | 56,780 | 56,780 | 30,769 | 30,769 | 30,769 | 26,011 | 26,011 | 26,011 |

Robust z-statistics in parentheses

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

Notes: 1: Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2. A few education categories have been automatically dropped by multicollinearity.

3. Vocational/profession training, college, and university (Bachelor).

4. 'Factory workers' form a reference category.

5. Some explanatory variables in Table 4 have been dropped to make the estimation of the system of equations tractable.

Online Appendices

Appendix Table A1: Classification of activities by major division, division, group and class with a focus on care activities

| Major Division/Group/Class of Activities |
|--|
| 01. Work for corporations, quasi-corporations, Government, NPIs |
| 02. Work for households in primary production activities |
| 03. Work for households in non-primary production activities |
| 04. Work for households in construction activities |
| 05. Work for households providing services for income |
| 06. Work providing unpaid domestic services for own final use within HH |
| 07. Work providing unpaid caring services to household members |
| 071. Work time providing unpaid caregiving services to household members |
| 0711. Childcare |
| 0712. Adult care |
| 07121 Caring for adults/physical care |
| 07122 Caring for adults/emotional support |
| 07123 Accompanying adults to places |
| 072. Travel related to unpaid caregiving services to household members |
| 079. Providing unpaid caregiving services to household members n.e.c. |
| 08. Providing community services and help to other households |
| 09. Learning |
| 10. Socializing and community participation |
| 11. Attending/visiting cultural, entertainment and sports events/venues |
| 12. Engaging in hobbies, games and other pastime activities |
| 13. Indoor and outdoor sport participation |
| 14. Use of mass media |
| 15. Personal care and maintenance |

Source: United Nations - ICATUS, 2006

Online Appendix Table 1: Probit Model for PSM: whether the individual spend time for elderly care

| VARIABLES | Whether the individual spends any time for the elderly care: | Whether the individual spends any time for the elderly care: |
|--|--|--|
| | Main activities | Main and secondary activities |
| The number of children (6-14 years) | -0.075* (-1.885) | -0.075** (-1.990) |
| The number of adult male members (15-59 years) | 0.030 (0.650) | 0.049 (1.172) |
| The number of adult female members (15-59 years) | 0.023 (0.525) | 0.044 (1.112) |
| The number of elderly members (>=60 years) | 0.049 (1.581) | 0.055* (1.826) |
| Age of the Individual | 0.012*** (8.713) | - - |
| Unmarried | 0.336*** (4.029) | 0.166** (2.196) |
| Married | 0.204*** (3.624) | 0.119** (2.199) |
| Education Variables *2 | | |
| Primary education with certificate | 0.112** (2.362) | 0.012 (0.280) |
| Lower Secondary Education | 0.058 (1.057) | -0.082* (-1.677) |
| Upper Secondary Education | 0.070 (1.217) | -0.066 (-1.228) |
| Tertiary Education *3 | -0.047 (-0.300) | -0.019 (-0.134) |
| Postgraduate Education | -0.279*** | -0.227*** |
| Relationship to the household head | | |
| Household head | -0.492*** (-6.037) | -0.349*** (-4.846) |
| Spouse of HH head | -0.468*** (-5.052) | -0.349*** (-4.153) |
| Married children | 0.164* (1.740) | 0.127 (1.450) |
| In-law children | -0.210* (-1.721) | -0.263** (-2.273) |
| Grandchildren | 0.222** (2.341) | 0.087 (0.978) |
| Parents of the head | -0.685*** (-4.244) | -0.366** (-2.456) |
| Other Relatives | -0.148 | -0.083 |
| Regional Classifications | | |
| Bangkok Metropolitan Area | -0.025 (-0.270) | -0.034 (-0.386) |
| Central | 0.017 (0.422) | 0.037 (0.966) |

| | | |
|--|-----------|-----------|
| North | -0.067 | -0.063 |
| | (-1.491) | (-1.453) |
| Whether an individual spends time in childcare | 0.132*** | 0.103** |
| | (2.697) | (2.269) |
| Whether in Urban Areas | 0.008 | -0.018 |
| | (0.218) | (-0.545) |
| Whether it is the typical/regular day | 0.026 | 0.011 |
| Occupation of household head | (0.697) | (0.316) |
| Executives and Managers | 0.087 | 0.100 |
| | (0.932) | (1.141) |
| Science and engineering professionals | 0.016 | 0.012 |
| | (0.184) | (0.142) |
| Professionals | -0.025 | -0.065 |
| | (-0.214) | (-0.572) |
| Customer service clerk | 0.268** | 0.223** |
| | (2.439) | (2.057) |
| Workers in agriculture, fishing and forestry | 0.043 | 0.058 |
| | (0.970) | (1.365) |
| Craftsmen , metal workers | 0.056 | 0.059 |
| | (0.879) | (0.975) |
| Cleaning workers and assistants | 0.092 | 0.075 |
| | (1.430) | (1.195) |
| Age of the head | -0.002 | -0.001 |
| | (-1.015) | (-0.479) |
| Whether the head is female | 0.037 | 0.040 |
| | (1.046) | (1.179) |
| Constant | -2.870*** | -2.225*** |
| | (-19.462) | (-17.750) |
| Observations | 56,797 | 56,797 |

Notes: 1: z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2. 'No education or less than primary' is a reference category.

3. Vocational/profession training, college, and university (Bachelor).

4. 'Employer' and 'Unemployed' jointly form a reference category.

5. 'Factory workers' form a reference category.

Online Appendix Table 2: Balancing Tests

| Variable | Unmatched Matched | Mean | | %bias | %reduc t bias | t-test | | V(T)/ V(C) |
|--|----------------------|-------------|-------------|-------|---------------------|--------|-------|---------------|
| | | Treat ed | Contro l | | | t | p>t | |
| The number of children (6-14 years) | U | 0.16 | 0.182 | -5.1 | | -1.15 | 0.251 | 0.81* |
| | M | 0.1606 | 0.1817 | -4.9 | 3.8 | -0.82 | 0.411 | 0.81* |
| The number of adult male members (15-59 years) | U | 0.2 | 0.1577 | 9.3 | | 2.37 | 0.018 | 1.31* |
| | M | 0.1955 | 0.1576 | 8.3 | 10.4 | 1.43 | 0.154 | 1.24* |
| The number of adult female members (15-59 years) | U | 0.2209 | 0.175 | 9.5 | | 2.44 | 0.015 | 1.35* |
| | M | 0.2199 | 0.1749 | 9.3 | 1.9 | 1.57 | 0.116 | 1.35* |
| The number of elderly members (>=60 years) | U | 0.5791 | 0.5368 | 5.8 | | 1.4 | 0.162 | 1.07 |
| | M | 0.5794 | 0.5369 | 5.8 | -0.5 | 0.98 | 0.328 | 1.07 |
| Unmarried | U | 0.3183 | 0.2023 | 26.6 | | 6.87 | 0 | . |
| | M | 0.3176 | 0.2027 | 26.4 | 0.9 | 4.47 | 0 | . |
| Married | U | 0.567 | 0.6423 | -15.4 | | -3.75 | 0 | . |
| | M | 0.5672 | 0.6424 | -15.4 | 0.2 | -2.61 | 0.009 | . |
| Education Variables *2 | M | 0.5672 | 0.6424 | -15.4 | 0.2 | -2.61 | 0.009 | . |
| Primary education with certificate | U | 0.1948 | 0.1767 | 4.6 | | 1.13 | 0.258 | . |

| | | | | | | | | |
|--|---|--------|--------|-------|-------|-------|-------|------|
| | M | 0.1955 | 0.1766 | 4.9 | -4.5 | 0.82 | 0.412 | . |
| Lower Secondary Education | U | 0.1635 | 0.1379 | 7.2 | | 1.77 | 0.077 | . |
| | M | 0.1641 | 0.1379 | 7.3 | -2 | 1.23 | 0.217 | . |
| Upper Secondary Education | U | 0.1148 | 0.1099 | 1.6 | | 0.37 | 0.708 | . |
| | M | 0.1134 | 0.1098 | 1.1 | 26.4 | 0.19 | 0.846 | . |
| Tertiary Education *3 | U | 0.0139 | 0.0131 | 0.7 | | 0.17 | 0.862 | . |
| | M | 0.014 | 0.0131 | 0.7 | -4.1 | 0.13 | 0.899 | . |
| Postgraduate Education | U | 0.0713 | 0.1111 | -13.8 | | -3.02 | 0.003 | . |
| Relationship to the household head | M | 0.0698 | 0.1105 | -14.1 | -2.2 | -2.41 | 0.016 | . |
| Household head | U | 0.3496 | 0.4792 | -26.5 | | -6.19 | 0 | . |
| | M | 0.3508 | 0.4801 | -26.5 | 0.3 | -4.48 | 0 | . |
| Spouse of HH head | U | 0.1757 | 0.2487 | -17.9 | | -4.04 | 0 | . |
| | M | 0.1745 | 0.2487 | -18.2 | -1.6 | -3.09 | 0.002 | . |
| Married children | U | 0.1374 | 0.0587 | 26.7 | | 7.94 | 0 | . |
| | M | 0.1379 | 0.0575 | 27.3 | -2.2 | 4.62 | 0 | . |
| In-law children | U | 0.0313 | 0.0349 | -2 | | -0.46 | 0.644 | . |
| | M | 0.0314 | 0.0351 | -2 | -2.7 | -0.34 | 0.731 | . |
| Grandchildren | U | 0.0487 | 0.0206 | 15.4 | | 4.68 | 0 | . |
| | M | 0.0471 | 0.0203 | 14.7 | 4.4 | 2.52 | 0.012 | . |
| Parents of the head | U | 0.0139 | 0.0224 | -6.3 | | -1.37 | 0.172 | . |
| | M | 0.014 | 0.0223 | -6.2 | 1.4 | -1.06 | 0.291 | . |
| Other Relatives | U | 0.0487 | 0.0328 | 8.1 | | 2.13 | 0.033 | . |
| Regional Classifications | M | 0.0489 | 0.0331 | 8 | 1 | 1.35 | 0.178 | . |
| Bangkok Metropolitan Area | U | 0.0365 | 0.0396 | -1.6 | | -0.37 | 0.709 | . |
| | M | 0.0367 | 0.0396 | -1.5 | 3.4 | -0.26 | 0.795 | . |
| Central | U | 0.3391 | 0.2991 | 8.6 | | 2.08 | 0.037 | . |
| | M | 0.3386 | 0.2993 | 8.4 | 1.9 | 1.43 | 0.154 | . |
| North | U | 0.1965 | 0.2341 | -9.1 | | -2.12 | 0.034 | . |
| | M | 0.1972 | 0.2337 | -8.9 | 2.9 | -1.5 | 0.133 | . |
| Whether an individual spends time in childcare | U | 0.1635 | 0.1364 | 7.6 | | 1.88 | 0.06 | . |
| | M | 0.1641 | 0.1363 | 7.8 | -2.6 | 1.31 | 0.189 | . |
| Whether in Urban Areas | U | 0.5357 | 0.5519 | -3.3 | | -0.78 | 0.437 | . |
| | M | 0.534 | 0.5519 | -3.6 | -10.2 | -0.61 | 0.545 | . |
| Whether it is the typical/regular day | U | 0.7165 | 0.7117 | 1.1 | | 0.26 | 0.798 | . |
| Occupation of household head | M | 0.7173 | 0.7117 | 1.2 | -14.4 | 0.21 | 0.835 | . |
| Executives and Managers | U | 0.0383 | 0.0323 | 3.2 | | 0.8 | 0.424 | . |
| | M | 0.0384 | 0.0323 | 3.3 | -1.9 | 0.55 | 0.58 | . |
| Science and engineering professionals | U | 0.04 | 0.0436 | -1.8 | | -0.42 | 0.675 | . |
| | M | 0.0401 | 0.0436 | -1.7 | 3.1 | -0.29 | 0.769 | . |
| Professionals | U | 0.0191 | 0.0261 | -4.7 | | -1.04 | 0.297 | . |
| | M | 0.0192 | 0.026 | -4.6 | 1.8 | -0.78 | 0.437 | . |
| Customer service clerk | U | 0.0261 | 0.0165 | 6.6 | | 1.79 | 0.073 | . |
| | M | 0.0262 | 0.0165 | 6.7 | -1.1 | 1.14 | 0.256 | . |
| Workers in agriculture, fishing and forestry | U | 0.2539 | 0.2464 | 1.7 | | 0.42 | 0.677 | . |
| | M | 0.2548 | 0.2463 | 2 | -12.5 | 0.33 | 0.741 | . |
| Craftsmen , metal workers | U | 0.0887 | 0.0846 | 1.4 | | 0.35 | 0.727 | . |
| | M | 0.089 | 0.0847 | 1.5 | -6.8 | 0.26 | 0.794 | . |
| Cleaning workers and assistants | U | 0.0817 | 0.075 | 2.5 | | 0.61 | 0.539 | . |
| | M | 0.082 | 0.075 | 2.6 | -3.5 | 0.44 | 0.659 | . |
| Age of the head | U | 53.852 | 53.538 | 2 | | 0.48 | 0.633 | 1.05 |
| | M | 53.829 | 53.537 | 1.8 | 6.9 | 0.31 | 0.756 | 1.05 |
| Whether the head is female | U | 0.4435 | 0.4281 | 3.1 | | 0.74 | 0.459 | . |
| | M | 0.4433 | 0.4282 | 3 | 1.7 | 0.52 | 0.606 | . |

* if variance ratio outside [0.85; 1.17] for U and [0.85; 1.17] for M.

After pscore, the balancing properties are satisfied for all the blocks for all the variables.

Online Appendix Table 3: Tobit Models with PSM for Elderly Care (with Social Norm on Altruism or Altruism Time Ratio): Only for Primary Activities

| | Case 1: all | Case 2: female | Case 3: male | Case 4: all individual altruistic indicator | Case 5: female individual altruistic indicator | Case 6: male individual altruistic indicator |
|--|-------------------------|------------------------|------------------------|--|---|---|
| a main explanatory variable | social norm | social norm | social norm | | | |
| VARIABLES | | | | | | |
| Social Gender Norm on Altruism | -8.618 (-0.097) | 306.636** (2.273) | -240.506* (-1.779) | | | |
| Altruistic Time Ratio (Individual level) | | | | 406.256*** (12.281) | 414.424*** (12.487) | 447.238*** (6.860) |
| The number of children (<= 5 years) in the household | 2.441 (0.178) | 3.085 (0.155) | -6.569 (-0.338) | 0.013 (0.001) | 16.266 (0.852) | -32.973 (-1.410) |
| The number of children (6-14 years) | 17.690 (0.973) | 11.866 (1.015) | 9.414 (0.290) | 2.366 (0.132) | -1.402 (-0.117) | 1.524 (0.057) |
| The number of adult male members (15-59 years) | -18.255 (-0.886) | -31.554 (-1.312) | -12.987 (-0.654) | -19.908 (-1.465) | -16.610 (-0.921) | -27.881 (-1.606) |
| The number of adult female members (15-59 years) | 10.088 (0.700) | -1.838 (-0.091) | 17.462 (0.766) | 25.239* (1.766) | 2.783 (0.168) | 36.902* (1.846) |
| The number of elderly members (>=60 years) | -2.776 (-0.324) | -12.696 (-0.976) | 4.308 (0.366) | -4.479 (-0.618) | -23.639 (-1.581) | 11.041 (1.486) |
| Age of the Individual | 12.919*** (8.933) | 13.699*** (7.027) | 11.490*** (3.585) | 5.819*** (4.077) | 5.180*** (2.774) | 8.247*** (3.734) |
| Age Squared | -0.122*** (-8.176) | -0.113*** (-5.050) | -0.122*** (-3.817) | -0.050*** (-3.219) | -0.034 (-1.594) | -0.083*** (-3.289) |
| Unmarried | 49.355* (1.946) | 91.257*** (2.704) | -34.479 (-1.241) | 43.103* (1.778) | 74.121*** (2.788) | -8.494 (-0.368) |
| Married | -12.879 (-0.984) | -10.349 (-0.411) | 12.678 (0.453) | -15.209 (-1.010) | -27.743 (-1.402) | -9.116 (-0.377) |
| Education Variables *2 | | | | | | |
| Primary education with certificate | 25.453** (2.241) | 50.794** (2.251) | 15.077 (0.623) | 28.092*** (4.133) | 55.743*** (3.302) | -1.323 (-0.098) |
| Lower Secondary Education | 11.989 (0.561) | 33.487 (1.631) | 0.549 (0.017) | 14.109 (0.907) | 32.873** (2.159) | -1.852 (-0.110) |
| Upper Secondary Education | 16.607 (1.123) | 1.741 (0.051) | 25.962 (1.296) | 7.457 (0.674) | 9.553 (0.404) | -18.656 (-0.816) |
| Tertiary Education *3 | 38.503* (1.754) | 42.580 (1.361) | 34.518 (1.029) | 21.038 (1.208) | 37.157* (1.697) | 9.165 (0.333) |
| Postgraduate Education | 62.399 (1.153) | 67.676 (1.070) | 9.193 (0.151) | 55.577 (1.332) | 93.910* (1.919) | -25.831 (-0.668) |
| Employment Status*4 | | | | | | |
| Employer | -140.819*** (-2.689) | -69.519 (-0.814) | -136.040** (-2.224) | -82.624** (-2.483) | -60.778 (-1.146) | -55.108 (-1.085) |
| Unpaid family worker | -99.876*** (-7.180) | -71.443*** (-3.536) | 128.568*** (-6.302) | -49.091*** (-4.230) | -29.918* (-1.713) | -77.895*** (-5.049) |
| Unemployed | -61.725*** (-4.322) | 104.842*** (-4.017) | -5.856 (-0.264) | -26.494 (-1.304) | -73.091*** (-3.742) | 18.352 (0.763) |
| Wage employee | -118.025*** (-5.310) | 115.698*** (-3.744) | 104.655*** (-4.846) | -57.840*** (-3.258) | -74.899*** (-3.397) | -48.178*** (-3.005) |
| Relation to the household head | | | | | | |
| Spouse of HH head | -39.903** (-2.026) | -29.146 (-0.920) | -60.487** (-2.347) | -55.313*** (-3.843) | -22.340 (-1.201) | -32.810 (-1.610) |
| Unmarried children | -66.866** | -77.402** | -6.658 | -53.562** | -73.038** | 6.965 |

| | | | | | | |
|--|-------------|------------|------------|-------------|-------------|-------------|
| | (-2.103) | (-2.046) | (-0.342) | (-2.037) | (-2.285) | (0.277) |
| Married children | -15.794 | 26.381 | -94.909*** | -4.749 | 36.537 | -31.224 |
| | (-0.664) | (0.762) | (-3.236) | (-0.237) | (1.456) | (-1.179) |
| In-law children | -21.909 | 60.137 | -55.167 | -1.857 | 77.424** | -11.372 |
| | (-0.835) | (1.246) | (-0.869) | (-0.094) | (2.035) | (-0.317) |
| Grandchildren | -80.195** | -44.199 | -60.115* | -74.122** | -61.564 | -11.101 |
| | (-2.353) | (-0.965) | (-1.661) | (-2.063) | (-1.426) | (-0.268) |
| Parents of the head | 16.844 | 3.055 | 108.035 | 46.620 | 51.251 | 83.920 |
| | (0.322) | (0.045) | (0.965) | (1.180) | (1.010) | (1.106) |
| Relatives | -62.784** | -79.792* | -50.362*** | -53.684** | -81.053*** | -13.612 |
| | (-2.218) | (-1.944) | (-2.604) | (-2.156) | (-2.607) | (-0.780) |
| Others | -301.813*** | -277.98*** | -919.48*** | -243.331*** | -236.548*** | -740.471*** |
| Regions | (-4.152) | (-3.036) | (-9.755) | (-4.241) | (-3.829) | (-11.611) |
| Central Region | 73.945** | 94.668** | 40.107 | 30.552 | 46.875 | 7.740 |
| | (2.263) | (2.534) | (1.100) | (1.295) | (1.613) | (0.297) |
| Northern Region | 77.710** | 120.561*** | 11.162 | 40.743 | 66.136** | -2.014 |
| | (2.211) | (2.826) | (0.261) | (1.373) | (2.031) | (-0.057) |
| Northeast | 45.154 | 51.453 | 33.378 | 10.245 | 27.627 | 9.413 |
| | (1.432) | (1.201) | (0.912) | (0.376) | (0.859) | (0.321) |
| Northeastern region | 82.105** | 101.725** | 54.312 | 44.213 | 49.488 | 45.486 |
| | (2.093) | (2.155) | (1.195) | (1.471) | (1.643) | (1.254) |
| Whether an individual spends time in childcare | -19.921 | -28.851* | -8.129 | -111.555*** | -133.451*** | -50.882** |
| | (-1.277) | (-1.871) | (-0.453) | (-5.418) | (-6.696) | (-2.225) |
| Whether in Urban Areas | 11.726 | 39.380** | -13.326 | 4.914 | 32.935*** | -19.481 |
| | (1.056) | (2.343) | (-0.738) | (0.561) | (3.335) | (-1.424) |
| Whether it is the week day | 4.100 | -2.884 | 13.813 | 2.577 | -5.650 | 14.429 |
| | (0.289) | (-0.144) | (0.766) | (0.183) | (-0.365) | (0.962) |
| Whether it is the irregular day | 138.223*** | 136.280*** | 135.359*** | 56.194*** | 35.389* | 75.860*** |
| Occupation of household head 6 | (6.507) | (3.869) | (4.482) | (3.557) | (1.893) | (4.702) |
| Executives and Managers | 16.423 | 39.348 | -7.978 | 30.581 | 60.914 | -1.573 |
| | (0.388) | (0.704) | (-0.266) | (0.920) | (1.490) | (-0.090) |
| Science and engineering professionals | -54.321* | -131.26*** | 4.205 | -74.048** | -155.473*** | -58.222** |
| | (-1.651) | (-3.592) | (0.111) | (-2.091) | (-4.816) | (-2.346) |
| Professionals | -22.869 | 3.756 | -231.35*** | -31.671 | 0.309 | -169.229*** |
| | (-0.320) | (0.051) | (-5.832) | (-0.604) | (0.005) | (-4.936) |
| Customer service clerk | -31.985 | -25.978 | -48.115** | -10.574 | 10.416 | -42.410* |
| | (-0.687) | (-0.464) | (-2.216) | (-0.275) | (0.247) | (-1.660) |
| Personal service worker/care worker | -30.974 | -46.339 | -2.609 | -14.091 | -11.926 | -13.110 |
| | (-1.092) | (-1.071) | (-0.092) | (-0.727) | (-0.471) | (-0.491) |
| Workers in agriculture, fishing and forestry | 19.176 | -17.548 | 56.364* | 10.783 | 0.882 | 20.378 |
| | (1.091) | (-0.909) | (1.941) | (0.658) | (0.068) | (0.783) |
| Craftsmen , metal workers | -2.285 | 1.757 | -5.064 | -0.665 | 1.207 | 5.786 |
| | (-0.103) | (0.061) | (-0.159) | (-0.039) | (0.058) | (0.233) |
| Cleaning workers and assistants | 2.744 | -10.061 | 19.427 | -1.206 | -14.005 | 13.231 |
| | (0.116) | (-0.362) | (0.587) | (-0.070) | (-0.770) | (0.540) |
| Age of the household head | -0.556 | -0.726 | -0.510 | -0.396 | 0.299 | -1.136*** |
| | (-1.366) | (-1.301) | (-1.510) | (-1.215) | (0.618) | (-2.935) |

| | | | | | | |
|----------------------------|-------------------------|------------------------|------------------------|---------------------------|---------------------------|--------------------------|
| Whether the head is female | 16.186 (1.049) | 18.749 (1.260) | 26.568 (1.102) | 5.255 (0.441) | 11.425 (1.126) | 17.698 (0.955) |
| var(e.Class712upAll) | 29,282.4*** (8.067) | 30,332.3*** (6.226) | 21,549.3*** (4.613) | 17,000.270*** (11.005) | 16,424.715*** (11.174) | 12,786.578*** (5.809) |
| Constant | -307.994*** (-6.609) | 421.439*** (-7.466) | -214.652** (-2.399) | -196.324*** (-3.944) | -282.884*** (-4.549) | -179.338*** (-2.729) |
| Observations | 56,238 | 30,361 | 25,877 | 56,250 | 30,371 | 25,879 |

Notes: 1: z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2. Upper secondary is a reference category.

3. Vocational/profession training, college, and university (Bachelor).

4. 'Other' is a reference category.

Online Appendix Table 4: A Simultaneous Equation Tobit Model for the Elderly Care Time, the Leisure Time, and the Paid-work Time: Primary and Secondary Activities

| VARIABLES ⁵ | Case 1: All Sample | | | Case 2: Females | | | Case 3: Males | | |
|--|--------------------|--------------|----------------|-------------------|--------------|----------------|-------------------|--------------|----------------|
| | Elderly Care time | Leisure Time | Paid-work Time | Elderly Care time | Leisure Time | Paid-work Time | Elderly Care time | Leisure Time | Paid-work Time |
| Leisure Time | -0.338* | | | -0.183 | | | -0.294 | | |
| | (-1.797) | | | (-1.016) | | | (-1.267) | | |
| Paid-work Time | -0.415*** | -0.343*** | | -0.311*** | -0.345*** | | -0.454*** | -0.412*** | |
| | (-5.305) | (-51.841) | | (-3.570) | (-41.032) | | (-4.409) | (-36.309) | |
| Peer Leisure Time (mode at gender-age-district cohort) | | 0.513*** | | | 0.160** | | | 0.366*** | |
| | | (10.425) | | | (2.562) | | | (4.320) | |
| (Peer Leisure Time) ² | | -0.001*** | | | -0.000 | | | -0.001** | |
| | | (-4.286) | | | (-0.096) | | | (-2.363) | |
| Imputed wage (2013) | | | 73.902*** | | | 66.303*** | | | 85.966*** |
| | | | (14.152) | | | (8.246) | | | (12.106) |
| (Imputed wage (2013)) ² | | | 0.715 | | | 1.768** | | | -0.932 |
| | | | (1.260) | | | (1.986) | | | (-1.229) |
| Social Gender Norm | -210.207 | -79.164*** | -22.563 | 162.294 | 150.411*** | -122.773** | -393.471** | -0.952 | 70.696* |
| | (-1.342) | (-4.733) | (-0.703) | (0.806) | (-6.890) | (-2.442) | (-2.037) | (-0.040) | (1.757) |
| The number of children (<= 5 years) in the household | 10.165 | -5.848** | 6.186 | -1.140 | -3.828 | 6.630 | 17.109 | -8.873*** | 4.403 |
| | (0.520) | (-2.495) | (1.402) | (-0.040) | (-1.202) | (0.975) | (0.705) | (-2.658) | (0.768) |
| The number of children (6-14 years) | -21.506 | 2.422 | 0.781 | -7.241 | 1.983 | -1.078 | -45.599* | 3.168 | 3.074 |
| | (-1.239) | (1.450) | (0.241) | (-0.334) | (0.885) | (-0.235) | (-1.936) | (1.332) | (0.671) |
| The number of adult male members (15-59 years) | -12.110 | 2.572 | -12.114*** | -15.437 | 4.330 | -8.020 | -12.678 | 0.977 | -14.358** |
| | (-0.580) | (1.092) | (-2.631) | (-0.489) | (1.380) | (-1.226) | (-0.513) | (0.286) | (-2.219) |
| The number of adult female members (15-59 years) | 39.991* | 2.025 | -13.372*** | 16.791 | 4.570 | -10.157 | 57.516** | -2.047 | -16.837** |
| | (1.885) | (0.886) | (-2.698) | (0.556) | (1.450) | (-1.552) | (2.224) | (-0.625) | (-2.299) |
| The number of elderly members (>=60 years) | 3.921 | -1.070 | 1.750 | -3.435 | -1.291 | 1.829 | 17.797 | -0.437 | 1.220 |
| | (0.255) | (-0.647) | (0.552) | (-0.181) | (-0.619) | (0.420) | (0.863) | (-0.172) | (0.266) |
| Age of the Individual | 0.431 | 0.148** | -1.042*** | 1.560** | 0.238*** | -1.316*** | -0.594 | -0.017 | -0.773*** |
| | (0.913) | (2.341) | (-8.734) | (2.243) | (2.750) | (-7.027) | (-1.103) | (-0.190) | (-5.018) |
| Lower Secondary Education | -10.063 | 5.939** | 0.856 | 27.991 | -4.448 | -6.884 | -41.738 | 10.015*** | 5.590 |

| | | | | | | | | | |
|--|------------|------------|------------|-------------|------------|------------|--------------|------------|------------|
| | (-0.392) | (2.207) | (0.172) | (0.776) | (-1.120) | (-0.831) | (-1.273) | (2.824) | (0.905) |
| Tertiary Education *3 | 32.660 | 19.056*** | -56.637*** | 31.406 | 15.526*** | -62.472*** | 35.625 | 25.965*** | -50.065*** |
| | (1.188) | (6.973) | (-8.574) | (0.784) | (4.353) | (-6.456) | (1.080) | (6.563) | (-5.422) |
| Postgraduate Education | 18.987 | 79.610** | -5.410 | -85.814 | 19.737 | -21.335 | 1,411.986*** | 169.289*** | 17.900 |
| | (0.108) | (2.519) | (-0.096) | (-0.450) | (0.673) | (-0.283) | (9.528) | (3.217) | (0.217) |
| MA/PhD/Other | 67.960 | -41.543 | -4.802 | 235.369 | 4.458 | 32.257 | 1,467.884*** | -109.564** | -58.391 |
| Regions | (0.457) | (-1.343) | (-0.088) | (1.459) | (0.157) | (0.442) | (-14.063) | (-2.119) | (-0.739) |
| Central Region | 53.303 | 10.217*** | 5.837 | 48.170 | 6.301 | 6.951 | 65.763 | 14.624*** | 2.633 |
| | (1.512) | (2.644) | (0.760) | (1.002) | (1.145) | (0.612) | (1.411) | (2.793) | (0.253) |
| Northern Region | 12.823 | 0.834 | 24.191*** | 28.768 | -6.412 | 24.933** | 6.280 | -0.264 | 17.152 |
| | (0.330) | (0.211) | (3.048) | (0.528) | (-1.151) | (2.161) | (0.127) | (-0.049) | (1.564) |
| Northeast | 15.400 | -4.105 | 1.413 | 11.453 | -13.306** | 4.508 | 31.170 | -3.509 | -7.353 |
| | (0.404) | (-1.029) | (0.176) | (0.220) | (-2.360) | (0.384) | (0.610) | (-0.638) | (-0.671) |
| Northeastern region | 76.694** | 8.024* | -25.410*** | 61.748 | 1.834 | -22.128* | 90.400* | 9.556 | -34.548*** |
| | (1.971) | (1.877) | (-3.072) | (1.169) | (0.305) | (-1.802) | (1.758) | (1.629) | (-3.080) |
| child | -11.861 | -78.827*** | -62.154*** | -15.764 | -79.515*** | -73.836*** | 24.936 | -49.822*** | -44.179*** |
| | (-0.445) | (-30.403) | (-12.999) | (-0.455) | (-24.144) | (-11.111) | (0.827) | (-12.830) | (-6.337) |
| Household Size | 26.787*** | 1.871*** | 6.238*** | 36.968*** | 0.601 | 7.079*** | 14.160** | 2.418*** | 5.236*** |
| | (5.634) | (3.326) | (5.737) | (5.853) | (0.787) | (4.435) | (2.214) | (2.998) | (3.541) |
| Whether in Urban Areas | 3.649 | 4.657*** | 2.666 | 32.671 | 5.263** | -2.081 | -23.745 | 4.688* | 8.863* |
| | (0.215) | (2.678) | (0.759) | (1.339) | (2.314) | (-0.415) | (-1.069) | (1.836) | (1.812) |
| Whether it is the regular/typical days | 14.856 | -17.145*** | | 27.645 | -11.586*** | | 0.399 | -23.617*** | |
| | (0.809) | (-8.679) | | (1.133) | (-4.240) | | (0.017) | (-8.548) | |
| Whether it is the irregular/non-typical days | 103.292*** | 26.501*** | -481.84*** | 148.280*** | 9.811 | -469.02*** | 39.885 | 18.363** | -488.42*** |
| Occupation of household head *4 | (3.698) | (5.387) | (-41.668) | (3.756) | (1.535) | (-26.583) | (1.149) | (2.460) | (-32.298) |
| Executives and Managers | 82.669* | -1.261 | -1.596 | 128.247* | -5.015 | 14.334 | 11.950 | 1.302 | -15.302 |
| | (1.715) | (-0.253) | (-0.155) | (1.933) | (-0.746) | (0.930) | (0.195) | (0.188) | (-1.108) |
| Science and engineering professionals | -26.409 | -2.925 | -7.722 | -163.389*** | 4.445 | -21.029 | 50.755 | -11.943* | 2.888 |
| | (-0.558) | (-0.656) | (-0.833) | (-2.919) | (0.737) | (-1.434) | (0.951) | (-1.864) | (0.245) |
| Professionals | -112.879* | -2.228 | -7.318 | -59.935 | -3.685 | -1.567 | -367.211*** | 0.019 | -12.000 |
| | (-1.779) | (-0.361) | (-0.634) | (-0.801) | (-0.414) | (-0.100) | (-4.009) | (0.002) | (-0.698) |
| Customer service clerk | 8.716 | 5.460 | -20.983 | 29.088 | 7.264 | 5.613 | -12.731 | 3.966 | -47.875* |
| | (0.169) | (0.879) | (-1.302) | (0.401) | (0.890) | (0.301) | (-0.191) | (0.439) | (-1.924) |
| Personal service worker/care worker | -21.830 | -4.024 | 12.207** | -39.994 | -1.334 | 5.748 | 0.773 | -5.388 | 18.131*** |

| | | | | | | | | | |
|--|------------|------------|------------|--------------|------------|------------|-------------|------------|------------|
| | (-0.811) | (-1.434) | (2.326) | (-1.029) | (-0.350) | (0.728) | (0.023) | (-1.365) | (2.606) |
| Workers in agriculture, fishing and forestry | 15.670 | -5.916** | -2.523 | -21.447 | -5.915* | -7.563 | 50.410* | -4.839 | 0.378 |
| | (0.725) | (-2.551) | (-0.586) | (-0.721) | (-1.935) | (-1.169) | (1.824) | (-1.431) | (0.065) |
| Craftsmen , metal workers | 6.746 | 1.209 | -1.361 | 27.518 | 0.017 | 5.496 | -13.643 | 2.756 | -6.922 |
| | (0.232) | (0.339) | (-0.184) | (0.683) | (0.004) | (0.535) | (-0.336) | (0.546) | (-0.662) |
| Cleaning workers and assistants | 29.275 | -1.245 | 7.239 | 27.323 | 4.094 | 13.466 | 28.501 | -7.333 | 1.931 |
| | (0.963) | (-0.352) | (1.224) | (0.598) | (0.908) | (1.513) | (0.787) | (-1.325) | (0.246) |
| Age of the household head | 0.070 | -0.018 | -0.341** | 0.311 | -0.037 | -0.297 | -0.457 | 0.009 | -0.366* |
| | (0.097) | (-0.219) | (-2.212) | (0.323) | (-0.350) | (-1.348) | (-0.487) | (0.072) | (-1.700) |
| Whether the head is female | 16.955 | -1.285 | 2.908 | 34.680 | -0.836 | 2.515 | 1.448 | 0.108 | 2.844 |
| | (0.984) | (-0.722) | (0.879) | (1.507) | (-0.349) | (0.524) | (0.064) | (0.043) | (0.627) |
| Constant | -817.98*** | 280.420*** | -238.07*** | -1,115.52*** | 306.976*** | -241.08*** | -546.032*** | 341.702*** | -220.94*** |
| | (-8.497) | (31.617) | (-14.798) | (-8.690) | (25.044) | (-10.056) | (-4.525) | (25.282) | (-10.056) |
| Observations | 56,785 | 56,785 | 56,785 | 30,773 | 30,773 | 30,773 | 26,012 | 26,012 | 26,012 |

Robust z-statistics in parentheses

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

Notes: 1: Robust z-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

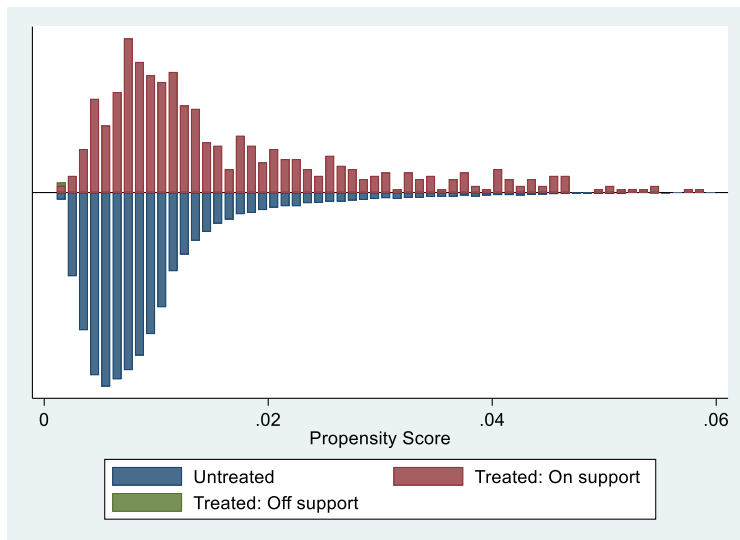
2. A few education categories have been automatically dropped by multi-collinearity.

3. Vocational/profession training, college, and university (Bachelor).

4. 'Factory workers' form a reference category.

5. Some explanatory variables in Table 4 have been dropped to make the estimation of the system of equations tractable.

Online Appendix Figure 1: Distributions of Propensity Scores (only for primary activities)



Online Appendix Figure 2: Distributions of Propensity Scores (primary and secondary activities)

