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Impact of Children on Household Savings in the Philippines

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ABSTRACT

This paper examines the relationship between household savings and family size. Household savings are important indicators of family welfare, not only in terms of a household's investment and income generation prospects, but also, and perhaps more importantly—given pervasive borrowing constraints and limited social security coverage—in terms of its ability to secure protection from income shortfalls. This paper also provides descriptive and multivariate evidence on the relationship of household savings and family size. It also rightly considers the endogeneity of family size in the household savings equation, as argued in the old-age security hypothesis, by using the instrumental variables estimation technique.

The paper likewise uses a recent nationally representative household survey in the analysis. The results show that, on average, the impact of additional children on household savings is both negative and regressive.

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INTRODUCTION

The importance of savings in development is well known. The traditional interest on savings is that, at the aggregate and household levels, it is the main determinant of investment. Investment, of course, is acknowledged as the primary engine of economic growth. This can be easily demonstrated, albeit crudely, by running a simple regression between gross domestic savings and investment.[1] At the household level, while investments and income prospects may also be important as determinants of savings, protection against income shortfalls may be more relevant, particularly if there are borrowing constraints and/or social security is not well developed. Savings are the vehicle for consumption smoothing, as argued in the celebrated life-cycle hypothesis. Saving, on a regular basis, has been recently found to enable households to move out of slum areas (Lall et al. 2005). Both of these macroeconomic and microeconomic concerns are evident in the Philippines. The savings rates in the country are low, even lower than those of Indonesia, which has lower per capita income (Orbeta 2005a). These low savings rates have been identified as one of the main reasons why the country has not grown as fast as her neighbors. Low household savings also expose households to the risk of income shortfalls.

Given the foregoing, policymakers would do well to determine the reasons for the low savings rate in the country. As far as the author is aware, Bautista and Lamberte (1990) is the latest available household savings study, based on data from a survey conducted 30 years ago. Updating this study using new data is vital to understanding the savings behavior of Philippine households. In addition, determining the role of children in household savings provides an added dimension to the low savings rate of the country.

This study is part of a series of studies[2] conducted by the author on the implications of large family size on household welfare. The general motivation for these studies is to understand the relation between poverty, vulnerability, and family size. Saving is an important instrument for consumption smoothing and reducing vulnerability to income shortfall. Understanding the impact of children and family size on household savings behavior is an important step in understanding the relationship between poverty, vulnerability, and family size.

The study estimates savings functions using data from the 2002 Annual Poverty Indicator Survey (APIS), augmented by barangay-level data from the 2000 Census of Population and Housing. The estimation challenge is that, given the old-age security motivation of bearing children, plus the quantity-quality hypothesis of having children, the number of children is endogenous to the savings

[1] Mason (1988), for instance, found the coefficient of the savings to GDP ratio to be 0.63.

[2] The other studies deal with the impact of family size on labor force participation and income (Orbeta 2005b) on the education of children (Orbeta 2005c).

equation, which could lead to biased results if ignored. The paper dealt with this problem using instrumental variables estimation, as proposed in Angrist and Evans (1998). The study finds that the impact of children on household savings is, on average, negative. In addition, this impact is regressive, with bigger depressing effect among poorer households.

The study is organized as follows: The next section presents a brief review of related literature. This is followed by a discussion of methodology and estimation concerns. A description of the data set and the variables used also comprises this section. The estimation results are presented in the fourth section. The final section provides a summary and policy implications.

Review of previous studies

The literature on savings is extensive yet fraught with controversies. It is not the purpose of the paper to disentangle these controversies. Rather, it focuses on the role of children in household savings, with the end in view of understanding how to estimate the independent impact of children on household savings after other factors have been considered. After some discussion on the general motivations for household savings, this study focuses on the role of family size and children on household savings. Those interested on aggregate savings are referred to Schultz (2004), among others, and the references therein.

Browning and Lusardi (1996) provide a comprehensive review of the recent household savings literature[3]. They noted that to the eight motives for savings identified in Keynes (1936), only one was added (the down payment motive) until the time of the review. The eight include: (1) pre-cautionary; (2) life-cycle; (3) intertemporal substitution; (4) improvement; (5) independence; (6) enterprise; (7) bequest; and (8) avarice/miserliness.

The survey contains several observations that are important for empirically estimating savings functions and which bear repeating here. One, there is considerable heterogeneity in the motives for savings, implying that a single explanation will not suffice for all members at any given time or even for the same person over time. Two, while a sophisticated intertemporal theory of consumption has led to a large empirical literature, empirical work on savings (treated as the difference between income and current consumption) is "relatively atheoretical." Finally, using intertemporal consumption theory, five major determinants of savings have been identified, namely: (1) the discount factor; (2) demographics[4]; (3) real interest rate; (4) variation in consumption; and (5) liquidity constraint. Deaton (1990) and

[3] See Mikesell and Zinser (1973) for an earlier comprehensive review of the savings literature at the macro level.

[4] This factor has been largely ignored in aggregate time series literature (largely because it does not change much at the aggregate level) but is potentially extremely important at the micro level.

Gersovitz (1988) have identified several reasons why savings behavior in developing countries may diverge from the textbook case developed in Browning and Lusardi (1996): (1) households are dynastic and as such survive individual members; (2) household is an indecomposable unit and savings are decided at the household rather than at the individual level; (3) households have lower and more uncertain income; (4) borrowing constraints may be much more pervasive; and (5) savings provide buffer for uncertain and unpredictable income rather than intertemporal consumption smoothing.

The Browning and Lusardi (1996) survey has also emphasized that while a description of who the savers are is not difficult to establish in many societies, it is not as easy to empirically determine the motivations for savings. The celebrated life-cycle hypothesis, for instance, has been put to question by evidence showing continued savings even at old age (e.g., Mikesell and Zinser 1973; Weil 1994). It is easy to establish that savings rates are higher among higher-income or more educated households. It is likewise easy to observe that savings rate increases with age until the period around retirement, after which it decreases. But when it comes to establishing the motivations for savings, hypotheses tests fail to provide definitive results.

The empirical definitions of savings come in two forms: (1) the difference between income (Y) and current consumption (C); and (2) the change in wealth (A), i.e., $A_{t+1}-A_t=rA_t+Y_t-C_t$, r is the interest rate. It is well known that what constitutes savings varies across societies. Using financial savings alone can underestimate wealth accumulation in societies where financial development is low. It has been argued that human capital investments (particularly education) should be considered savings (e.g., Gesovitz 1988). Expenditure on durable goods, livestock, or housing materials had been considered a form of savings as well. Lamberte and Bautista (1988), for instance, net out expenditure on education and on durable goods from consumption spending in defining savings in the Philippines. The form of the dependent variable used in savings functions also varies. Savings functions have been estimated in levels (e.g., total savings or savings per capita) as well as in rates (e.g., ratio of savings to income, usually disposable income).

As for the role of children and family size on household savings, several explanations have been offered. For one, consumption theory tells us that consumption is directly proportional to the number of household members. There is little challenge to this proposition except that perhaps those children need not be treated equally like adults. Hence, the popularity of the concept of adult equivalent units.

Another hypothesis states that children can substitute for savings because they are a form of old-age security (Neher 1972; Willis 1980; Nerlove et al. 1985).

Cain (1981) has argued that children can be a source of risk insurance in high-risk settings. Furthermore, given problems of moral hazards, adverse selection and deception inherent in public annuities or just their limited coverage or total absence, the family may prove to be a better institution for risk sharing (Kotlikoff and Spivak 1981). Hammer (1986) has provided evidence that financial development can appear to be a substitute for having children. The substitutability of pension wealth and savings has been established using developed country data (e.g., Diamond and Hausman 1984 and Hubbard 1986 for the US; Attanasio and Brugiavini 2003 for Italy). Early direct evidence on the existence of old-age security incentive for having children was also found using Philippines and Taiwan data, and it was found to be larger in the former (De Vos 1985). Children also affect savings through other variables (Hammer 1986; Kelley 1988): (1) children can be substitutes for other consumption goods; (2) they can contribute directly to market and nonmarket household income; (3) they can encourage (discourage) parents to work[5]; (4) they encourage the accumulation (reduction) of estates; and (5) they encourage the accumulation (reduction) of certain assets (e.g., human capital, farm implements).

Literature from developed countries consistently shows a negative relationship between family size and household savings. Browning and Lusardi (1996), for instance, have reported that savings ratio is higher among childless couples, lower among households with children, and lowest among lone parents. Harris et al. (1999), using Australian data, found a negative and significant relationship between household savings (measured as ordered discrete responses) and both the number of children and whether or not there are children in the household. Early literature, using the 1950 US Survey of Consumption Expenditures, showed that controlling for household income, age, and occupation of the household head, savings fall significantly as family size increases from one to three members, but decline gradually thereafter (Eizenga 1961). Smith and Ward (1980), using US data, have found that young children depress savings for young families but increase them in marriages with duration of more than five years. They pointed out that the main channel through which children depress savings is the child-induced withdrawal of mothers from the labor force. Even if family consumption is found to decrease with the birth of a child, this reduction is not sufficient to offset the fall in income. Smith and Ward (1980) have also found that the impact of children on family consumption, and by implication, on savings, depends on their impact on family income and family consumption. The dominant link of children to the income side is the child-induced lower work effort of women.

[5] Orbeta (2005b) has shown that having additional children reduces labor force participation and income of mothers but does not significantly affect the labor force participation of fathers.

A much less understood link is whether the father and/or older children's time offsets this reduction in the work effort of the mother.[6] On the consumption side, children have two effects. One, goods devoted for children will obviously increase proportionately. Two, the impact on other goods will depend on whether they substitute for or complement children. These considerations indicate that the effect of children will depend on the age of their parents, the previous consumption history, and the children's ages.

As with many other issues, the empirical evidence of the impact of children on household savings is relatively scarce in developing countries (Schultz 2004). A review of earlier research using developing country data done in Mason (1988) showed mixed results. In Korea, rural household savings are not depressed by dependency ratio while urban household average savings and marginal propensity to save are inversely related to household size (Kim 1974). Kelly and Williamson (1968), using data from Indonesia, found that savings vary with the number of equivalent adults in rural households but not in urban households. Musgrove (1978), using data from five South American countries, notes that the results vary from country to country. In Columbia, Chile, and Equador, consumption increases with the number of children. An additional child is estimated to reduce savings, on average, by 1.0 to 1.5 percent. In Peru and Venezuela, consumption declines with the number of children. Kelinbaum and Mason (1987) have found that in Thailand, additional children (three to 12 years old) depress the savings ratio from one to two percentage points, depending on the socioeconomic status of the household and the educational attainment of its head. The impact of additional children on Korean households was found greater. More recent results from Thailand have confirmed this earlier result. Havanon et al. (1992), using multiclassification analysis, noted a negative relationship between wealth accumulation (measured in terms of consumer goods and financial savings and housing) and family size in rural Thailand. The results seem to indicate that the impact is much larger in more developed areas, e.g., larger in Korea compared to Thailand, significant in urban but not in rural Korea (with contrasting results from Indonesia).

Evidence using data from the Philippines is much more consistent in showing the negative impact of children on household savings and asset accumulation. Peek (1974), using data for 1965 and 1971, found that given household income, an increase in household size reduces savings, but the number of children under age 18 has no significant effect on savings. In his analysis of house-

[6] Angrist and Evans (1998) provide recent evidence supporting findings on the negative impact of children on the labor force participation of mothers and the insignificant impact of children on the labor force participation of fathers.

hold data from Misamis Oriental, Herrin (1993) showed that the number of young children aged 0 to 6 and 7 to 12 appears to reduce asset accumulation, suggesting that these age groups are net resource users compared to older children who can contribute to household income more than they consume. In spite of children's contribution to household income, higher fertility households have not shown an increase in accumulated assets. Using the 1985 FIES, Mason (1992) showed that (1) the rate of savings is depressed by child bearing; (2) bearing additional children does not necessarily lead to a reduction in the absolute amount of savings or in the absolute amount of savings or in the accumulation of wealth; and (3) asset per child is greater in lower fertility households than in higher fertility households.

METHODOLOGY, INSTRUMENT, AND DATA

Methodology

To determine the impact of children on household savings, this study estimated savings equations that recognize the endogeneity of the number of children. The importance of recognizing the endogeneity of children in the household savings equation is based on the notion that children are a form of old-age security for parents (Neher 1971; Cain 1981; Hammer 1986; Nerlove et al. 1987) and therefore an alternative to savings. Gersovitz (1988) argued that under these conditions it would be inappropriate econometrically to explain savings using demographic variables unless the endogeneity of the children variable is considered.

To allow for the endogeneity of the number of children, this study instrumented it in the estimation. Following Agrist and Evans (1998), it assumes a balanced sex-mix and used same sex as the instrument for the number of children. The validity of this instrument is explained in the following section.

The paper estimates the following savings function:

$$s = \alpha_0 + \alpha_1 n + \alpha_2 y + \mathbf{X}\boldsymbol{\alpha}_3 + \varepsilon$$

$$n = \beta_0 + \beta_1 z + \mathbf{X}\boldsymbol{\beta}_2 + \mu$$

The variable s represents savings, n is the number of children, y is income, and $\boldsymbol{X}$ is the vector of household and community characteristics. The second equation expresses n as a function of the instrument z and the household and community characteristics $\boldsymbol{X}$. Given this structure, ε and μ are presumably correlated.

As Paxon (1992) pointed out, a savings equation that is linear in income can be obtained by maximizing a lifetime utility function that is additively separable over time and has either a quadratic or a constant-absolute-risk aversion form. This is also amply demonstrated in Browning and Lusardi (1996).

Two savings definitions[7] are used in this paper. One is the difference between total income and total expenditures (definition 1). The other recognizes that some of the household expenditures do not provide immediate benefits, or the benefits accrue over some period of time, failing to satisfy the more narrow definition of consumption. These include expenditures on durable goods, education, and health. These three components in the household expenditure were added back in the second savings definition (definition 2). In addition, two savings concepts were studied, namely: (1) the average savings rates or the ratio of savings to disposable income, and (2) the savings levels. These are the most common concepts used in the literature.

The estimation strategy is as follows. This paper first establishes the endogeneity of the number of children equation using the sex of the first two children as instruments following Angrist and Evans (1998). This is done by various tests available in the ivreg2 Stata routine described in Baum et al. (2003). This study also checks the relevance of the instruments by determining the first-stage regression results, particularly the partial R^2 for the instruments, and finding out if there is a weak instrument problem (Bound et al. 1995). The presence of heteroscedasticity in the data is also tested because this is common in cross-section data. When endogeneity is established, it is well known that the OLS estimate will be biased and inconsistent, and 2SLS or GMM estimates would provide a consistent estimate and, in the case of the GMM, an efficient estimate as well. When weak instrument is indicated, we present LIML estimates that are considered more robust than the GMM in this case (Stock et al. 2002). Finally, in the case of using separate both-male and both-female instruments, the overidentifying restrictions test results are tested. This, of course, cannot be done when using the same sex as instrument, as the system is exactly identified. When endogeneity is not established and heteroscedasticity is present, heteroscedasticity-corrected OLS estimates is used.

To provide estimates of the expected varying impacts on savings of the number of children by socioeconomic class, this study estimates the models that include the interaction of the number of children and the per capita income quintile dummy variables, using the method deemed most appropriate given the results of the tests mentioned earlier. The differential impact across socioeconomic class will be estimated by the sum of the coefficient of the base category and the coefficient of the corresponding interaction term.

[7] Other savings definitions such as the change in stock household assets cannot be applied because no data on assets are available in the data set.

Balanced sex mix as an instrument

There is a dearth of instruments for the number-of-children-in-household models. Most of the likely candidates such as household income, education of the parents, and length of marriage are also related to the dependent variable of interest such as labor force participation of parents, savings, or education of children, rendering them inappropriate as instruments. Recent research using US data, such as Angrist and Evans (1998), used the hypothesis that families prefer to have a balanced sex mix of children as an instrument for the number of children. The Philippines is one of the countries in Asia where a balanced sex mix is found to have prevailed in contrast to countries in South and Eastern Asia, where indications for son preference are often found (Wongboonsin and Ruffolo 1995).

Early literature that confirms preference for a balanced sex mix in the Philippines is found in Stinner and Mader (1975). Other available instruments are limited by their applicability only in very specific circumstances. Having twins in the family has also been used as instruments, again using US data, initially in Rosenzweig and Wolpin (1980) and subsequently in studies such as Angrist and Evans (1998). A much more recent application of the technique was done for the US (Vere 2005), Romania (Glick, Marini and Sahn 2005), and Norway (Black et al. 2004). Son preference in Korea was likewise used as an instrument for fertility, such as in Lee (2004). Finally, another instrument would be an exogenous policy change that could affect child bearing. Quian (2004), for instance, used the relaxation of the one-child policy in China that allows rural households to have another child if the first child is a girl. Viitanen (2003), on the other hand, used the large-scale giving out of vouchers for privately provided childcare in Finland.

In the case of the balanced sex mix hypothesis, the fact that families do not have control over the sex of their children makes same sex for the first two children virtually a random assignment. As Angrist and Evans (1998) argued, using same sex as an instrument allows a causal interpretation. The downside of this instrument, however, is that it renders families with less than two children unusable for analysis. While this may be a serious problem in low-fertility areas, it may not be so in the Philippines, where the average number of children exceeds four.

To check on the validity of this instrument, Table 1 provides a cross tabulation of the average proportion of families that have a third or more children, and the average number of children categorized by sex of the first- and second-born children, using the APIS 2002 dataset. The table shows that 67.4 percent families with one male and one female for their first two offspring had another child, while 71.8 percent had another child when their first two children were of the same sex, resulting in a difference of more than 4 percent. The average number of children in each of these two groups of families is 3.49 and 3.61, respectively, or a difference of a little over 0.12 children. These average differences are statistically significant

Table 1. Proportion of families with a third child and average number of children by sex of the first two children

Sex of first two children	Proportion with a third child			Number of children			Proportion to sample
	Mean	SD	SE	Mean	SD	SE	
(1) One male, one female	0.6740	0.4688	0.0042	3.4850	1.5436	0.0315	0.964
(2) Both male	0.7179	0.4500	0.0052	3.6452	1.5994	0.0420	0.432
(3) Both female	0.7180	0.4500	0.0063	3.5575	1.4975	0.0495	0.261
(4) Same sex	0.7179	0.4500	0.0040	3.6095	1.5592	0.0320	1.037
Difference (4)-(1)	0.0439		0.0058	0.1245		0.0449	

Source of basic data: National Statistics Office, Annual Poverty Indicators Survey, 2002.

under a conventional level of significance. Comparing this with Tables 3 and 5 in Angrist and Evans (1998), one can observe several differences. The difference in the proportion of families having a third child among the two groups is smaller and the standard error is larger. In the case of the difference in the average number of children, the difference is larger, but so is the standard error. This is not unexpected, given the larger family size in the Philippines and the expected larger dispersion of the distribution. Consequently, the implied t statistics in Table 1 are not as large as those in Angrist and Evans (1998), indicating that discrimination generated from the same-sex instrument may not be as strong as those obtained using US data.

Data sources

The data on individual and household characteristics and location characteristics were taken from the 2002 Annual Poverty Indicator Survey (APIS). The APIS is a rider survey to the July round of the quarterly Labor Force Survey conducted by the National Statistics Office (NSO). The 2002 round is the third of the APIS series conducted by the NSO. The other two were conducted in 1998 and 1999. The APIS provides basic demographic information on all members of the household as well as household amenities. Income and expenditure during the six months preceding the survey are also gathered. These are the variables used to compute savings.

All monetary values such as income are deflated using provincial consumer price indices compiled by the Price Division of the NSO. This is done to control for interprovincial price variability.

Barangay and municipal data from the 2000 Census of Population and Housing are also used to provide measures of availability of banking facilities and other indicators of investment opportunities. Hence it is assumed that there is not much difference in the structure of distribution of the facilities in 2000 and 2002, or that

whatever changes happened did not upset the relative distribution of the availability of facilities. These barangay and municipal data were aggregated at the domain level of the APIS and attached to the APIS data set using domain identification variables.

Descriptive statistics

Table 2 provides savings rates and levels using the two definitions by per capita income quintile and by number of children. The average savings rate is 2.7 percent for definition 1 and 9.0 percent for definition 2. In level terms, these percentages translate to 7,730 and 11,253 (deflated 1994=100) under definition 1 and definition 2, respectively. The emerging pattern across per capita income quintiles shows dissaving at the bottom two quintiles under definition 1 while the upper three quintiles have positive savings rates, rising as one moves up the socioeconomic ladder. Under definition 2 the poorest quintile indicates dissaving, with the rest of the households having positive savings rates. A similar pattern can, of course, be seen in the savings levels.

By number of children, the savings rate declines, in general, as one goes from a two-children household to a nine- or more-children family, with an unex-

Table 2. Savings rates and savings level by per capita income quintile and number of children, 2002

	Savings Rates		Savings Levels*	
	Def. 1	Def. 2	Def. 1	Def. 2
Per capita Income quintile				
Poorest	-0.208	-0.164	-1,898	-1,373
Lower middle	-0.038	0.011	-263	739
Middle	0.048	0.104	2,084	3,883
Upper middle	0.121	0.191	6,930	10,527
Richest	0.218	0.305	31,888	41,816
No. of children				
2	0.061	0.120	9,039	12,635
3	0.034	0.099	8,332	12,257
4	0.013	0.078	7,793	11,364
5	-0.005	0.059	6,832	9,963
6	-0.019	0.046	3,471	6,128
7	-0.038	0.020	2,924	5,372
8	-0.004	0.055	5,559	8,435
9 and above	-0.007	0.051	3,248	6,348
Philippines	0.027	0.090	7,730	11,253

* Deflated (1994=100)

pected bulge in six- and seven-children households. This result becomes more surprising when viewed alongside an unusual drop in savings levels for these types of households. This can only mean an even greater decline in incomes.

Table 3 provides descriptive statistics for the variables used in the estimation. The average disposable income per capita is 9.6 thousand (deflated 1994=100). About 84 percent are male-headed households with an average age of 48. The population per banking unit is 11 thousand. Barangays with access to national highways comprise about 80 percent, and those with electricity, about the same. These latter indicators are expected to capture investment opportunities that can impact savings behavior.

Table 3. Decriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
Savings rate, def. 1	29868	0.028	0.288	-1	1
Savings rate, def. 2	29868	0.089	0.286	-1	1
Savings, def 1	29868	7,532	41,775	-399,545	2,645,582
Savings, def 2	29868	10,845	43,857	-138,493	2,648,716
Disp. Inc. per capita, 000	29868	9.6	18.0	0	1557
Male household head	29868	0.84	0.36	0	1
Age of household head	29868	48	13	12	99
Pop per banking inst., 000	29538	11	20	2	167
Prop. of bgy with acc. to nat'l highway	29868	0.80	0.13	0.38	1
Prop. of bgy with electricity	29868	0.80	0.18	0.25	1
Urban dummy	29868	0.59	0.49	0	1
Region 1 dummy	29868	0.05	0.21	0	1
Region 2 dummy	29868	0.04	0.19	0	1
Region 3 dummy	29868	0.10	0.29	0	1
Region 4 dummy	29868	0.16	0.37	0	1
Region 5 dummy	29868	0.05	0.22	0	1
Region 6 dummy	29868	0.07	0.26	0	1
Region 7 dummy	29868	0.06	0.23	0	1
Region 8 dummy	29868	0.05	0.23	0	1
Region 9 dummy	29868	0.04	0.20	0	1
Region 10 dummy	29868	0.05	0.22	0	1
Region 11 dummy	29868	0.05	0.22	0	1
Region 12 dummy	29868	0.04	0.21	0	1
NCR dummy	29868	0.10	0.31	0	1
CAR dummy	29868	0.04	0.20	0	1
ARMM dummy	29868	0.05	0.22	0	1
Caraga dummy	29868	0.04	0.19	0	1

Def 1= Total Income-Total Expenditures.
Def 2= Def 1+Educ Exp.+Health Exp.+Dur. Fur. Exp.

ESTIMATION RESULTS

Savings rates

Tables 4 and 5 provide the OLS, IV, and heteroscedasticity-corrected OLS estimates for the savings rates under definition 1 and definition 2, respectively. As shown by the estimates, the endogeneity of the number of children in the savings equations is not validated by the tests in this particular data set. The F-values for the Wu-Hausman and the chi-square value for the Durbun-Wu-Hausman tests are both insignificant. The Pagan-Hall test for heteroscedasticity, however, is significant, indicating the presence of heteroscedasticity. These are true for both savings definitions. Thus, the most appropriate estimates are those from the heteroscedasticity-corrected OLS. This is used in the subsequent discussions.

In Table 4, each additional child reduces the savings rates by -0.36 for definition 1. Table 5 shows that under definition 2, the impact of additional children is not significant. While the estimates may look small in absolute value, they are not relative to the recorded average saving rates. Given the average savings rate in the sample of 0.028, this represents a reduction of about 13 percent.

The other noteworthy results from the savings rates equation (definition 1) are as follows: (1) per capita income is a strong positive determinant; (2) the sex of the household head does not significantly affect savings rates; (3) savings rates rise with age but does not decline, as expected from the life-cycle hypothesis; (4) the availability of banking institutions positively affects the savings rates, (5) access to national highways positively impacts the savings rates, although not with respect to the availability of electricity; (6) savings rate is higher in urban areas; and (7) the savings rates in almost all of the other regions, except in Western Visayas (Region 6), the Autonomous Region of Muslim Mindanao (ARMM), and CARAGA, are higher than in the National Capital Region (NCR).

In the case of definition 2, the following are the deviations from the definition 1 results besides the insignificance of the number of children variable: (1) the savings rate rises with age, but at a declining rate, lending some support to the life-cycle hypothesis; (2) male-headed households have lower savings rates; and (3) Region 6 has higher savings rate than the NCR.

Table 6 shows the estimation results using the interaction terms of the number of children and per capita income quintile dummy variables. These interaction terms all turned out to be significant for both savings definitions. The impact on the poorest quintile shows a decline by 2.8 percent while the corresponding results for the lower-middle to the richest quintile are, respectively, 0.9 (-2.8+3.6), 2.9 (-2.8+5.7), 4.8 (-2.8+7.6), and 6.2 (-2.8+9.0) for definition 1. The corresponding results for definition 2 are 1.0 (-2.8+3.8), 3.2 (-2.8+6.0), 5.5 (-2.8+8.3), and 7.7 (-2.8+10.5) for the poorest to the richest quintile, respectively. Thus, the impact of

Table 4. Determinants of household savings rate
[Definition 1:Total Income-Total Expenditures]

Explanatory Variables	OLS (Robust SE)			IV*			OLS (Het.corrected)		
	Coef.	Std. Err.	t	Coef.	Std. Err.	z	Coef.	Std. Err.	z
No. of children	-0.003819	0.001348	-2.83	0.00258	0.02614	0.10	-0.003617	0.001343	-2.69
Per capita income, 000	0.007936	0.000671	11.83	0.00808	0.00059	13.70	0.008135	0.000662	12.29
Male household head	-0.009086	0.005401	-1.68	-0.01114	0.00992	-1.12	-0.008592	0.005392	-1.59
Age of household head	0.002329	0.001044	2.23	0.00119	0.00477	0.25	0.002245	0.001043	2.15
Age of household head, squared	-0.000004	0.000010	-0.42	0.00001	0.00005	0.15	-0.000004	0.000010	-0.35
Pop per banking inst., 000	0.000925	0.000112	8.29	0.00092	0.00012	7.77	0.000924	0.000112	8.29
Prop. of bgy with acc. to nat'l highway	0.073444	0.020889	3.52	0.07598	0.02258	3.37	0.073719	0.020877	3.53
Prop. of bgy with electricity	-0.029605	0.020026	-1.48	-0.03095	0.01940	-1.60	-0.030669	0.020006	-1.53
Urban dummy	0.057922	0.004435	13.06	0.05839	0.00429	13.60	0.057304	0.004420	12.96
Region 1 dummy	0.060230	0.009910	6.08	0.05986	0.00995	6.02	0.061158	0.009892	6.18
Region 2 dummy	0.095234	0.011329	8.41	0.09670	0.01239	7.81	0.095619	0.011321	8.45
Region 3 dummy	0.066376	0.007577	8.76	0.06641	0.00760	8.74	0.067139	0.007562	8.88
Region 4 dummy	0.034394	0.006820	5.04	0.03419	0.00700	4.88	0.034869	0.006811	5.12
Region 5 dummy	0.038612	0.010126	3.81	0.03681	0.01224	3.01	0.039737	0.010102	3.93
Region 6 dummy	0.004947	0.008859	0.56	0.00396	0.00956	0.41	0.006055	0.008833	0.69
Region 7 dummy	0.044775	0.009836	4.55	0.04397	0.00967	4.55	0.045777	0.009815	4.66
Region 8 dummy	0.066213	0.010760	6.15	0.06478	0.01180	5.49	0.067236	0.010739	6.26
Region 9 dummy	0.039084	0.011322	3.45	0.03859	0.01128	3.42	0.040062	0.011304	3.54
Region 10 dummy	0.062247	0.009856	6.32	0.06249	0.00946	6.61	0.063146	0.009839	6.42
Region 11 dummy	0.053261	0.009977	5.34	0.05292	0.00963	5.49	0.054401	0.009951	5.47
Region 12 dummy	0.084093	0.011201	7.51	0.08296	0.01171	7.08	0.084908	0.011185	7.59
CAR dummy	0.101432	0.011682	8.68	0.09991	0.01253	7.97	0.101858	0.011674	8.73
ARMM dummy	0.003175	0.017302	0.18	0.00114	0.01748	0.07	0.003996	0.017286	0.23

Table 4 continued

Explanatory Variables	OLS (Robust SE) Coef.	Std. Err.	t	IV* Coef.	Std. Err.	z	OLS (Het.corrected) Coef.	Std. Err.	z
Caraga dummy	-0.007894	0.012013	-0.66	-0.00748	0.01067	-0.70	-0.006514	0.011983	-0.54
Constant	-0.236148	0.029496	-8.01	-0.23314	0.03198	-7.29	-0.236422	0.029479	-8.02
R-Sq.	0.1500			0.1489			0.1500		
Obs	24,140			24,140			24,140		
Test of Heteroscedasticity									
Pagan-Hall Test Stat (P-value)				26.55(0.0000)					
Endogeneity of No. of Children									
Wu-Hausman F test (P-value)				0.0601(0.8063)					
Durbin-Wu-Hausman chi-sq test (P-value)				0.0602(0.8062)					

* For 2SLS instrumented with both male and both female.

Table 5. Determinants of household savings rates
[Definition 2:Total Income-(Total Expenditures-Dur. Fur-Education-Health)]

	OLS (Robust SE)			IV*			OLS (Het.corrected)		
Explanatory Variables	**Coef.**	**Std. Err.**	**t**	**Coef.**	**Std. Err.**	**z**	**Coef.**	**Std. Err.**	**z**
No. of children	-0.00262	0.00138	-1.90	-0.01402	0.02529	-0.55	-0.00216	0.00137	-1.58
Per capita income, 000	0.00881	0.00076	11.56	0.00856	0.00057	15.01	0.00924	0.00075	12.35
Male household head	-0.01578	0.00526	-3.00	-0.01213	0.00960	-1.26	-0.01456	0.00525	-2.78
Age of household head	0.00740	0.00103	7.19	0.00943	0.00461	2.04	0.00718	0.00103	7.01
Age of household head, squared	-0.00005	0.00001	-5.10	-0.00007	0.00005	-1.51	-0.00005	0.00001	-4.92
Pop per banking inst., 000	0.00089	0.00011	8.14	0.00090	0.00011	7.89	0.00088	0.00011	8.13
Prop. of bgy with acc. to nat'l highway	0.07026	0.02017	3.48	0.06575	0.02185	3.01	0.07107	0.02015	3.53
Prop. of bgy with electricity	-0.03391	0.01953	-1.74	-0.03151	0.01877	-1.68	-0.03662	0.01949	-1.88
Urban dummy	0.06299	0.00449	14.02	0.06216	0.00416	14.96	0.06171	0.00447	13.80
Region 1 dummy	0.06794	0.00955	7.11	0.06860	0.00962	7.13	0.06977	0.00953	7.32
Region 2 dummy	0.10741	0.01107	9.70	0.10480	0.01199	8.74	0.10851	0.01106	9.81
Region 3 dummy	0.07992	0.00738	10.82	0.07985	0.00735	10.86	0.08153	0.00736	11.08
Region 4 dummy	0.04823	0.00654	7.37	0.04859	0.00678	7.17	0.04927	0.00653	7.55
Region 5 dummy	0.04437	0.00998	4.45	0.04758	0.01185	4.02	0.04685	0.00994	4.71
Region 6 dummy	0.02325	0.00874	2.66	0.02501	0.00925	2.70	0.02542	0.00871	2.92
Region 7 dummy	0.04513	0.00972	4.65	0.04656	0.00936	4.98	0.04727	0.00969	4.88
Region 8 dummy	0.06522	0.01059	6.16	0.06777	0.01142	5.93	0.06755	0.01056	6.39
Region 9 dummy	0.03606	0.01114	3.24	0.03694	0.01091	3.38	0.03800	0.01112	3.42
Region 10 dummy	0.06257	0.00982	6.37	0.06214	0.00915	6.79	0.06453	0.00979	6.59
Region 11 dummy	0.06166	0.00983	6.27	0.06226	0.00932	6.68	0.06419	0.00979	6.55
Region 12 dummy	0.09766	0.01083	9.01	0.09968	0.01133	8.80	0.09922	0.01082	9.17
CAR dummy	0.12070	0.01112	10.85	0.12341	0.01213	10.18	0.12133	0.01111	10.92
ARMM dummy	0.00277	0.01686	0.16	0.00639	0.01691	0.38	0.00423	0.01684	0.25

Table 5 continued

Explanatory Variables	OLS (Robust SE) Coef.	Std. Err.	t	IV* Coef.	Std. Err.	z	OLS (Het.corrected) Coef.	Std. Err.	z
Caraga dummy	0.01086	0.01183	0.92	0.01013	0.01033	0.98	0.01371	0.01178	1.16
Constant	-0.31085	0.02865	-10.85	-0.31620	0.03094	-10.22	-0.31080	0.02863	-10.85
R-Sq.	0.1893			0.1858			0.1890		
Obs	24,120			24,120			24,120		
Test of Heteroscedasticity									
Pagan-Hall Test Stat (P-value)				25.85(0.0000)					
Endogeneity of No. of Children									
Wu-Hausman F test (P-value)				0.241(0.6514)					
Durbin-Wu-Hausman chi-sq test (P-value)				0.2043(0.6513)					

* For 2SLS instrumented with both male and both female.

Table 6. Determinants of household savings rates
(OLS -Heteroscedasticity corrected)

Explanatory Variables	Definition 1 Coef.	Std. Err.	z	Definition 2 Coef.	Std. Err.	z
No. of children	-0.02757	0.00139	-19.80	-0.02789	0.00137	-20.29
No. of children x quintile 2	0.03628	0.00114	31.71	0.03755	0.00111	33.94
No. of children x quintile 3	0.05663	0.00133	42.65	0.05999	0.00126	47.68
No. of children x quintile 4	0.07580	0.00163	46.42	0.08337	0.00158	52.84
No. of children x quintile 5	0.08995	0.00350	25.73	0.10466	0.00357	29.33
Per capita income, 000	0.00493	0.00052	9.46	0.00515	0.00055	9.31
Male household head	-0.00264	0.00495	-0.53	-0.00776	0.00461	-1.68
Age of household head	-0.00346	0.00095	-3.64	0.00087	0.00091	0.96
Age of household head, squared	0.00004	0.00001	4.67	0.00000	0.00001	0.39
Pop per banking inst., 000	0.00074	0.00010	7.39	0.00069	0.00010	7.29
Prop. of bgy with acc. to nat'l highway	0.06726	0.01945	3.46	0.06381	0.01836	3.47
Prop. of bgy with electricity	-0.12741	0.01828	-6.97	-0.14149	0.01732	-8.17
Urban dummy	0.00982	0.00370	2.66	0.00968	0.00351	2.76
Region 1 dummy	0.09101	0.00906	10.05	0.10422	0.00845	12.33
Region 2 dummy	0.11202	0.01016	11.02	0.12826	0.00966	13.28
Region 3 dummy	0.07775	0.00697	11.15	0.09506	0.00649	14.64
Region 4 dummy	0.04653	0.00641	7.26	0.06303	0.00596	10.58
Region 5 dummy	0.09616	0.00913	10.53	0.10922	0.00860	12.71
Region 6 dummy	0.04493	0.00781	5.75	0.06958	0.00730	9.53
Region 7 dummy	0.08935	0.00902	9.90	0.09604	0.00858	11.19
Region 8 dummy	0.11437	0.00983	11.63	0.11961	0.00932	12.83
Region 9 dummy	0.07209	0.01034	6.97	0.07435	0.00988	7.53
Region 10 dummy	0.12935	0.00892	14.51	0.13764	0.00853	16.14
Region 11 dummy	0.09855	0.00891	11.06	0.11441	0.00835	13.70
Region 12 dummy	0.11453	0.01051	10.90	0.13264	0.00992	13.37
CAR dummy	0.09812	0.01073	9.15	0.11708	0.00999	11.72
ARMM dummy	0.01623	0.01543	1.05	0.01854	0.01464	1.27
Caraga dummy	0.06403	0.01065	6.01	0.09191	0.01000	9.19
Constant	-0.04857	0.02801	-1.73	-0.10207	0.02671	-3.82
R-Sq.	0.2643			0.3326		
Obs	24,120			24,120		

additional children on savings rate is negative on average and is regressive, i.e., negative on the poorest households and positive for the top four quintiles.

Savings levels

The endogeneity test for the savings levels equation also showed insignificance such as those for the savings rate equations. Again, similar to the savings

rate equation, the heteroscedasticity tests also yielded significance. Under these conditions, the heteroscedasticity-corrected OLS estimation is deemed most reliable.

Tables 7 and 8 show the estimation results for the savings levels equations. On average, the impact of additional children is negative for both definition 1 and definition 2. Each additional child will cause a reduction of about -254 (deflated 1994=100) for definition 1 and -309 (deflated 1994=100) for definition 2. Relative to the recorded average savings levels, this represents a reduction of about -3.3 percent for definition 1 and -2.7 percent for definition 2.

Here are other noteworthy results: (1) the marginal propensity to save is about 0.52 for definition 1 and 0.59 for definition 2[8]; (2) savings level is not affected by the sex of the household head for both definitions; (3) savings level declines with age at a declining rate; (4) savings level is not affected by the availability of banking institutions for definition 1 but unexpectedly is negatively affected in definition 2; (5) definition 1 savings is not affected by access to national highway and negatively affected by the availability of electricity with definition 2; (6) savings level is lower in urban areas for both definitions[9]; and (7) with the exception of the ARMM, savings level is higher in all other regions compared to the national capital region[10].

Table 9 presents the estimation results of using the interaction between the number of children and per capita income dummy variables to capture the differential effects across socioeconomic classes. The results show that the impact of children is insignificant for the poorest quintile for both definitions. For the top four income quintiles, this is negative and increasing in magnitude as one goes up the income classes.

Thus, the impact of additional children on savings levels is negative on average. The impact across income classes is not significant for the poorest but negative for the other income groups.

Summary of estimation results

To get a better picture of the impact of additional children on household savings across the income classes, the computed impacts are expressed in percentage terms relative to recorded rates and levels. The results show that the impact of each additional child on savings rates is a -14 percent reduction for definition 1 and -18 percent reduction for definition 2 for the bottom quintile (Table 10). For the top four quintiles, the resulting impacts on the savings rate in percentage terms are

[8] Bautista and Lamberte (1990) estimated a savings propensity ranging from 0.334 to 0.775.
[9] This agrees with the earlier results of Bautista and Lamberte (1990).
[10] This is also consistent with the earlier results of Bautista and Lamberte (1990).

Table 7. Determinants of household savings
[Definition 1:Total Income-Total Expenditures]

Explanatory Variables	OLS (Robust SE) Coef.	Std. Err.	t	IV* Coef.	Std. Err.	z	OLS (Het.corrected) Coef.	Std. Err.	z
No. of children	-223.15	101.32	-2.20	1583.53	2184.29	0.72	-253.94	97.84	-2.60
Household income	0.56	0.04	13.09	0.56	0.00	202.20	0.52	0.03	14.94
Male household head	296.57	513.85	0.58	-375.15	940.18	-0.40	185.93	508.17	0.37
Age of household head	-675.06	142.19	-4.75	-989.45	389.98	-2.54	-566.72	123.49	-4.59
Age of household head, squared	5.38	1.31	4.12	8.72	4.12	2.11	4.60	1.19	3.85
Pop per banking inst., 000	-1.74	5.01	-0.35	-3.93	10.45	-0.38	-0.15	4.91	-0.03
Prop. of bgy with acc. to nat'l highway	-2213.78	1729.82	-1.28	-1406.90	2044.80	-0.69	-2400.44	1718.63	-1.40
Prop. of bgy with electricity	-14086.64	2092.07	-6.73	-14300.84	1686.26	-8.48	-12686.38	1845.19	-6.88
Urban dummy	-5309.24	865.69	-6.13	-5041.13	473.20	-10.65	-4590.52	745.58	-6.16
Region 1 dummy	13476.15	1285.96	10.48	13226.26	930.55	14.21	12801.99	1212.95	10.55
Region 2 dummy	13845.52	1294.52	10.70	14189.26	1056.44	13.43	13442.42	1271.94	10.57
Region 3 dummy	11633.72	1377.71	8.44	11511.39	696.25	16.53	10790.27	1258.90	8.57
Region 4 dummy	8380.79	1023.44	8.19	8233.29	647.75	12.71	7970.41	992.88	8.03
Region 5 dummy	14794.09	1414.79	10.46	14089.60	1221.47	11.53	13738.12	1260.89	10.90
Region 6 dummy	9610.37	1283.77	7.49	9204.46	918.75	10.02	8853.93	1205.21	7.35
Region 7 dummy	13918.73	1428.58	9.74	13487.50	966.91	13.95	12917.54	1290.31	10.01
Region 8 dummy	14126.09	1281.16	11.03	13561.31	1143.71	11.86	13309.93	1185.34	11.23
Region 9 dummy	11717.86	1235.55	9.48	11435.60	1050.89	10.88	10978.42	1154.23	9.51
Region 10 dummy	17113.80	1476.21	11.59	16977.20	858.37	19.78	16048.13	1323.03	12.13
Region 11 dummy	14997.72	1549.37	9.68	14746.21	906.14	16.27	13910.48	1408.06	9.88
Region 12 dummy	11833.06	1181.24	10.02	11385.03	1104.98	10.30	11242.14	1126.63	9.98
CAR dummy	10405.47	1078.81	9.65	9962.08	1112.08	8.96	10416.18	1075.14	9.69
ARMM dummy	11046.94	1385.85	7.97	10324.06	1631.13	6.33	10356.43	1325.46	7.81

Table 7 continued

Explanatory Variables	OLS (Robust SE) Coef.	Std. Err.	t	IV* Coef.	Std. Err.	z	OLS (Het.corrected) Coef.	Std. Err.	z
Caraga dummy	15362.83	1638.50	9.38	15264.48	951.17	16.05	14177.03	1459.49	9.71
Constant	7211.49	3254.32	2.22	8000.05	2813.79	2.84	5186.02	2951.77	1.76
R-Sq.	0.678			0.674			0.674		
Obs	24,120			24,120			24,120		
Test of Heteroscedasticity									
Pagan-Hall Test Stat (P-value)				4,667.7(0.000)					
Endogeneity of No. of Children									
Wu-Hausman F test (P-value)				0.694(0.405)					
Durbin-Wu-Hausman chi-sq test (P-value)				0.695(0.405)					

* For 2SLS instrumented with both male and both female.

Table 8. Determinants of household savings
[Definition 2:Total Income-(Total Expenditures-Dur. Fur-Education-Health)]

Explanatory Variables	OLS (Robust SE)			IV*			OLS (Het.corrected)		
	Coef.	Std. Err.	t	Coef.	Std. Err.	z	Coef.	Std. Err.	z
No. of children	-281.96	89.47	-3.15	2055.21	1923.49	1.07	-309.10	86.95	-3.55
Household income	0.63	0.04	17.24	0.63	0.00	259.02	0.59	0.03	19.91
Male household head	-548.32	411.78	-1.33	-1417.28	827.92	-1.71	-750.45	398.10	-1.89
Age of household head	-415.75	132.60	-3.14	-822.45	343.42	-2.39	-304.31	114.41	-2.66
Age of household head, squared	2.83	1.24	2.28	7.14	3.63	1.97	2.01	1.12	1.79
Pop per banking inst.,000	-1.53	4.30	-0.36	-4.37	9.20	-0.47	-4041.83	637.73	-6.34
Prop. of bgy with acc. to nat'l highway	-1987.45	1536.51	-1.29	-943.64	1800.65	-0.52	-0.09	4.24	-0.02
Prop. of bgy with electricity	-13617.61	1828.13	-7.45	-13894.70	1484.92	-9.36	-2018.45	1519.33	-1.33
Urban dummy	-4758.91	747.13	-6.37	-4412.07	416.70	-10.59	-12175.09	1595.27	-7.63
Region 1 dummy	13288.13	1119.08	11.87	12964.87	819.44	15.82	12800.19	1078.89	11.86
Region 2 dummy	14318.58	1126.56	12.71	14763.25	930.30	15.87	14146.26	1121.06	12.62
Region 3 dummy	12009.50	1160.42	10.35	11851.25	613.11	19.33	11414.66	1093.17	10.44
Region 4 dummy	9202.31	878.00	10.48	9011.50	570.41	15.80	9029.37	869.14	10.39
Region 5 dummy	15016.00	1180.14	12.72	14104.66	1075.62	13.11	14229.29	1088.72	13.07
Region 6 dummy	11172.71	1030.90	10.84	10647.61	809.05	13.16	10791.80	1004.81	10.74
Region 7 dummy	13851.00	1212.46	11.42	13293.15	851.46	15.61	13076.01	1129.36	11.58
Region 8 dummy	14234.87	1077.05	13.22	13504.25	1007.15	13.41	13680.00	1030.47	13.28
Region 9 dummy	11937.53	1050.54	11.36	11572.40	925.41	12.51	11484.52	1016.53	11.30
Region 10 dummy	16993.83	1239.14	13.71	16817.13	755.88	22.25	16154.29	1142.45	14.14
Region 11 dummy	15409.32	1302.07	11.83	15083.96	797.94	18.90	14587.10	1225.84	11.90
Region 12 dummy	12437.71	1015.27	12.25	11858.13	973.04	12.19	12126.09	994.86	12.19
CAR dummy	11052.50	982.76	11.25	10478.92	979.29	10.70	11264.57	974.71	11.56
ARMM dummy	11215.08	1184.88	9.47	10279.93	1436.37	7.16	10820.01	1167.65	9.27

Table 8 continued

Explanatory Variables	OLS (Robust SE) Coef.	Std. Err.	t	IV* Coef.	Std. Err.	z	OLS (Het.corrected) Coef.	Std. Err.	z
Caraga dummy	16242.83	1357.43	11.97	16115.60	837.60	19.24	15311.25	1241.89	12.33
Constant	913.92	3044.36	0.30	1934.02	2477.82	0.78	-1577.86	2689.58	-0.59
R-Sq.	0.780			0.773			0.777		
Obs	24,120			24,120			24,120		
Test of Heteroscedasticity									
Pagan-Hall Test Stat (P-value)				4,337.4(0.000)					
Endogeneity of No. of Children									
Wu-Hausman F test (P-value)				1.52(0.217)					
Durbin-Wu-Hausman chi-sq test (P-value)				1.53(0.217)					

* For 2SLS instrumented with both male and both female.

Table 9. Determinants of household savings
(OLS -Heteroscedasticity corrected)

Explanatory Variables	Definition 1 Coef.	Std. Err.	z	Definition 2 Coef.	Std. Err.	z
No. of children	84.33	103.59	0.81	49.41	91.40	0.54
No. of children x quintile 2	-593.68	85.01	-6.98	-592.41	75.70	-7.83
No. of children x quintile 3	-1538.13	224.90	-6.84	-1445.43	198.89	-7.27
No. of children x quintile 4	-3457.89	511.23	-6.76	-3044.24	450.02	-6.76
No. of children x quintile 5	-9113.79	1547.97	-5.89	-7279.21	1355.18	-5.37
Per capita income, 000	0.64	0.05	13.17	0.69	0.04	16.32
Male household head	-1310.75	490.67	-2.67	-1856.98	375.63	-4.94
Age of household head	-258.00	100.92	-2.56	-63.71	94.64	-0.67
Age of household head, squared	1.56	1.09	1.43	-0.34	1.02	-0.34
Pop per banking inst., 000	-0.54	5.05	-0.11	0.39	4.32	0.09
Prop. of bgy with acc. to nat'l highway	-2057.04	1647.19	-1.25	-1729.57	1466.33	-1.18
Prop. of bgy with electricity	-9587.56	1470.84	-6.52	-9563.68	1293.24	-7.40
Urban dummy	-2752.75	377.37	-7.29	-2514.57	327.39	-7.68
Region 1 dummy	10288.91	1022.81	10.06	10738.90	953.65	11.26
Region 2 dummy	11492.87	1150.66	9.99	12509.21	1033.51	12.10
Region 3 dummy	9344.64	998.35	9.36	10255.51	895.01	11.46
Region 4 dummy	6863.20	892.25	7.69	8071.27	795.45	10.15
Region 5 dummy	11091.13	924.05	12.00	11942.62	820.30	14.56
Region 6 dummy	6203.06	1071.52	5.79	8481.52	892.52	9.50
Region 7 dummy	10625.66	953.30	11.15	11131.28	866.32	12.85
Region 8 dummy	10939.98	972.24	11.25	11607.26	871.68	13.32
Region 9 dummy	8893.22	962.67	9.24	9688.22	868.29	11.16
Region 10 dummy	12993.86	921.93	14.09	13525.39	830.36	16.29
Region 11 dummy	10915.69	1095.03	9.97	12079.43	992.30	12.17
Region 12 dummy	9342.94	985.66	9.48	10485.18	889.82	11.78
CAR dummy	10503.34	1080.41	9.72	11229.43	979.12	11.47
ARMM dummy	9486.84	1211.02	7.83	10032.03	1064.84	9.42
Caraga dummy	10624.58	1043.47	10.18	12282.00	911.96	13.47
Constant	-1813.88	2640.69	-0.69	-7171.11	2375.81	-3.02
R-Sq.	0.7089			0.7981		
Obs	24,120			24,120		

positive and declining as one goes up the income classes. For the savings level, the impact is insignificant for the poorest income class and negative for the upper income classes. Similar to the pattern of the effect on the savings rates, the impact in percentage terms also declines as one goes up the income classes.

These results show the negative and regressive effect that additional children have on both the savings rates and levels of households.

Table 10. Impact of children on savings rate and levels

	Rate				Levels			
	Def 1		Def 2		Def 1		Def 2	
	coeff.	%	coeff.	%	coeff.	%	coeff.	%
Average	-0.36	-12.96	ns	ns	-254	-3.28	-309	-2.74
Poorest	-2.76	-13.90	-2.79	-18.22	ns	ns	ns	ns
Lower middle	0.87	41.12	0.97	32.42	-594	-433.35	-592	-61.13
Middle	2.91	48.97	3.21	27.50	-1,538	-63.16	-1,445	-32.63
Upper middle	4.82	36.96	5.55	27.24	-3,458	-43.52	-3,044	-25.28
Richest	6.27	27.07	7.68	23.53	-9,114	-23.86	-7,279	-14.46
Means	0.028		0.091		7,742		10,854	

ns - not significant
Source: Computed from Tables 4-9.

SUMMARY AND POLICY IMPLICATIONS

This paper formulates and estimates savings functions, recognizing the endogeneity of the number of children, as required by the old-age security hypothesis. In addition, it controls for income and other household and community variables common to savings functions. It uses a nationally representative household survey data.

The estimation results show the negative impact of children on household savings. In addition and perhaps more importantly, it finds that the impact of additional children on the saving rates and levels of households is regressive. In particular, the results can be summarized in two statements. One, the impact on the savings rates of the bottom quintile is negative. Two, the impact on the savings level is negative, except for the poorest quintile, who are dissaving, and, in percentage terms, is greater among the lower-income households.

The implications of these results are clear. At the household level, additional children, particularly among poorer households, will expose some more families to the risk of income shortfalls. They also deprive households of the prospect of exploiting available investment opportunities. At the aggregate level, additional children contribute to the reduction in saving rates, further depressing the already low savings rate of the country. These results also imply that reducing the number of children can help beef up savings to protect families from income shortfalls. It constitutes an important alternative to a formal safety net, given the limited reach of the social security system.

REFERENCES

Angrist, J. and W. Evans. 1998. Children and their parents' labor supply: Evidence from exogenous variation in family size. *American Economic Review* 88(3):450-477.

Attanasio, O. and A. Brugiavini. 2003. Social security and household savings. *Quarterly Journal of Economics* 118(3):1075-1119

Bautista, R. and M. Lamberte. 1990. Comparative savings behavior of rural and urban households in the Philippines. *Journal of Philippine Development* 17(2):149-181

Baum, C., M. Schaffer and S. Stillman. 2003. Instrumental variables and GMM: estimation and testing. Boston College Working Paper No. 545. Boston, MA: Boston College

Black, S., P. Deveruex and K. Salvanes. 2004. The more the merrier? The effect of family composition on children's education. NBER Working Paper No. 10720. Boston, MA: National Bureau of Economic Research

Bound, J., D. Jaeger and R. Baker. 1995. Problems with instrumental variables estimation when the correlation between the instruments and the endogenous explanatory variable is weak. *Journal of the American Statistical Association* 90(430):433-450.

Browning, M. and A. Lusardi. 1996. Household saving: micro theories and micro facts. *Journal of Economic Literature* 34 (December):1797-1855.

Cain, M. 1981. Risk and insurance: perspective on fertility and agrarian change in India and Bangladesh. *Population and Development Review* 7(3):435-474.

Deaton, A. 1990. Saving in developing countries: theory and review. Proceedings of the First Annual World Bank Conference on Development Economics, World Bank, Washington, D.C.

De Vos, S. 1985. An old-age security incentive for children in the Philippines and Taiwan. *Economic Development and Cultural Change* 33(4):793-814.

Diamond, P. and J. Hausman. 1984. Individual retirement and savings decisions. *Journal of Public Economics* 23(1-2):81-114.

Eizenga, W. 1961. Demographic factors and savings. Amsterdam: North-Holland.

Gersovitz, M. 1988. Saving and development. In *Handbook of development economics*, edited by T. N. Srinivasan. Vol 1. Amsterdam: Elsevier Science Publishers.

Glick, P. , A. Marini and D. Sahn. 2005. Estimating the consequences of changes in fertility on child health and education in Romania: an analysis using twins data. Cornell Food and Nutrition Policy Program Working Paper No. 183. New York: Cornell University.

Hammer, J. 1986. Children and savings in less developed countries. *Journal of Development Economics* 23:107-118.

Harris, M., J. Loundes and E. Webster. 1999. Determinants of household saving in Australia. Melbourne Institute of Applied Economic and Social Research Working Paper 22/99. Melborne: The University of Melbourne

Herrin, A. 1993. Studies on consequences of population change in Asia: Philippines. Asian Population Studies Series No. 121. United Nations Economic and Social Commission for Asia and the Pacific. New York: United Nations.

Hubbard, R. 1986. Pension wealth and individual saving. *Journal of Money, Credit and Banking* 28:167–178.

Kelley, A. 1980. Interactions of economic development and demographic household behavior, pp. 403-470. In *Population and economic change in developing countries*, edited by R. Easterlin. Massachusetts: National Bureau of Economic Research.

Kelley, A. and J. Williamson. 1968. Household saving behavior in developing economies: the Indonesian case. *Economic Development and Cultural Change* 16:385-403.

Kleinbaum, R. and A. Mason. 1987. Aggregate projections of household consumption in Korean and Thailand. Paper presented at the Annual Meeting of the Population Association of America, 2 May, Chicago.

Keynes, J. 1936. *The general theory of employment, interest and money.* London: MacMillan.

Kim, K. S. 1974. The household saving behavior in Korea. Interim Report 7402. Seoul: Korea Development Institute.

Lall, S., A. Suri and U. Deichmann. 2005. Household savings and residential mobility in informal settlements. World Bank Policy Research Working Paper 3596. Washington, D.C.: World Bank.

Lee, J. 2004. Sibling size and investment in children's education: an Asian instrument. IZA Discussion Paper No. 1323. Bonn: Institute for the Study of Labor.

Leff, N. 1969. Dependency rates and savings rates. *American Economic Review* 59(5):886-895.

Mason, A. 1992. Saving in the Philippines. In *Family size and family welfare in the Philippines*, edited by J. Bauer, D. Canlas, M.T. Fernandez and A. Mason. East-West Center Working Papers, Population Series, No. 67. Honolulu: East-West Center.

————. 1988. Saving, economic growth and demographic change. *Population and Development Review* 14(1):113-144.

Musgrove, P. 1978. Determinants of urban household consumption in Latin America: a summary of evidence from the ECIEL surveys. *Economic Development and Cultural Changes* 26(3):441-466.

Mikesell, R. and J. Zinser. 1973. The nature of the savings function in developing countries: a survey of theoretical and empirical literature. *Journal of Economic Literature* 11(1): 1-26.

Neher, P. 1971. Peasants, procreation, and pension. *American Economic Review* 61(3):380-389.

Nerlove, M., A. Razin and E. Sadka. 1987. Household economy: welfare economics of endogenous fertility. Boston: Academic Press.

Orbeta, A. 2005a. Poverty, vulnerability and family size: evidence from the Philippines. PIDS Discussion Paper 2005-19. Makati City: Philippine Institute for Development Studies.

————. 2005b. Children and the labor force participation and earnings of parents in the Philippines. *Philippine Journal of Development* 32(1): 19-52.

————. 2005c. Number of children and their education in Philippine households. PIDS Discussion Paper 2005-21. Makati City: Philippine Institute for Development Studies.

Paxson, C. 1992. Using weather variability to estimate the response of savings to transitory income in Thailand. *American Economic Review* 82(1):15-33.

Peek, P. 1974. Household savings and demographic change in the Philippines. *Malayan Economic Review* 19:86-104.

Quian, N. 2004. Quantity-quality and the one-child policy: the positive effect of family size on school enrollment in China [online]. http://econ-www.mit.edu/graduate/candidates/download_res.php?id=130 [Accessed February 2005]

Rosenzweig, M. and K. Wolpin. 1980. Testing the quantity-quality fertility model: the use of twins as a natural experiment. *Econometrica* 48(1):227-240.

Smith, J. and M. Ward. 1980. Asset accumulation and family size. *Demography* 17(3):243-260.

Schultz, T. P. 2004. Demographic determinants of savings: estimating and interpreting the aggregate association in Asia. Yale University Economic Growth Center Discussion Paper 901. New Haven: Economic Growth Center, Yale University.

Stinner, W. and P. Mader. 1975. Sons, daughters or both? An analysis of family sex composition preferences in the Philippines. *Demography* 12(1):67-79.

Stock, J., J. Wright and M. Yogo. 2002. A survey of weak instruments and weak identification in generalized method of moments. *Journal of Business and Economic Statistics* 20(4):518-529.

Vere, J. 2005. *Life cycle effects of fertility on parents' labor supply*. Hong Kong: University of Hong Kong.

Viitanen, T. 2003. Children and their mothers' labor supply: evidence for a large-scale policy change in Finland. Paper presented at the Annual Conference of the European Society for Population Economics, June 2003, New York, United States.

Weil, D. 1994. The saving of the elderly in micro and macro data. *Quarterly Journal of Economics* 109(1):55-81.

Wongboonsin, K. and V. P. Ruffolo. 1995. Sex preference for children in Thailand and some other South-East Asian countries. *Asia-Pacific Population Journal* 10(3): 43-62.

Willis, R. 1980. The old age security hypothesis and population growth. In *Demographic behavior: interdisciplinary perspectives on decision making*, edited by T. K. Burch. Boulder, CO: Westview.