

Intrahousehold allocation of financial resources: evidence from South Korean individual bank accounts

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Abstract Using individual bank account data from South Korea, where joint accounts are rare and the legal system emphasizes the individuality of financial transactions, we examine the distribution of financial resources between spouses within households. We find that each member's share of household savings depends on the balance of bargaining power. We also find that the wife's bargaining power increases total household savings. The findings deviate from the unitary model.

Keywords Savings · Household bargaining

JEL Classifications D1 · E2

1 Introduction

There are a variety of microeconomic models to explain household decisions on consumption and saving. These models incorporate ideas of life-cycle income and wealth, attitudes toward risk, and discount factors.¹ Traditionally it

¹ See, for example, Browning and Lusardi (1996) for a survey.

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is assumed that households are the valid unit of decision-making for savings. However, as it has become more evident that individual household members have potentially conflicting preferences, there have been some attempts to analyze household saving decisions from the perspective of household bargaining models.²

This paper exploits a unique data set from South Korea in which we can identify not only total household savings but also their distribution over individual members' separate accounts. This unique feature of the data set reflects a peculiar institutional framework. First, joint accounts are virtually non-existent. Individuals hold their own bank accounts. Second, the law emphasizes the individuality of financial properties and transactions. Individuals have their exclusive accessibility to money in their accounts. Lastly, the divorce law is based on a separate property system. The system de facto guarantees one's own right to assets in his or her name in the event of divorce. These institutional characteristics provide an interesting context to analyze household saving decisions from the perspective of household bargaining models.

In summary, we find that a household where the wife has strong bargaining power not only saves more in total, but also saves relatively more in her own account. This is consistent with the previous finding that women prefer to save more than men and try to secure money under their control. The unitary household model in which family members combine their incomes and maximize a family common utility function cannot explain our findings.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the data set and the institutional framework in South Korea. Section 4 presents a conceptual model. Section 5 presents empirical strategy and results. Section 6 concludes.

2 Related literature

The motivation of this paper is that individual family members have potentially conflicting preferences and they need a decision-making procedure to reconcile different opinions about expenditure and savings. In particular, we note that men (husbands) and women (wives) differ in risk averseness, prudence, self-control, and discount factor, all of which are known as the standard determinants of household savings. Interestingly, most studies have found or suggested that women have a higher propensity to save than men.³ Barber and Odean (2001) showed that, consistent with psychological research, men are more confident about themselves than women. Using individual financial

² Sociologists have examined internal dynamics within households related to financial arrangements and their implications for marital conflicts and gender inequality within marriage (Pahl, 1980, 1989; Treas, 1993; Zelizer, 1989).

³ This is often suggested as evidence that female empowerment should foster economic development in developing countries. High private savings rates are an important engine for economic growth. East Asian countries save more than 30% of gross national disposable income, while African countries save less than 15%.

transaction data, they found that men trade more excessively than women, which lowers men's net returns significantly. Similarly, Jianakoplos and Bernasek (1998) found that men are less risk averse than women. Thomas (1990) found that women are more concerned about children. It is then implied that, since children are an important motivation for household savings, women should prefer to save more. Anderson and Baland (2002) found that women prefer to purchase more durable goods than men and therefore to save more. Besides differences in preferences, yet another reason why women want to save more is biological; women have a higher discount factor because they usually live longer than men.

It follows from gender differences in preferences for savings that the balance of bargaining power between spouses should matter in household saving decisions. Along this line of thought a few recent studies have attempted to incorporate bargaining into the standard model of household savings. Using a two-period Nash bargaining model, Browning (2000) shows that when a wife is more concerned about future consumption, her husband's savings decrease as her relative bargaining power increases. However, he finds that household savings in total would increase because the wife's savings increase enough to offset the decrease in the husband's savings. Nargis (2003) tested for Browning's predictions using the Panel Study of Income Dynamics (PSID) and indeed found that household savings tend to increase with the wife's bargaining power (measured by relative earnings). Similarly, Lundberg and Ward-Batts (2000) show that wives with strong bargaining power accumulate more net wealth as they approach retirement. They measure the balance of power by a spouse's relative control over income sources, relative age, and relative education.

While the above studies assume a decision-making process (bargaining) and verify between-spouse differences in preferences, there are some studies that exploit direct measures of individual preferences to elicit the internal decision-making mechanism. Mazzocco (2004) approximated spousal differences in attitudes toward risk by using "lottery" questions in the Health and Retirement Study. Using the PSID, Lich-Tyler (2003) utilized individual spouses' time preferences. Both studies found that the underlying decision-making process is different from what the unitary household model suggests.

Note that all the above studies are focused on household savings in total. While there is, to our knowledge, no study on the intrahousehold distribution of savings, there are some studies that qualitatively examine "control and power" over financial resources. This so-called "domestic politics" approach is focused on who actually controls financial assets when the internal decision-making procedure is, at least in part, directly observable. For example, both Dobbelsteen and Kooreman (1997) and Woolley (2003) exploit survey questions about family financial organization and decision-makers for financial issues and examines whether households' financial management is determined by bargaining between spouses. Woolley (2003) found that, holding the wife's income constant, a husband's higher income decreases the degree of the wife's control over money in marriage, although the wife's income by itself is not significant. Both studies assume that those who are responsible for financial

management have control over resources. In this study, however, we examine both how household savings are determined and how the savings are divided over spouses' individual accounts.

3 Data

The data used in this study are from the Korean Household Panel Study (KHPS). Conducted by Daewoo Research Institute, the KHPS is the first panel survey on Korean households. It is structured similarly to the PSID, and the data are available from 1993 to 1998. Our sample consists of households with two spouses present. For homogeneity of the sample, we exclude households in which the husband does not work for pay or is older than 65. It is very rare that married men do not work if they are healthy. The male unemployment rate was only 2.8% in 1997. The sample selection problem should not be serious. Since we are interested in the distribution of household savings, we have to exclude households with zero savings.⁴ Lastly, those with a "third-party" adult are dropped to focus on bargaining between spouses.

The most unique feature of the data set is that we can know not only total household savings but the distribution of household savings over individual accounts. Beginning in 1995, respondents are asked about individual holdings of bank and financial assets. The question varies in detail year by year. In 1995, the question about individual holdings is, "How much did you save monthly in bank accounts on average in 1994?" In 1996, individual respondents are asked about the accumulated stock of various financial assets as opposed to the previous question about the flow. In 1997, it emphasizes individual bank accounts by asking explicitly, "How much did you save monthly under *your name* on average in last year?" Since we are interested in the intrahousehold allocation of savings over individuals, this paper focuses on the data in 1997. The resulting sample size is 1,041 couples.⁵

This unique feature of the data set reflects South Korea's peculiar institutional framework. First, the concept of joint accounts is rare among the majority of the population.⁶ The reason for the absence of joint accounts is not

⁴ There might be potentially a sample-selection bias due to this criterion. Two hundred and thirty-four couples save zero and are dropped from our sample.

⁵ We do not use the 1998 survey because several major commercial banks declared bankruptcy because of the Asian financial crisis.

⁶ To substantiate our claim, we talked with an accounting professor, a senior researcher at the South Korean central bank, and a former employee at a national bank in South Korea. Each confirmed that accounts with joint legal status do not exist in Korea. Interestingly, joint accounts seem to get less popular in developed countries. A survey on joint accounts was conducted by Abbey National Bank of the United Kingdom ("Women More Reluctant to Have Joint Bank Account," Press Association, June 10, 2003). The survey states that women are more reluctant than men to have a joint account. Reasons for not wanting a joint account include: uncertainty in the relationship (57%), to avoid arguments (48%), and that they don't trust partner or spouse to use money sensibly (27%). The survey reports that 30% of couples in the UK have a joint account. The proportion of married women in the U.S. who keep checking or savings accounts in their own names is increasing over time (Treas, 1993).

Table 1 Descriptive statistics of principal variables^a

	All households		Full-time dual earners	
	Husbands	Wives	Husbands	Wives
Individual savings	38.0 (41.6)	28.2 (41.9)	40.5 (44.8)	41.4 (52.1)
Household savings	66.1 (54.0)		81.9 (61.9)	
Wife's share of savings (%)	40.8 (41.2)		49.3 (39.4)	
Individual earnings	201 (91.9)	25.7 (50.5)	175 (81.5)	86.5 (63.7)
Household earnings	226 (102)		261 (119)	
Wife's share of earnings (%)	9.7 (16.8)		32.2 (15.9)	
Age	39.9 (7.4)	36.6 (7.0)	40.7 (7.5)	37.2 (6.9)
Education (years of schooling)	12.6 (2.8)	11.6 (2.6)	12.3 (2.8)	11.2 (2.6)
Number of children	1.8 (.7)		1.8 (.9)	
Metropolitan residence	.6 (.5)		.6 (.5)	
Spearman correlation	-.4		-.4	
	[<i>p</i> < .01]		[<i>p</i> < .01]	
<i>N</i> =	1,041		213	

^a Standard deviations are in parentheses. Earnings and savings are in terms of 10,000 South Korean won. Spearman correlation tests for independence between spouses' individual savings are presented

well known, while some banks only recently started to offer spousal joint accounts. Second, the “real-name financial transaction” law, legislated in 1993, requires that any financial account should be registered under a real name. The law also constrains accessibility of one's financial assets by others, even if they are family members.⁷ In this institutional framework, if a couple opens an account, they must decide who will have the legal ownership of the account.

Some descriptive statistics are presented in Table 1. Earnings and savings are denominated in 10,000 South Korean won, which is roughly equivalent to about 10 United States dollars. First, it is notable that a husband's monthly earnings are typically 7–10 times larger than his wife's. This large gap reflects low labor force participation of married women. However, even when both spouses work, husbands earn still 2–3 times more than their wives.

The savings rate is defined as the percentage ratio of savings to earnings. The average household savings rate is 29.2%, which is close to the national statistics. We cannot use the disposable income since information on tax payments and non-labor income is not available. With regard to the distribution of savings over individual accounts, most households save more in the husband's account than in the wife's. The gap is significant. The average holdings of husbands are 34% larger than their wife's. About 40% of wives do not have their own account in the first place. A recent study by Seoul Women's Foundation (2006) found that about 41.8% of married women do not have any property registered under their own name.

⁷ Civil organizations and groups for women's rights criticize the law. They argue that it be reformed to allow one to inquire about his or her partner's (in particular, husbands') accounts to prevent the partner from hiding marital assets near at the event of divorce.

The division of household savings is positively correlated with the distribution of income within households. Note that the savings rate gap decreases to only 5% for dual-earner households. For full-time dual-earner households, the percentage of households in which the wife does not have her own bank account is 26%. On the other hand, 56% of single-earner (male-breadwinner) households do not have the wife's own bank account. However, it is also notable that not a few non-working wives have their own account and positive savings. This suggests that a part of the husband's earnings is transferred to the wife's account.

One last thing to be noted here is that the Korean separate property system gives individuals the ownership of accounts in their name in the event of divorce. By Civil Law, the property which is obtained before marriage or obtained under a specific name during marriage belongs to that individual (Korean Civil Law, Article 830, Clause 1). In other words, the property accumulated after marriage, and held under an individual's name, is the property of that individual. Although any spouse is allowed to request that it be divided (Korean Civil Law, Article 839, Clause 2), it is believed that, when a judge further divides the assets, the wife's contribution to household wealth tends to be underestimated especially if she does not work for pay (Cho & Chun, 2004; Lee, 1990; Won, 1992). Furthermore, the law cannot prevent husbands from disposing or holding back household property under their name before divorce (Cho & Chun, 2004). This legal environment provides a strong reason why the division of household savings over individual accounts is likely to be subject to household bargaining, especially when the marriage is at risk.

4 A conceptual model

The unitary household model assumes that individual members pool their incomes and maximize a single common utility function. For simplicity consider a two-period model of consumption and savings. Suppose that a household maximizes the following utility function:

$$V(c_1^h, c_1^w) + \delta V(c_2^h, c_2^w), \quad (1)$$

where δ is the household discount factor, V is the household's periodic utility function, and c_t^j is consumption of spouse j , $j = h$ (husband) or w (wife), at time t . For each period, the budget constraint is:

$$c_1^h + c_1^w + (s^h + s^w) = y_1^h + y_1^w \quad (2)$$

$$c_2^h + c_2^w = y_2^h + y_2^w + r(s^h + s^w), \quad (3)$$

where y_t^j is earnings of spouse j at time t and s^j is savings in the spouse's own account. There are two things to be noted here. First, in the unitary model,

only the sum of individual savings is to be determined. The division of household savings over individual accounts is not relevant. Total savings depend upon household income, gross interest rate (r), and preferences including the discount factor. Second, only the sum of individual earnings matters in determining total savings. The latter is called the “income-pooling” hypothesis.

Now consider a simple household bargaining model where individual spouses have potentially divergent preferences. We therefore define individual-specific utility function, $u^j(c_t^j)$. The utility function is egoistic in that it depends on the individual’s own consumption only. In each period spouses divide total income for their consumption and savings. We assume that spouses can divorce in the second period with probability p .⁸ In the event of divorce, each spouse possesses savings in his or her own account. Assuming that household decisions are on the ex-ante Pareto frontier (Mazzocco, 2004), we can represent the household’s optimization problem as the following:

$$\begin{aligned} &\mu[u^w(c_1^w) + \delta^w(p \cdot u^w(c_2^{wD}) + (1 - p) \cdot u^w(c_2^{wM}))] \\ &+ (1 - \mu)[u^h(c_1^h) + \delta^h(p \cdot u^h(c_2^{hD}) + (1 - p) \cdot u^h(c_2^{hM}))], \end{aligned} \tag{4}$$

where μ denotes the wife’s relative bargaining power, $0 < \mu < 1$.⁹ The household maximizes the collective welfare function subject to the budget constraints. The constraint for the first period is the same as that in the unitary model: $c_1^h + c_1^w + (s^h + s^w) = y_1^h + y_1^w$. In the second period there is a possibility of divorce. If there were no divorce, spouses still share a household common budget constraint, $c_2^{hM} + c_2^{wM} = y_2^h + y_2^w + r(s^h + s^w)$. On the other hand, when divorced, c_2^{jD} is the second-period consumption of spouse j . Since there is only a composite consumption good, a spouse’s consumption is his or her own income plus savings and interests, $c_2^{jD} = y_2^j + rs^j$.

In the above model, the household chooses not only consumption and total savings, but also individual savings. Let s denote total savings and θ denote the wife’s relative share of savings (s^w/s). Assuming an interior solution, the first-order condition for θ is:

$$\frac{\mu\delta^w}{(1 - \mu)\delta^h} = \frac{u^{hw}(y_2^h + (1 - \theta)rs)}{u^{hw}(y_2^w + \theta rs)}. \tag{5}$$

This condition provides us with testable hypotheses. First, if there is any positive probability of divorce, spouses have incentives to save more in their own accounts. As shown in the Appendix, the above condition exists if and only if $p > 0$. If there is no divorce, then spouses should renegotiate and

⁸ If we allow for divorce in the unitary model, the division of household savings as well as total household savings should be determined. Then we need to figure out the decision-making process for the division of savings and so this model loses its appeal.

⁹ We exclude the case of $\mu = 0$ or 1 in which the bargaining model degenerates into the unitary model.

divide total savings in the second period. In this model it does not matter whether savings are deposited in the husband's or the wife's account. The intrahousehold allocation of savings depends on the balance of bargaining power. It is straightforward to show that, *conditional on s* , as μ increases, θ increases, and vice versa. More generally, if total savings and their division are simultaneously determined, then the prediction becomes ambiguous. The effect of μ on θ depends on $ds/d\mu$ and $\mu\theta\delta^w u^{w''}(c_2^{wD}) - (1-\mu)(1-\theta)\delta^h u^{h''}(c_2^{hD})$. For the derivation, see the Appendix. If μ increases total savings and if μ and θ are sufficiently small, then the effect is likely to be positive. In fact, the sufficient conditions seem to be intuitively reasonable, first, because it is generally found that women are willing to save more and, second, because the wife's bargaining power is presumably weak, in particular in South Korea. In the empirical section, we will estimate $d\theta/d\mu$.

In addition, unlike in the unitary model, total savings also depend on the balance of power because spouses have different preferences. For example, if the wife has a high discount factor (high δ^w), she would prefer to save more. This prediction should hold even if there is no possibility of divorce.

In the model the probability of divorce is exogenously given, which is restrictive. In fact, the probability depends on the value of the utility outside of the marriage. Therefore individuals' opportunities outside the marriage, which may be determined by earning power and the market conditions for re-marriages, determine the probability of divorce endogenously. The present model assumes exogenous labor income (earning power), so this point does not alter our results. However, if we extend our model to endogenize labor supply, we must take this into account. Johnson and Skinner (1986), for example, found that married women increase their labor supply prior to divorce.

Also note that bargaining power is exogenously given in the above model. One may think that individual savings affect bargaining power. Indeed it is found that a wife's financial autonomy increases her bargaining power over household expenditure (Pitt, Khandker, & Cartwright, 2003). Wives can use savings in their own accounts for private consumption without being monitored by their partners. This is particularly true when there is marital discord. Anderson and Baland (2002) show that women use financial control to protect household resources from their husband's squandering. As a result, the fact that individual savings increase bargaining power provides spouses with another incentive to save more in their own accounts if other things are equal. This will only strengthen our prediction.

There is a potentially important factor which is missing in the above models but would affect the division of savings even in the context of the unitary model. From the perspective of transaction costs, it is more efficient to open a bank account under the name of the spouse mainly responsible for financial management (Treas, 1993). In doing so, the household can minimize transaction costs by increasing the financial manager's accessibility to household resources. For example, when the husband works for pay and the wife is specialized in domestic tasks, she is likely to be responsible for managing the

household’s financial affairs. The division of financial management is a part of the efficient division of labor within the household. Dobbelsteen and Koor-eman (1997) called this the household production model of financial management. We will discuss this model later.

5 Empirical strategy and results

5.1 Estimation

To test the empirical validity of the unitary household model and the bargaining model, we estimate a system of simultaneous equations for total household savings and their division over individual accounts:

$$s_i = \alpha_0 + \alpha_1\mu_i + \alpha_2y_i + \mathbf{X}'_i\alpha_3 + u_i \tag{6}$$

$$\theta_i = \beta_0 + \beta_1\mu_i + \beta_2y_i + \mathbf{X}'_i\beta_3 + v_i \tag{7}$$

where the subscript represents household i . $s_i = s_i^h + s_i^w$, $\theta_i = s_i^w / (s_i^h + s_i^w)$, and y_i is total earnings. Other variables are defined as before. A vector of individual and household characteristics, \mathbf{X}_i , includes total earnings squared, spouses’ age and education, number of children, an indicator for urban residence, and a constant. The key variable is μ_i , a proxy of the wife’s relative bargaining power. α_1 and β_1 represent the effects of bargaining power on total savings and the wife’s share, respectively. We jointly estimate the two equations by the seemingly unrelated regressions (SUR) model, which allows the error terms (u_i and v_i) to be arbitrarily correlated. It is possible that both total savings and between-spouse allocation are determined by some common unobservable factors, such as household preferences. This model can be estimated by using feasible generalized least squares (FGLS). The unitary model predicts a cross-equation restriction that $\alpha_1 = \beta_1 = 0$.

For robustness, we also estimate an alternative model. The motivation is that our prediction about the effect of μ on θ is valid after conditioning the latter on total savings (s). We assume a two-stage decision-making procedure in which households first decide total savings and, conditional on the total savings, allocate them to individual accounts. We estimate the following system of equations:

$$\theta_i = \beta_0 + \beta_1\mu_i + \beta_2y_i + \mathbf{W}'_i\beta_3 + \beta_4s_i + v_i \tag{8}$$

$$s_i = \alpha_0 + \alpha_1\mu_i + \alpha_2y_i + \mathbf{Z}'_i\alpha_3 + u_i, \tag{9}$$

where \mathbf{Z}_i contains all variables in \mathbf{W}_i and some instrumental variables that affect total savings but do not affect the wife’s share. Now β_1 represents the net effect of bargaining power on the wife’s share of savings, holding total savings constant. The two-stage least-squares (TSLS) model is advantageous over the previous SUR model in that it reflects the theory more closely, but it

is disadvantageous since the identification needs exclusion restrictions as we will discuss shortly.¹⁰ The equations can be consistently estimated by the two stage least squares model.

An empirical difficulty in both models is finding a good proxy for bargaining power. Following the literature on the collective household models, we use the ratio of the wife's earnings to total earnings, $\mu_i = y_i^w / (y_i^h + y_i^w)$.¹¹ A spouse's relative earnings would be a legitimate measure since they measure one's contribution to household resources. Also, it is reasonable since a woman's access to employment outside the home increases her domestic decision-making power. Basu (2006) argues that a wife's bargaining power should come from what she actually earns. The wife's labor supply as well as her wage rate should affect the threat point because career interruptions during marriage would diminish her human capital and job opportunities after divorce.¹²

On the other hand, relative spousal earnings as a measure of bargaining power have been criticized. Relative earnings can be a valid measure of bargaining power only if consumption and leisure are separable and labor supply is constrained (Browning, Chiappori, & Lechene, 2006; Lundberg & Pollak, 1996). For example, in our context of savings, the effect of relative earnings on savings might pick up the direct effect of labor supply (or leisure) on consumption and thereby on savings. As a wife works for pay in the labor market, her shadow price of working at home increases. If other things are equal, consumption, e.g. spending on dining out, is higher and savings lower. Another criticism about relative earnings is that they do not acknowledge the value of home production. Pollak (2005) points out that earnings within marriage are not a good proxy for potential earnings outside marriage because labor supply is endogenous to household production. Women are more likely to participate in the labor market after divorce.

To address the above problems, we will experiment with a sub-sample where both spouses work full-time, that is, 35 h or longer. This sample restriction should remove any substitution effect between consumption and labor supply because working hours are legally constrained. Also, since married women's labor force participation is pretty low, the restriction should significantly lessen the endogeneity of relative earnings with regards to endogenous labor force participation. The same empirical strategy has been used to avoid the endogeneity problem in the literature (Bourguignon et al. 1993; Browning et al. 1994). This strategy seems appropriate for our sample. We find that the intrahousehold allocation of savings is different for these sub-sample households. For example, the percentage of households without the

¹⁰ Ideally, we also need to allow the share to determine total savings. This requires more exclusion restrictions.

¹¹ See, e.g., Phipps and Burton (1992), Hoddinott and Haddad (1995), Browning and Chiappori (1998), Lundberg and Ward-Batts (2000), Woolley (2003), and Nargis (2003).

¹² Then μ is likely to be positively correlated with the wife's own earnings after divorce, y_2^w in Eq. 5. In this case the effects of relative earnings on total savings or the wife's share should be downward biased. Our estimates then will form the lower bounds on the effects.

wife's own account is 26% when the wife is working full time, while it is 41% when the wife is a part-time worker and 44% when the wife is not working in the labor market. Full-time dual-earner households are significantly different from others in the intrahousehold allocation of savings.

Also note that, contrary to our assumption, a spouse's relative earnings could be to some degree *negatively* correlated with his or her bargaining position within the household. The reason is that, for example, a "good" wife who possesses desirable characteristics appreciated in the marriage market should have strong decision-making power in marriage and receive larger material benefits from her husband. Such a woman is less likely to work in the labor market after marriage (Grossbard-Shechtman, 1984). In this case, women with strong power might have lower relative earnings. To the extent that this kind of compensating transfer between spouses happens, our estimates for the effects of bargaining power using relative earnings as a proxy should be underestimated.

For robustness and because of various problems with relative earnings, we use non-labor income from non-bank financial assets as an alternative proxy for bargaining power. Unfortunately, there is no direct information on spouses' non-labor income in 1997, so we use the wife's relative holdings of these non-bank financial assets in 1996 out of the household's total non-bank asset holdings. The idea is that any annual non-labor income in 1997 is likely to accrue from asset holdings in 1996. Assuming that the returns to assets are on average equivalent between spouses, the wife's relative holdings should be a good proxy for her relative non-labor income. As mentioned earlier, besides savings, the 1996 survey asked each spouse's current holdings (in stock, not in flow) of financial assets registered in his or her own name, including insurance, equity, bonds, and private loan. The wife's share is on average 34%, which is quite close to the wife's share of savings (40.8%). This measure might be a better proxy of bargaining power because we can avoid the endogeneity of labor supply (Thomas, 1990). However, note that non-labor income is an accumulated consequence of past earnings, and so the measure is not completely free of the endogeneity problem of labor supply (Lundberg & Pollak, 1996). Unfortunately, we cannot know how much of non-labor income is from inheritances and gifts made prior to marriage. Since individuals in the sample are pretty young and there is no strong dowry system in Korea, the endogeneity problem of non-labor income should not be ignorable. Also individual holdings of financial assets and bank savings are likely to be correlated when households choose their portfolio and diversify financial resources over various assets.

6 Results

Table 2 presents results when we use the wife's relative earnings as an indicator for bargaining power. Consistent with the bargaining model's predictions, we find that an increase in the wife's relative earnings significantly increases total

Table 2 Effects of Relative earnings on total savings and allocation over individual bank accounts: seemingly unrelated regressions^a

	All households		Full-time dual earners	
	Total savings	Wife's share	Total savings	Wife's share
Wife's relative earnings	.220*** (.079)	.419*** (.079)	.399* (.212)	.565*** (.169)
Total earnings	.269*** (.037)	.012 (.037)	.204** (.101)	-.112 (.080)
Total earnings squared	.004 (.005)	-.003 (.005)	.009 (.013)	.012 (.010)
Husband's age	.822* (.463)	-.897* (.463)	3.229** (1.271)	-.335 (1.011)
Wife's age	-1.122** (.488)	.723 (.488)	-3.564*** (1.341)	.264 (1.067)
Husband's education	-.338 (.627)	-.054 (.627)	1.179 (1.762)	-.675 (1.402)
Wife's education	.183 (.738)	.119 (.739)	1.255 (2.022)	.330 (1.609)
Number of children	-3.940** (1.716)	-.087 (1.717)	-5.787 (4.294)	.823 (3.416)
Metropolitan residence	-.962 (2.581)	1.327 (2.582)	1.439 (6.717)	-.163 (5.344)
Constant	17.24 (13.20)	44.10*** (13.20)	-9.769 (39.15)	57.51* (31.14)
R ² =	.377	.032	.400	.063
Breusch-Pagan test of independence	$\chi^2(1) = 1.63$		$\chi^2(1) = .82$	
p-value	[p = .20]		[p = .36]	
Number of observations	1,041	1,041	213	213

^a Standard errors are in parentheses. One asterisk indicates a 10% level of significance; two asterisks indicate a 5% level of significance; three asterisks indicate a 1% level of significance

household savings. For a typical household, a 10% increase in the wife's relative earnings increases total savings by 3.3%. The magnitude is very similar to what Nargis (2003) found for the U.S. households. The effect of relative earnings on the wife's share of savings is also significant. The same 10% increase in the wife's relative earnings increases her share of savings by 4.2% points. The last two columns in Table 2 present results for full-time dual earner households. We again find that an increase in the wife's relative earnings increases both total savings and her relative share. A 10% increase in the wife's relative earnings increases household savings by 4.9% and the wife's share by 5.7%. Although the differences between results for the two samples are not statistically significant, it is economically reasonable that household saving decisions are more sensitive to spousal relative earnings when both spouses are full-time workers. Bargaining power should depend more upon earning power when both spouses work for pay and they are more comparable.¹³

The unitary model clearly does not explain the results here. It should be kept in mind that, even though relative earnings do not represent bargaining power, the unitary model predicts that individual earnings should not matter after controlling for total earnings and accounting for the endogeneity of labor supply. The income-pooling hypothesis is strongly rejected.

Other results are consistent with our priors. As expected, total earnings increase household savings. Holding the wife's relative earnings constant, a 10% increase in total earnings increases total savings by 2.7%. We included

¹³ One might wonder if there is any tax incentive to smooth holdings over individual bank accounts for two-earner couples. In South Korea there was no such incentive during the sample period because the income tax was levied on the sum of spouses' earnings.

the squared term of total earnings, first, because the wife’s relative earnings might be correlated with the higher-order terms of total earnings and, second, because the savings rate might change over income levels. The squared term, however, is not statistically significant. The number of children significantly decreases household savings, which reflects that public consumption is necessarily larger with more children. On the other hand, it is interesting to note that total earnings and children do not affect the between-spouse distribution of total savings. The findings are consistent with our hypothesis that households decide the household savings rate and then, by bargaining, determine in whose account to deposit the savings.

Now consider a possible alternative interpretation by the household production model of financial management. This model shows that relative earnings might affect the distribution of savings over individual accounts if spouses try to minimize transaction costs by the efficient division of labor. It is important to note that the predictions from this model are exactly opposite to those from the household bargaining model. Suppose that one spouse specializes in work in the labor market and the other specializes in domestic works including financial management. Then, an increase in the wife’s relative earnings, which decreases with her specialization in financial management, should have decreased savings in her own account. Furthermore this model cannot explain why the wife’s relative earnings increase the total savings rate.

Table 3 shows results from the two-stage least-squares estimation. The identification assumptions are somehow restrictive. As explained before, we assume that, considering public consumption and intertemporal substitution of resources, households first decide the total savings rate and allocate the total savings over individual accounts. Under the assumption, we exclude total

Table 3 Two-stage least-squares estimation^a

	All households		Full-time dual earners	
	Total savings	Wife’s share	Total savings	Wife’s share
Total savings		-.035 (.045)		-.067 (.090)
Wife’s relative earnings	.220*** (.079)	.431*** (.082)	.399* (.217)	.584*** (.178)
Husband’s age	.822* (.465)	-.894* (.464)	3.229** (1.302)	.046 (1.055)
Wife’s age	-1.122** (.491)	.701 (.491)	-3.564** (1.374)	-.022 (1.135)
Husband’s education	-.338 (.630)	-.045 (.625)	1.179 (1.805)	-.901 (1.408)
Wife’s education	.183 (.742)	.144 (.741)	1.255 (2.071)	.675 (1.637)
Metropolitan residence	-.962 (2.593)	1.343 (2.575)	1.439 (6.881)	-.176 (5.426)
Total earnings	.269*** (.037)		.204** (.104)	
Total earnings squared	.004 (.005)		.009 (.013)	
Number of children	-3.940** (1.725)		-5.787 (4.399)	
Constant	17.24 (13.26)	47.04*** (12.26)	-9.769 (40.10)	38.49 (27.91)
R ² =	.377	.028	.400	.063
Anderson’s test for IV relevance	[p < .01]		[p < .01]	
Sargan test	[p = .83]		[p = .46]	

^a Standard errors are in parentheses. One asterisk indicates a 10% level of significance; two asterisks indicate a 5% level of significance; three asterisks indicate a 1% level of significance

Table 4 Non-labor income as an alternative measure of bargaining power: seemingly unrelated regressions^a

	All households			Full-time dual earners		
	Total savings	Wife's share	Total savings	Wife's share	Total savings	Wife's share
Wife's relative earnings						
Wife's relative non-labor income	.005 (.033)	.195*** (.032)	.206** (.093)	.358*** (.090)	-.003 (.092)	.219*** (.069)
Total earnings	.188*** (.047)	.020 (.046)	.174*** (.047)	-.004 (.046)	.200 * (.120)	-.062 (.090)
Total earnings squared	.017** (.007)	-.003 (.007)	.018*** (.007)	-.001 (.007)	.009*** (.015)	.008 (.011)
Husband's age	1.113** (.554)	-1.156** (.540)	1.074* (.552)	-1.222** (.535)	3.947** (1.541)	-.607 (1.155)
Wife's age	-1.502** (.588)	1.026* (.573)	-1.519*** (.586)	.997* (.568)	-3.710 (1.686)	-4.111** (1.686)
Husband's education	-.632 (.728)	-.421 (.710)	-.516 (.728)	-.220 (.705)	-.967 (2.159)	-1.701 (1.619)
Wife's education	.353 (.849)	.506 (.828)	.359 (.847)	.516 (.820)	3.868 (2.429)	.337 (1.821)
Number of children	-1.238 (2.344)	-1.005 (2.286)	-1.442 (2.339)	-1.359 (2.265)	-1.977 (6.637)	.607 (4.975)
Metropolitan residence	-.882 (2.963)	1.923 (2.888)	-.836 (2.954)	2.003 (2.861)	.727 (8.236)	5.025 (6.174)
Constant	28.29* (16.74)	40.46* (16.32)	30.30* (16.71)	43.96*** (16.19)	-30.85* (52.50)	105.0*** (39.36)
R ² =	.362	.051	.366	.069	.372	.088
Number of observations	808	808	808	808	164	164

^aStandard errors are in parentheses. One asterisk indicates a 10% level of significance; two asterisks indicate a 5% level of significance; three asterisks indicate a 1% level of significance. Wife's relative non-labor income is defined as her relative share of household financial assets other than savings in 1996

earnings, total earnings squared, and the number of children (public consumption) from the determinants for the wife's relative share. The results in Table 2 seem to support the validity of the assumption. Total earnings and children affect total savings but do not alter the distribution of savings.

Contrary to our prediction, we find that total savings do not directly affect the wife's share in Table 3. In other words, the division of savings is determined independently of total savings. It is not surprising, however, that the estimates are very similar to those in Table 2.¹⁴ Rather this is expected from the results from the SUR model. As you can see in Table 2, for the SUR model, we computed the correlation matrix of the residuals from the two equations and tested whether the covariance matrix is diagonal. The Breusch-Pagan Lagrange multiplier statistic, $n \cdot r^2$ where n is the number of observations and r^2 is the estimated correlation between the residuals, is 1.63 for all households and .82 for dual-earner households. We cannot reject the hypothesis that the correlation is zero. This implies that total savings and the wife's share are independently determined, which is what we found from the TOLS model in Table 3. In fact, estimating the two equations separately by ordinary least squares gives very similar results.

In Table 4 we use non-labor income as an alternative measure of bargaining power. We include the ratio of the wife's non-bank financial asset holdings to the household's total holdings in the previous year (1996). The results change little except that the wife's relative non-labor income does not have any significant effect on total savings. A 10% increase in the wife's relative non-labor income increases her own share of total savings by about 2% points. Lastly, we include both relative non-labor income and relative earnings together. The effects of relative earnings are similar to the ones we obtained before.

7 Conclusion

The recent development of household bargaining models is focused on spouses' joint labor supply and consumption. This study, as a natural extension, examines household savings from the perspective of bargaining between spouses. Exploiting the unique data and institutional framework in South Korea, we analyze the determinants of household savings at the spouse level. Our findings indicate that the balance of power between spouses plays a significant role in determining the intrahousehold distribution of savings as well as the overall level of household savings. The results support the conventional wisdom that women have a higher propensity to save than men.

These results may extend to countries other than South Korea. In fact the traditional gender roles are still dominant as a social norm in South Korea. In spite of this we find strong evidence that household savings are decided in the context of bargaining. Perhaps couples in less rigid societies are likely to have

¹⁴ The first-stage regression point estimates should be identical to those in Table 2, but only the standard errors are slightly different.

a higher incidence of household bargaining in financial resource allocation than those in South Korea.

Appendix

The household's problem is to maximize:

$$\begin{aligned} & \mu[u^w(c_1^w) + \delta^w(p \cdot u^w(c_2^{wD}) + (1-p) \cdot u^w(c_2^{wM}))] + (1-\mu)[u^h(c_1^h) \\ & + \delta^h(p \cdot u^h(c_2^{hD}) + (1-p) \cdot u^h(c_2^{hM}))] \end{aligned}$$

subject to

$$\begin{aligned} c_1^h + c_1^w + (s^h + s^w) &= y_1^h + y_1^w \\ c_2^{hM} + c_2^{wM} &= y_2^h + y_2^w + rs \\ c^{hD} &= y_2^h + r(1-\theta)s \\ c^{wD} &= y_2^w + r\theta s. \end{aligned}$$

Substituting the constraints into the objective function, we obtain:

$$\begin{aligned} & \mu[u^w(c_1^w) + \delta^w(p \cdot u^w(y_2^w + r\theta s) + (1-p) \cdot u^w(c_2^{wM}))] \\ & + (1-\mu)[u^h(y_1^h + y_1^w - c_1^w - s) + \delta^h(p \cdot u^h(y_2^h + r(1-\theta)s) \\ & + (1-p) \cdot u^h(y_2^h + y_2^w + rs - c_2^{wM}))]. \end{aligned}$$

The household chooses c_1^w , c_2^{wM} , s and θ . The first-order conditions are respectively:

$$\begin{aligned} \mu u^{w'}(c_1^w) &= (1-\mu)u^{h'}(y_1^h + y_1^w - c_1^w - s) \\ \mu \delta^w(1-p)u^{w'}(c_2^{wM}) &= (1-\mu)\delta^h(1-p)u^{h'}(y_2^h + y_2^w + rs - c_2^{wM}) \\ \mu \delta^w p u^{w'}(y_2^w + r\theta s)r\theta + (1-\mu)\delta^h p u^{h'}(y_2^h + r(1-\theta)s) \\ &+ (1-\mu)\delta^h(1-p)u^{h'}(y_2^h + y_2^w + rs - c_2^{wM})r \\ &= (1-\mu)u^{h'}(y_1^h + y_1^w - c_1^w - s) \\ \mu \delta^w p u^{w'}(y_2^w + r\theta s)rs &= (1-\mu)\delta^h p u^{h'}(y_2^h + r(1-\theta)s)rs. \end{aligned}$$

The last equation is Eq. 5 in the text. Note that if $p = 0$, then the last condition is non-existent. Totally differentiating the last condition, we obtain:

$$\frac{d\theta}{d\mu} = - \frac{\delta^w u^{w''} + \delta^h u^{h''}}{\underbrace{(\mu \delta^w u^{w'''} + (1-\mu)\delta^h u^{h'''})}_{\text{negative}} rs} - \frac{\mu \delta^w u^{w'''} r\theta - (1-\mu)\delta^h u^{h'''} r(1-\theta)}{\mu \delta^w u^{w'''} + (1-\mu)\delta^h u^{h'''}} \cdot \frac{ds}{d\mu}.$$

If $\mu \delta^w u^{w'''} r\theta - (1-\mu)\delta^h u^{h'''} r(1-\theta) \geq 0$ and $ds/d\mu \geq 0$, then $d\theta/d\mu \geq 0$.

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