FAMILY SIZE AND SUPPORT OF OLDER ADULTS IN URBAN AND RURAL CHINA: CURRENT EFFECTS AND FUTURE IMPLICATIONS*

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Change in China's age structure is creating concerns about whether reductions in family size undermine traditional support mechanisms for older adults. Future generations may expect less support as the availability of children declines. In this article, the association between number of children and the receipt of instrumental and financial support is examined for rural and urban populations. Probabilities are modeled as bivariate probits. Coefficients are used to conduct simulations in which support is examined across hypothetical distributions of number of children. The results show that the number of children is an important determinant of support, but future reductions in support may not be as dramatic as anticipated.

China will experience rapid growth in the proportion and number of older people in its population in the near future as a consequence of an extraordinarily rapid decline in fertility over the past several decades. Total fertility rates were as high as 7.5 in the early 1950s, but have fallen to below replacement level in recent years, with the sharpest declines occurring in the late 1970s and early 1980s, around the time that China began implementing its one-child policy (Liu 1988; Poston 1992; T.H. Yuan et al. 1992). The aging of China has also been influenced by a decline in infant mortality during and after the 1950s, which increased survivorship among a "baby-boom" cohort, who were subsequently the first to experience a rapid decline in fertility and the one-child policy (Zhenghua and Lingguang 2000). Thus, China now has a large cohort of adults who are in or nearing the end of their childbearing ages and are experiencing much lower birth rates than did their predecessors. This next generation of elderly persons will make up more than 20% of China's total population and will put the proportion of older adults in China on par with or surpassing that in Western developed countries.

The aging of the population of China and its magnitude have implications for the support of China's older population. Because of physical and life-course changes that tend to occur at older ages, such as decreases in functional ability and the move from productive labor to retirement, older persons require various kinds of support, including financial assistance when they can no longer work and instrumental assistance (that is, assistance in conducting daily activities) if physical functioning begins to fail. Although these types of support come from a variety of sources in Western developed countries, most older adults in China receive them from their adult children (Pei and Pillai 1999;

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F. Yuan 1990). As family sizes decline, so, too, will the availability of adult children who are the traditional providers of support. For instance, in 1998 there were more than six working-age adults (15 to 59 years) for every one elderly person (aged 60 and older) in the Chinese population; by 2040, there will be only two working-aged adults for every one elderly person (United Nations 1999).

There is, indeed, much concern about whether and how the future needs of older adults can be satisfied (Banister 1990; Feldstein 1999; Lin 1994; Phillips 2000; West 1997). Some programs provide financial assistance for the most needy and for those in state enterprises, and some new support programs are being developed in urban areas that have growing elderly populations, such as Shanghai (Di and Rosenbaum 1994; Wu 1994), but overall there has been little change in the social security and social service systems, and traditional sources remain the primary means of support. On the one hand, reform should be a crucial issue for China. Recent guidelines suggested that support for the elderly should be shared among the state, the community, and the family (Du and Guo 2000). This proposal would require additional taxes leveled on the working-age population, particularly given the pay-as-you-go system of financing in which the current working generation pays for the pensions of the older generation (Feldstein 1999). On the other hand, the state has not reacted as swiftly as one might think necessary, given upcoming changes in the population structure, and the most recent social service reforms have even suggested a pulling back of provisions (J. Kwong forthcoming). Moreover, even if the state introduces new programs for fiscal support in old age, assistance with emotional and physical security will still be an issue.

A commonsense approach dictates that declines in the availability of adult children would result in parallel reductions in support to elders and a growing gap between needed support and support that is provided because it is adult children who are viewed as being the most responsible for the care of their elderly parents. Such a scenario would call for much faster and more helpful intervention from the state to ensure that levels of unmet needs do not increase sharply. Although this notion has rarely been tested empirically, it is possible that it overstates the consequences of reductions in family size. First, support from other sources, such as the community, can substitute for the lack of available children. Second, circumstantial evidence has suggested that reductions in fertility would not parallel reductions in support. Lin (1994) conducted simulations to determine how future elderly persons in China will be distributed across household types. He found that owing to a reduction in infant mortality and no projected decline in childlessness, the number of elderly persons living without children will remain small at least for the next several generations. Lee and Xiao (1998) examined monetary exchanges in China and found that transfers to older adults from their adult children are higher when the socioeconomic standing of the parents is lower, implying that the motivation for providing financial support is based largely on the needs of the parents, rather than on the size of the family. Knodel, Chayovan, and Siriboon (1992) showed that coresidence and related support in Thailand is not likely to change substantially in the future because older adults with only one or two children are likely to be living with at least one of their children. Projecting these results on to China is complex, however, for many reasons, not the least of which is the rate of change in fertility, which has been somewhat less dramatic in Thailand.

To extend these past studies, the study presented here examined the association between the number of living children and the probability that an older adult in China will receive support. We focused on two types of support: instrumental (assistance in conducting daily tasks) and financial. Using a bivariate probit model, we considered whether older adults receive support from their children or from other sources simultaneously, and we modeled the residual correlation between types of support, adjusting for other important covariates. We combined other sources into a single category because our aim was to contrast the main source of support—adult children—with support from sources that were

not child based. The hypothesis we tested was, *Other things being equal, those with a greater number of children will be more likely to receive support from children and less likely to receive support from other sources*. To conjecture on future implications, we subsequently conducted simulations of the probability of receiving any support, given a likely distribution of the number of children that the next generation of elders will have, that is, the generation that began its childbearing at the start of rapid decline in fertility. We recognize that China is changing in many respects and that future levels of support may depend not only on changes in family size, but on other alterations of its social and demographic structure. Although we attempted to account for one of these potential changes in our simulations, a decline in coresidence, we wish to emphasize that simulations are meant to be heuristic, isolating the potential influence of changes in family size alone on support for the elderly.

SUPPORT FOR OLDER ADULTS IN THE CHINESE CONTEXT

A number of theories concerning intergenerational support have been advanced that lead to predictions regarding the nature and level of physical and material support. Three popular models predict support on the basis of (1) bargaining power, (2) exchange of services, and (3) feelings of altruism. The power model (Goode 1963) holds that an older generation receives support as long as they control such important resources as land and knowledge. The rise in social and economic standing of the young, prompted by their increasing ability to find work outside the household and the establishment of rank on the basis of technical and scientific merit, rather than tradition, increases the independence of the young and undermines the position of older family members. Subsequently, support no longer flows from the younger to the older generations, and parents are motivated to reduce their childbearing (Caldwell 1976). From the perspective of the younger generation, a rise in personal resources allows them to exempt themselves from time-intensive support tasks (Hermalin et al. 1990).

The exchange model is based on the notion of quid pro quo trades between generations (Cox 1987; Morgan and Hirosima 1983). Transfers from parent to child can include things like baby-sitting and housework, which would be given to adult children who, in turn, provide housing and material goods. This model predicts that high-income children receive more of the older generation's time than do lower-income children, and older adults who have little to share receive less support in return.

The altruistic model (Becker 1974) suggests that behavior within a family is based on maximizing an individual's utility, which requires exchanges with family members. The model can be extended to assume that it is family utility that is maximized, and it can be accomplished by an altruistic individual who heads the household, controls resources, and cares about his or her own and the family's welfare (Lee, Parish, and Willis 1994). Altruism prompts the family to act as a "corporate unit," with resources pooled and efficiently distributed to guarantee the survival of the head and each family member. The model would predict that a younger generation would provide more support to the elderly generation within social systems that maintain strong family traditions and altruistic feelings for each other, which bind behaviors to the interest of the entire family, rather than to the interests of the individual. The model also suggests that those within a family who are the most needy (often the oldest members) will receive the greatest volume of support even if they have little to offer in return.

Historical and empirical evidence supports the altruistic model as the best for explaining intergenerational support in China. Although all societies value and care for older adults, filial piety among the Chinese seems to have a special role in the philosophy of the culture, dating back to Confucius, who stated that helping the old not only benefits them and their families, but leads to peace and harmony throughout the world (Ebrey 1996). Thus, care for the elderly is seen as a moral obligation (Lang 1946). Older

adults are provided for materially through collective resources and physically through assistance with household maintenance (Cohen 1976; Hermalin, Ofstedal, and Chang 1996). The obligation that children have to their parents has been formalized into law as well, which, according to Fricke, Chang, and Yang (1994), suggests that the ideology is pervasive and unitary.

Empirical results further suggest that increasing affluence, economic growth, and greater independence have not greatly changed intergenerational relations. Lee and Xiao (1998) in Mainland China and Lee et al. (1994) in Taiwan both found that elderly people who are more needy receive more assistance than do others. Mason and Miller (1995), examining family income in Taiwan between 1976 and 1991, found that intergenerational transfers eliminated a good proportion of the gap between personal and family income, supporting the corporate notion of family. Similarly, Lillard and Willis (1997), looking at time and money transfers in Malaysia, reported that these transfers are contingent on factors such as income, marital status, age, and health in ways that are consistent with the pooling hypothesis. The coresidence of an older adult and an adult child is one of the important mechanisms through which intergenerational support among the Chinese is maintained (Yan and Chi 2001), yet studies have found that support is being sustained among noncoresident kin in the face of declining rates of coresidence (Bian, Logan, and Bian 1998; Mason and Miller 1998; Sun and Liu 1994).

Rural-Urban Differences

A pension system developed in China in the early 1950s. It was established through the State Council's Regulations on Labor Insurance and was meant to provide retirement income for those in state enterprises with more than 100 workers (World Bank 1997). This was strictly a pay-as-you-go system, funded exclusively through the enterprises. Because large enterprises are generally located in urban areas, the pension program has covered few rural workers. Although reforms have been aimed at expanding coverage while providing greater stability for the system and removing some of the burden from enterprises (P. Kwong and Cai 1992; World Bank 1997), coverage remains limited mostly to urban workers, and concerns remain regarding China's ability to maintain coverage in the face of its growing elderly population.

Wide rural-urban discrepancies also exist with respect to health and health care resources. In urban areas, governmental insurance plans allow for free outpatient and inpatient services to state employees and former employees (Lassey, Lassey, and Jinks 1997). In rural areas, health care, which was at one time grounded in the political structure of a collective economy and organized around a cooperative care system (Sidel 1993), has been increasingly privatized. This change has resulted in a fee-for-service system in rural areas, where about 90% of the residents pay the full cost of their medical care out of pocket (P. Kwong and Cai 1992; Li and Martin 1999). Resources and patterns of use are also biased toward urban residents. The number of health professionals per capita is five times greater, and health spending by the government is four times greater, in urban than in rural areas (Shi 1993). Community-based programs, meant to substitute for the lack of other sources of support, are more abundant in urban areas (Di and Rosenbaum 1994). Moreover, standards of living are substantially lower in rural areas, suggesting that the financial needs of older adults in rural areas may be greater (P. Kwong and Cai 1992; Wu 1994).

Given differences in support systems that favor urban areas, reductions in fertility may have greater implications for rural than for urban older adults. It may not be surprising, then, that fertility rates remain higher in rural areas of China (Zhenghua and Lingguang 2000). Because older adults in urban areas have greater access to support programs than do their rural counterparts and there is a variation in social systems, our analyses treated urban and rural samples separately.

DATA, MEASURES, AND MODELS

The data for our study came from the 1992 Survey of the Support for the Elderly in Rural and Urban China, conducted by Beijing's China Research Center on Aging (CRCA). They consisted of roughly 20,000 cases, divided nearly equally between rural and urban areas, selected via a nationally chosen stratified cluster sample. The first step in sampling involved purposively choosing 12 provinces to participate in the data collection (Beijing, Heilong Jiang, Hubei, Guangxi, Guinzhou, Jiangsu, Shaanxi, Shanghai, Shanxi, Sichuan, Tainjin, Zhenjian) and dividing them into urban and rural areas. Urban and rural areas were further divided into clusters on the basis of residents' committees in urban areas and villagers' committees in rural areas. These clusters were stratified by age, economic development, and geographic environment. Ninety-five clusters (48 urban and 47 rural) were randomly chosen for inclusion in the study, and respondents were randomly selected from within clusters. The sample size within each cluster was on a proportionate-to-size basis. There was a 90% response rate. Although the sample was not designed as strictly nationally representative, subsequent analyses conducted by the CRCA indicated that the characteristics of the sample population closely match the total population with respect to important demographic characteristics, such as age and sex, in the census data (CRCA 1994). Interviews were conducted on a face-to-face basis. A series of measures were used to reduce errors in the survey process, and they, as well as more detailed information on the sampling procedures, are presented in CRCA (1992, 1994).

Measuring Support

In our analyses, we considered the probability of receiving two types of support, instrumental and financial. For each type, we measured whether support came from children or not and from other sources or not.

Instrumental support. Older adults in China were asked whether they received assistance with four instrumental tasks: preparing meals, washing clothes, doing housework, and shopping. They were read a list of potential sources of assistance, including assistance from either an own child or a child-in-law. Support from children, which included children-in-law, and from all sources, was coded dichotomously, as 1 in the case of any affirmative response to any of the four items and 0 otherwise.[1] Other sources of support were volunteer organizations, village committees, institutions for the elderly, and other network members, including other family members, friends, and neighbors. They were coded into a single response, with 1 indicating that support was received from any other source, and 0 otherwise.[2]

Financial support. Financial support is any monetary assistance that adds to the income of an older adult. The survey asked the respondents if children had given them financial support over the past year. Positive responses were coded 1, and negative responses were coded 0. In addition, the respondents were asked if they received financial

1. A weakness arises from the fact that the nature of the survey allows for only dichotomous measures of support. As such, we were limited with respect to analytical techniques and interpretations. Rather than focus on the effects of family size on the volume received, we had to focus on the probability of receiving support. Although this probability is enlightening in itself, we recognize that an older adult with a large family may receive support from several members, which may increase the chances that needs are being met. More will be said about this possibility in the Conclusion.

2. It is recognized that the four instrumental items have a gender bias. Yet, women were only a little more likely than men to respond that they received support from one of these sources (63% versus 51% in urban areas, 72% versus 62% in rural areas), and this difference may be explained by differences in health, which tend to favor men, rather than by differences in whose task it is to shop, wash, prepare meals, and do housework. Further analyses showed that men were more than twice as likely to report receiving assistance from their spouses, but were also more than twice as likely to be living with their spouses because of differences in age-specific death rates that favor women. We controlled for both gender and support from spouses in our analyses.

support from a village committee, a street or neighborhood organization, the government, or from any relatives besides children in the previous year. We considered an affirmative response to any of these items as having received financial support from other sources. We did not consider pensions state-based support but, rather, added amounts received through pensions to our calculation of the respondents' and spouses' incomes.[3]

Although other sources included both formal (e.g., governmental programs) and informal (e.g., other network members) sources, nonchild instrumental support is generally provided by informal sources, whereas nonchild financial support is usually provided by formal sources. Dividing other sources further, then, would not make statistical sense for our analysis.

Covariates

Table 1 presents distributions of covariates by rural and urban residence. Number of children is categorized as having 0, 1, 2, 3, 4, and 5 or more children. For estimation purposes, we created a series of dichotomous variables that contrast the influence of having 1 versus having other numbers of children. Treating number of children categorically instead of continuously was necessary because the effects are nonlinear, and we wanted to determine whether there are thresholds above which additional children do not make a difference.

We also defined variables representing several domains that are likely to be important in determining the probability of obtaining support: (1) availability of support (other than children), (2) need for support, and (3) demographic characteristics that apply to the propensity to seek and receive support. The availability factors include whether older adults coreside with a child (coded 0 and 1) and residual household size. The latter measure is the number of household residents less 1 if there is a coresident child already captured in the former measure and the number of household residents less 1 if there is a spouse present, which is captured in the need indicators described next.

Characteristics that determine the need for support differ, depending on whether the consideration is for instrumental or financial support. In all instances, need indicators were measured dichotomously (1 when there was a high need and 0 otherwise). In all cases, need is expected to increase the probability of support. We used two indicators of need for instrumental support. The first is a measure of the health of the respondent because worse health can relate to greater difficulty performing household tasks. Those who reported a functional limitation, that is, they had difficulty walking, dressing, bathing, or eating, and/or self-assessed their health as "unhealthy" were considered to have a high need. In addition, we considered marital status, often thought of as a demographic characteristic, as belonging to the need domain. We did so because spouses, if they are active in the household, are likely to play a critical role in performing tasks, like shopping and cleaning, and hence decrease the need for support from other sources. To ensure that we were capturing a need, we included in our measure both whether a spouse was in the household and whether the spouse helped with tasks. Those who were not married or who were married but had spouses who did not perform any instrumental tasks (either for health or other reasons) were considered as having a high need.

We considered three indicators of the need for financial support. The first is a measure of whether a respondent had a low income. Income was considered as individual income calculated from all sources listed on the survey, including bank savings and rental

3. If pensions were included in the definition of support from the state, urban elders would be more likely to receive support. But pensions, overall, are a factor for urban elders only. For instance, about 19% of older adults in urban China reported receiving financial support from state sources other than pensions. When pensions were included, this percentage increased considerably, to about 87%. In rural areas, however, 35% received support from non-pension state sources, and this percentage increased to only 38% when pensions were included.

Table 1. Descriptions of Covariates

Variable	Rural Areas (N = 10,195)	Urban Areas (N = 9,887)
Number of Living Children		
0	2.5	2.3
1	8.5	10.4
2	11.2	13.5
3	14.9	18.7
4	20.6	21.6
5 or more	42.3	33.5
Availability		
% living with an offspring	55.3	51.4
Mean residual household size	2.3 (SD = 1.7)	2.1 (SD = 1.4)
Need for Instrumental Support		
% in poor health	26.3	25.2
% with no spouse/no support from spouse	47.9	40.5
Need for Financial Support		
% with low income	71.7	39.4
% with no spouse/spouse with low income	77.7	47.0
% not pension eligible	94.3	27.1
Demographic Characteristics		
% aged 60–64	31.5	34.4
% aged 65–69	27.8	27.4
% aged 70–74	19.5	20.1
% aged 75–79	12.8	11.0
% aged 80+	8.4	7.1
% female	52.7	51.8
% with any formal education	25.6	58.8

income. Because living expenses and income levels are higher in urban than in rural areas (State Statistical Bureau 1991), we used different definitions of low income. We considered half the average incomes in rural and urban areas, obtained from the *China Population Statistics Yearbook, 1991* (State Statistical Bureau 1991) as cut-off points for low income. The average annual income in urban areas in 1991 was 1,522.79 Yuan. Our measure of income was monthly, and hence we considered a monthly income of under about 63 Yuan (about $7.50US) as a low income for elderly urban residents. In rural areas, the average was 916.50, and those making under about 38 Yuan a month (about $4.50US) were coded as having a low income. Like instrumental need, the second indicator of financial need included marital status and contributions of income from the spouse to the household. Those who were not married or had a spouse whose total income was also low, using the same definitions, were considered as having a high need. The third measure of need is whether or not individuals were eligible for pensions (coded 1 if not eligible and 0 otherwise). As can be seen in Table 1, urban elderly people are far more likely

than their rural counterparts to be eligible for pensions. Collecting a pension or having the opportunity to do so after retirement should reduce the need for financial support.

The three demographic factors were age, gender, and education. Education was coded 1 if an individual had a formal education and 0 otherwise. Gender was coded 1 if female and 0 if male. We categorized age into five 5-year age groups until age 80 and over. Age was categorized because the probability of support is not likely to be linear with increasing age.

Modeling Support

Table 2 shows the percentage who receive instrumental and financial support in rural and urban areas, by source. Children are a much more frequent source than are others, substantiating the view that children are the traditional source of support. In addition, support is more likely in rural than in urban areas. The table is presented at this point to show the conceptualization of two types of support (instrumental and financial) and two separate geographic areas (rural and urban), resulting in four outcome models. To model these outcomes, we defined latent variables SC_i^* and SO_i^*, which indicate the tendency to receive support from children and other sources, respectively. We then defined a vector of characteristics representing number of children (C'), availability (A'), indicators of need (N'), demographic characteristics (D'), and a random disturbance term, representing an unobservable effect, that has a mean of 0 and a variance of 1 (ε). We assumed that if $SC_i^* > 0$ and $SO_i^* > 0$, the respondent in question was receiving support from children and/or other sources and that the probability of receiving support from children and/or other sources is a function of a similar vector of determinants and conforms to the standard normal cumulative distribution (Φ), such that

$$\text{Prob}(SC_i = 1) = \text{Prob}\,(SC_i^* > 0) = \Phi(C'_i\beta + A'_i\beta + N'_i\beta + D'_i\beta + \varepsilon_i c) \quad (1)$$

$$\text{Prob}(SO_i = 1) = \text{Prob}\,(SO_i^* > 0) = \Phi(C'_i\beta + A'_i\beta + N'_i\beta + D'_i\beta + \varepsilon_i o). \quad (2)$$

The particular modeling challenge here is that support from children and other sources may be dependent, such that the unobserved characteristics that relate to the tendency to receive support from children either positively or negatively correlate with the unobserved characteristics that relate to the tendency to receive support from other sources, such that

$$\text{cov}[\varepsilon c, \varepsilon o] \neq 0 = \rho. \quad (3)$$

The possibility that the unobservable terms are correlated means that we needed to model Eqs. (1) and (2) simultaneously while estimating ρ. To be specific, it is possible that dependencies between sources of support are unaccounted for by predictors. For instance, a possible scenario is that strategies for receiving support are similar across sources, making probabilities directly related. This possibility cannot be established using the more customary modeling techniques of separate estimation. Modeling the receipt of support simultaneously allows not only for the efficient determination of effects, given potentially related outcomes, but, if error terms are related, for estimates of the nature of the association. The corresponding likelihood function is the bivariate probit (Greene 1997). Using this model, we estimated the probability of receiving support from either source simultaneously as a function of C, A, N, and D and estimated ρ from the data. If it is 95% certain that $\rho \neq 0$, then estimating equations simultaneously is justified.

Given the standard normal cumulative distribution, the coefficients that we present represent a standard deviation metric, such that a one-unit increase in any variable results in a β standard deviation change in the probability. All variances in these models are estimated using a robust estimator that corrects for correlated observations within

Table 2. Percentage Receiving Instrumental and Financial Support by Source and Rural/Urban Residence

	Instrumental Support		Financial Support	
Source	Rural Areas (1)	Urban Areas (2)	Rural Areas (3)	Urban Areas (4)
From Children	60.8	53.3	43.8	33.5
From Other Sources	2.8	4.4	9.7	5.4
From Both Sources	6.0	3.8	29.1	13.0
From Neither Source	30.4	38.5	17.4	48.1
Total	100.0	100.0	100.0	100.0

clusters (Royall 1986). After estimation, we transformed the standard normal coefficients into probabilities so that we could predict the chances of receiving support, given different numbers of children. To do so, we estimated a set of predicted probabilities for each individual that relate to receiving support from children only (p_{10}), other sources only (p_{01}), both children and other sources (p_{11}), and neither children nor other sources (p_{00}). For example, to estimate a set of probabilities that would be expected for a respondent with no children, we let k0, k2, k3, k4, and k5 represent dummy variables for having no children and 2, 3, 4, and 5 or more children, respectively (having 1 child being the omitted category). We then took our coefficients derived in Eqs. (1) and (2) and transferred them into the following equations:

$$\text{Prob}(S_iC = 1) = \Phi\{k0(1)\beta + k2(0)\beta + k3(0)\beta + k4(0)\beta + k5(0)\beta + A'_i\beta + N'_i\beta + D'_i\beta\} \quad (4)$$

$$\text{Prob}(S_iO = 1) = \Phi\{k0(1)\beta + k2(0)\beta + k3(0)\beta + k4(0)\beta + k5(0)\beta + A'_i\beta + N'_i\beta + D'_i\beta\}. \quad (5)$$

As Eqs. (4) and (5) suggest, the cumulative standard normal of the mean normal index (the part of the equation in brackets) is the probability, and the probabilities derived across the equations will sum to 1.0. To determine the probability of receiving support from more than one type of source, the probabilities for individual sources can be summed. For example, the probability of receiving support from any source would be $(p_{01}) + (p_{10}) + (p_{11})$. Mean probabilities across the sample provide the predicted probability of support for those without children, such that

$$\text{Prob}(SC_{\Sigma i} = 1 | k0 = 1, k2 = 0, k3 = 0, k4 = 0, k5 = 0) = \{\Sigma(p_{01} + p_{11}) / N\}). \quad (6)$$

We took the predicted probabilities one step further by assessing how decreases in fertility alone, all else remaining equal, change support for the elderly and, further, how decreases in fertility, coupled with declines in coresidence, change support for the elderly. To do so, we simulated the predicted probability of receiving support from any source, given the current distribution of number of children in families with elderly members and given a reasonable distribution for the next generation, who we defined as those who began their childbearing at the start of the one-child campaign. Because the one-child campaign began in the late 1970s and early 1980s, this next generation will reach age 60 by about 2020 or so. Today, they are in their late 40s and early 50s and have completed their childbearing careers. Because their childbearing is complete, a

fairly accurate scenario of the number of children they will have in old age can be estimated using a current survey that provides a distribution of the number of children across age groups. To generate this type of distribution, we consulted the 1997 National Demographic and Reproductive Health Survey of China, conducted by the State Family Planning Commission of China (1997), that had a sample of 186,088 women.

Both physical functioning and income potential decline with age, and it is those at very advanced ages, say 80 and older, who are the most likely to require support and need the greatest amount of support. Because of this need, the oldest-old may be more influenced by reductions in family size than are others. In additional procedures, we interacted age with number of children to assess the probability of receiving support for the oldest-old. We also conducted the simulations described earlier separately for those aged 80 and older. We speculated that although support may be less for older adults who have smaller families, the reduction in support owing to reduced fertility could be the most drastic for those who need it the most, that is, those aged 80 and older.

RESULTS

Probability of Receiving Support, by Number of Children

Table 3 presents the bivariate probit coefficients predicting the probability of obtaining instrumental and financial support from children and/or other sources in rural and urban areas. The four models represent (1) instrumental support in rural areas, (2) instrumental support in urban areas, (3) financial support in rural areas, and (4) financial support in urban areas. Most of the coefficients across all the models are significant, and the change in the log-likelihood for the models (measuring the difference in the log-likelihood between an intercept model only and a model containing all determinants) shows that we obtained a good fit in each case. Also shown is the change in the log-likelihood for the set of dummy variables that make up number of children, which is also high, affirming the importance of children's support.

Looking first at the receipt of instrumental support, using one child as the comparison category, the number of children clearly has an influence. Endorsing our hypothesis, having more than one child increases the probability of receiving support from children in *both* rural and urban areas.[4] The magnitudes of the coefficients, however, do not increase monotonically but, instead, suggest diminishing returns. For instance, the probability of obtaining support from children in rural areas is virtually the same for those who have three children and those who have four (coefficients of .402 and .406). The same can be said for the comparison between those with two and three children in urban areas (coefficients of .148 and .146). At the same time, those with three or more children are less likely to receive support from other sources than are those with only one child. Furthermore, those without any children are, by far, the most likely to receive support from other sources, and the magnitudes of the coefficient for those without children suggest that the role of other sources is fundamentally to assist those who are childless.

Like the receipt of instrumental support, number of children has strong influences on the probability of receiving financial support from children in both rural and urban areas. However, the magnitudes of the coefficients appear to increase with each additional child, so additional children increase the likelihood of receiving financial support without much diminishing return. The increasing gains from each child are more apparent in rural than

4. The bivariate probit model can derive a coefficient for support from those without children even though this outcome is not within the range of real possibilities. The coefficient produced, however, is essentially $-\infty$, indicating that the predicted chance of receiving support from children is zero. For presentation purposes, we omit this coefficient.

Table 3. Bivariate Probit Coefficients for Receipt of Support From Children and/or Other Sources in Rural and Urban Areas

	Instrumental Support				Financial Support			
	Rural Areas		Urban Areas		Rural Areas		Urban Areas	
	From Children	From Other Sources	From Children	From Other Sources	From Children	From Other Sources	From Children	From Other Sources
Number of Living Children								
0	na	1.051**	na	0.693**	na	0.860**	na	0.559**
1 (comparison)	—	—	—	—	—	—	—	—
2	0.309**	–0.057	0.148**	–0.094	0.269**	–0.147**	0.250**	–0.077
3	0.402**	–0.240**	0.146**	–0.233**	0.460**	–0.188**	0.435**	–0.066
4	0.406**	–0.340**	0.302**	–0.410**	0.567**	–0.256**	0.512**	–0.152*
5 or more	0.418**	–0.367**	0.323**	–0.409**	0.747**	–0.150	0.577**	–0.154*
Need for Instrumental Support								
Poor health[a]	0.257**	0.253**	0.127**	0.295**				
No spouse/spouse support[a]	0.290**	0.272**	0.364**	0.435**				
Need for Financial Support								
Low income[a]					0.546**	–0.072	0.156*	–0.101
Spouse withlow income[a]					0.314**	–0.211*	0.460**	0.188*
Not pension eligible[a]					0.373**	0.930**	0.743**	1.950**
Availability of Other Support								
Lives with offspring[a]	0.987**	–0.450**	0.773**	–0.389**	–0.336**	–0.045	0.003	0.016
Residual household size	0.217**	0.182**	0.070**	0.069**	0.042*	–0.055**	0.031*	–0.007
Demographics								
Age 60–64	—	—	—	—	—	—	—	—
Age 65–69	0.143**	0.181**	0.112**	0.098	0.123**	0.142**	0.111**	–0.003
Age 70–74	0.335**	0.525**	0.176**	0.306**	0.241**	0.242**	0.168**	0.017
Age 75–79	0.363**	0.724**	0.283**	0.417**	0.472**	0.297**	0.279**	0.010
Age 80+	0.438**	0.959**	0.445**	0.789**	0.495**	0.502**	0.292**	–0.048
Gender (1 = female)	0.156**	0.160**	0.210**	0.174**	0.343**	–0.007	0.171**	0.205**
Has a formal education[a]	–0.057	0.119	–0.009	0.351**	0.193**	0.206**	–0.099*	0.050
Constant	–1.214	–2.187	–0.936	–1.992	–0.732	–0.058	–0.422	0.083

(continued)

in urban areas. For instance, coefficients in rural areas increase steadily from .269 for those with two children to .747 for those with five or more children. In urban areas, the increase is from .250 to .577. In rural areas, those with more than one child are much less likely to receive financial support from other sources than are those with one child, whereas the childless are far more likely to receive financial support from other sources

(Table 3, continued)

	Instrumental Support				Financial Support			
	Rural Areas		Urban Areas		Rural Areas		Urban Areas	
	From Children	From Other Sources	From Children	From Other Sources	From Children	From Other Sources	From Children	From Other Sources
−2 Log-Likelihood	13,954.6		15,944.4		22,895.2		17,411.2	
Δ Log-Likelihood (Model)	5,078.3**		3,116.3**		2,611.4**		5,146.8**	
Δ Log-Likelihood (Children)	597.8**		473.3**		1,220.9**		653.8**	
ρ	−.055		−.119**		.099*		.158**	

*.01 < p < .05; **p < .01

[a]For these variables, 1 = yes.

than are those with any children. In urban areas, the childless are similarly most likely to receive support from other sources, but there is little decline in the probability of receiving support from other sources until one reaches four children.

Although the focus is on the number of children, other coefficients in Table 3 are also revealing. Those who have a high need are more likely to receive support from both children and other sources. Poor health and the lack of a spouse increase the likelihood of instrumental support, while low income and no spouse or a low-income spouse increase the chances of financial support, particularly from children. Not being eligible for a pension also greatly increases the probability of support from all sources. The one anomaly is that those who either have no spouse or have a spouse with a low income are less likely to obtain financial support from other sources in rural areas. Otherwise, need is a good predictor of obtaining support.

With respect to availability, coresidence with offspring substantially increases the probability of receiving instrumental support from children and decreases the probability of receiving support from other sources. This is the case in both rural and urban areas. A commonsense explanation for this finding is that it is convenient for coresident children to provide regular assistance around the house because they are immediately present. It could also be that older adults who need support are the ones most likely to be in a coresident situation with children, although a further analysis of our data indicated that need and coresidence do not correlate as highly as would be expected if this explanation were correct.

Associations with coresidence differ for financial support. In rural areas, living with children relates to a lower probability of receiving financial support. This finding supports the view that children who migrate from rural to urban areas tend to remit financial resources back to their parents who are living in rural areas.[5] It also suggests that there is a trade-off between instrumental and financial support whereby those who live with parents are able to help in instrumental ways, whereas those who do not live with parents, because they are less able to assist physically, opt instead to assist financially. In urban areas, there is no association between coresidence and financial support, likely because there is less remittance that is related to migration.

5. To clarify, questions on the survey asked about the receipt of support from children, not distinguishing those who were coresident from those who were living elsewhere. Assuming that the responses referred to children both in and outside the household, the results suggest that within-household receipt of monetary support is less frequent than is receipt of this support from children living elsewhere.

The effects of residual household size generally act in a similar fashion to coresidence with a child, probably because most residual household members are also offspring. Older as opposed to younger elders are more likely to be receiving instrumental and financial support from both children and other sources. The coefficients for age suggest some nonlinearity, although they increase with each increasing age group. Women receive more support than do men, which may reflect the fact that older women tend to have more health problems than do older men (see Verbrugge 1989 for U.S. evidence on gender and health), and tend to have lower earnings. Finally, education displays some mixed effects. Those with higher education are more likely to obtain instrumental support from other sources in urban areas only. With regard to financial support, those with higher education are more likely to receive support from both sources in rural areas and less likely to receive it from children in urban areas.

The residual correlations between receiving support from children and other sources are indicated as ρ. The correlations are negative for instrumental support, although significant only in urban areas. With respect to this type of support, then, there appears to be some residual or unobserved trade-off effect between the two sources of support. It is interesting, however, that when it comes to financial support, the residual correlations are strongly positive in both rural and urban areas, suggesting that there is some unobserved factor that increases the tendency to receive support from any source. The significance of three of the four residual correlations confirms the dependence between types of support.

The estimates produced by the bivariate probit results provide two probabilities of support (from children and from other sources), and it is not obvious from the coefficients alone how these two combine to affect the net probability of support. To determine how the total probability of receiving any support from children and/or other sources changes by number of children, we had to calculate predicted probabilities. These probabilities are presented in Figure 1. Probabilities plotted here are the combined probabilities of receiving support from children only, other sources only, or both. Further analyses that interacted number of children and age allowed us to construct probabilities for the oldest age group (aged 80 and older), and these results are also shown in the figure.[6] The two left-hand charts plot instrumental support, and the right-hand charts plot financial support. The two top charts are for the total population, and the two bottom charts are only for those aged 80 and older.

Starting with the total population, for instrumental support, there is a large increase in the probability as one goes from having no children to having one child. For example, in urban areas, the probability of those without children receiving support from any source is .28, and this probability doubles to .56 for those with only one child. There is another slight gain for those with two children, particularly in rural areas. After that, the probabilities in both urban and rural areas level off, suggesting diminishing returns. For financial support, the situation is somewhat different. There is clearly a greater likelihood of financial support for rural elders, perhaps because of higher financial need or other factors unaccounted for in the analysis. In contrast to instrumental support, the overall effects across number of children appear to be more linear. So, although one or two children provide the maximum chances of instrumental support in China, a greater number of children provide increasing chances of financial support.

In some ways, this net probability of support is not surprising. The majority of support in China, be it financial or instrumental, comes from children. Hence, the net probability of support would be highly influenced by the probability of support from children. The probit results showed that a greater number of children have diminishing returns on instrumental support in China but more linear returns on financial support. Support from other sources, though related to number of children, do not seem to override this basic

6. Full results are not shown here because of space limitations.

Figure 1. Probability of Receiving Support From Any Source, by Number of Children and Rural/Urban Residence, Total Population and Those Aged 80 and Older

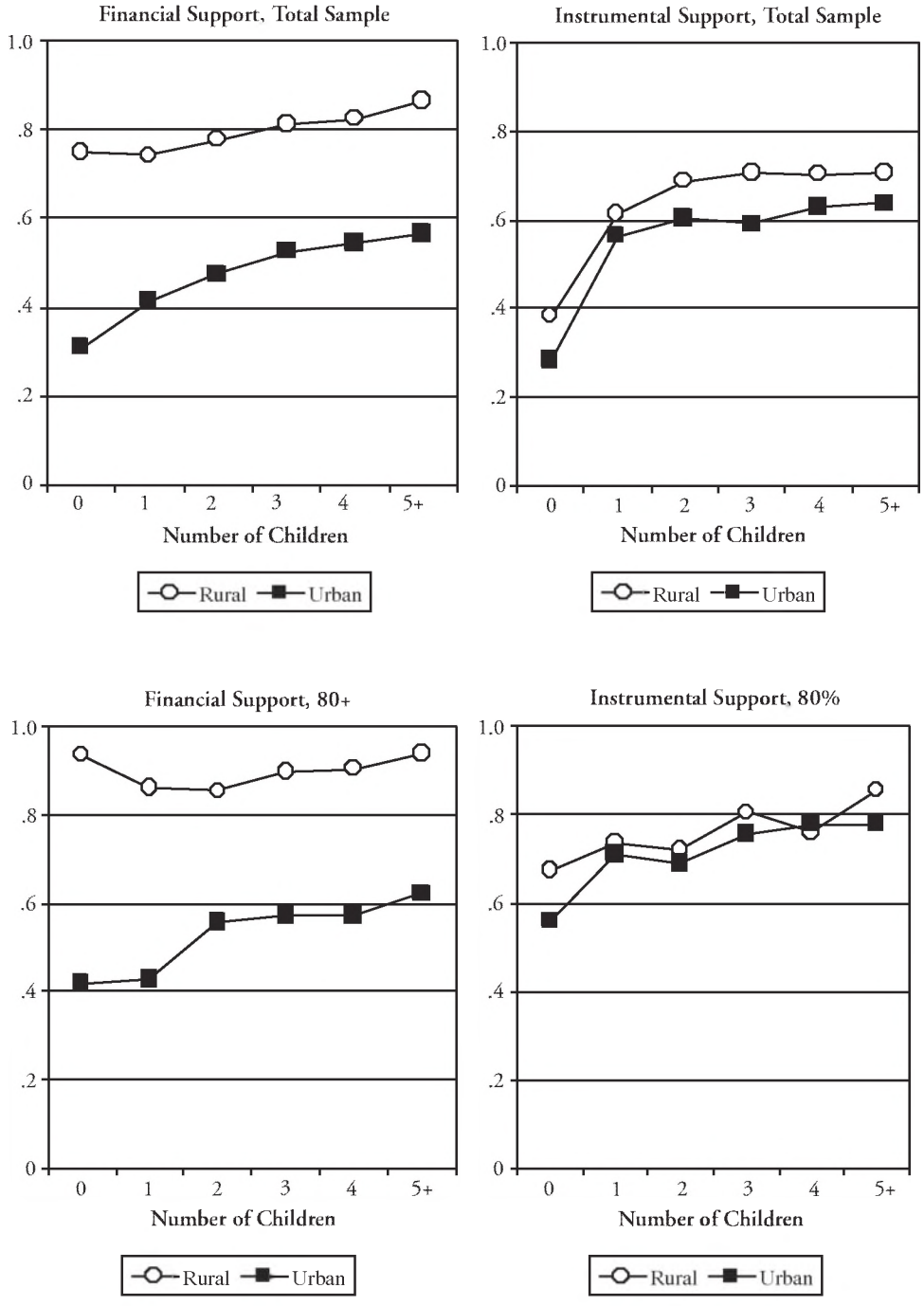

Table 4. Distribution of Number of Children Scenarios

Number of Children	Current (%)	Next Generation (%)
Rural Areas		
0	2.5	0.7
1	8.5	5.2
2	11.2	39.5
3	14.9	33.9
4	20.6	13.9
5 or more	42.3	6.7
Total	100.0	100.0[a]
Average per family	4.1	2.8
Urban Areas		
0	2.3	1.0
1	10.4	50.4
2	13.5	35.3
3	18.7	9.4
4	21.6	3.1
5 or more	33.5	0.8
Total	100.0	100.0
Average per family	3.7	1.7

[a]Does not sum to 100.0 because of rounding.

effect, except perhaps that those without any children receive a fair bit of financial support in rural areas.

In comparison with the total sample, those aged 80 and older are more likely to receive support. The changes by number of children for instrumental support are somewhat similar, as was shown earlier, in that the probability does not increase substantially with a greater number of children. The major difference is that those without children have a high probability of receiving instrumental support. The chances of receiving financial support in urban areas for the 80-and-older group increase slightly by number of children, from about .40 for those without children to .60 for those with 5 or more children. In rural areas, the probabilities are high (about .90), regardless of the number of children.

Simulations for the Next Generation

Table 4 shows a reasonable current and next-generation distribution of the number of children of those aged 60 and older. The current distribution is the one that is generated from the current data source. The next-generation distribution is the distribution of the number of children to those aged 40 to 49 from the 1997 National Demographic and Reproductive Health Survey of China.[7] Currently, a high proportion of elders, in both

7. We recognize that this next-generation distribution will not exactly describe the distribution of the number of children for all elderly persons 20 years from now: that distribution will depend not only on the current distribution of the number of children in the 45- to 49-year cohort, but on the distribution in other age cohorts who will become elderly over the next two decades. However, we used this distribution as an analytical

rural and urban areas, have 5 or more children, and a large majority have 3 or more. The next-generation scenario assumes that in the rural areas, the number of children will decline from an average of 4.1 to 2.8 per family, with the majority of families having either 2 or 3 children. In urban areas, the average number of children will decline from 3.7 to 1.7, and about half of all families will have only 1 child. The two scenarios are indeed different and highlight the extensive changes in family size that are expected over the next 20 to 30 years. These distributions conform closely to those provided in simulations by Lin (1994).

To compare the predicted probability of receiving support for the current and next generations, we applied the probabilities derived from the bivariate probit but used the distributions of number of children as weights. Because we are ultimately interested in how reductions in family size will change the chances of receiving support from any source, we added probabilities of receiving support from children, others, and both children and others, and these summative results are presented. We conducted simulations for both the total population, determining probabilities averaged across all ages, and those aged 80 and older.

Other changes, besides family size, that will occur over the next few decades are more difficult to predict. Nonetheless, to assess the potential influence of one other important modification in family structure, we simulated the predicted probabilities for the next generation with the further assumption that coresidence rates between an elder and an adult child will decline by 50%. The multivariate results presented earlier showed that coresidence is a particularly important determinant of instrumental support in rural and urban areas and an important determinant of financial support in rural areas (though in the opposite direction). It is reasonable to expect that as China's socioeconomic structure develops and changes, adult children will be more likely to set up their own residences and that those who are living in rural areas will be more likely to migrate to urban areas to seek employment. Whether this will be the case or not, given the importance of coresidence, it is informative to add this constraint to the simulation procedure.

Table 5 presents the results of the simulation. We found only moderate changes in the net provision of instrumental support, particularly in rural areas, for all ages. For instance, in the current generation, in rural areas, the predicted probability that an older adult will receive instrumental support is .695, and this probability declines only minimally to .692 in the next generation. Slightly larger declines are observed in urban areas, likely because of more rapid declines in fertility, but the changes are still moderate.

If one considers the likelihood of a decline in coresidence, somewhat greater changes occur. In rural areas, the probability of receiving support from any source decreases from .695 in the current generation to .643 in the next generation, given a decline in coresidence; the change is from .611 to .525 in urban areas. Thus, trends in coresidence in China will make a difference with respect to the future provision of support to older adults.

The change in the chances of receiving financial support is a bit more consequential, probably because of the more linear association with number of children, but it is still not dramatic. For instance, the probability that a rural elder will receive any financial support is .826 in the current generation and decreases to .798 in the next generation. Unlike instrumental support, changes in coresidence make little difference to the chances

device to conjecture on the possible changes that could occur to support, given continuing declines in family size over the next 20 to 40 years. In addition, the hypothetical distributions do not account for the influence of mortality on the distribution of the number of children. Mortality would have the effect of reducing family size by the time an individual reaches age 60. We conducted sensitivity tests to determine whether applying some mortality rate to the distributions of number of children would substantially alter the results of the simulations. We found that any reasonable effect of mortality would be too minimal to be worth considering further.

Table 5. Predicted Probability of Support From Any Source, in Rural and Urban Areas, Based on Scenarios for Distributions of Number of Children and Changes in Coresidence

Age Group	Type of Support	Rural/ Urban Areas	Current Generation	Next Generation	Next Generation With a Decline in Coresidence
All Ages	Instrumental	Rural	.695	.692	.643
		Urban	.611	.578	.525
	Financial	Rural	.826	.798	.817
		Urban	.519	.450	.450
Those aged 80+	Instrumental	Rural	.807	.765	.654
		Urban	.754	.709	.526
	Financial	Rural	.908	.882	.814
		Urban	.568	.493	.450

of receiving financial support. In rural areas, a decline in coresidence appears to increase financial support to older parents, albeit slightly, whereas changes in coresidence would have virtually no influence in urban areas. An explanation for this finding is that declines in coresidence in rural areas are likely the result of the rural-to-urban migration of working-aged adults, who tend to remit financial resources to their parents who remain in the countryside. As more of these adults migrate, more financial remittance can occur, although our findings are not strong enough to suggest that the overall impact would be sizable.

The decline in the probability of receiving instrumental support is greater for those aged 80 and older than for the total population. For instance, in rural areas, the chances decrease from .807 in the current generation to .765 in the next generation. Chances are reduced to .654 with a decline in coresidence, although it is not certain whether the oldest-old would be subject to the same percentage decline in coresidence as would all elders. In urban areas, the decrease is from .754 in the current generation to .526 in the next generation with a decline in coresidence. These results seem to suggest that the oldest-old could be more substantially influenced by decreases in fertility. When it comes to financial support, the reductions are not quite as dramatic.

In further examinations of these data, we conducted a series of sensitivity analyses to determine how robust our results are, given various assumptions about future distributions of the number of children. We tested for distributions that involve less overall change in the number of children and distributions that represent extreme changes. For the sake of brevity, these various scenarios are not presented in tabular form, but to summarize, altering distributions of the number of children does not greatly alter the main conclusions presented here. This is the case unless assumptions include large increases in childlessness. Large increases in childlessness lead to substantial reductions in the probability of support, all else remaining equal, particularly for instrumental support, certainly owing to the fact that in the current data, much instrumental support is provided by children.

CONCLUSION

Older adults still represent a relatively small proportion of the population, but China will experience rapid aging over the next several decades. The first generation to experience the start of childbearing during the one-child policy era, which began in 1979, are now nearing the end of their childbearing ages and will move into their early elderly years in a couple of decades. Adult children have traditionally been seen as the main providers of

support to older adults, and they provide both instrumental and financial support. Although the current generation of older adults still have a large number of children on which to rely for support, the reductions in family size that have already been experienced lead to concerns about whether traditional sources will decay, which may lead to an increase in the proportion of older adults with unmet needs. This notion has rarely been empirically tested, however, and doing so involves making a number of guesses as to what family sizes will be in the future and how other important factors, such as social security, will change.

The first part of this analysis involved correlating the number of children and the probability of support from children and other sources. We found that, in concurrence with our hypothesis, having more children increases the chances of receiving support from children and decreases the chances of receiving support from others. However, there were differences, depending on the type of support. Each additional child was shown to have diminishing returns on the receipt of instrumental support. In contrast, there were linear increases in the probability of receiving financial support. This result may also be a function of the difference in the nature of financial and instrumental support. Physical support may be a "finite" need. Depending on an individual's health, these needs may be satisfied with a particular volume of support, beyond which there is little difference. Financial support, on the other hand, may be more elastic, and a larger number of children can provide a greater volume of support. Furthermore, financial support can be provided across large distances and geographic boundaries, whereas physical support requires close proximity. Therefore, one child present may be able to provide the needed household help, but any number of children, regardless of where they live, can provide monetary assistance. This monetary elasticity of income support may have implications for those in rural China, where income is low. Poor rural elders may get increased security from more children, which may be why fertility remains higher in rural than in urban China.

In the second part of the analysis, we extrapolated these findings to conjecture how changes in family size alone may alter the provision of support. We cited three previous articles (Knodel et al. 1992; Lee and Xiao 1998; Lin 1994), none of which directly tested for associations between family size and both instrumental and financial support in China, but which together present circumstantial evidence that changes may not parallel reductions in fertility. On balance, the simulations lend some additional credence to this notion, although it is also necessary to qualify this statement in a number of ways.

First, our simulations assumed that a variety of factors will remain constant in the future, such as the way in which the number of children influences support. Making assumptions is necessary to isolate the potential effect of changes in family size, but we fully recognize that China's social structures are changing, and factors such as increased urbanization, changes in income, and changes in current support institutions will influence the nature of support. Our results should be interpreted as an indication of the implications of reductions in family size, rather than as a direct forecast of the number or proportion of older adults who can expect support in the future.

Second, we are less optimistic about support for the oldest-old, who, because of a greater degree of frailty, are the ones with the greatest need, and about changes in financial support, which seem to react more linearly to changes in family size.

Third, although our data did not allow us to examine differences in the quantity of support received, in reality this factor may be important, and the volume of support may be more linearly related to the number of children. For instance, one child may provide minimal assistance, which may not be enough to satisfy the needs of the older adult, but the support from many children, if additive in some way, may provide satisfactory assistance. The government's assistance to childless and poverty-stricken older adults may increase the probability of support, but this provision tends to be small. In addition, a dichotomous measure does not evaluate the burden of support, which may be higher for

children in one-child families than for those in larger families. If the support obligation of children from small families is high, then continued declines in family size will lead to even greater burdens, and the volume of support may decline even if the probability of obtaining any support remains high.

Apart from these caveats, our results imply that overall reductions in support may be somewhat moderate in the next generation and that a decline in fertility alone will not lead to a collapse of the traditional support system. The reason for tempered changes in support in the study is that the probability of obtaining support for those with one or two children is not substantially different from the probability for those with more than two children, at least as far as instrumental assistance is concerned, and that it is the childless who are truly disadvantaged (see Figure 1).[8] Hence, the maintenance of the desire to have at least one child is important for the future support of older adults. Research has suggested that childlessness in China will remain rare, at least for the next several decades (Lin 1994; Shen 1987). Leete (1987) reported that the reduction in fertility in much of East Asia is a result of the adoption of one- and two-child families, rather than a change to childlessness. Some examinations of Japan have found later marriage and longer intervals between marriage and the birth of the first child, with most still having at least one child (Klitsch 1994; Retherford, Ogawa, and Sakamoto 1996). Some studies have even suggested that completed family sizes in Japan may end up being somewhat higher than is suggested by current fertility rates (Breslin 1997). Continued declines in rates of marriage in Japan could eventually increase the proportion of childless persons. Yet, data from Taiwan, which may be more reasonably compared to Mainland China, show little change in the proportion of childless persons and a rapid adoption of the one- and two-child family (Chi and Hsin 1996).

Our results can be contrasted with the commonsense approach that the extensive reductions in family size that will be experienced by elders in China will be accompanied by parallel declines in support. This view has, at times, led to a type of "moral panic" (Du and Guo 2000; Phillips 2000) that seems to be unjustified if family size is measured as the average number of adult children per family and if this change alone is assumed to instigate changes in support. This is not to say that there will be no changes in the probability of support and the percentage with unmet needs, particularly among the oldest-old. Indeed, our simulations show that in some instances, there will be fair declines in the probabilities of receiving support. Rather, the adjustments in support may not be as dramatic as is often assumed.

As was noted earlier, other aspects of life will certainly influence these probabilities. We have shown that a decline in coresidence can reduce the probability of instrumental support, although coresidence has less to do with financial support, probably because supporting a parent financially does not require living in proximity to him or her. In China, there is a strong preference for sons, and the obligation of a son (and often his wife) to support his older parents is greater than that of a daughter. A reduction in family size, then, could alter the availability of support through the availability of sons. But transformation is taking place with respect to the status of women, which, in turn, could influence gender preferences and the ability of daughters to care for their parents. We know that future generations in China will be better educated and that in other societies, greater education has been shown to be highly predictive of health in old age (Ross and Wu 1996; Zimmer et al. 1998). Increasing wealth could result in declining financial needs. It could also be that the development of the educational system in China and greater opportunities for high wages may mean that parents can invest more in their

8. Figure 1 suggests that this scenario is a little different among the 80-and-older population because those with no children still have a fair probability of receiving support from any source.

children's education with the goal of raising higher-quality children who can provide well for their parents. Other changes will involve urbanization, employment, retirement, health care, and the social security system. In short, sociostructural life in China is complex and difficult to predict, although it is certain that fundamental adjustments in the family lie ahead (Bian et al. 1998; Neville 2000). Although it is beyond the scope of the current analysis to conjecture on all these potential structural alterations, they will no doubt have profound effects on the older population.

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