An Extended Household Model of Eldercare by Children and Children-in-law based on Far-Eastern Traditions

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Abstract

A model of informal caregiving is presented, in which decisions are made by extended households including parents and children. An extended household possibly has both a demand and a supply of elder caregiving by children-in-law. A patrilocal version of the model, inspired from traditional Chinese marriage institutions adopted by a number of countries in the Far East, leads to derived demands for caregiving by daughters-in-law and supplies of caregiving by families of daughters. Market equilibrium prices for caregiving by children-in-law are established. These prices then provide incentives to which individual households respond. Payments can be made during, before, or after marriage. The model can throw light on gender differences in marital happiness, differences in the impact of eldercare on the health of in-family caregivers and on their happiness, and East/West and regional differences in caregiving obligations of family members. It also suggests that these geographic differentials may be related to variation in family institutions, including variation in the prevalence of dowry and brideprice. The policy relevance of the model is discussed.

Keywords: caregiving, eldercare, brideprice, dowry, marriage, in-laws, China, Japan, India, Korea, household finance

JEL classifications: D1, I12, I15, I30, J12, J14, J16, D14, N15, Z13

1. Introduction

Population ageing implies greater demand for health services, including informal eldercare. In all countries, even the richest ones, some informal eldercare is supplied by relatives. For instance, substantial proportions of older households in Japan, the U.S. and Europe have been receiving informal care from their children (Alessie et al. 2014, Kokumin Seikatsu Kiso Chosa 2013). Japan stands out from the U.S. in its proportion of informal eldercare provided by daughters-in-law. In Japan in 2013 cohabiting biological children supplied 21.8% of informal eldercare whereas children-in-law provided 11.2% (Kokumin Seikatsu Kiso Chosa 2013). Close to 70% of all informal caregivers were women, and the percentage female among children-in-law caring for the elderly is likely to be even higher in light of the very large gender differentials in household production observed in Japan. For instance, if we compare the time that men and women spent on cooking and food-related activities Japanese women ages 18 to 64 spent 13.4 times more weekly minutes on such activities than men the same age, whereas U.S. women in the same age group spent only 2.8 times more minutes on this activity than men. The same multiples stood at 3.8 and 3.6 for France and Canada (Fisher and Robinson 2011).

A comparison of informal eldercare by children and children-in-law in Japan and the U.S. indicates a lesser involvement of children-in-law in the U.S. Almost half (47%) of caregivers of someone age 50+ in the U.S. cared for a parent, but only 8% for a parent-in-law (National Alliance for Caregiving 2015).[1] This cross-country difference in time spent caring for older in-laws may be more pronounced for women than for men, given that in the U.S. men are relatively more likely to engage in household production, and patrilocality (the custom whereby a young couple moves to live with the husband's parents) is less common.

This paper presents a model that considers the association between in-family caregiving of the elderly, patrilocality, as well as the prevalence of two kinds of premarital payments: brideprice (paid to parents of daughters) and dowry (paid by parents of daughters). Like Van Houtven and Norton's (2004, henceforth VHN) the model presented here assumes that individual decisions regarding in-household caregiving are motivated by self-interest. Empirical studies of eldercare supplied by children and transfers by older parents to their children suggest some degree of self-interest (Lopez Anuarbe 2013, Nivakoski 2015). Self-interest may also lead parents to state that their future bequests are conditional on the nursing care their children will provide (Horioka 2014). It is also recognized that

[1] Data on older Americans receiving help from children in the form of either time or money can be found in Averett et al. (2015).

children's motivation to care for their elder parents or parents-in-law could be altruistic (Cox and Rank 1992, Grossbard 2014, Averett et al. 2015). It follows from the model that cross-country or regional differences in the proportion of informal eldercare supplied by children-in-law could exist even if we assume that the Americans and the Japanese are equally self-interested. Instead, these differences could be explained in terms of different family institutions, such as patrilocality, prevalence of one type of premarital payment, and authority parents have over their children. This could be useful to policy makers who need a better understanding of how the cultural and institutional context possibly influences informal eldercare.

Other points shared by VHN and the models below are the inclusion of a household production function of assistance to older parents and the presence of two sets of decision-makers. In the case of VHN the two sides are parent and child. In the models below they are extended households who are on the demand side, willing to pay for caregiving by children-in-law, and those on the supply side, whose children are willing to provide caregiving to future in-laws.

I present two extended household models in which parents make marriage decisions for their children, which implies that they have authority over their children and the children accept that authority. These are assumptions that also underlie Steven Cheung's (1972) theory of marriage, the first full-size article analyzing marriage.[2] Cheung places his economic analysis of marriage in the organizational and legal context of traditional China, where fathers yielded enormous power in their households, including the power to arrange marriages and sometimes even to force marriages on their children.[3] His analysis is particularly applicable to countries that were influenced by Chinese culture, such as Korea and Japan. Cheung (1972) preceded Becker's (1973) economic theory of marriage, a model that has individuals choosing to marry or not and selecting their mate. The second extended household model I present assumes patrilocality and preferences for sons staying home, further characteristics of the traditional Chinese marriage system underlying Cheung's theory of marriage.

Both models presented below were inspired by Gary Becker's (1973, 1981) market theories of marriage, in which it is first assumed that there is a supply of brides (or grooms) at given prices, and then the equilibrium price of men or women available for marriage is established in a market.[4] I follow the adaptation of Becker's theory developed in Grossbard-Shechtman (1984) and Grossbard (2015),

[2] Cheung's 'The enforcement of property rights in children, and the marriage contract' was published in the prestigious *Economic Journal* in 1972. Earlier, the *Journal of Political Economy* had published a short note on marriage markets by Martin Bronfenbrenner (1971).

[3] In traditional China fathers also decided whether newborn children should stay alive, as was the case in ancient Rome (Lemennicier 1988).

[4] This is one of Becker's marriage models (see Grossbard 2010 for an overview of Becker's various models of marriage)

with marriage markets being not markets for people but rather markets for work by people. More precisely, they are markets for caregiving of the elderly by children-in-law.[5] Price may include premarital or post-marital transfers as well as transfers within the household.

It follows from the model that aggregate demands and supplies set market equilibrium prices for caregiving by children-in-law. In turn, these prices provide incentives to which individual households respond. The more is paid to spouses taking care of a father-in-law or mother-in-law in need of assistance, the more individuals and their households are willing to supply such caregiving. Payments can be made during, before, or after marriage. Premarital payments tend to occur in societies where parents control their children, including their marriage decisions.

One implication from the model is that when studying the impact of eldercare on the health and happiness of the relatives who do the caregiving one should take account of (1) the material incentives possibly received by children-in-law and their relatives, and (2) the command structures that help extended households function as one unit. Policymakers concerned with the wellbeing of the elderly can't expect younger generations of adult children-in-law to accept the same caregiving responsibilities that were accepted by previous generations. Command structures such as force marriage may have become less prevalent over time. Parents may no longer be able to pocket the present value of their children's future caregiving. An implication of the patrilocal extended household model is that, at the society level, provision of care to older in-laws by daughters-in-law is expected to be positively related to the prevalence of brideprice (in the form of money or in-kind). In contrast, dowries may be negatively associated with eldercare supplied by daughters-in-law.

This paper is organized as follows. Section 2 presents three models: the VHN model, an extended household model, and a gender-specific version of that household model assuming patrilocality. This leads to the implications discussed in Section 3. The extended household model can help explain gender differences in subjective wellbeing in marriage and divergences between the effects of caregiving of older parents on caregivers' subjective wellbeing and on their health. Furthermore, provision of care to older in-laws may be related to the presence of a brideprice or a dowry system. Section 4 presents conclusions, including implications for further research and policy.

[5] The work in household production by wives and husbands in Grossbard-Shechtman (1984) goes beyond caregiving of older in-laws. Previous research has applied marriage market models of work in household production to analyses of labor supply of married women (Grossbard-Shechtman and Granger 1998), individual savings (Grossbard and Pereira 2010), and choice of number of (co-)wives in a polygynous society (Grossbard 1976).

2. Conceptual Framework

The conceptual framework presented here builds partially on the VHN household production model of informal care based on Mincer (1963), Becker (1965) and Grossman (1972). After summarizing the VHN model I present an extended household model followed by an extended household model with patrilocality.

2.1 The VHN model.

VHN consider two households making separate decisions: one parent and one child.[6] Their adult child household has the following utility function: $U\ (X, L, A, h^p)$, where X is a consumption good consumed by the child, L her leisure, A the informal care she possibly provides to the parent, and h^p is the parent's health status. To the extent that the child is altruistic she will derive a positive utility when the parent's health status improves. In turn, following Grossman (1972) VHN assume that the parent's health status is produced with the informal care A supplied by all his children, paid medical care M, and stock of human capital Z. This is reflected in production function $h^p = h(A\ by\ all\ children, M, Z)$, which can be incorporated into the utility function.

The child household's budget constraint is $w(24 - L - A) + C = p^M M + X$, where w is wage, C is non-wage income, p^M is the price of medical care, the price of the goods consumed by the child is assumed to equal 1, and the first term on the left contains a time constraint. The child household then maximizes its utility subject to the budget constraint. Separately, VHN model the parent household as maximizing its utility subject to a parental budget constraint.

This one-period model could be applied to a married couple, in line with Becker (1981, p. 22) who assumes that multi-agent households act as one decision-making unit. In turn, this assumption requires further assumptions, such as the assumption that spouses cooperate and coordinate their decisions or the assumption that one person decides for the household. In the case of a multi-agent household X is a vector of consumption goods consumed by each member, L a vector of leisure, A a vector of informal care provided to the parent by a member of the child household, and each member faces a similar time constraint. Thus VHN could be expanded to include a child-in-law who

[6] Becker and Mincer are considered the leaders of the New Home Economics (NHE). Grossman was their student (see Grossbard-Shechtman 2001).

cares for the parent in the child household. However, such model takes married status as given and ignores decisions regarding entry into marriage. The question of whether a spouse or a child-in-law should be added to the household as a possible way to care for elderly parents cannot be addressed by a multi-person VHN model.

2.2 Extended household model.

To incorporate the decision to add children-in-law into the family I now present a model in which the main decision-maker is a multi-person multi-generational or extended household. As is the case of couple-households in Becker (1981), this two-generation household acts as one unit, which implies that its members coordinate their actions or that they follow a single decision-maker. The household has to decide on at least two outcomes: how much time do children spend caring for the parents and do children get married? If they marry children-in-law can also care for parents. The decision-makers in the extended household do not include the children-in-law. Potential or actual children-in-law are modelled as separate agents who possibly belong to other extended households.

Consumption and leisure of parents and children enter the extended household *i*'s utility function:

(1) $U^i\ (X, L, h^p)$,

where X is a vector of consumption goods consumed by all household members (father, mother, children and possibly grandchildren), L is a vector of leisure of all household members, and h^p is parental health status (father's, mother's or a vector for father and mother). Health status can be produced with the time of own children, time of children-in-law, and other services M. Instead of the production function of health in VHN we thus have

(2) $h^p = h(A^c, A^d\ , M, Z)$,

where h^p is a vector composed of the health of both parents, A is caregiving assistance, superscript c stands for 'child' and d stands for 'child-in-law'. Other symbols are borrowed from VHN (see Section 2.1 above). In addition, as in Becker (1981), the household has time constraints consisting on the LHS of the time limit of each household member and on the RHS of the various uses of time of these same household members. Each of the members of household i thus faces a time constraint

(3) $T = L + H + A^c$, where T is total time available (let us say 24 hours a day) and H are hours of work in the labor force. Parent's A is likely to be zero, so they only spend time on L and H.

The extended household acts as a family firm that has the option of hiring additional workers, including workers assisting with caring for older parents. One of the few ways that dependable care

workers can be added is by adding children-in-law through marriage. As with conventional workers these caregiving workers maintain control over their own resources and make decisions about their own consumption. Marriage implies that children-in-law have agreed to work for extended household *i* and provide caregiving to the parents at an hourly price that has been determined in a marriage market. It is first assumed that a price per unit of caregiving (possibly hours of caregiving) by children-in-law has been exogeneously established and is equal to *y*, in line with market theories of marriage such as Becker (1973, 1981) and Grossbard-Shechtman (1984). Price *y* is ultimately set in marriage markets, as explained below.

The extended household's budget constraint follows. On the LHS are all the sources of income available to the household: income from work by all household members and non-work income.

(4) $\sum_{k=1}^{n} H^k w + C = X + p^M M + A^d y.$

Each working member *k* of household *i* gets paid an hourly wage *w*. On the RHS of the budget constraint are three kinds of expenditures: spending on a vector of goods *X,* spending on paid care and other services *M*, and spending on caregiving by children-in-law A^d. Price of *X* is 1.

In utility function (1) we now replace parental health with its production function (2) and maximize household utility subject to time constraints 3 for each household member and a combined budget constraint 4. One of the first order conditions that can be derived from this maximization leads to the familiar result that at optimum, for each family member

$\frac{MUH}{MUx} = w$, i.e. the real wage has to equal the relative value of the marginal utility of time spent working for income (*H*). At the margin, children will be indifferent between spending an hour on leisure and an hour on caring for their parents (A^c). A new insight is that at optimum the extended household will chose a quantity of caregiving from children-in-law derived from first order condition $\frac{MUA^d}{MUx} = y$. Given that marginal utility is likely to be downward-sloping, the more expensive it is to obtain caregiving from a child-in-law, i.e. the higher price *y*, the less it is likely that children will marry. Another insight that follows from this model is that there is a cross elasticity of assistance from a child-in-law with respect to the price of other available services *M*. The two forms of assistance are substitutes, so the more expensive caregiving by maids or servants (forms of *M*) the higher the household's demand for assistance by children-in-law. Another insight is that the demand for children-in-law is a function of the child's value of time: the more he earns, the more the household is likely to have a demand for a substitute: caregiving by a spouse.

Like VHN and many other models of allocation of time in the tradition of Becker and Mincer, the extended household model presented here relies on the simplifying assumption that the household acts as if it were one unit, and in that sense these are 'unitary' models (see Chiappori et al. 1993). There is an extensive literature criticizing 'unitary' models for overlooking that the agents composing a multi-person household may bargain with each other (e.g. McElroy and Horney 1981, Chiappori et al. 1993, Pollak 2003, Grossbard 2011. For instance, a husband and wife or a parent and a child may bargain about who gets the surplus that they produce together. Nevertheless, Becker's unitary models are still widely used, including in health economics and economics of fertility, and a unitary model is useful here, given this paper's focus on associating the price of brides and grooms with who takes care of older parents.

So far, I have not elaborated on whether it is consensus and coordination or despotic leadership that enables the extended household to act as a single decision-maker. Most economists of the family live in highly educated circles where gender equality is emphasized, but typically not achieved. On average, women do more household production than men in every country we have data for (Sevilla-Sanz 2010). The assumption that household members act out of coordination and cooperation fits well with an egalitarian mentality. However, the alternative assumption of one leader behind the unitary nature of an extended household found in Cheung (1972) may be more compatible with traditional kinship organizations such as those that used to prevail in East Asia. Cheung places his economic analysis of marriage in the organizational and legal context of traditional China, where fathers were the household leaders. They had the power to take important decisions, including that of arranging marriages, and sometimes even to force marriages on their children.

Another feature of the traditional Chinese family institutions adopted by Cheung (1972) is its bias in favor of men. Sons stayed in the extended household and daughters were married out to other extended households. After marriage women relocated to their husband's household and were expected to be submissive to their husband, his father, and other family members. Additional institutions and norms contributed to fathers' ability to force marriage on their daughters, including girls' foot binding and child marriage. Foot binding made it hard for married women to escape their husband's household and make an independent living, and child marriage (*t'ung-yang-hsi*) typically implied that girls grew up in their husband's families and were trained into the highly valued trait of submissiveness.

Next, I integrate Cheung's (1972) gender-specific assumptions based on traditional China into a patrilocal version of the model.

2.3 Extended household model with Patrilocality.

It is now assumed that children-in-law are daughters-in-law. Daughters stay home until the household decides to marry them out and they go to live with their husband. With these additional assumptions, and by introducing two kinds of extended household--extended households from which daughters originate (*j*) and extended households into which daughters marry (*i*). The model determines the price of caregiving by daughters-in-law, *y*. Utility function 1 is now defined for household *i*. After including the production function of parental health into the function we get

(1′) $U^i\left(X, L^{ci}, A^{ci}, A^{dji}, h^p\right)$.

The child-in-law is now a daughter-in-law who originates from household *j* and can possibly take care of parents in household *i*. This is denoted by A^{dji}. Each son in household *i* has a time constraint 3' identical to time constraint 3, except for the addition of superscripts *i*:

$(3')T = L^{ci}+H^{ci} + A^{ci}$. Daughters' time constraint 3" is similar to that of sons, except that in addition to assisting their own parents (part of vector A^{ci}) they may also supply caregiving to a parent-in-law in household *j,* which is denoted by A^{dij}:

$(3'')T = L^{di}+H^{di} + A^{ci}+ A^{dij}$.

The extended household's budget constraint now includes one more source of income: the income that daughters can generate if they offer caregiving to in-laws after marriage. It is assumed that daughters and daughters-in-law get paid at the same rate *y*. A daughter-in-law maintains the freedom to possibly exit the household in which she marries. She needs to be paid for her assistance *A*. As she remains connected to her household of origin who is also run by a father, it is her household that gets paid for her services. There are *m* daughters and *n* other household members capable of work or caregiving, and the budget constrain of household *i* is now:

(4′) $\sum_{k=1}^{n} H^k w + \sum_{f=1}^{m} A^{cjif} y + C = X + p^M M + A^{dij} y$.

Maximization of utility function 1' subject to time constraints 3' and 3", as well as budget constraint 4', generates a supply of assistance by daughters. It is derived from the following equalities based on the first order conditions. At the optimum

(5) $\frac{MUA^{cii}}{MUx} - \frac{MUA^{cij}}{MUx} = y$.

This implies that a daughter (or the extended household that raised her) needs to be paid an amount *y* that is worth at least the difference between the value of her marginal utility caring for her

own parents and the value of her marginal utility living in household *j* and caring for her in-laws. The demand for assistance from daughters-in-law is the same as the derived demand for assistance from children-in-law in the previous section, when patrilocality was not assume, and is based on $\frac{MUA^{dji}}{MUx}$.

Any change in the equilibrium value of *y* in marriage markets will influence the amount of time that children-in-law (daughters-in-law in the patrilocal version of the model) supply to eldercare *A*. It will also influence the quantity demanded of such care. A household's demand for substitutes for assistance by daughters-in-law will also be affected by the price of marriage *y*.

2.4 Market Equilibrium Price.

Price *y* is set in equilibrium in markets for caregiving assistance by children-in-law. In the patrilocal extended household model households enter on the demand side if they have sons and they enter on the supply side if they have daughters who are available to take care of parents-in-law. The equilibrium price *y* of women available for marriage in a society will be higher the higher the demand by men and their families and the lower the supply by women and their families (Grossbard-Shechtman 1993). The following factors are expected to influence *y,* the price of elder care provided by daughters-in-law.

Testable Implication 1. The higher a society's reliance on the caregiving work of daughters-in-law the higher the demand for women in marriage, and the higher the price of their caregiving. In turn, reliance on daughters-in-law's caregiving is a function of whether the society is patrilocal or not. *Testable Implication 2.* If marriage involves patrilocality parents will be more reluctant to offer their daughters in marriage, and the price of caregiving by daughters-in-law will be higher (daughters may not be available to work on behalf of their family of origin and take care of their own elderly parents). *Testable Implication 3.* It is also expected that the more limited legal protection against domestic violence on the part of husbands, the lower the supply of potential daughters-in-law and the higher the price of women in marriage is likely to be.

Testable Implication 4. Another factor that could possibly influence the equilibrium value of *y* in marriage markets is sex ratios. The more men there are relatively to women, the more expensive the caregiving provided by daughters-in-law is likely to be. Given that most people are heterosexual and since sex ratios are easy to measure there are many studies documenting their influence on household decisions, including their impact on savings rates in Asia (e.g. Du and Wei 2013; Horioka and Terada-Hagiwara 2017). If the price of marriage takes the form of pre-marital payments (possibly in the form

of providing housing for new couples) higher sex ratios may translate into higher savings by young men and their parents. Labor supply is also likely to vary with sex ratios: the higher the ratio of men to women the higher the (unmeasured) price of married women's caregiving and the less married women are likely to participate in the labor force (Grossbard 2015).

Testable Implication 5. If a society allows men to have multiple wives, i.e. polygyny is legal, but women are not allowed to have multiple husbands, the aggregate demand for women's caregiving will be higher than if all participants in marriage markets are limited to one spouse. Polygyny is therefore expected to be associated with higher price *y* (Becker 1973). Polygyny also typically goes together with male domination of social and political channels, preventing women from seizing the value of their caregiving work (Grossbard 2016b). Consequently, polygyny may be positively associated with prevalence of brideprice (see discussion in next Section).

Many more factors are expected to influence markets for caregiving performed by spouses (see Grossbard-Shechtman 2003; Grossbard 2016a), including norms regarding gender roles and public policies. For example, in 2000 Japan introduced public funded insurance for formal nursing care, which must have reduced the demand for informal caregiving by children-in-law.

There may be many different interrelated marriage markets, depending on personal characteristics (see Grossbard 2015). As is usually the case, the higher the price in a particular market, the smaller the quantity demanded and the larger the quantity supplied. The net predicted effect of a change in price may not always be obvious. The price of assistance by children-in-law is likely to vary by individual traits of men and women, including their social class, birth order and their number of siblings. The following section presents some potential applications of this modeling framework.

3. Examples of applications of the conceptual framework.

3.1. Health, subjective well-being, and caregiving in Japan.

The concept of a compensation for caregiving of in-laws (*y)* was central to both versions of the extended household model presented above. While it is difficult to measure directly since it is largely implicit, it could help explain some empirical findings. The first example applies to both male and female children-in-law providing eldercare to in-laws and helps interpret findings reported in three Japanese studies tying health and wellbeing of caregivers to amount of caregiving supplied to parents and parents-in-law. Two of the studies suggest that daughters-in-law incur a cost when caring for elderly in-laws: Oshio (2014) found that caring for a mother-in-law entailed a lower mental health

score and Wakabayashi and Kureishi (2016) report that, compared to married women not providing care to elderly parents-in-law, women who do provide such care had lower subjective health status and life satisfaction. However, a third study by Niimi (2016) found no adverse effect of informal parental care on subjective well-being (SWB) of married caregivers (male and female), regardless of whether they were caring for their parents or their parents-in-law. Niimi's finding holds for a sample of men and women and therefore does not necessarily contradict those of the other studies based on samples of female married caregivers. How to reconcile the findings from the three studies? It is possible that those caring for a parent-in-law have worse health than those caring for their own parent and their health reflects the value of their marginal utility from engaging in eldercare. However, SBW scores may be based on a combination of both health and material compensation. If spouses compensate spouses/caregivers for taking care of their parents (but not of the caregivers' parents) and the amount of compensation *y* obtained from a spouse in return for care supplied to the parent-in-law is large enough, it is possible that, based on equation 5, $\frac{MUA^{cii}}{MUx} - \frac{MUA^{cij}}{MUx} = y.$ This means that the caregiver receives a compensation equal to the difference in dollar value between the value of marginal utility obtained from caring for own parents ($\frac{MUA^{cii}}{MUx}$) and that obtained from caring for parents-in-law ($\frac{MUA^{cij}}{MUx}$). It is therefore possible that SWB (A^{cii}) $=$ $SWB\left(A^{cij} + y\right)$, where compensation *y* may be paid in part by the spouse's parent(s) in need of caregiving. This could explain why Oshio (2014) and Wakabayashi and Kureishi (2016) found worse health results for married women caring for older in-laws than for married women caring for their own parents, but Niimi (2016) did not find that caregiving children-in-law had worse subjective well-being SWB. Contemporary parents of daughters may be particularly generous towards caregiving by sons-in-law, given that such care diverges from traditional standards. The material compensation *y* could take the form of expected future bequests. It is hoped that future researchers will obtain data on caregiving of the elderly, bequests, health and subjective well-being so that these ideas can be tested.

3.2 Gender differences in SWB in the Republic of Korea.

In the Republic of Korea marriage adds more to men's SWB than to women's, and this gender gap is more pronounced in older couples (Rudolf and Kang 2015, Bethmann and Rudolf 2018). The patrilocal version of the extended household model presented above can help explain this. In Korea

it is still frequently the case that daughters-in-law take care of their husband's older parents (Das Gupta et al. 2003), especially if their husband is the older son. In contrast, men supply little caregiving benefiting in-laws. This could help explain a gender gap in the SWB of married men and women. The following equation (based on equation 5) holds equally for men and women:

SWB (A^{cii}) $=$ $SWB\ (A^{cij} + y\ )$.

To the extent that all caregiving of elderly parents is done by women, and that the *y* paid by husbands to wives is not sufficiently high, it is possible that women will engage in caring for elderly in-laws beyond an optimal allocation of their own resources of time and money. Why would women agree to a sub-optimal situation? It could be that they grew up in traditional households reminiscent of those that Cheung describes as typical of traditional China, and that their parents agreed to marry them knowing that their daughters will later be stuck in marriages involving in-marriage compensations that don't suffice to compensate the daughters for their disutility of caregiving. The women's parents may have obtained part of the present value of future compensations *y* at the time of marriage in the form of bride price. The traditional system may not have forced men to sub-optimize to the same degree, and therefore at the time of this recent survey men were happier in marriage than women.

Age may influence the gender gap in marital happiness, for supplying eldercare may become more difficult for daughters-in-law as the parents-in-law age and require more care, whereas the in-marriage transfer component of *y* may not increase sufficiently over time to provide adequate compensation to caregiving daughters-in-law. The fact that in Korea the gender gap in happiness is higher at older ages than at younger ages could also indicate that younger men do relatively more caregiving than their older counterparts, or that the real value of in-marriage compensation *y* that men pay women for their caregiving work decreased with marital duration.

Studies from countries other than Japan and the Republic of Korea also indicate that relative to caring for own parents caring for older in-laws contains more of an element of work and therefore may be associated with lower value of marginal utility (or higher marginal disutility). A survey completed in India and Belgium suggested that altruism is less likely to motivate eldercare supplied by daughters-in-law than that supplied by daughters (Datta et al. 2003). There may be less direct utility from performing the caregiving, using the terms of Zhu et al. (2003). In terms of the model presented above, the value of the marginal disutility of A^{cij} may exceed that of A^{cii}, and therefore the person caring for an older parent-in-law may need to be compensated more than one caring for a parent.

3.3 Is variation in the prevalence of brideprice and dowry related to the frequency of eldercare by children-in-law?

Observable components of price of marriage may include intra-marriage transfers, access to a future inheritance or bequest, or premarital payments. In his gender-specific economic theory of marriage Becker (1973, 1981) discusses how these different components are substitutes in the sense that a premarital payment to the bride or her relatives (brideprice) may come instead of a stream of payments from husband to wife during the marriage.[7] The more traditional marriage institutions prevent women from benefiting from higher prices during marriage, the more it is likely that a higher price of marriage will take the form of higher prevalence of brideprice or lower dowry payments prior to marriage (Grossbard-Shechtman 1993).

It follows from the conceptual framework presented in Section 2.2 that the equilibrium price of marriage, *y*, defined as the price of elder care provided by children-in-law, is related to both caregiving by children-in-law and prevalence of brideprice or dowry. More reliance on caregiving by children-in-law implies a higher price *y*, and in societies where parents control their children's marriage decisions a higher price may take the form of higher premarital payment paid to families supplying valuable future caregiving. Making it gender-specific, if price *y* is that of elder care provided by daughters-in-law, and parents control their children's marriages, the higher *y* the more it is likely that brideprice is paid prior to marriage.

A social characteristic associated with a higher equilibrium price of women's caregiving because it causes increased demand by men (and their parents) or decreased supply by women (and their parents), is more likely to be associated with brideprice than with dowry. These social characteristics include patrilocality, absence of state-supported eldercare, and limited availability of servants. For example, if servants are easily available and relatively cheap, there will be less demand for caregiving of older parents by daughters-in-law, the price of women's caregiving will be lower, and the society will not be as likely to have a brideprice system. It may have a dowry system instead, especially among higher income classes who can afford servants more easily.

These considerations help explain why there appears to be a cross-cultural association between elderly care supplied by daughters-in-law on the one hand and the prevalence of a brideprice system versus a dowry system and level of dowry on the other hand. A broad East-West comparison suggests such association.

[7] Marriage is defined as either marriage or non-marital cohabitation. Dowry is a premarital payment that goes from the bride (or her family) to the groom or the couple.

The traditional Chinese marriage institutions that inspired Cheung's economic analysis of marriage include patrilocality, high expectations that daughters-in-law supply eldercare and prevalence of brideprice. In contrast, traditional Western societies typically did not have brideprice (but dowry was not uncommon, especially in higher social classes, see Grossbard-Shechtman 1993). Contemporary East-Asian societies that still seem to be partially under the influence of the traditional Chinese marriage system include Japan, China, and South Korea. Even though currently these countries rarely have monetary brideprice—especially China where brideprice was officially banned under communist rule as part of the 1950 Marriage Law (Chu and Yu 2010)--the institution of brideprice lives on informally. Facts consistent with the idea that men pay the equivalent of a brideprice in Japan or China are that (1) relative to women and their families, men and their families are more likely to provide housing at the time of marriage (e.g. they pay for new housing or provide the family farm); and (2) single women save proportionately less than single men (Kureishi and Wakabayashi 2013, Wei and Zhang 2011). In contrast, today in Europe and the U.S. it is not common that men and their families disproportionately assume most of the costs of housing for a young couple getting married.

Japan, China and Korea also have relatively high levels of informal caregiving to the elderly supplied by daughters-in-law. Expectations that daughters-in-law take care of their husband's older parents are quite prevalent in all three countries, certainly more so than expectations that sons-in-law take care of their wife's older parents (Das Gupta et al. 2003). In all three countries patrilocality is relatively common, meaning that after marriage a couple often goes to live close to the husband's family, sometimes under the same roof. Traditionally, patrilineality has also been common in these countries, meaning that generally sons inherited but daughters did not (Das Gupta et al. 2003). As a result, later in their life cycle women have often been living with their in-laws and have taken care of them more than they have cared for their own parents. Patrilocality may be related to primogeniture, whereby eldest children (usually sons) inherit most or all of their parents' estate. Primogeniture is also less common in the U.S. than is Japan, which helps explain why Japanese parents are considerably more likely to leave bequests conditional on child eldercare than their American counterparts (12.8 % versus .5% of responses to question 7 in section 4.3, Horioka 2014).

Evidence of high levels of eldercare provided by daughters-in-law in Japan was mentioned in the introduction. For China, data from the 2013 Health and Retirement Longitudinal Study (CHARLS) indicate that among families with sons, 13.7% of older respondents (ages 45 or more) with an IADL limit received help from daughters-in-laws, where IADL stands for Instrumental Activities of Daily

Living such as shopping, using a telephone, or doing laundry. In contrast, among families with daughters only 2% of such respondents with an IADL limit received help from sons-in-laws.[8] A broad generalization is that the countries where informal brideprice is more common (Japan, China and Korea versus Europe and the U.S.) are also the countries where daughters-in-law tend to be more actively involved in eldercare.

Like Japan, China and Korea, Northwest India also has strong traditions of patrilocality and patrilineality (Das Gupta et al. 2003). Like China India is also poor and offers limited state-funded formal care to the elderly. Overall in India it is also the case that daughters-in-law are considerably more likely to take care of their elderly in-laws than sons-in-law. According to Ugargol et al. (2015) of those providing informal help with IADL (instrument activities of daily living) close to 40% were sons and daughters-in-law and only about 15% were daughters (including unmarried daughters). Sons-in-law were not mentioned as a category. Their study was based on the 2011 Building Knowledge Base on Population Ageing in India survey (BKPAI) that included thousands of respondents over age 60 in seven Indian states, including states from the Northwest.

However, in contrast to China and Japan, in Northwest India the same traditions of patrilocality, patrilineality, and a relatively high prevalence of eldercare by daughters-in-law are associated mostly with a dowry system. For India as a whole dowries and brideprices tend to coexist, which inspired the first economic publication on marriage: Bronfenbrenner (1971). Bronfenbrenner and, more recently Anderson (2007), have pointed out that dowries tend to be paid more frequently and consist of higher amounts among the highest social classes than among the lower classes.[9] Bronfenbrenner explained that class differential as follows: women in the lower castes work harder in the labor market and upper caste families have to pay dowry so their daughters can afford a lifestyle free of the hard work to which their lower caste counterparts are doomed. It is possible that relative to their upper-caste counterparts poor Indian women provide not only more labor in labor markets but also more caregiving to older in-laws when families can't afford paid help. It can be expected that where dowry had been paid the older parents-in-law would be more likely to be cared for by servants (relative to daughters-in-law) than where dowry was not paid. The dowries of upper class women may thus allow them to access a more leisurely lifestyle after marriage, involving less work in both the labor market and marriage.

[8] I thank Christine Ho for providing me with these statistics. The survey is based on a sample of thousands of respondents. The percentage of sons providing help to their parents was 19.8%, and that of daughters 10.9%.
[9] This was also the case in 17th Century France (Grossbard-Shechtman 1993).

Whether there is a negative association between dowry and caregiving by daughters-in-law could be tested by comparing various regions in the same country. A preliminary North/South comparison suggests a negative association between dowry level and prevalence of eldercare by daughters-in-law in India's rural areas. In the rural North in 2010 25% of eldercare was provided by children's spouses (in most cases daughters-in-law), versus 4% in the rural South.[10] This was compared to dowries reported in a 1998 survey: a median dowry of 6,343 rupees in the North, versus 30,229 rupees in the South.[11] That the dowries were observed at least twelve years earlier than the caregiving is in line with the idea that at the time of marriage daughters of families not paying a dowry were more likely to carry obligations of future care for in-laws.

It is hoped that future work can offer a comprehensive and rigorous empirical investigation of the association between type of premarital transfer (brideprice or dowry) and prevalence of eldercare by daughters-in-law using regional or individual data.

4.Conclusions, Policy Implications, and Suggestions for Further Research

In the model presented here extended households composed of parents and children make decisions regarding demand for informal eldercare, including caregiving by children-in-law. At the same time extended households supply children who can become children-in-law caring for elderly parents-in-law. Aggregate demands and supplies set market equilibrium prices for caregiving by children-in-law. In turn, these prices provide incentives to which individual households respond. The more is paid to spouses taking care of a father-in-law or mother-in-law in need of assistance, the more individuals and their households are willing to supply such caregiving. Payments can be made during, before, or after marriage. The higher the price of caregiving by a child-in-law the less individuals will have a demand for such care. Premarital payments tend to occur in societies where parents control their children, including their children's marriages, and where during marriage children-in-law don't get paid in accordance with their marginal productivity as caregivers.

One implication from the model is that when studying the impact of eldercare on the health and happiness of the relatives who do the caregiving one should take account of (1) the material incentives possibly received by children-in-law and their relatives, and (2) the command structures that help extended households function as one unit. Whether individuals are free to take their own

[10] Based on the 2010 LASI pilot survey (Arokiasamy et al 2011; downloaded from The Program on Global Aging, Health, and Policy, The Center for Economic and Social Research (CESR) at the University of Southern California. https://g2aging.org/?section=page&pageid=26).

[11] Rural Economic and Demographic Survey based on Chowdhury (2010).

decisions regarding their time allocation, marriage or divorce may have a considerable effect on who takes care of the elderly. Policymakers concerned with the wellbeing of the elderly can not expect younger generations to accept the same caregiving responsibilities to parents and parents-in-law that seemed normal to previous generations. Forced marriage is rare now, but its past existence may still have repercussions today in terms of what families do and what individuals can expect.

A version of the extended household model with patrilocality implies that at the society level provision of care to older in-laws by daughters-in-law is expected to be positively associated with the prevalence of brideprice (in the form of money or in-kind). In contrast, dowries may be negatively associated with eldercare supplied by daughters-in-law. It follows that East/West and regional differences in caregiving obligations of family members may be associated systematically with certain family institutions, such as dowry or brideprice.

Rigorous empirical analysis is needed to test for an association between eldercare by in-laws and brideprice, dowry or similar pre-marital transfers. Such research will need good data and will have to recognize that causality between the type of premarital payment and amount of eldercare could run both ways. It is also possible that other factors, such as poverty or price of servants, affect both premarital transfers and eldercare by in-laws.

Future research could also investigate whether sex ratios play a role in explaining caregiving by daughters-in-law. The higher the sex ratio, the higher the aggregate demand for women's work in household production (including caregiving) and the higher the price of such work is likely to be. With higher sex ratios men's work in household production is expected to be cheaper. Higher sex ratios, and presumably higher prices for women's work in household production, have been associated with lower rates of participation of married women in the labor force (Grossbard-Shechtman 1984; Grossbard and Amuedo-Dorantes 2007). Are they also associated with a lower eldercare supplied to in-laws by married women? In that case, what will be the impact of the current shortage of marriageable women in China? Will these women be less available to care for their elderly in-laws in the future?

Future research could also examine how caregiving by children-in-law varies with divorce. Traditionally divorce rates have been very low in the Far East. However, if divorce rates are substantial (and they are rising in Asia) the connection between premarital payments and eldercare by children-in-law is likely to be weaker. For example, the higher the divorce rate the more men's families will be reluctant to pay their sons' wives (or their families) prior to marriage for future caregiving to be performed when they reach an age of high dependency.

Another important demographic variable worth incorporating into the model is life expectancy. Life expectancy will be positively associated with aggregate demand for eldercare supplied by children-in-law: the longer the in-laws are expected to live, the more in-family arrangements for their future care become valuable. However, the longer people expect to live, the more children may be reluctant to commit to marriage involving future obligations of caring for older in-laws. It is also possible that the supply of eldercare by in-laws contributes to a higher life expectancy. Japan has the world's highest life expectancy. Is it partially the result of more eldercare supplied by children or children-in-law? If so, did traditions regarding pre-marriage payments and patrilocality contribute to longevity?

The ideas presented here open doors for further research associating caregiving by relatives and marriage markets. Policy implications are numerous. Almost everywhere government programs aimed at the elderly are underfunded. Would it be possible to encourage informal eldercare, including that provided by daughters- and sons-in-law, to fill that vacuum? Could that encouragement consist not only of government policies such as subsidies for informal care, but also facilitation of informal contracts that encourage caregiving via material incentives? For example, could spouses whose parents are in need of caregiving possibly find more ways to compensate their spouse/caregiver?

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