WHO CARES AND WHO SHARES?
CAREGIVING IN THE HOUSEHOLD

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CWE-GAM Working Paper Series: 21-07
Program on Gender Analysis in Economics
(PGAE)American University, Washington, DC
DOI: 10.17606/CCQ8-JC76
Revised August 2021

This working paper is part of the Care Work and the Economy (CWE-GAM) Project, based at American University's Program on Gender Analysis in Economics (PGAE). The authors would like to acknowledge the financial support of the William and Flora Hewlett Foundation for this report. The findings, views, and conclusions or recommendations expressed in this material are strictly those of the authors and do not necessarily reflect those of the William and FloraHewlett Foundation.

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THE CARE WORK AND THE ECONOMY (CWE-GAM) PROJECT

The Care Work and the Economy (CWE-GAM) Project strives to reduce gender gaps in economic outcomes and enhance gender equality by illuminating and properly valuing the broader economic and social contributions of caregivers and integrating care in macroeconomic policymaking toolkits. We work to provide policymakers, scholars, researchers and advocacy groups with gender-aware data, empirical evidence, and analytical tools needed to promote creative, gender-sensitive macroeconomic and social policy solutions. In this era of demographic shifts and economic change, innovative policy solutions to chronic public underinvestment in care provisioning and infrastructures and the constraints that care work places on women's life and employment choices are needed more than ever. Sustainable development requires gender-sensitive policy tools that integrate emerging understandings of care work and its connection with labor supply, and economic and welfare outcomes.

Find out more about the project at www.careworkeconomy.org.

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Who cares and who shares: Unpaid caregiving in households

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Revised August 2021

ABSTRACT

This paper examines the unpaid care provided by family members, using nationally representative time-use survey data from three countries to understand the magnitude of care work within households and how that work is shared among household members. It develops a time use-based approach to examine the presence of economies of scale and economies of scope in family caregiving. Ghana, Mongolia and South Korea are different with respect not only to their level of economic development but also to their average household size, demographic structure, and gender norms. Yet, controlling for household characteristics, there are striking similarities in the allocation of the care work within households in these countries. We find significant evidence of substitution between men and women, particularly in childcare, as well as economies of scale in the care of young children by women in all three countries and by men in Mongolia and Korea. We also explore the evidence on economies of scope, but typical limitations of time-use survey data make it difficult to discern them clearly.

KEYWORDS: Family care burden, unpaid caregiving, time-use data

JEL CODES: D13, J22, J13

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Acknowledgments

The authors would like to thank Tanima Ahmed and Mungunsvud Terbish for their assistance in time use survey data processing, and Maria Floro and the participants of the IAFFE Annual Conference 2021 for their helpful comments and suggestions on earlier versions of this work. The authors also would like to acknowledge the financial support of the William and Flora Hewlett Foundation through the Care Work and the Economy (CWE-GAM) project at American University, Washington, DC.

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I. Introduction

The 2020 coronavirus epidemic has spotlighted the critical importance of household care activities and the interconnectivity of the private sphere of the household and the public sphere of the market economy. It is clear that we cannot afford to lose sight of the contributions of household sustenance and reproductive activities to society and the economy at large. Time use surveys which collect a wealth of information on how people spend their time tell us that the burden of those activities falls most heavily on women and girls worldwide (ILO, 2018; King et al., 2021). That burden reduces women's ability to participate in the labor market (e.g., Ettner, 1996; Bolin, Lindgren and Lundborg, 2008; Craig and Churchill, 2021; Klasen, 2019) and affects their health (Coe and van Houtven, 2009; Bom et al., 2019). And who cares and who shares in the care burden are shaped by culture and gender norms (Folbre, 2012; Gimenez-Nadal, Molina and Sevilla-Sanz, 2012; Do et al., 2015), and by the accessibility and affordability of market substitutes for care, on the other hand (e.g., Forry and Hofferth, 2011; Randall, 2011; Morissey, 2017).

This paper contributes to the relatively thin literature about the relationship between the household's characteristics and the patterns of time use of its members in different country contexts, especially in the developing world. In particular, we explore how the household's structure and its age and sex composition relate to how time is allocated to productive and reproductive activities, controlling for wealth, location, and education levels of the household. We examine the extent to which women and men substitute for each other in these activities, and whether or not households realize economies of scale and scope. Instead of analyzing individuals' time allocation which has been the typical approach of previous studies, we treat the household as the unit of analysis and group together the time use of its members by age and gender. We are able to aggregate household time-use data by gender because we use data from time-use surveys that have collected data for every member of the household. This household approach allows us to focus on gender differences in care work while taking into account care needs. We do not attempt to model the endogeneity of, say, fertility in women's labor force or caregiving decisions as previous studies have done (Connelly, 1992; Posadas and Vidal-Fernandez, 2013; Nguyen and Connelly, 2014).

To explore the existence of regularities in the patterns of family caregiving such as about who tends to be the principal caregiver and how that work is shared within the household,

we analyze nationally representative time-use survey data from three very different country contexts—Ghana, Mongolia, and South Korea—which differ greatly with respect to not only their level of economic development but also their average household size and structure and their gender and social norms. Despite the country differences, we find striking similarities in the allocation of unpaid care work within families, including significant evidence of substitution between men and women in all three countries, particularly in childcare, as well as economies of scale in the care of young children for women in all three countries and for men in Mongolia and South Korea. We also find weak evidence of economies of scope in childcare, which can be attributed partly to the limitations of many time-use surveys (Buvinic and King, 2019). By examining who provides care in the household and whether there are economies of scale in care activities in low- and middle-income countries such as Ghana and Mongolia, this paper contributes to the literature.

Our results are generally consistent with those of previous country-specific research. Previous research has recognized, for example, that having two children of similar ages instead of one does not necessarily double the amount of care time that parents must devote to childcare, allowing them to take advantage of the economies of scale. See, for example, Gustafsson and Kjulin, 1994, on Sweden; Holmes and Tiefenthaler, 1997, on the Philippines; Kalenkoski, Ribar, and Stratton, 2005, on the U.K.; and Craig and Bitman, 2008, on Australia. Studies have also examined the presence of economies of scale in domestic or indirect care activities such as meal preparation, but the evidence on this is more mixed. For example, Gustafsson and Kjulin (1994) do not find any economies of scale in non-childcare unpaid work, whereas Couprie and Ferrant (2015) do. With regards to the substitution in doing care work between male and female adults within the household, Hallberg and Klevmarken (2003) for Nordic countries and Kalenkoski, Ribar, and Stratton (2005) for the U.K. find evidence of substitution between adults in childcare.

The paper is organized as follows: Section II discusses a conceptual framework for understanding how household structure determines time spent on care and other activities, based in the extensive literature on collective household models. Section III describes the time-use surveys and variables we use in the estimations. In Section IV, we introduce regression specifications that estimate the relationship between household composition and time spent on unpaid work by household members. Regression results are presented in Section V. Section VI concludes with a discussion of the policy implications of our results and some comments on further research on this topic.

II. Conceptual framework

This section discusses a basic model of the household in which members produce as well as consume a nonmarket good called care but are constrained by the number of hours that members can allocate to its production. That constraint derives from having to allocate time between care activities and market work which is needed to be able to purchase the goods required to produce care. Because time is constrained, roles are assigned among household members depending on their relative (shadow) wages, productivity, physical limitations, and preferences, and on the relationships among household members that are built on altruism, interdependence, and trust.[1] These factors lead not only to a substitution between time and goods inputs in the production of care, but also to a distribution of care and market work among household members.[2] And Folbre (2006) reminds us that:

> "[d]istributional conflict influences decisions made by families and also shapes the social institutions that govern the allocation of time. Time allocation does not conform to the idealized processes of competitive markets because it involves important coordination problems that cannot be solved entirely by the independent decisions of individuals. … The social institutions that evolve to help solve these coordination problems are shaped by collective action, and often prove resistant to change even when they lead to inefficient outcomes."

In meeting the care needs of the household, market goods may substitute for household time spent on activities such as cleaning house and meal preparation, but purchased

1 Folbre (1986) argues that a household model needs to take into account the role of power relations, sharing, reciprocity, nurturance, and authority. Similarly, Apps (2003) points to the limitations of the New Household Economics approach, with "its estimation of aggregate household demands, in analyzing the intra-household distribution of welfare and its determinants" and not recognizing that individuals have opportunities, preferences, and constraints that affect their choices as individuals but also as members of the household.

2 Microeconomic studies, especially those that examine labor supply behavior, have tended to ignore the significance of household production activities and how these activities compete with labor market work. In those studies, the key determinant of labor supply is market wages, and the factor that determines the relative engagement of women and men is their relative wages. For example, in Blundell and MaCurdy (1999), what is termed the standard family labor supply model is a highly simplified two-adult household in which the family is a single decision-making unit that maximizes joint utility over consumption and the leisure of husband and wife, where consumption refers to goods and leisure is simply time.

relational care such as child care, elder care, and care for disabled members may not be regarded as sufficient substitutes for family caregiving. The choice between paid and family care is a decision made with respect to not only prices and foregone earnings but also social and cultural norms and personal preferences. Thus, parents may prefer to do child care themselves in spite of the availability of affordable paid care services (Hallberg and Klevmarken, 2003; Hook, 2010).

We posit four hypothetical cases to illustrate how the size and age composition of the household affect caregiving. We start with the simplest case of a household with two independent adults who have separable utility functions but have decided to live together. We modify this case to a household in which the two adults care for each other, and then further expand this case to include one child and then two children. We do not concern ourselves with the form of the household utility function, that is, whether it is a unitary or collective model, which has been the subject of debate of a large literature (Lundberg and Pollak, 1993; Apps, 2003; Carmichael and Charles, 2003; Browning et al., 2013). Time-use survey data tend to be too limited that could be used to estimate structural models of the household's decisions about the allocation of care production and consumption.

Case 1: A household with two independent adults

In this basic case, two independent adults have formed a household only in order to share a public good between them, such as housing. Individuals form households in order to take advantage of the benefits from economies of doing so and gains from trade (Becker, 1965). Suppose that the utility of each adult is a function only of a good termed "care," C_i,

$$U_i = U_i(C_i) \quad i \in \{1, 2\} \tag{1}$$

which is produced by each person using inputs of own-care time $t_{C,i}$ and the public good which is also a care input Z_i.[3] The production function for person *i* is,

$$C_i = C_i(t_{C,i}, Z_i) \quad i \in \{1, 2\}, \tag{2}$$

subject to two constraints—a time constraint and a budget constraint.

$$T_i = t_{C,i} + t_{W,i} \quad i \in \{1, 2\} \tag{3}$$

3 Own-care time includes leisure time. The purchased care input can be a commodity or the time of a paid caregiver.

where $t_{W,i}$ represents adult *i's* time spent on paid work depending on the market wage w_i. The income received, Y_i, is used to purchase Z_i at the market price *p/2*, on the assumption that the two adults share equally in the cost of Z_i. The monetary budget constraint for adult *i* is,

$$Y_i = w_i t_{W,i} \geq \frac{p}{2} Z_i. \quad (4)$$

The standard optimization condition in this model for each individual is that time will be allocated to own-care up to the point at which the ratio of the marginal product of own-care time to that of paid work (the marginal rate of substitution) is equal to the ratio of the wage to the (one-half) price of the purchased input Z_i (the economic rate of substitution). The production function in this model assumes that own-care time and the purchased input are substitutes to some degree, but the degree of substitutability between the two inputs depends on several factors, among them the availability and affordability of the purchased input. In contexts where the purchased input is not available or its price is too high and under the same cultural and economic context, an individual is likely to use more of one's own-care time than purchased inputs in the production of care and the more costly the public good *Z*, the higher the gains from sharing the cost of that good.

Case 2: A joint household with two adults

Consider next a household with two adults who care for one another, such that each individual's utility function is a function of own-care (caring for oneself) as well as other-care (caring for the other),

$$U_i = U_i(C_i, C_j), \quad i, j \in \{1, 2\}, i \neq j. \quad (5)$$

We assume that each adult's utility function is convex with respect to each care good such that the marginal utility of own-care depends on the level of other-care and vice versa. In Becker's model of an altruistic household (1991), the household "head" maximizes the wellbeing of all members, but this approach requires a further assumption that the altruistic head of the household is able to control the distribution of resources by having more power by other means (Folbre, 1986; Pollak, 1985). For the purpose of this paper, we ignore the sources and distribution of this power.

In this second hypothetical case, the production of a person's care involves not only own-care time but also care received from the other member of the household. Thus, the care consumed by adult *i* is a function of own-care time, $t_{C,i}$, the other-care time received from adult *j*, $\tau_{C,i}^{j}$, and the shared (public) good *Z*. In this case, care consumed no longer has to be limited by own-care produced.

$$C_i = C_i\left(t_{C,i}, \tau_{C,i}^{j}, Z\right) \quad i \in \{1,2\} \tag{6}$$

subject to the time constraint of each adult,

$$T_i = t_{C,i} + \tau_{C,i}^{j} + t_{W,i}, \quad i,j \in \{1,2\}, i \neq j \tag{7}$$

and a monetary budget constraint,

$$Y_i = w_i\left(T_i - t_{C,i} - \tau_{C,i}^{j}\right) \geq \frac{p}{2}Z\,, \quad i,j \in \{1,2\}, i \neq j \tag{8}$$

The optimization conditions for this maximization problem are similar to that in Case 1 except that they now involve the relative wage rates of the two adults as well as their relative productivity in the production of each care good. Assuming that own-care and other-care are weighted equally in the utility function, each adult in the household will allocate time to the production of own-care and to other-care up to the point that the marginal products of these two care activities are equal, and up to the point that the marginal products of the other-care time of the two adults are equal to the ratio of their wages. This implies that if w_i exceeds w_j, adult *i* will give less time to other-care than adult *j*. Another condition is that own-care time must be nonzero, so $t_{C,i} > 0$ and $0 \leq \tau_{C,i}^{j} < T_i$. In this case too, the market work time of either adult can be zero but that market work time cannot be zero for both adults. As Apps (2003) characterizes it, one possible (and probable) outcome is that a household member, most likely a woman, takes on most care responsibilities in exchange for receiving goods or money from other household members who are able to earn more. Care work is determined by how much a household member is

willing to give which, in turn, depends on the opportunity cost of that time, the price of purchased inputs, preferences, and expectations about roles.

Note too that although the only purchased good in this case so far is a public good, this case can be modified to include individual-specific goods, Z_i.[4] Assuming that Z and $\boldsymbol{Z_i}$ are imperfect substitutes, individuals must decide how much of each to consume and that decision would depend on the substitutability of the purchased goods and their relative prices.

Case 3: A joint household with two adults and one child

We pose this case to examine the substitution of adults' care time in caring for a young child who is assumed to be fully dependent on the adults for care and does not contribute to the care produced and consumed by either adult. This is essentially a nuclear household with two parents and a young child, although it could also be that the second adult is an older sibling or grandparent of the young child. In this case, the household utility function is given by

$$U_i = U_i(C_i, C_j, C_c), \quad i,j \in \{1,2\}, i \neq j. \tag{9}$$

Child care depends on the time inputs of each adult and a purchased child-specific input $\boldsymbol{Z_c}$ that is available for the purchase price $\boldsymbol{p_c}$,

$$C_c = C_c(\tau^c_{C,j}, \tau^j_{C,i}, Z, Z_c) \quad i,j \in \{1,2\}, i \neq j \tag{10}$$

The time constraint of each adult *i* is a function of own-care time, care time given to the other adult, child care ($\tau^c_{C,i}$), and market work time.

4 We ignore the issue of the quality of available purchased inputs, but this too could be a factor in the choice of whether to produce own-care.

$$T_i = t_{C,i} + \tau^j_{C,i} + \tau^c_{C,i} + t_{W,i}, \quad i,j \in \{1,2\}, i \neq j \tag{11}$$

The willingness of either adult to substitute the common public good for the childcare-specific good depends on their relative prices, and similar to Case 2, each adult will allocate time to the production of own-care and to other-care up to the point that the marginal products of these two care activities are equal, and up to the point that the marginal products of their care time are equal to the ratio of their wages. Who cares more for the child will depend also on the relative wages of adults. Per this condition, the adult with a lower wage or higher relative marginal productivity in care production will provide more or (almost) all of the childcare.

The child-specific purchased good, Z_C, could pertain to paid childcare, available at p_c. The marginal rate of substitution between this purchased good and the childcare time of either adult in the household would depend on the ratio of the adult wages to the price of childcare. The higher the price of paid childcare relative to wages, less paid childcare will be purchased and more time spent on childcare by the adult whose wage is lower than either the price of paid care or the wage of the other adult. This is the reason why a subsidy for paid childcare would be necessary if women are to be encouraged to increase their labor supply.

Case 4: A joint household with two adults and two children

To explore whether there are economies of scale in caring for a young child, we consider the case of a household with two adults and two young children. The case of twins (or multiple births) would be ideal for illustrating the presence of scale economies. As in Case 3, assuming that the consumption of care by each individual has equal weight in the utility function, the addition of a second child in the household increases the marginal productivity of time spent on childcare by both adults, so another young child means that more time will be spent on childcare than in a household with one child. If this additional time for the second child is less than the time provided when there is only one child, this is evidence of economies of scale in the production of childcare.[5]

5 The demographic literature has long recognized that birth spacing is a hugely important fertility decision. As the number of children who benefit at once from care time that parents expend increases, the cost per child decreases. Holmes and Tiefanthaler (1997) conclude that the marginal time costs are not the same across households of various sizes in the Philippines. They find that first-born children cost significantly more in terms of additional mother's time than children of higher birth orders. Similarly, the time costs of the

Economies of scale may be present not only in childcare time but also in the purchased child-related inputs. Following the example in the previous case in which the purchased child-related input is paid childcare, a couple may be able to pay a childminder less than double the price for the care of one child. There are many other examples of siblings sharing the cost of child inputs, including children's books and toys.

If the two children have a substantial age gap, say, an infant and an eight-year-old child who attends school, the nature of care for the two children is no longer the same. In effect, the presence of this second child in the household is akin to undertaking a different relational care activity. In such a case, if the additional amount of time spent on the care of the second child is less than the amount spent for the first child, all else constant, this may be considered evidence of economies of scope in childcare. Examples abound—a parent taking the older child to school or preparing meals while minding a sleeping infant—but these activities are more difficult to measure because one of these simultaneous or overlapping activities may be reported as a secondary or a supervisory activity which is typically missed in time-use surveys (Floro and Miles, 2003; Folbre and Yoon, 2007; Suh and Folbre, 2016). The result of omitting these activities from time-use data is to underestimate the intensity of care time.

III. Data and descriptive statistics

A. Time-use surveys from Ghana, Mongolia, and South Korea

We analyze time-use survey data from Ghana (collected in 2009), Mongolia (2011) and South Korea (2014). We have chosen these three countries because of their different household structure and composition, social norms, principal occupations and level of economic development. These factors are likely to influence the economics of the household, including how care responsibilities are allocated among activities and among members. On household structure, Korean households tend to be nuclear families with few children; the total births per woman in 2019 was 0.98. In contrast, fertility rates are higher in Ghana and Mongolia—3.9 and 2.9 total births per woman, respectively. Households tend to be multi-generational in these two countries, whereas in Korea almost one-quarter of households are elderly couples (aged 65 and over) living on their own.

second child are found to be significantly greater than those of the third child. However, these economies of scale in childcare are limited and do not extend beyond three children.

With respect to the economic development, the GDP per capita levels of the three countries are strikingly dissimilar. In 2020, Ghana's per-capita was one-half of Mongolia's and only one-eighth of Korea's.[6] Korea is highly industrialized, with 25 percent of its workers employed in manufacturing and 70 percent in services in 2019, and it has the largest formal sector of the three countries (World Bank Group, 2020). By comparison, Mongolia and Ghana are significantly more agricultural—but these two economies are also quite different from each other. Mongolia's economy has traditionally depended on nomadic, pastoral agriculture, while Ghana's agriculture relies on crop farming. The nomadic lifestyle of the rural population in Mongolia and its dependence on livestock raising where men are responsible for long-distance herding, building, and repairing winter and spring shelters, often taking their young sons with them (Cooper and Gelezhamstin, 1994),[7] explains perhaps men's relatively higher participation in care work that we see from our analysis. Lastly, highly relevant to a study of time allocation in the household, female labor force participation rates differ across the three countries, though perhaps not as expected given their GDP per capita differences. In 2019, Ghana's female labor force participation rate was 64 percent, Mongolia's was 55 percent, and Korea's was 54 percent; by comparison, male female labor force participation rates were 72 percent in Ghana and Korea and 71 percent in Mongolia. These demographic and economic country differences are useful to keep in mind as we discuss the multivariate regression results.

We have also chosen the three countries because their nationally representative time-use surveys collected data on all adult members of the household (ages 10+ for Ghana, 12+ for Mongolia, and 10+ for South Korea), allowing us to account for total household time spent in different activities. Descriptions of the collection dates, methods, sampling, and sample size are presented in Appendix Table A1. Time-use categories include several care activities, namely, direct (or relational) and indirect (or domestic) care, as well as market work. From the full time-use survey samples, we extract our analysis samples which are households consisting of young children and adults aged 15-64 years (Table 1). We define our analysis samples in this way because our focus is on childcare and how it relates to indirect care and market activities, and how those care and market activities are shared among household members.

6 According to World Bank data (https://data.worldbank.org/indicator/), Ghana's GDP per capita in constant 2017 $PPP in 2020 was 5,305, Mongolia's was 11,471, and South Korea's was 42,251.

7 In pastoral areas, women are responsible for herding small stock and milking, in addition to performing domestic tasks such as product processing, cleaning, washing, and sewing (Cooper and Glezhamstin, 1994). Older boys and girls help collect wood for fuel and water (Terbish and Floro, 2016).

Table 1. Age composition of time-use surveys

	Ghana	Mongolia	South Korea
Full time-use survey samples (households)	4182	1322	11787
Households with no children aged 0-14	1322 (32.1%)	562 (42.5%)	6815 (57.8%)
Households with only members aged 65 and over	277 (6.6%)	62 (4.7%)	2793 (23.7%)
Households with members aged 0-64 (analysis samples)	2273 (54.4%)	754 (57.0%)	2179 (18.5%)

Data sources: Authors' calculations from Ghana TUS 2009, Mongolia TUS 2011, and South Korea TUS 2014.

Time-use survey data are extremely useful for documenting the types and levels of care activities. Nonetheless, before turning to our results, it is useful to acknowledge the limitations of those data that are relevant to our study.[8] First, as mentioned earlier, some amount of unpaid care is performed as a secondary or simultaneous activity, but most time-use surveys do not collect data on activities considered by the survey respondent as secondary (Charmes, 2019; Folbre and Yoon, 2007; Gauthier et al., 2004), so they underestimate the amount of care work in the household.[9] Second, these surveys do not collect data on the occupation or wages of household members who work, thus limiting our ability to use wages to predict the allocation between care and market work and the degree of substitution among household members. Time-use surveys are time- and attention-intensive for respondents, whether the surveys use the diary or interview method, so these surveys tend to collect a limited set of data on many variables that could describe the respondents or the household. Third, these surveys typically do not contain information about the availability, price and use of paid care services by the households, information that provides a fuller picture of the care needs within the household and the burden of those needs on household members.

[8] Time-use researchers have been developing different methods since the 1980s to address many of the challenges and difficulties of time-use data collection and measurement (Gershuny and Robinson, 1988; Ironmonger, 1996; Bittman,1999; Gershuny, 2011). A review and comparison of data collection methods can be found in Floro and King (2016). Although the time diary is generally considered the most reliable approach, but the observation method may be preferred in some contexts provided that the presence of the observer does not unduly influence the activities performed by the respondents (Hirway, 2010).

9 Fedick, Pacholok, and Gauthier (2005), using Canadian data, and Craig and Bittman (2005), using Australian data, find that for every childcare hour recorded as a primary activity, three to four more hours of childcare are performed as a secondary activity.

B. Time patterns: childcare, indirect care, and market work

We are primarily interested in how childcare and indirect care work are shared among household members, so we focus first on households with children. To limit the confounding of potential care suppliers and potential care recipients, we omit households with elderly members (65+), who may either or both be caregivers and care recipients depending on their physical and mental health status, from our analysis sample. We analyze the total time spent on childcare, indirect care, and market work by adults aged 15-64, disaggregated by gender. We initially explored also care time for adults aged 65 and over, but only a small fraction of the households with young children in the three countries also include elderly persons aged 65 and over.[10] Nonetheless, the relatively younger households that we include in our analysis samples could still be multigenerational, especially in contexts where the ages at marriage and first birth are quite young.

Table 2 shows the gender-disaggregated means and standard deviations of total household time spent in three activity categories for different types of households, measured in minutes per day.[11] Several striking patterns emerge from just these averages. In all three countries, women perform the bulk of unpaid care work, a stylized fact that is well-documented in time-use reports, but the number of minutes per data spent on childcare are widely different. On average, women's total time for childcare in households with at least one child is 49 minutes per day in Ghana, 68 minutes in Mongolia, and 169 minutes in Korea. The corresponding averages for men are all far lower but also differ across the countries—just 7 minutes per day in Ghana, 15 minutes in Mongolia and 42 minutes in Korea. These country differences are all the more striking when we consider that more than one-third of sample households in Ghana and nearly one-half of households in Mongolia have one to two children, while fewer than one-tenth of households in Korea have at least one child.

Table 2. Mean unpaid time for childcare, indirect care, and market work by household members 15-64 (minutes per day): Ghana, Mongolia, and South Korea

10 In the Ghana sample, this fraction is 7 percent; in Mongolia, 3 percent; and in Korea, 0 percent.
11 The specific activities included in the aggregate categories of childcare and indirect care are described in Appendix Table A2.

	Activity	All households	Households with children	Households with positive childcare time	Households with children, no elderly
Ghana					
Women	Childcare	31.4	49.1	70.1	51.4
		(60.77)	(70.53)	(74.33)	(71.05)
	Indirect care	100.3	132.0	148.8	133.3
		(118.83)	(122.88)	(121.75)	(121.12)
	Market work	149.7	188.8	201.2	194.3
		(205.25)	(212.88)	(210.69)	(212.42)
Men	Childcare	4.6	6.9	10.2	7.6
		(18.04)	(22.05)	(25.85)	(23.05)
	Indirect care	15.9	16.1	15.9	16.3
		(44.46)	(43.67)	(42.92)	(42.84)
	Market work	78.9	86.7	100.9	93.1
		(161.40)	(167.84)	(174.32)	(170.18)
	N	4182	2638	1876	2275
Mongolia					
Women	Childcare	44.9	68.1	98.7	68.4
		(93.13)	(108.86)	(117.38)	(108.27)
	Indirect care	61.5	59.7	74.2	62.2
		(125.49)	(124.72)	(133.57)	(126.59)
	Market work	277.3	298.4	292.2	301.5
		(317.14)	(314.52)	(319.11)	(314.94)
Men	Childcare	10.4	15.1	22.8	15.4
		(37.18)	(43.32)	(52.52)	(43.27)
	Indirect care	51.6	52.1	59.3	53.8
		(93.07)	(90.78)	(99.55)	(90.32)
	Market work	312.1	343.9	308.4	351.0
		(339.68)	(337.23)	(324.28)	(337.77)
	N	1322	802	601	754

South Korea					
Women	Childcare	34.9	167.9	126.9	169.1
		(88.10)	(131.95)	(128.54)	(131.68)
	Indirect care	140.2	198.4	214.5	199.1
		(134.15)	(107.17)	(109.69)	(105.05)
	Market work	92.5	66.5	78.5	66.3
		(159.39)	(118.73)	(123.22)	(118.75)
Men	Childcare	8.7	42.3	31.4	42.9
		(30.84)	(57.62)	(52.34)	(57.85)
	Indirect care	26.9	29.8	30.6	30.2
		(50.74)	(47.97)	(49.87)	(48.08)
	Market work	132.0	165.7	166.8	167.9
		(168.10)	(122.63)	(131.59)	(122.28)
	N	11787	2254	3244	2203

Data sources: Authors' calculations using 2009 Ghana Time-Use Survey, 2011 Mongolia Time-Use Survey, and 2014 South Korea Time-Use Survey. Notes: Childcare pertains to direct care given to children under 15. Only time for primary activities are included in these numbers. Households reflected here are only those with members 15-64.

Paradoxically, many households in Ghana and Mongolia have young children but report zero childcare time by adults, while in Korea, many more households report giving childcare than have children. These patterns indicate common inter-household care arrangements in these countries: In Ghana and Mongolia, it is common to share child-minding and childcare duties with non-household family members or with older children, while in Korea, grandparents who live on their own nevertheless provide childcare time for their grandchildren. In all, however, we find little difference in mean time spent on childcare between those households with young children but no elderly members and all households with children, perhaps indicating that elderly members in households are not often childcare providers.

Households with children also report more time for indirect care by women and men in Ghana and Korea than households without children; the differences are minimal for Mongolia. This difference is marginal for men, where the differences are less than three minutes on average, but far greater for women in Ghana and Korea (32 minutes in the former and 58 minutes in the latter).

Finally, differences in average total market work for men and women demonstrate different work arrangements across households. In Ghana and Mongolia, adult men and women in households with children spend more time on market work activities, on average, compared with all households. In Korea, men in households with young children tend to have higher market work time, but women in those households spend tend to have fewer market work time by 14-26 minutes per day (or 15-28 percent of the average for women in all households).

Most studies that examine time-use data are based on average reported care time. While suggestive of the large gender disparities in unpaid time spent on child care and on indirect care work, these averages hide patterns that could shed light on the trade-offs (many gendered) that households make between paid and unpaid work and leisure in order to respond to care demands. In other words, summary statistics mask variation across households even within the same country setting and do not reflect the marginal care burden of high fertility rates or of aging on the distribution of care responsibilities within the household.

C. Descriptive statistics: Analysis samples

Our study treats the household as the unit of analysis. Tables 3-5 describe the household composition and other characteristics of the analysis samples from the three countries, that is, those households that have at least have one child aged 0-14 and do not have members aged 65 and over. On average, the Ghana sample has 0.9 children aged 0-4 and 1.6 children aged 5-14; the corresponding numbers in Korea are 0.8 and 0.7 children. Due differences in the survey questionnaire for Mongolia, the age categories for children are 0-11 and 12-14. The Mongolia sample has 1.5 children aged 0-11 and 0.3 children aged 12-14, on average. There are approximately 2.3 adults aged 15-64 in the average household in the Ghana sample, 2.5 in Mongolia, and about two in Korea.

Table 3. Ghana: Summary statistics from 2009 Time-Use Survey

	Mean	s.d.	Min	Max
Number of children aged 0-4	0.87	(0.84)	0	6
Number of children aged 5-14	1.56	(1.24)	0	9
Number of female adults aged 15-64	1.33	(0.72)	0	6

Number of male adults aged 15-64	1.05	(0.79)	0	7
Household head is female (binary)	0.28	(0.45)	0	1
Head's age	40.68	(10.55)	15	64
Head's highest years of education completed	3.31	(1.47)	0	10
Wealth index*	0.18	(0.16)	0	1
Urban (binary)	0.38	(0.49)	0	1
Distance to nearest school (km)	1.17	(0.96)	0	15
N	2273			

* This is a normalized index of household assets, created by applying principal component analysis to binary variables regarding the ownership of various assets. The assets in question include: ownership of a wall clock, radio, TV, phone, refrigerator, freezer, electric generator, washing machine, computer, camera, video deck, DVD player, bed, cupboard or cabinet, microwave, living room furniture, satellite dish, sewing machine, fan, air conditioner, gas cooker, kerosene stove, blender, rice cooker, and coal pot; and ownership of farmland, other land, livestock, tractors, industrial machines, residential and non-residential buildings, industrial premises, an import and sale license, transportation equipment, a private car, a bicycle, a motorbike, a donkey or cart, and cornmills.

Notes: Authors' calculations from a subsample of households from the 2009 Ghana Time-Use Survey. The subsample used is households with at least one child and one member 15-64, but without elderly members.

Table 4. Mongolia: Summary statistics from 2011 Time-Use Survey

	Mean	s.d.	Min	Max
Number of children aged 0-11	1.47	(0.91)	0	5
Number of children aged 12-14	0.33	(0.54)	0	3
Number of female adults aged 15-64	1.34	(0.67)	0	6
Number of male adults aged 15-64	1.15	(0.69)	0	5
Household head is female (binary)	0.31	(0.46)	0	1
Head's age	37.92	(9.94)	12	64
Head's highest years of education completed	4.23	(1.84)	1	8
Wealth index*	0.70	(0.18)	0	1
Urban (binary)	0.35	(0.48)	0	1
N	754			

* This is a normalized index of household assets, created by applying principal component analysis to binary variables regarding the ownership of various assets. The assets in question include: ownership and size of agricultural land; ownership of livestock or farm animals, horses, cattle, camels, sheep, goats, pigs, and poultry; ownership of a renewable energy generator, computer, TV, washing machine, refrigerator, microwave, telephone, cell phone, car, bus or minivan, and motorcycle; and household access to internet or cable TV.

Notes: Authors' calculations from a subsample of households from the 2011 Mongolia Time-Use Survey. The subsample used is households with at least one child and one member 15-64, but without elderly members.

Table 5. South Korea: Summary statistics from 2014 Time-Use Survey

	Mean	s.d.	Min	Max
Number of children aged 0-4	0.78	(0.72)	0	3
Number of children aged 5-14	0.71	(0.70)	0	3
Number of female adults aged 15-64	1.06	(0.37)	0	4
Number of male adults aged 15-64	0.97	(0.34)	0	3
Household head is female (binary)	0.13	(0.33)	0	1
Head's age	38.95	(6.39)	20	64
Head's highest years of education completed	14.43	(2.47)	0	23
Size of house (sq. ft.)*	80.51	(28.04)	16	347
Owns house* (binary)	0.57	(0.49)	0	1
Urban (binary)	0.46	(0.50)	0	1
Double earner household (binary)	0.41	(0.49)	0	1
N	2179			

* These variables are proxies for wealth, since the Korean Time-Use Survey does not have sufficient asset information to allow the calculation of a wealth index to match Ghana and Mongolia.

Notes: Authors' calculations from a subsample of households from the 2014 South Korea Time-Use Survey. The subsample used is households with at least one child and one member 15-64, but without elderly members.

As controls variables in the multivariate analysis of time allocation, we use the characteristics of the household head (gender, age, and education), urban or rural residence, and a proxy measure for wealth. Female headship is low in the three countries—around 30 percent in Ghana and Mongolia, and 13 percent in Korea—with the average age of the household head ranging from 38 to 41 years. The average years of education completed by the head is lowest in Ghana, just 3.3 years, and only a little higher in Mongolia, 4.2 years, as compared with over 14 years of education in Korea. Urban residence is also lower in Ghana (38 percent) and Mongolia (35), and higher in Korea at 46 percent. Detailed information on ownership of pre-specified assets has been collected in Ghana and Mongolia, allowing us to use principal component analysis to construct a wealth index that ranges between 0 and 1. This index is quite low in Ghana (0.18, on average) and considerably higher in Mongolia (0.70).[12] For Korea, detailed information on asset ownership is not available so we use instead the size of the house in which the household lives[13] and whether or not the household is a double-earner household (41 percent).

IV. Estimation model

We next examine the relationship between household composition and time spent on market and unpaid care work, using the count of household members in three age groups. We estimate these relationships separately for adult females and adult males. As mentioned, the sample for this analysis is restricted to households that have at least one member aged 15-64, at least one child under the age of 15, and no elderly members (aged 65 and over).

A basic specification of our estimation model is

$$\ln\left(T_{jh}^{w}\right) = \alpha_j + \sum_i \beta_{ij} N_{ih} + \boldsymbol{\zeta_j X_h} + \epsilon_{jh} \qquad (1)$$

where $\boldsymbol{T_{jh}^{w}}$ is the total time spent by adults 15-64 of gender *j* in household *h* on activities in category *w* (childcare, indirect care, or market work). We use a logged specification of

12 Details on which assets are included in the construction of each index are given in the notes for Tables 4-6.

13 According to Statistics Korea, home ownership rate in Korea in 2017 was 56 percent of households, a far lower rate than in other countries with comparable average income.

the dependent variable because we expect a decreasing marginal association between the number of household members and time allocation. N_{ih} is the number of household members of age group *i*, where *i* specifies the care recipient group (ages 0-4, 5-14 for Ghana and Korea, and 0-11 and 12-14 for Mongolia). X is a vector of household characteristics such as household wealth, urban or rural location, and the age and sex of the household head; ϵ_{jh} is a stochastic error term.

Since the reported care time reflects both the demand for and supply of care within the household, interpreting the coefficients β_{ij} is not straightforward. With total household care time as the dependent variable, a positive coefficient β_{ij} may be due to an increase in either demand or supply. This identification issue can be addressed easily in the case of care for infants and toddlers since they are not caregivers themselves, so we structure our analysis as follows: (1) We include only the number of likely care recipients as independent variables, that is, number of infants and preschoolers; and (2) use only the care time provided by the most likely caregivers (that is, members aged 15-64) as the dependent variable. Using this approach, we ignore the personal care time that members aged 15-64 give to each other ($\tau^{j}_{C,i}$ in our conceptual model), as well as any care work that children under 15 years old may do.

Previous time-use studies—as well as demographic research on fertility planning—have recognized that having two pre-school children instead of one does not necessarily double the amount of care time that parents have to devote to childcare, allowing them to take advantage of economies of scale (Aalto and Varjonen, 2006; Kalenkoski, Ribar, and Stratton, 2005). A similar argument has been made for meal preparation—cooking for four persons does not take much more time or effort than cooking for, say, three—and so on about several home production activities.[14] For these reasons, we examine whether there are economies of scale in caregiving and whether these economies of scale are similar across the different care activities and across different countries. We also examine how the presence of economies of scale affects time for labor supply or market work. Previous time-use studies have also claimed that household members take advantage of economies of scope in caregiving. Any parent would understand that caring for an infant is quite different from caring for a school-age child of eight in terms of attention and physical

14 For example, Couprie and Ferrant demonstrate economies of scale in time spent on general housework using time use data from the UK (2015).

care, but that caring for both would not necessarily double the amount of childcare during the day, so there may be *economies of scope* to be had.

Including household member counts and covariates allows us to explore substitution and complementarity among caregivers within the household, economies of scale in care activities, and evidence of economies of scope. The full specification that may reveal all these relationships is,

$$\ln(T_{jh}^{w}) = \alpha_j + \sum_i \beta_{ij} N_{ih} + \gamma_j N_{kh} + \sum_i \delta_{ij} N_{ih}^2 + \zeta_j N_{ih} N_{mh} + \boldsymbol{\eta_j X_h} + \epsilon_{jh}, \quad (2)$$

where the term $\boldsymbol{N_{kh}}$ represents the number of adults aged 15-64 of the opposite gender in the household (male if *j*=female, female if *j*=male). This term provides an estimate of substitution or complementarity between women's and men's time in different activities; a negative estimate for $\boldsymbol{\gamma_j}$ represents substitution and a positive estimate complementarity. The second additive term represents squared member counts for the children's age categories; a negative coefficient $\boldsymbol{\delta_{ij}}$ represents evidence of economies of scale in the care of children, as well as in other activities with respect to children. The term $\boldsymbol{N_{ih}N_{mh}}$ is the interaction between the number of younger children in the household and the number of older children. A negative estimate of $\boldsymbol{\zeta_j}$ indicates economies of scope; however, there are alternative explanations, such as that older children help to care for younger children and thus reduce the demand for adults' time spent on childcare and indirect care activities. Thus, any evidence of economies of scope is indicative, but not definitive.

Assuming that decisions about the household's time spent on different activities are determined simultaneously, we use a seemingly unrelated regression (SUR) model to account for correlated error terms in the estimations for childcare, indirect care, and market time. The omitted time category is household time spent on other activities, primarily leisure. As discussed above, each regression equation contains a vector of controls that includes characteristics of the household head (age, age squared, gender, and highest years of education completed), a binary variable for urban residence, and at least one proxy measure for wealth. Details on the specific control vector for each country can be found in the notes of Table 6.

Table 6. SUR results: Full regression specification for Ghana, Mongolia, and South Korea (coefficients)

	A. Logged total household time spent on childcare by gender					
	Ghana		Mongolia		South Korea	
	Female	Male	Female	Male	Female	Male
Children 0-4 (0-11)	2.005***	0.230**	1.730***	0.803***	1.891***	1.417***
	(0.125)	(0.0985)	(0.314)	(0.234)	0.266	0.376
Children 5-14 (12-14)	-0.156	0.0445	-0.161	-0.0472	1.004***	-0.174
	(0.105)	(0.0827)	(0.423)	(0.316)	0.261	0.369
Female adults 15-64	0.219***	-0.0834	0.260**	-0.150*	1.287***	-0.286**
	(0.0662)	(0.0524)	(0.118)	(0.0882)	0.080	0.114
Male adults 15-64	-0.184***	0.0565	-0.199*	0.0734	-0.167	0.641***
	(0.0699)	(0.0558)	(0.115)	(0.0857)	0.101	0.144
Children 0-4 (0-11) squared	-0.339***	0.0343	-0.241***	-0.120**	-0.457***	-0.352***
	(0.0461)	(0.0365)	(0.0698)	(0.0521)	0.085	0.120
Children 5-14 (12-14) squared	0.0583***	0.00382	0.0747	0.0486	-0.233***	0.054
	(0.0221)	(0.0175)	(0.234)	(0.175)	0.082	0.116
Children 0-4 (0-11) x Children 5-14 (12-14)	-0.0114	-0.0217	-0.0145	-0.161	-0.564***	-0.189
	(0.0378)	(0.0299)	(0.170)	(0.127)	0.141	0.199
N	1593	1591	754	754	1984	1984
R^2	0.303	0.108	0.199	0.201	0.255	0.216
	B. Logged total household time spent on indirect care by gender					
Children 0-4 (0-11)	0.713***	-0.182	0.0540	0.00721	0.560**	-0.574
	(0.121)	(0.115)	(0.141)	(0.260)	0.245	0.397
Children 5-14 (12-14)	0.167	-0.0254	-0.199	-0.0875	0.697***	-0.713*
	(0.102)	(0.0965)	(0.190)	(0.351)	0.240	0.389
Female adults 15-64	0.913***	-0.273***	-0.0863	-0.209**	1.397***	-0.204*
	(0.0644)	(0.0611)	(0.0530)	(0.0979)	0.074	0.120
Male adults 15-64	-0.0627	1.061***	0.0157	-0.0809	-0.088	0.963***
	(0.0680)	(0.0652)	(0.0514)	(0.0950)	0.093	0.151
	-0.0913**	0.0728*	0.0113	0.00654	-0.133*	0.170

Children 0-4 (0-11) squared	(0.0449)	(0.0426)	(0.0313)	(0.0578)	0.078	0.127
Children 5-14 (12-14) squared	-0.0120	-0.0154	0.0987	-0.179	-0.186**	0.179
	(0.0215)	(0.0204)	(0.105)	(0.194)	0.076	0.123
Children 0-4 (0-11) x Children 5-14 (12-14)	-0.0621*	0.0107	-0.122	0.0970	-0.287**	0.385*
	(0.0369)	(0.0349)	(0.0760)	(0.141)	0.129	0.210
N	1631	1629	754	754	1984	1984
R^2	0.156	0.212	0.854	0.444	0.173	0.0850
C. Logged total household time spent on market work by gender						
Children 0-4 (0-11)	0.128	0.00380	-0.250	0.114	-0.720**	0.268
	(0.185)	(0.175)	(0.414)	(0.299)	0.354	0.371
Children 5-14 (12-14)	0.119	-0.0442	-0.228	0.236	-0.279	0.512
	(0.156)	(0.147)	(0.558)	(0.403)	0.347	0.364
Female adults 15-64	0.923***	-0.164*	0.819***	-0.0260	1.116***	-0.281**
	(0.0985)	(0.0930)	(0.156)	(0.113)	0.107	0.112
Male adults 15-64	0.128	0.718***	0.0169	0.323***	-0.366***	1.944***
	(0.104)	(0.0991)	(0.151)	(0.109)	0.135	0.142
Children 0-4 (0-11) squared	-0.0130	0.0665	-0.0193	-0.0274	0.203*	-0.029
	(0.0687)	(0.0648)	(0.0920)	(0.0665)	0.113	0.119
Children 5-14 (12-14) squared	0.0131	-0.0195	-0.234	0.0219	0.030	-0.128
	(0.0328)	(0.0310)	(0.308)	(0.223)	0.110	0.115
Children 0-4 (0-11) x Children 5-14 (12-14)	-0.0724	0.0582	0.242	-0.272*	0.217	-0.205
	(0.0563)	(0.0531)	(0.224)	(0.162)	0.187	0.196
N	1631	1629	754	754	1984	1984
R^2	0.0813	0.159	0.142	0.603	0.547	0.270

Sources: Authors' calculations using 2009 Ghana Time-Use Survey, 2011 Mongolia Time-Use Survey, and 2014 South Korea Time-Use Survey. Notes: Standard errors in parentheses. Estimates are calculated using a seemingly unrelated regression (SUR) specification. The outcome variables are logged total household time spent on the specified activity by either men or women as indicated. The subsample used from each survey is those households with at least one child and one member 15-64, but without elderly members. The vector of controls includes an indicator for whether or not the household head is female; the head's age and age squared; the head's highest years of education completed; and an indicator for whether or not the household resides in an urban area. Additional controls by country are: Ghana: Wealth index (see notes for Table 3); distance to nearest school (proxy for availability of formal care); Mongolia: Wealth index (see notes for Table 4); South Korea: Size of house (sq. ft.) and indicator for whether or not the household owns their own house (proxies for wealth); indicator for whether or not the household is a dual-earner household

V. Regression results

Table 6, Panel A, presents the estimated coefficients for childcare, Panel B for indirect care, and Panel C for market work.[15] The first two rows of each panel show the coefficients of the number of children in each age group. As one would expect, an additional child in the household increases the time spent on childcare by adults, but it does so unequally for men and women. The marginal coefficient for this count variable (excluding the squared and interaction terms) indicates that an additional child increases women's time spent on childcare by 173 percent in Mongolia, 189 percent in Korea and 201 percent in Ghana. The corresponding numbers for men are 80 percent, 142 percent, and 23 percent. These results show the largest gender inequality in the distribution of childcare to be in Ghana and the smallest gender gap in Korea.

The rows for number of female adults aged 15-64 and male adults aged 15-64 in each panel of the table give our estimates of the coefficients γ_j for women and men, indicating the substitution between them. In the regressions for total female time, it is no surprise that an additional female adult in the household would increase the time spent on each activity undertaken by women, although this effect is much larger in Korea than in Ghana or Mongolia. An additional male adult in the household hardly increases total childcare time by men in Ghana and Mongolia, but an additional adult male in Korea would raise the total childcare time by men by 64 percent. Turning to the cross-gender coefficients, a negative coefficient for the male adult count in the regression for women's childcare time (or vice versa) would indicate substitution between adult men and women in the household in the care of children. We find that an additional adult male in the household decreases women's total time spent on childcare by 18 percent in Ghana, 20 percent in Mongolia, and 17 percent (though insignificant) in Korea. In the case of total male time on childcare, an additional female adult also implies substitution, but the coefficients are significant only in Mongolia (15 percent) and Korea (29 percent).

Panel B focuses on indirect care time. The presence of children significantly increases the total time spent by adult women on indirect care time—by 71 percent in Ghana and by 56 percent in Korea with respect to children aged 0-14, and by 70 percent in Korea with respect to older children. This coefficient is also positive but small and insignificant in Mongolia which might be due to the wider age grouping used in the Mongolia survey. The results for the cross-gender counts indicate much less substitution than in the case of

15 The full results of all specifications (with the control variables included) are provided in the tables in Appendix A3.

childcare. An additional female adult in the household decreases men's time for indirect care by 20-27 percent across the three countries, but there is no significant substitution of men's time on indirect care for women's in any country. This intrahousehold dynamic suggests that while men and women may share in childcare, indirect care, which includes meal preparation and housecleaning, is strongly regarded as "women's work," to be done by women when they are present.

In Panel C, the results show that an additional child aged 0-4 would decrease the total market work by women in the household by 72 percent in Korea, but not in the other two countries. The coefficients of the own-gender adult counts are large and statistically significant, and larger for women than for men in Ghana (92 percent v. 72 percent) and Mongolia (82 percent v. 32 percent) but larger for men than for women in Korea (194 percent v. 112 percent). Evidence of cross-gender substitution in market work is limited to Ghana and Korea: an additional female would reduce the total market time of men by 16 percent in Ghana and by 28 percent in Korea; an additional male would reduce the total market time of women by 37 percent.

Turning now to the coefficients of the squared terms in each of the panels, we find evidence of significant economies of scale with respect to women's care time for younger children in all three countries, and for men's care time in Mongolia and Korea. The coefficients suggest that an additional child would reduce the per-child care time provided by women in the household by 34 percent in Ghana, 24 percent in Mongolia and 46 percent in Korea. In Mongolia and Korea, men's care time per child would decrease by 12 and 35 percent, respectively. There are also economies of scale in the indirect care of women, but not men's, with respect to the number of children in the household. An additional child aged 0-4 would reduce the per-child indirect care time of women by 9 percent in Ghana and by 13 percent in Korea. As with childcare, the economies of scale are lower with respect to older children, but not in Korea where an additional child in the older group would reduce indirect care by 19 percent.

Finally, the coefficients of the interaction between the counts of young and older children suggest evidence of economies of scope in indirect care work by women in all three countries, but in childcare by women only in Korea. An additional child of either age group would decrease the per-child indirect care time of women by 6 percent in Ghana, by 12 percent in Mongolia (though only at 10 percent significance level) and by 29 percent in Korea. In Korea only, the per-child indirect care time of men would increase by 38 percent with the increase in the number of children of either age group, given the number of children of the other age group, implying that this coefficient also indicates that the presence of children of different ages presents other opportunities for some substitution

between men and women in the household. In other words, an additional young child, for example, given the count of older children, could shift some indirect work to men.

VI. Discussion and conclusion

In this paper, we analyze the relationship between household composition and time for childcare, indirect care, and market work by adults. Our paper relates to a large literature in economics that has examined the distribution of consumption within the household and has examined economies of scale across types of households (e.g., Deaton and Paxton, 1998), but our focus is on the distribution of the care burden and how time-use survey data reveal the sharing of this burden. Undertaking this analysis for three very different countries in terms of demographics and economic development has shown that many similarities as well as striking differences. As with previous studies on who bears the weight of this care burden, we also find that women do, but we also find evidence of sharing of that burden among the women in the household and also with men in the household. This is the case with childcare and indirect care work. We also find evidence of economies of scale in the care of young children especially by women, and less evidence of economies of scale in the care of older children. There is some indication of economies of scope in women's childcare and indirect care, but we are cautious about interpreting the results too strongly.

Policy discussions of issues related to caregiving by household members have been largely absent in many countries, reflecting the prevailing belief that these activities belong in the private sphere and have little impact on economic development. In line with traditional norms of filial piety and familial obligations, caregiving still rests overwhelmingly on family members. Even in countries where public provision of care has some public support, policymakers are hindered by the lack of detailed evidence on the dynamics of household care provision and how it interacts with paid work decisions. The COVID-19 pandemic has opened more eyes to the important work that households do for children and the elderly members of the community, but this broadening of views needs to be translated into policy change.

Our findings indicate two important directions for policy on the provision of care. The first is that to increase women's labor force participation and fertility in the case of countries with low fertility rates, it is crucial to understand the willingness of parents to use paid child services and the affordability of such services. In addition, there is evidence that men are willing to substitute for some of women's childcare time, but those men will need some family leave time to do so. The second consideration we highlight is that there are

significant economies of scale for the care of young children, particularly for women, in both direct care (in all three countries) and in indirect care (in Ghana and Korea). The economies of scale in childcare have strong pricing implications for publicly provided or subsidized childcare programs; in the presence of economies of scale, the monetary cost of paid childcare typically increases arithmetically, while the opportunity cost of unpaid childcare in the household has a decreasing marginal cost as the number of children increases. Countries with higher fertility rates should take this dynamic into account when designing childcare subsidies or tax credits.

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APPENDIX

Appendix Table A2: Specific activities included in time-use survey care categories, Ghana, Mongolia, and South Korea

	Child Care	Indirect Care
Ghana	Physical care of young children	Food management
	Teaching, training, and helping children	Cleaning and upkeep of dwelling and surroundings
	Accompanying children to places	Do-it-yourself decoration, maintenance and small repairs
	Minding children (passive care)	Care of textiles and footwear
		Household management
		Shopping for/purchasing of goods and related activities Shopping for/availing of services and related activities Travel related to provision of unpaid domestic services Unpaid domestic services not explicitly covered by the above
Mongolia	Caring for pre-school age and school-age children/physical care	Preparing meals/snacks and cleaning up after food preparation/meals/snacks
	Reading, playing and talking to children	Hand-washing; loading/unloading washing machine
	Assisting with school work	Indoor and outdoor cleaning
	Meeting with teachers and attending parent-teacher meetings	Shopping for/purchasing of goods and related activities
	Other activities related to childcare	Improvement, maintenance and repair of dwellings personal and household goods including computers
		Vehicle maintenance and minor repairs
		Collecting water, preparing fuel and heat for dwelling
		Other activities related to household management
South Korea	Physical care of children aged 0-9	Cooking and washing dishes
	Educational activities with children aged 0-9	Laundry and clothing repair
	Reading and playing with children aged 0-9	Home cleaning and taking out trash
	Providing medical care for children aged 0-9	Home repairs and maintenance
	Other care for children aged 0-9	Shopping
	Physical care of children aged 10-17	Organizing and managing the household
	Helping with homework and study for children aged 10-17	Other household chores
	Providing medical care for children aged 10-17	Travel related to indirect care
	Other care for children aged 10-17	
	Travel related to child care	

Data sources: 2009 Ghana Time-Use Survey, 2011 Mongolia Time-Use Survey, and 2014 South Korea Time-Use Survey.

Appendix

Table A1: Time use survey characteristics for Ghana, Mongolia, and South Korea

	Ghana	**Mongolia**	**South Korea**
Survey period	June – July, 2009	March – December 2011	July, September, December 2014
Collected by…	Ghana Statistical Service	National Statistical Office of Mongolia	Statistics Korea
Sample selection procedure	Households drawn randomly from enumeration areas (EAs) of the 2008 Ghana Demographic and Health Survey	Stage 1: Probability sampling proportional to size of 400 primary sampling units (lowest administrative units) Stage 2: 10 households from each PSU selected using systematic sampling	Households drawn randomly from Korea census
Time use collection method	24-hour time diary in 1-hour slots	Recall method for last week	Recall method for last two consecutive days, 24-hour time diary in 10-minute intervals
Total number of households surveyed	4,800	3,998	12,000
Household members surveyed	All members 10+	All members 12+	All members 10+
Nationally representative?	Yes	Yes	Yes

Notes: Information taken from statistical agency websites, time use survey documentation, and data reports.

Ghana

	Total household time by gender (log minutes per week)					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	1.206***	0.268***	0.444***	-0.0865	0.0383	0.199**
	(0.0584)	(0.0451)	(0.0590)	(0.0570)	(0.0873)	(0.0814)
Children 5-14	0.0273	0.0397	0.0821*	-0.0687*	0.143**	-0.0542
	(0.0415)	(0.0321)	(0.0419)	(0.0406)	(0.0619)	(0.0579)
Female-headed household	0.357***	-0.852***	0.419***	-0.798***	0.372**	-1.871***
	(0.105)	(0.0808)	(0.106)	(0.102)	(0.156)	(0.146)
Head age	0.0213	0.0197	0.0416	0.0715**	0.0910*	0.0832*
	(0.0329)	(0.0254)	(0.0332)	(0.0321)	(0.0491)	(0.0458)
Head's age squared	-0.000518	-0.000293	-0.000322	-0.000606	-0.000816	-0.000905*
	(0.000388)	(0.000299)	(0.000392)	(0.000379)	(0.000579)	(0.000540)
Highest grade completed	0.0274	0.0228	0.00193	0.00112	-0.0755*	0.0184
	(0.0303)	(0.0234)	(0.0306)	(0.0296)	(0.0452)	(0.0422)
Wealth index	0.616**	0.0652	0.535*	0.259	-0.603	-0.199
	(0.312)	(0.242)	(0.315)	(0.306)	(0.466)	(0.437)
Urban	0.165	-0.00245	-0.243**	-0.260***	-0.325**	-0.388***
	(0.103)	(0.0795)	(0.104)	(0.101)	(0.154)	(0.143)
Distance to closest primary school	0.0458	-0.0639	0.0989*	0.0351	0.0525	0.0875
	(0.0529)	(0.0408)	(0.0534)	(0.0516)	(0.0789)	(0.0737)
Constant	1.163*	0.338	2.225***	-0.359	1.328	0.463
	(0.655)	(0.506)	(0.662)	(0.640)	(0.979)	(0.913)
N	1593	1591	1593	1591	1593	1591
R^2	0.268	0.106	0.0466	0.0726	0.0276	0.128

Table A1. Baseline specification, Ghana (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	1.177***	0.279***	0.368***	0.00830	-0.0253	0.261***
	(0.0586)	(0.0454)	(0.0562)	(0.0531)	(0.0856)	(0.0808)
Children 5-14	0.0204	0.0430	0.0389	-0.0664*	0.0963	-0.0538
	(0.0414)	(0.0321)	(0.0397)	(0.0376)	(0.0605)	(0.0571)
Female adults 15-64	0.197***	-0.0824	0.901***	-0.267***	0.917***	-0.156*
	(0.0674)	(0.0523)	(0.0646)	(0.0611)	(0.0984)	(0.0929)
Male adults 15-64	-0.193***	0.0583	-0.0660	1.063***	0.129	0.719***
	(0.0712)	(0.0558)	(0.0683)	(0.0652)	(0.104)	(0.0992)
Female-headed household	0.128	-0.778***	0.146	0.271**	0.279	-1.154***
	(0.126)	(0.0977)	(0.120)	(0.114)	(0.183)	(0.174)
Head age	0.0277	0.0178	0.0421	0.0341	0.0846*	0.0578
	(0.0328)	(0.0254)	(0.0314)	(0.0297)	(0.0479)	(0.0452)
Head's age squared	-0.000610	-0.000259	-0.000557	-0.000294	-0.00101*	-0.000700
	(0.000387)	(0.000300)	(0.000371)	(0.000350)	(0.000564)	(0.000533)
Highest grade completed	0.0286	0.0225	-0.000485	-0.0105	-0.0798*	0.0104
	(0.0301)	(0.0234)	(0.0289)	(0.0273)	(0.0440)	(0.0415)
Wealth index	0.549*	0.101	0.0129	0.185	-1.188***	-0.264
	(0.313)	(0.244)	(0.300)	(0.285)	(0.457)	(0.433)
Urban	0.178*	-0.00840	-0.178*	-0.285***	-0.258*	-0.402***
	(0.102)	(0.0795)	(0.0982)	(0.0929)	(0.150)	(0.141)
Distance to closest primary school	0.0414	-0.0623	0.0851*	0.0464	0.0398	0.0949
	(0.0526)	(0.0408)	(0.0504)	(0.0476)	(0.0768)	(0.0725)
Constant	1.115*	0.363	1.813***	-0.470	0.863	0.376
	(0.653)	(0.506)	(0.626)	(0.591)	(0.953)	(0.900)
N	1593	1591	1593	1591	1593	1591
R^2	0.275	0.107	0.150	0.210	0.0800	0.157

Table A2. Substitution specification, Ghana (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender

	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	1.996***	0.214**	0.667***	-0.175	0.0745	0.0467
	(0.121)	(0.0960)	(0.118)	(0.112)	(0.181)	(0.170)
Children 5-14	-0.166*	0.0250	0.111	-0.0158	0.0541	0.00807
	(0.0989)	(0.0782)	(0.0964)	(0.0913)	(0.147)	(0.139)
Female adults 15-64	0.218***	-0.0845	0.910***	-0.272***	0.919***	-0.161*
	(0.0661)	(0.0523)	(0.0645)	(0.0611)	(0.0985)	(0.0930)
Male adults 15-64	-0.184***	0.0571	-0.0612	1.060***	0.130	0.716***
	(0.0699)	(0.0558)	(0.0681)	(0.0652)	(0.104)	(0.0991)
Children 0-4 squared	-0.344***	0.0253	-0.117***	0.0773*	-0.0430	0.0906
	(0.0434)	(0.0343)	(0.0423)	(0.0401)	(0.0646)	(0.0610)
Children 5-14 squared	0.0581***	0.00344	-0.0131	-0.0152	0.0118	-0.0185
	(0.0221)	(0.0175)	(0.0215)	(0.0204)	(0.0329)	(0.0310)
Female-headed household	0.196	-0.782***	0.166	0.255**	0.288	-1.173***
	(0.123)	(0.0979)	(0.120)	(0.114)	(0.184)	(0.174)
Head age	0.0530	0.0181	0.0416	0.0278	0.0890*	0.0503
	(0.0328)	(0.0259)	(0.0320)	(0.0302)	(0.0488)	(0.0460)
Head's age squared	-0.000834**	-0.000266	-0.000536	-0.000237	-0.00105*	-0.000632
	(0.000385)	(0.000304)	(0.000375)	(0.000355)	(0.000573)	(0.000540)
Highest grade completed	0.0374	0.0220	0.00189	-0.0125	-0.0786*	0.00816
	(0.0295)	(0.0234)	(0.0288)	(0.0273)	(0.0440)	(0.0415)
Wealth index	0.537*	0.0999	0.0127	0.186	-1.190***	-0.262
	(0.307)	(0.244)	(0.299)	(0.285)	(0.457)	(0.433)
Urban	0.147	-0.00727	-0.183*	-0.277***	-0.263*	-0.393***
	(0.101)	(0.0796)	(0.0980)	(0.0929)	(0.150)	(0.141)
Distance to closest primary school	0.0381	-0.0623	0.0851*	0.0473	0.0392	0.0959
	(0.0516)	(0.0408)	(0.0503)	(0.0476)	(0.0768)	(0.0724)
Constant	0.270	0.404	1.618**	-0.274	0.745	0.608
	(0.650)	(0.514)	(0.634)	(0.600)	(0.968)	(0.913)
N	1593	1591	1593	1591	1593	1591
R^2	0.303	0.108	0.155	0.212	0.0803	0.158

Table A3. Economies of scale specification, Ghana (SUR coefficients)
Notes : See notes Table 8.

Logged total household time by gender

	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	2.005***	0.230**	0.713***	-0.182	0.128	0.00380
	(0.125)	(0.0985)	(0.121)	(0.115)	(0.185)	(0.175)
Children 5-14	-0.156	0.0445	0.167	-0.0254	0.119	-0.0442
	(0.105)	(0.0827)	(0.102)	(0.0965)	(0.156)	(0.147)
Female adults 15-64	0.219***	-0.0834	0.913***	-0.273***	0.923***	-0.164*
	(0.0662)	(0.0524)	(0.0644)	(0.0611)	(0.0985)	(0.0930)
Male adults 15-64	-0.184***	0.0565	-0.0627	1.061***	0.128	0.718***
	(0.0699)	(0.0558)	(0.0680)	(0.0652)	(0.104)	(0.0991)
Children 0-4 squared	-0.339***	0.0343	-0.0913**	0.0728*	-0.0130	0.0665
	(0.0461)	(0.0365)	(0.0449)	(0.0426)	(0.0687)	(0.0648)
Children 5-14 squared	0.0583***	0.00382	-0.0120	-0.0154	0.0131	-0.0195
	(0.0221)	(0.0175)	(0.0215)	(0.0204)	(0.0328)	(0.0310)
Children 0-4 x Children 5-14	-0.0114	-0.0217	-0.0621*	0.0107	-0.0724	0.0582
	(0.0378)	(0.0299)	(0.0369)	(0.0349)	(0.0563)	(0.0531)
Female-headed household	0.197	-0.781***	0.169	0.254**	0.292	-1.176***
	(0.123)	(0.0979)	(0.120)	(0.114)	(0.184)	(0.174)
Head age	0.0533	0.0187	0.0434	0.0275	0.0911*	0.0487
	(0.0328)	(0.0259)	(0.0319)	(0.0303)	(0.0488)	(0.0460)
Head's age squared	-0.000837**	-0.000272	-0.000552	-0.000235	-0.00107*	-0.000616
	(0.000385)	(0.000304)	(0.000375)	(0.000355)	(0.000573)	(0.000540)
Highest grade completed	0.0376	0.0222	0.00250	-0.0126	-0.0779*	0.00755
	(0.0295)	(0.0234)	(0.0288)	(0.0273)	(0.0440)	(0.0415)
Wealth index	0.535*	0.0962	0.00293	0.188	-1.201***	-0.252
	(0.307)	(0.244)	(0.299)	(0.285)	(0.457)	(0.433)
Urban	0.148	-0.00549	-0.178*	-0.278***	-0.257*	-0.398***
	(0.101)	(0.0796)	(0.0980)	(0.0929)	(0.150)	(0.141)
Distance to closest primary school	0.0383	-0.0620	0.0860*	0.0471	0.0403	0.0950
	(0.0516)	(0.0408)	(0.0502)	(0.0476)	(0.0768)	(0.0724)
Constant	0.244	0.354	1.475**	-0.250	0.578	0.742
	(0.656)	(0.518)	(0.639)	(0.605)	(0.976)	(0.920)
N	1593	1591	1631	1629	1631	1629
R^2	0.303	0.108	0.156	0.212	0.0813	0.159

Table A4. Economies of scope specification, Ghana (SUR coefficients)
Notes : See notes Table 8.

Mongolia

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-11	0.829***	0.290***	0.0542	0.0613	-0.252**	-0.112
	(0.0877)	(0.0649)	(0.0389)	(0.0719)	(0.116)	(0.0830)
Children 12-14	-0.243*	-0.265**	-0.212***	-0.197*	-0.299	-0.123
	(0.144)	(0.107)	(0.0640)	(0.118)	(0.191)	(0.136)
Female-headed household	0.687***	-1.282***	4.734***	-3.104***	0.425*	-4.781***
	(0.167)	(0.124)	(0.0741)	(0.137)	(0.221)	(0.158)
Head age	0.0186	-0.0178	0.0274	-0.0204	0.297***	0.193***
	(0.0455)	(0.0337)	(0.0202)	(0.0373)	(0.0602)	(0.0430)
Head's age squared	-0.0000976	0.000259	-0.000232	0.000429	-0.00340***	-0.00226***
	(0.000569)	(0.000421)	(0.000252)	(0.000466)	(0.000753)	(0.000538)
Highest grade completed	-0.0650	-0.101***	0.00460	-0.0554	0.273***	0.108**
	(0.0505)	(0.0373)	(0.0224)	(0.0413)	(0.0668)	(0.0477)
Wealth index	3.031***	2.784***	-0.131	0.929*	-4.101***	-2.343***
	(0.586)	(0.434)	(0.260)	(0.480)	(0.776)	(0.554)
Urban	-0.0446	-0.242*	-0.142*	-0.401**	-0.312	0.163
	(0.191)	(0.141)	(0.0846)	(0.156)	(0.253)	(0.181)
Constant	-1.219	-0.165	-0.588	2.936***	0.0190	2.864***
	(0.950)	(0.703)	(0.421)	(0.778)	(1.257)	(0.898)
N	754	754	754	754	754	754
R^2	0.174	0.191	0.853	0.439	0.109	0.597

Table A5. Baseline specification, Mongolia (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-11	0.825***	0.291***	0.0537	0.0563	-0.242**	-0.102
	(0.0874)	(0.0648)	(0.0389)	(0.0717)	(0.114)	(0.0826)
Children 12-14	-0.224	-0.277***	-0.217***	-0.210*	-0.245	-0.129
	(0.144)	(0.107)	(0.0640)	(0.118)	(0.188)	(0.136)
Female adults 15-64	0.248**	-0.157*	-0.0853	-0.210**	0.817***	-0.0285
	(0.119)	(0.0885)	(0.0530)	(0.0978)	(0.156)	(0.113)
Male adults 15-64	-0.185	0.0790	0.0133	-0.0795	0.0215	0.322***
	(0.116)	(0.0859)	(0.0515)	(0.0950)	(0.151)	(0.109)
Female-headed household	0.563***	-1.220***	4.755***	-3.102***	0.291	-4.635***
	(0.175)	(0.130)	(0.0778)	(0.144)	(0.229)	(0.165)
Head age	0.0179	-0.0182	0.0264	-0.0256	0.310***	0.200***
	(0.0454)	(0.0337)	(0.0202)	(0.0372)	(0.0593)	(0.0429)
Head's age squared	-0.000120	0.000293	-0.000198	0.000570	-0.00380***	-0.00241***
	(0.000572)	(0.000424)	(0.000254)	(0.000469)	(0.000747)	(0.000541)
Highest grade completed	-0.0632	-0.102***	0.00416	-0.0561	0.277***	0.107**
	(0.0502)	(0.0372)	(0.0223)	(0.0412)	(0.0656)	(0.0475)
Wealth index	3.054***	2.768***	-0.140	0.904*	-4.010***	-2.340***
	(0.584)	(0.433)	(0.259)	(0.479)	(0.762)	(0.551)
Urban	-0.0623	-0.225	-0.128	-0.352**	-0.462*	0.121
	(0.192)	(0.142)	(0.0854)	(0.157)	(0.251)	(0.181)
Constant	-1.258	-0.0860	-0.503	3.306***	-1.011	2.438***
	(0.971)	(0.720)	(0.432)	(0.797)	(1.268)	(0.918)
N	754	754	754	754	754	754
R^2	0.182	0.195	0.853	0.443	0.140	0.602

Table A6. Substitution specification, Mongolia (SUR coefficients)

Notes : See notes Table 8.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-11	1.714***	0.631***	-0.0764	0.111	0.00788	-0.176
	(0.257)	(0.192)	(0.115)	(0.213)	(0.339)	(0.245)
Children 12-14	-0.177	-0.231	-0.338**	0.0229	0.0474	-0.0729
	(0.377)	(0.282)	(0.169)	(0.312)	(0.497)	(0.360)
Female adults 15-64	0.260**	-0.152*	-0.0878*	-0.208**	0.822***	-0.0292
	(0.118)	(0.0883)	(0.0530)	(0.0979)	(0.156)	(0.113)
Male adults 15-64	-0.199*	0.0735	0.0157	-0.0810	0.0168	0.323***
	(0.115)	(0.0858)	(0.0515)	(0.0951)	(0.151)	(0.110)
Children 0-11 squared	-0.239***	-0.0909*	0.0330	-0.0107	-0.0624	0.0210
	(0.0629)	(0.0470)	(0.0282)	(0.0521)	(0.0830)	(0.0601)
Children 12-14 squared	0.0710	0.00746	0.0675	-0.154	-0.172	-0.0475
	(0.230)	(0.172)	(0.103)	(0.190)	(0.303)	(0.220)
Female-headed household	0.576***	-1.214***	4.751***	-3.097***	0.300	-4.635***
	(0.173)	(0.130)	(0.0778)	(0.144)	(0.229)	(0.166)
Head age	0.0221	-0.0168	0.0265	-0.0268	0.310***	0.200***
	(0.0450)	(0.0336)	(0.0202)	(0.0373)	(0.0593)	(0.0430)
Head's age squared	-0.000145	0.000285	-0.000202	0.000584	-0.00379***	-0.00240***
	(0.000567)	(0.000423)	(0.000254)	(0.000469)	(0.000748)	(0.000541)
Highest grade completed	-0.0696	-0.105***	0.00584	-0.0580	0.273***	0.107**
	(0.0498)	(0.0372)	(0.0224)	(0.0413)	(0.0657)	(0.0476)
Wealth index	3.038***	2.763***	-0.141	0.910*	-4.006***	-2.337***
	(0.578)	(0.432)	(0.259)	(0.478)	(0.762)	(0.551)
Urban	-0.0521	-0.221	-0.131	-0.347**	-0.454*	0.121
	(0.190)	(0.142)	(0.0853)	(0.157)	(0.251)	(0.181)
Constant	-1.982**	-0.363	-0.398	3.265***	-1.210	2.499***
	(0.981)	(0.733)	(0.440)	(0.812)	(1.294)	(0.936)
N	754	754	754	754	754	754
R^2	0.199	0.199	0.854	0.443	0.141	0.602

Table A7. Economies of scale specification, Mongolia (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender

	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-11	1.730***	0.803***	0.0540	0.00721	-0.250	0.114
	(0.314)	(0.234)	(0.141)	(0.260)	(0.414)	(0.299)
Children 12-14	-0.161	-0.0472	-0.199	-0.0875	-0.228	0.236
	(0.423)	(0.316)	(0.190)	(0.351)	(0.558)	(0.403)
Female adults 15-64	0.260**	-0.150*	-0.0863	-0.209**	0.819***	-0.0260
	(0.118)	(0.0882)	(0.0530)	(0.0979)	(0.156)	(0.113)
Male adults 15-64	-0.199*	0.0734	0.0157	-0.0809	0.0169	0.323***
	(0.115)	(0.0857)	(0.0514)	(0.0950)	(0.151)	(0.109)
Children 0-11 squared	-0.241***	-0.120**	0.0113	0.00654	-0.0193	-0.0274
	(0.0698)	(0.0521)	(0.0313)	(0.0578)	(0.0920)	(0.0665)
Children 12-14 squared	0.0747	0.0486	0.0987	-0.179	-0.234	0.0219
	(0.234)	(0.175)	(0.105)	(0.194)	(0.308)	(0.223)
Children 0-11 x Children 12-14	-0.0145	-0.161	-0.122	0.0970	0.242	-0.272*
	(0.170)	(0.127)	(0.0760)	(0.141)	(0.224)	(0.162)
Female-headed household	0.575***	-1.219***	4.747***	-3.094***	0.307	-4.644***
	(0.174)	(0.130)	(0.0777)	(0.144)	(0.229)	(0.165)
Head age	0.0219	-0.0184	0.0253	-0.0259	0.312***	0.197***
	(0.0450)	(0.0336)	(0.0202)	(0.0373)	(0.0593)	(0.0429)
Head's age squared	-0.000143	0.000308	-0.000185	0.000570	-0.00382***	-0.00236***
	(0.000567)	(0.000423)	(0.000254)	(0.000470)	(0.000748)	(0.000541)
Highest grade completed	-0.0695	-0.105***	0.00604	-0.0582	0.273***	0.107**
	(0.0498)	(0.0372)	(0.0223)	(0.0413)	(0.0657)	(0.0475)
Wealth index	3.038***	2.768***	-0.137	0.907*	-4.014***	-2.329***
	(0.578)	(0.431)	(0.259)	(0.478)	(0.761)	(0.550)
Urban	-0.0530	-0.231	-0.139	-0.342**	-0.440*	0.105
	(0.190)	(0.142)	(0.0853)	(0.158)	(0.251)	(0.181)
Constant	-1.997**	-0.528	-0.524	3.365***	-0.961	2.220**
	(0.996)	(0.744)	(0.446)	(0.825)	(1.313)	(0.949)
N	754	754	754	754	754	754
R^2	0.199	0.201	0.854	0.444	0.142	0.603

Table A8. Economies of scale specification, Mongolia (SUR coefficients)
Notes : See notes Table 8.

South Korea

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	0.559***	0.576***	0.077	0.029	-0.159**	0.037
	0.056	0.075	0.052	0.079	0.072	0.077
Children 5-14	0.052	-0.264***	0.089*	-0.076	-0.050	0.110
	0.057	0.076	0.053	0.080	0.073	0.078
Female-headed household	0.187**	-1.724***	0.154*	-1.214***	1.035***	-2.648***
	0.091	0.121	0.085	0.128	0.116	0.124
Head age	-0.089**	-0.122**	-0.039	-0.061	-0.128**	-0.129**
	0.039	0.052	0.036	0.055	0.050	0.053
Head's age squared	0.001*	0.001**	0.001	0.001	0.002***	0.001**
	0.000	0.001	0.000	0.001	0.001	0.001
Highest grade completed	0.018	0.036**	0.011	0.055***	-0.069***	-0.023
	0.013	0.018	0.012	0.018	0.017	0.018
Size of house (sq. ft.)	0.002	0.002	0.003***	-0.000	-0.001	-0.001
	0.001	0.001	0.001	0.002	0.001	0.002
Owns house	0.031	-0.038	0.042	-0.005	-0.122	0.096
	0.062	0.083	0.058	0.087	0.079	0.085
Urban	0.144**	-0.110	0.050	0.010	-0.164**	-0.079
	0.059	0.079	0.056	0.084	0.076	0.081
Double-earner household	-0.425***	0.007	-0.237***	0.274***	3.384***	0.181**
	0.061	0.081	0.057	0.086	0.078	0.083
Constant	6.036***	4.513***	5.201***	2.269**	3.574***	7.772***
	0.820	1.096	0.768	1.156	1.051	1.122
N	1984	1984	1984	1984	1984	1984
R^2	0.146	0.199	0.0204	0.0634	0.519	0.197

Table A9. Baseline specification, South Korea (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	0.555***	0.584***	0.074	0.042	-0.165**	0.062
	0.053	0.074	0.048	0.078	0.070	0.073
Children 5-14	0.070	-0.265***	0.110**	-0.073	-0.036	0.118
	0.053	0.075	0.049	0.079	0.071	0.074
Female adults 15-64	1.290***	-0.292**	1.402***	-0.209*	1.117***	-0.276**
	0.081	0.114	0.074	0.120	0.107	0.112
Male adults 15-64	-0.168	0.627***	-0.081	0.957***	-0.362***	1.951***
	0.102	0.144	0.094	0.151	0.135	0.142
Female-headed household	-0.141	-1.260***	-0.137	-0.547***	0.607***	-1.313***
	0.109	0.154	0.100	0.162	0.145	0.152
Head age	-0.023	-0.115**	0.037	-0.037	-0.078	-0.071
	0.037	0.052	0.034	0.055	0.049	0.051
Head's age squared	-0.000	0.001**	-0.001	0.001	0.001**	0.001
	0.000	0.001	0.000	0.001	0.001	0.001
Highest grade completed	0.024**	0.035**	0.017	0.055***	-0.064***	-0.022
	0.012	0.017	0.011	0.018	0.016	0.017
Size of house (sq. ft.)	0.000	0.002	0.001	-0.000	-0.003*	-0.002
	0.001	0.001	0.001	0.002	0.001	0.001
Owns house	0.016	-0.050	0.023	-0.027	-0.129*	0.048
	0.058	0.082	0.053	0.086	0.077	0.081
Urban	0.094*	-0.088	-0.003	0.035	-0.211***	-0.033
	0.056	0.079	0.051	0.083	0.074	0.078
Double-earner household	-0.522***	-0.001	-0.347***	0.243***	3.311***	0.105
	0.058	0.082	0.053	0.086	0.077	0.080
Constant	3.854***	4.004***	2.657***	1.039	2.054*	4.974***
	0.807	1.138	0.738	1.196	1.068	1.118
N	1984	1984	1984	1984	1984	1984
R^2	0.244	0.209	0.170	0.0834	0.546	0.269

Table A10. Substitution specification, South Korea (SUR coefficients)
Notes : See notes Table 8.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	0.943***	1.100***	0.079	0.072	-0.355**	-0.075
	0.123	0.173	0.113	0.183	0.163	0.171
Children 5-14	0.085	-0.481***	0.231**	-0.087	0.075	0.179
	0.126	0.177	0.115	0.187	0.167	0.175
Female adults 15-64	1.294***	-0.284**	1.401***	-0.209*	1.113***	-0.278**
	0.081	0.114	0.074	0.120	0.107	0.112
Male adults 15-64	-0.159	0.643***	-0.084	0.958***	-0.369***	1.947***
	0.102	0.144	0.094	0.152	0.135	0.142
Children 0-4 squared	-0.185***	-0.261***	0.005	-0.016	0.098	0.069
	0.052	0.073	0.047	0.077	0.068	0.072
Children 5-14 squared	0.016	0.137*	-0.059	0.009	-0.066	-0.038
	0.054	0.076	0.050	0.081	0.072	0.075
Female-headed household	-0.133	-1.244***	-0.140	-0.546***	0.600***	-1.317***
	0.109	0.154	0.100	0.162	0.145	0.152
Head age	-0.006	-0.079	0.030	-0.034	-0.094*	-0.081
	0.038	0.053	0.035	0.056	0.050	0.052
Head's age squared	-0.000	0.001	-0.000	0.001	0.001**	0.001
	0.000	0.001	0.000	0.001	0.001	0.001
Highest grade completed	0.024*	0.033*	0.018	0.055***	-0.064***	-0.021
	0.012	0.017	0.011	0.018	0.016	0.017
Size of house (sq. ft.)	0.000	0.002	0.001	-0.000	-0.003*	-0.002
	0.001	0.001	0.001	0.002	0.001	0.001
Owns house	0.017	-0.043	0.020	-0.027	-0.132*	0.046
	0.058	0.082	0.053	0.087	0.077	0.081
Urban	0.092*	-0.092	-0.002	0.035	-0.210***	-0.032
	0.056	0.079	0.051	0.083	0.074	0.078
Double-earner household	-0.518***	0.011	-0.350***	0.244***	3.306***	0.102
	0.058	0.082	0.053	0.086	0.077	0.080
Constant	3.347***	3.069***	2.784***	0.981	2.433**	5.226***
	0.820	1.156	0.753	1.220	1.089	1.141
N	1984	1984	1984	1984	1984	1984
R^2	0.249	0.216	0.171	0.0834	0.547	0.270

Table A11. Economies of scale specification, South Korea (SUR coefficients)

Notes : See notes Table 6.

	Logged total household time by gender					
	Childcare		Indirect care		Market work	
	Female	Male	Female	Male	Female	Male
Children 0-4	1.891***	1.417***	0.560**	-0.574	-0.720**	0.268
	0.266	0.376	0.245	0.397	0.354	0.371
Children 5-14	1.004***	-0.174	0.697***	-0.713*	-0.279	0.512
	0.261	0.369	0.240	0.389	0.347	0.364
Female adults 15-64	1.287***	-0.286**	1.397***	-0.204*	1.116***	-0.281**
	0.080	0.114	0.074	0.120	0.107	0.112
Male adults 15-64	-0.167	0.641***	-0.088	0.963***	-0.366***	1.944***
	0.101	0.144	0.093	0.151	0.135	0.142
Children 0-4 squared	-0.457***	-0.352***	-0.133*	0.170	0.203*	-0.029
	0.085	0.120	0.078	0.127	0.113	0.119
Children 5-14 squared	-0.233***	0.054	-0.186**	0.179	0.030	-0.128
	0.082	0.116	0.076	0.123	0.110	0.115
Children 0-4 x Children 5-14	-0.564***	-0.189	-0.287**	0.385*	0.217	-0.205
	0.141	0.199	0.129	0.210	0.187	0.196
Female-headed household	-0.138	-1.245***	-0.142	-0.543***	0.602***	-1.319***
	0.109	0.154	0.100	0.162	0.145	0.152
Head age	-0.006	-0.079	0.030	-0.034	-0.094*	-0.081
	0.038	0.053	0.035	0.056	0.050	0.052
Head's age squared	-0.000	0.001	-0.000	0.001	0.001**	0.001
	0.000	0.001	0.000	0.001	0.001	0.001
Highest grade completed	0.021*	0.033*	0.016	0.057***	-0.063***	-0.022
	0.012	0.017	0.011	0.018	0.016	0.017
Size of house (sq. ft.)	0.000	0.002	0.001	-0.000	-0.003*	-0.002
	0.001	0.001	0.001	0.002	0.001	0.001
Owns house	0.014	-0.044	0.018	-0.024	-0.131*	0.045
	0.058	0.082	0.053	0.086	0.077	0.081
Urban	0.088	-0.093	-0.004	0.037	-0.208***	-0.033
	0.056	0.079	0.051	0.083	0.074	0.078
Double-earner household	-0.516***	0.011	-0.349***	0.242***	3.305***	0.103
	0.058	0.081	0.053	0.086	0.077	0.080
Constant	2.697***	2.852**	2.454***	1.424	2.683**	4.990***
	0.833	1.179	0.767	1.243	1.109	1.163
N	1984	1984	1984	1984	1984	1984
R^2	0.255	0.216	0.173	0.0850	0.547	0.270

Table A12. Economies of scope specification, South Korea (SUR coefficients)
Notes : See notes Table 6.