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**Do Governmental Transfers Displace Supports from Children to Their Poor  
Parents? A Case Study on Taiwan**

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**Summary**

We analyze the extent in which two newly implemented public programs (i.e., old-age allowances and National Health Insurance) crowd out familial transfers of poor elderly in Taiwan. We estimate that one dollar of both public programs displaces 20-35 cents of inter-household transfers given to poor elderly. Despite the diminished support from adult children, our findings show substantial increases in the overall consumption, especially in luxury goods, which perhaps indicate the two public welfare programs actually improve the overall welfare of poor Taiwanese elderly.

Key words – Asia, Taiwan, public transfers, familial transfers, poverty, old-age

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# **Do Governmental Transfers Displace Supports from Children to Their Poor Parents? A Case Study on Taiwan**

We analyze the extent in which two newly implemented public programs (i.e., old-age allowances and National Health Insurance) crowd out familial transfers of poor elderly in Taiwan. We estimate that one dollar of both public programs displaces 20-35 cents of inter-household transfers given to poor elderly. Despite the diminished support from adult children, our findings show substantial increases in the overall consumption, especially in luxury goods, which perhaps indicate the two public welfare programs actually improve the overall welfare of poor Taiwanese elderly.

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## **1. INTRODUCTION**

Improved health has contributed to higher living standards by increasing the longevity of people around the world. By 2020, the number of elderly around the world is projected to increase by approximately 12% of today's population, or 464 million (Council for Economic Planning and Development of Taiwan, 2006). Their well-being is not only related to the advances in living standards, but also related to the interaction of a wide range of social factors such as strong family support as well as government's continuing public welfare support (Barrientos et al., 2003). In fact, for countries with a high number of old-age populations relying heavily on familial transfers from their children, the long range policy concern may be to provide these elderly with public welfare support in the form of cash transfers such as allowances, social pensions, unemployment insurance allowances; and in-kind transfers such as health care, food aid, and housing (Lloyd-Sherlock, 2000).

Public welfare has become an important issue in government policy due to the increasing number of elderly and the diminishing joint family system in the globe. However, several studies have found that these welfare programs may not fully reach their intended goal of improving the welfare of the poor elderly because government aid could cause the children of these poor

elderly to reduce their own financial support towards their parents. In other words, government aid may perhaps act as a substitute for familial support. If this were adults' reaction to government policy, these results would diminish the overall impact of the aid policy by reducing the intended benefit for recipients. Understanding the impact of an aid program on the behavior of individuals is important so that policymakers know if the benefits of such programs are worth the costs.

Similar to other countries facing problems of demographic aging, Taiwan has experienced a similar population change with 10% of the current Taiwan's population above 65 years, while its life expectancy has rapidly increased for the past 10 years. Because the country has a large number of elderly with no self-supported economic incomes, providing adequate welfare support for these elderly has become one of the important social issues in Taiwan. Since the early 1990's, Taiwan has introduced two major public transfer programs: old-age allowances and National Health Insurance. Starting in July 1993, the Taiwanese government has provided a monthly stipend to low-income elderly who are 65 years old and above. The current income level and need of such elderly determine the amount of such stipend. For example, those with an average household income level less than or equal to 1.5 times the minimum monthly expenses (Taiwan's poverty line) are eligible for a monthly stipend of approximately NT\$6,000 (USD171), while those with an average household income level between 1.5 and 2.5 times the minimum expense are eligible for a monthly stipend of approximately NT\$ 3,000 (USD 86). In addition, to be eligible for the monthly stipend, participants must not concurrently receive any other forms of public pension (e.g., military pension, government employee pension, teacher pension, pension from labor insurance, farmer's pension, low-income assistance) nor do they have personal savings, investment and fixed assets exceeding certain market values<sup>1</sup>. The amount

of the stipend generally covers approximately one-third of the monthly consumption expenditure of an elderly.

Another Taiwan's welfare program is National Health Insurance (NHI). Implemented in March 1995, the main objectives of the program are to provide equal access to health care for all citizens and to limit total health spending to a reasonable level. Before NHI was implemented, the insured populations (57%) had previously been covered by three major health-insurance programs (i.e., Labor Insurance, Government Employees' Insurance, and Farmers' Health Insurance). However, while a small portion of employees' dependents was covered by the Government Employees' Insurance, a large number of children, elderly and homemakers (43% of total population) were uninsured. These uninsured groups have been benefited from the introduction of NHI. Overall, since its implementation in 1995, NHI has increased the percentage of the insured population from 57% in 1994 to 97% in 1998.

In this paper, we examine how and to what extent public transfers, old-age allowances and National Health Insurance, relate to ways in which adult children financially support their poor parents. Examining the results of this type of policy action is worthwhile because long-term operating costs of the two welfare programs are expensive, can be passed on to taxpayers and may reduce government expending on other public sectors. For example, in 2001 more than 181,211 elderly received old-age allowances of USD280.68 million. NHI now covers approximately 97% of the total population and its expenditures totals USD 6.3 billion or equivalent to 4% of the country's Gross National Product (GNP). The heated debate over these two welfare programs often relates to their underlying policy values and costs, as opposed to their actual effects on these two programs. In addition, some have speculated that these two welfare programs may, in fact, displace adult children's financial support to their aged parents

and, hence, lower total welfare of the elderly. To test this proposition, we use cross-sectional data collected from the early 1990s through 2003 on income and expenditures of individuals and their households to examine the amount of public and familial transfers given to 57,520 elderly.

## 2. BACKGROUND OF THE STUDY

### *(a) Theories of Role of Public Welfare Programs and Familial Transfers*

In this research, we focus on the poor elderly whose consumption largely depends on the support from their children and government. Hence, the terms “donors” or “givers” refer to working adult children, and “recipients” refer to poor, elderly parents. Similar to previous studies, we hypothesize that the extent to which the impact of public welfare on the amount of familial transfers depends upon kinds of motives of the giver or the adult child. Previous literature has discussed several kinds of motive including altruism (Barro, 1974; Becker, 1974), warm-glow (Andreoni, 1989), mixture of altruism and warm-glow (Andreoni, 1989), paternalistic model (Pollak, 1988), and exchange (Berheim, Shleifer & Summers, 1985; Cox & Raines, 1985; Cox, 1987). These motives lead to different predictions on the degree of crowding out of government transfers on familial transfers. In this paper, we do not aim to directly conclude the motives of the donors, but we are particularly interested in estimating how and to what extent the government transfers displace familial transfers.

To illustrate motive models, let us consider a simple model where a donor (e.g., an adult child) makes familial transfers  $F$  to a recipient (e.g., the child’s elderly parent). In this model,  $C_p$  and  $C_c$  are the private consumption of the elderly parent and his adult child, respectively. For the elderly, besides financial support from his child, other sources for the parent’s consumption

include net public welfare support ( $\tau_p$ ) and other types of income ( $I_p$ ). Therefore, the consumption of the elderly can be expressed as  $C_p = I_p + \tau_p + F = Y_p$ . On the other hand, the consumption function of the adult child is different from that of his parent because he does not receive the public support, but rather has to subsidize net public transfers ( $-\tau_c$ ). Similar to his elderly parent, the adult child also has other sources of income ( $I_c$ ). Hence, the adult child's consumption function is expressed as  $C_c = I_c - \tau_c - F = Y_c$ . In addition, the elderly parent's utility is denoted as  $U_p$ , and the adult child's utility is denoted as  $U_c$ .

The altruism theory makes two possible predictions regarding the impact of public welfare on familial transfers: a complete crowding out or a partial crowding out. If the motive of the donor is purely altruistic, a dollar increase in public transfers would reduce familial transfers (Barro, 1974; Becker, 1974; Cox, 1987). According to altruism theory, an altruistic giver maximizes both the utility of his own consumption as well as his elderly parent. The relationship between the utility functions of the adult child and his parent then can be expressed as  $U_c = (C_c, U_p(C_p))$ . The public welfare support ( $\tau_p$ ) received by elderly is, in fact, net public transfers ( $\tau_c$ ) subsidized by the adult child's income taxes. As a result, the total income of the family remains unchanged since  $\tau_p = -\tau_c$ . The interior solution is  $\partial F / \partial Y_c - \partial F / \partial Y_p = 1$ . The altruistic child then subsequently reduces a dollar of familial transfers previously given to his parent when he provides one dollar to support the public welfare system. This type of outcome is known as the redistributive neutrality property of Ricardian. However, the adult child may reduce his support less than a dollar of familial transfers when his elderly parent receives public transfers, but the adult child bear no specific tax burden for the new welfare program ( $\tau_p \neq -\tau_c$ ). In this case, the

public transfers become windfall benefits to the family. A partial crowding out occurs, instead of a complete crowd-out.

Unlike the altruism theory, the warm-glow model predicts that increases in public transfers do not influence familial transfers (Andreoni, 1989). In this case, the adult child derives his satisfaction purely from the act of giving regardless of the level of elderly parent's income ( $U_c = U_c(C_c, w(F, Z))$ ); where  $w(F, Z)$  is the warm glow effect influenced by familial transfers ( $F$ ) and other factors ( $Z$ ). That is, when the elderly parent receives additional transfers from the government, the adult child still provides the same amount of familial support to his elderly parent.

Relying on a mixture of both the altruism and “warm-glow” models, some researchers predict that the increases in public transfers may partially crowd out familial transfers (Andreoni, 1989). This outcome may be present when the altruistic adult child continues giving the same amount of support to his parent because he also enjoys the act of giving to elderly parent (similar to the prediction by the warm-glow model) even if he realizes that he already subsidizes the public welfare system with his income taxes (as predicted by the altruism model). Hence, this mixed model would predict a partial crowding out effect of public transfers on familial transfers.

The paternalistic theory (Pollack, 1988) makes two possible predictions regarding the impact of public welfare on familial transfers: a complete crowding out or a partial crowding out. In this theory, the adult child chooses to maximize his consumption and his elderly parent's consumption ( $U_c = U_c(C_c, C_p)$ ). That is, the adult child particularly cares about what his parent should consume and wants to make sure his parent consumes a certain good such as health care. Public health support provided by the government may be viewed as a perfect substitution for the money the child would provide for his parent. Hence, public transfers may lead to a complete

crowding out. However, if government assistance is in the form of cash transfers, instead of health care the child has in mind for his parent, the paternalistic child may still partially subsidize the health consumption of his parents. Under this circumstance, public cash transfers may partially affect net familial transfers.

On the other hand, some scholars have found that increases in public transfers actually lead to a crowding-in effect. According to the exchange model (Cox, 1987; Bernheim, Shleifer & Summers, 1985), the adult child may want his parent to provide some household services for him in return for his familial transfers. Therefore, the relationship between the utility functions of the adult child and his parent then can be expressed as  $U_c = U(C_c, U_p(C_p, S))$ , where  $S$  is the services provided by the elderly to adult child (e.g., household chores and grandchildren care). The more service an elderly parent gives to his adult child, the lesser the well-being and leisure time the parent has ( $\partial U_p / \partial S < 0$ ). Therefore, when the government increases support to the elderly parent, the parent becomes less dependent on his child's support and consequently his terms of trade with his adult child increases. To sustain the same services before his parent receives additional public transfers, the adult child would have to increase the amount of familial transfers from what he used to give his parent, resulting in a crowding-in effect.

### ***(b) Empirical Evidence of the Role of Public Transfers on Familial Transfers***

Several empirical studies have examined the crowding out effect of public transfers on familial transfers. Most of these studies, however, have taken place in developed countries and have concluded that the crowding out effect of public transfers on familial transfers is minimal (Rosenzweig & Wolpin, 1994; Cox & Jakubson, 1995;). Rosenzweig and Wolpin analyze parental aids to young women and their children using National Longitudinal Survey for

Young Women and National Longitudinal Survey for Youth. They find that government transfers displace familial transfers very marginally. Using public assistance data, Cox and Jakubson find that public transfers moderately crowd out private transfers. However, Schoeni (2000) finds a substantial crowding out effect of public transfers on familial transfers when using U.S. unemployed households data from Panel Study of Income Dynamics 1987. He concludes that unemployment insurance crowds out inter-household private transfers by 20-40 percent.

Few have examined the crowding out effect of public transfers on familial transfers in developing countries because public transfers are limited (Cox & Jimenez, 1992; Jensen, 2003). Nevertheless, these existing studies have found the crowd out effect of public transfers to be approximately 20-30 percent. Cox and Jimenez use the Peruvian Living Standard Survey 1986 and estimate that private transfers would increase by 20 percent in the absence of social security transfers. Jensen (2003) examines the large increase of old-age pension to the low-income group in South Africa between 1983-1993. He finds that a one rand increase in pensions crowds out 0.25-0.30 rand in inter-household transfers. However, estimating the crowding out effects of government transfers on familial transfers using data from Asia is often unknown.

### ***(c) Patterns of Inter-Household Transfers in Taiwan***

Familial transfers are large and widespread sources of income for low-income families in many Asian countries. Familial transfers can generally go from parents to young children, from adult children to elderly parents, and between siblings. Specific to Taiwan, familial transfers from adult children to elderly parents are vital because they can account as much as one-third of the consumption of a typical Taiwanese elderly (Mason *et al.*, 2006). Familial transfers from adult children to elderly parents can take place between households (i.e., inter-household

transfers) if the parents and their adult children live in separate households, and within the household (i.e., intra-household transfers) if parents and their adult children live together. In this paper, we particularly focus on the role of public transfers and the inter-household transfers flowing from adult children to parents due to two reasons. First, a large number of poor Taiwanese elderly live independently from their adult children, while these elderly financially depend on their children. Hence, a large share of familial transfers surging from children to parents occurs between households. Second, due to the existence of its prevalent welfare programs, Taiwan is one of the few countries in Asia that routinely collects the records of both public welfare assistances and inter-household transfers.

Over the past decade, the public transfer income of poor elderly has increased substantially, while the net inter-household transfers decline dramatically. Figure 1 shows the discrepancies of the average inter-household familial transfers (net) and public transfers given to poor elderly, while Figure 2 illustrates these transfers given to non-poor elderly. Public transfers include several public welfare assistances (i.e., old-age allowances, National Health Insurance and low-income assistance)<sup>2</sup>. Comparisons are standardized to relative individual consumption<sup>3</sup>. Figure 1 and Figure 2 show very distinct transfer patterns between the poor elderly and the non-poor elderly. On the one hand, since 1994, the poor elderly have received increases in public transfers and decreases in net inter-household familial transfers. On the other hand, the transfer patterns have been relatively stable for the non-poor elderly. For the poor elderly, familial transfers supported 60% of their consumption before the implementations of old-age allowances in 1993 and NHI in 1995. Since 1993, familial transfers have declined from 60% to 30% of the total incomes used for the poor elderly's consumption. For the non-poor elderly, their net familial transfers have been stable over time and accounted for a small percentage of their

consumption. Our preliminary results demonstrate that public transfers appear to crowd out familial transfers.

**Insert Figure 1 and Figure 2 about here**

The contribution of our study is two-fold. First, we examine the role of public transfers and familial transfers in Taiwan, where old-age public transfers have recently been introduced to the Taiwanese citizens and where the government agency collects cross-sectional data annually that capture the exact amount and specific type of both public and familial transfers over time. Second, we also examine how and to what extent the welfare of elderly has changed after the implementation of public programs.

### **3. ANALYSIS**

#### ***(a) Data and Sample***

We employ cross-sectional data from the Survey of Family Income and Expenditure (FIES) conducted by the Directorate-General of Budget, Accounting and Statistics of Taiwan from 1990 to 2003. The survey is nationally representative and was conducted by well-trained government officials. It provides data at both the household and individual levels. The data contain information about individual characteristics (e.g., demographic characteristics, economic status, and employment status) as well as information about income and expenditures of individuals and their households. More specifically, income data include employee compensation, entrepreneurial income, property income, private transfer income and public transfer income, while expenditures data consist of interest expenditure, private transfer expenditure, public transfer expenditure and household consumption. The FIES reports information about individuals who receive public old-age allowances and NHI benefits<sup>4</sup>, and

provides information about specific amounts of inter-household familial transfers<sup>5</sup>. Inter-household familial transfers are cash and gifts received or given between households.

The sample used in this study consists of individuals of age 65 and above interviewed between 1990 and 2003. Elderly living in agricultural families, however, were not part of this study because they received different social welfare programs. These restrictions result in a sample of 57,520. Among the elderly, 10,518 (18%) live in households receiving old-age allowances and 2,455 (4%) live in government employee households. The advantage of our sample is the ability to identify the exact amount and specific type of both public and familial transfers.

### *(b) Design*

The objective of this study is to evaluate the impact of Taiwan's old-age allowances and NHI on familial transfers. The old-age allowances target the poor elderly who have low per capita household income and do not receive any other social benefits. That is to say, the old-age allowance is a non-random public program. Despite this non-random program placement, we can estimate the impact of the program using the difference-in-difference method (Rosenzweig & Wolpin 2000). This method is applicable when the data arise from a natural experiment or a quasi-experiment, which is an exogenous event (i.e., public policy). With this method, we compare the changes in the size of familial transfers of treatment groups and control groups that happened before and after a new policy implementation.

In our analysis, two major events occurred in the 1990s: old age allowances and NHI. The FIES data identify the recipients of old-age allowances. All the elderly, including the poor and non-poor, receive NHI since 1995. Before 1995, most elderly did not receive any health

insurance except those who were government employees or who were parents of government employees. Therefore, NHI did not affect the elderly (parents) who lived in government-employed households because they received similar health insurance packages before and after NHI. In addition, they were not affected by old-age allowances because government employed households were medium-income to high-income households.

The selection of the control and treatment groups is an important focus in difference-in-difference methods. In this study, there are two control groups. The first control group, “Control I,” includes the elderly parents who live in households where the head (adult child) is employed in the public sector and the head’s spouse is either employed in public sector or is unemployed (N=1,891). The second control group, “Control II”, includes the elderly who live in households where the head (adult child) and his/her spouse work in different sectors: one in public sector and one in private sector (N=2,085). The difference between these two control groups is that the elderly in “Control I” have access to Government Employees’ Insurance (through children working for public sector), while those in “Control II” have access to both Government Employees’ Insurance (through children working for public sector) and Labor Insurance (through children working for private sector). The elderly in both control groups are not affected by introduction of NHI and old age allowances because either they already have health coverage through their children’s coverage or are not eligible for old-age cash transfers due to their high-income levels. To test for the reliability of “Control I”, the presence of “Control II” allows us to test for ignorability and quality of “Control I”. That is, if “Control I” is a “reliable” control group, the response of “Control II” to both public programs should be comparable to that of “Control I”. Therefore, “Control II” provides a test of the assumption that observed variables are controlled in estimating treatment effects (Meyer, 1995).

This study has three treatment groups. All the elderly included in the three treatment groups reside in non-government employees' households and are not covered by health insurance before the introduction of NHI. "Treatment I" includes the elderly who receive both an old-age allowance and were eligible for NHI in FIES (N=11,033) because they meet the "very poor" criteria<sup>6</sup> of having per capita pre-transfer household income less than 1.5 times the annual poverty line. "Treatment II" (N=15,972) includes the elderly in "Treatment I" plus other elderly who meet the "poor" criteria (household income between 1.5 and 2.5 of poverty line in the FIES). "Treatment III" consists of elderly who are not eligible to receive old-age allowances (non-poor), but were covered NHI (N=14,307).

Both old age allowance and NHI are expected to affect the elderly in "Treatment I" and "Treatment II". The crowding out effect of the two public transfers on the familial transfers of the two treatments should be similar because they have never received either public cash allowances or health coverage before policy implementation. Consequently, "Treatment II" is used to test the reliability of Treatment I's results. As for "Treatment III", it is used to measure the crowding out effects of NHI alone; therefore, its coefficient should be smaller than that of "Treatment I" and "Treatment II" (measuring both allowances and NHI). Descriptions of treatment and control groups are summarized in Table 1.

**Insert Table 1 about here**

**(c) Model Specification**

The difference-in-difference estimator can be stated as:

$$\text{Effect of public transfers, } \Delta = (F_{\text{for treatment group}}^{\text{After public transfer}} - F_{\text{for treatment group}}^{\text{Before public transfer}}) - (F_{\text{for control group}}^{\text{After public transfer}} - F_{\text{for control group}}^{\text{Before public transfer}})$$

where  $F$  denotes familial transfers by the treatment and control groups before and after the implementation of public transfer programs.

Since transfers are sensitive to economic shocks and may be volatile over time, an estimate derived from single-year data may not be representative. To increase the predictive power of the model, we estimate the difference-in-difference using the pooled samples of control and treatment groups from 1990 to 2003. The model can be represented as

$$F_{it} = \alpha + \beta_{it}^1 P_{it} + \beta_{it}^2 Treat_{it} + \beta_{it}^3 P_{it} * Treat_{it} + \beta_{it}^4 X_{it} + \beta_t^5 Year_t + \beta_j^6 Area_j + \varepsilon_{it} \quad (1)$$

where  $i$  indexes individuals,  $j$  indexes region,  $t$  indexes year.  $F_{it}$  is the net familial transfers observed for individual  $i$  in year  $t$ ,  $P$  is an indicator variable for the period after implementation of old-age subsidy and NHI (year 1994 and after),  $Treat$  is an indicator variable for the treatment group,  $X$  is a vector of observed individual and household characteristics,  $\beta_t^5$  is the fixed year effect,  $\beta_j^6$  is the fixed regional effect,  $\varepsilon_{it}$  is a random error term. The coefficients of these control variables are assumed to be constant across years. Using coefficients from equation (1), the effect of old-age cash subsidy and NHI can be expressed as

$$\Delta^P = [(\beta_{it}^1 + \beta_{it}^2 + \beta_{it}^3) - \beta_{it}^2] - [\beta_{it}^1 - 0] = \beta_{it}^3. \text{ Therefore, } \beta_{it}^3 \text{ measures the effect of old-age cash}$$

subsidy and NHI. We estimate equation (1) using an ordinary least square model (OLS) and nonlinear Tobit model.

There are two identification assumptions held in this difference-in-difference method (Besley & Case, 2000). First, it is assumed that no other factors affects the treatment and control

groups differently before and after the policy change, except the control variables included in the regression. Economic, social, and demographic variables are included in the regression. Second, the composition of the treatment and control groups remains stable over the period of study. In other words, the policies are not endogenous in terms of their effect on the treatment groups versus the control groups. We further investigate whether endogeneity is an issue with respect to old-age allowances in this study. If endogeneity occurs, old-age allowances should induce more proportion of elderly to report pre-transfer income under the “poor” criteria. However, our data show the percentage change in poor population distribution is the same for all age groups between 1990 and 2000. We can then conclude that endogeneity is not an issue in this study (Lai, 2006).

Another empirical issue is whether or not changes in living arrangement may affect the inter-household familial transfers. We further investigate the percentage of elderly living independently from adult children between 1990 and 2003 and find that the living arrangement trend of “poor” elderly is stable during the period of study; that is, about 45 percent of poor elderly lived independently from adult children. Since old-age allowances are targeted to “poor” elderly, this stable living arrangement trend is less likely to lead to biased estimate of familial transfers.

#### **4. RESULTS**

Table 2 presents descriptive statistics of the dependent and explanatory variables by the treatment and control groups. Some striking differences between these elderly groups are noticeable. First, the poor elderly (Treatment I and II) receive familial assistance primarily through inter-household transfers, while the non-poor elderly (Treatment III, Control I and II)

receive minimal inter-household transfers. This result is unsurprising as the control groups primarily consist of the elderly living in government employee households. Therefore, they receive familial supports mainly through co-residency. Second, the poor elderly receive a large amount of public welfare income (i.e., old-age allowances and NHI), while non-poor elderly receive NHI only. Third, the pre-transfer income for the poor elderly is very low, compared that of the non-poor elderly. Evidently, the pre-transfer income accounted less than 20 percent of the poor elderly's consumption. Furthermore, the poor elderly rely heavily on both public assistance and familial transfers to finance their consumption. On the other hand, approximately half of the consumption of the non-poor elderly is financed by their pre-transfer income (i.e., wage, pension income, property income and entrepreneurial income).

**Insert Table 2 about here**

***(a) Did Public Transfers Reduce Familial Transfers?***

Table 3 presents our full OLS results, while Table 4 presents the summary of our OLS results when using the full sample size (familial transfers of all values). All income and expenditure variables are converted to real values using Consumer Price Index in regressions. In column (1) of Table 4, the coefficient of the interaction term between post and treatment of -13,755 is statistically significant at the one-percent level, indicating that inter-household transfers for Treatment I (very poor elderly) reduced by NT\$13,755 (around USD\$420) after the implementation of old-age allowance and NHI. Table 4 also shows the average amount of each public transfer (i.e. old-age allowances and NHI) given to the “very poor” elderly each year between 1994 and 2003. The average amount of old-age cash allowances and the NHI received by the elderly annually was NT\$40,370 (USD\$1,240) and NT\$21,661 (USD\$667), respectively.

To calculate the total crowd out effect of public transfers on familial transfers, we divide the difference in the amount of inter-household transfers (-13,775) by the total public transfers (40,370+1,240). This results in a total crowd out of twenty two percent [ $-13,775/(40,370+1,240)$ ]. In other words, when the government provides the very poor elderly with one-dollar worth of public transfers, his adult child subsequently lower his supports to his parent by 22 cents.

Insert Table 3 about here

Insert Table 4 about here

We also examine the crowd out effect of public transfers on the familial transfers of the very poor and poor elderly (Treatment II) to test the reliability of Treatment I's results. We find the crowd out effects of public transfers on familial transfers using Treatments I and II comparable (see Columns 1 and 2 in Table 4). The coefficient of interaction term between post and treatment period for Treatment II is -19,222, which is statistically significant at one percent level. This coefficient yields a thirty four percent crowding out effects, and therefore we can be more confident with the estimated effects of the public programs on familial transfers.

In addition, we also examine how public welfare policy would affect the non-poor elderly. Specifically, we focus on how NHI (all elderly are eligible regardless of their income level) might have an impact on the non-poor family (Treatment III) (see Column 3, Table 4). More specifically, NHI crowds out inter-household transfers by NT\$3,742 (USD115). As predicted, these crowd-out amounts (NT3,742) of NHI alone are smaller than crowd-out amounts of both programs (NHI and old-age allowances) discussed earlier in Column 1 and Column 2.

We also check for the validity of Control I and find that the crowding effects using either Controls I or II are comparable in terms of the magnitude and sign. We also estimate the crowd out effects of government transfers on familial transfers using a nonlinear model-TOBIT procedure (not tabled). The marginal effects conditional on positive familial transfers of Tobit regression have the same sign as the interaction terms of OLS regression.

***(b) What Is the Impact of Public Transfers on the Total Consumption of Elderly?***

If public transfers crowd out familial transfers as our results show above, do the elderly ever benefit from public transfers? To answer this question, we investigate the effect of public transfers on elderly consumption using the difference-in-difference approach, while using the same treatment and control groups used to derive the results in the previous section. The only difference is that dependent variable is individual consumption<sup>7</sup> (log terms), as opposed to familial transfers. Because the dependent variable (elderly consumption) is measured in log forms, we use the “smearing” method (Manning *et al.*, 1987) to retransform it to calculate the marginal effect of public transfers (i.e., allowances and NHI) on elderly consumption. The transformed coefficients<sup>8</sup> of public welfare programs are shown in brackets in Table 5. The figures indicate that public transfers significantly increase the individual consumption of the elderly included in Treatment I (very poor elderly)<sup>9</sup> by 5.08 percent. More specifically, the increases in the consumption of very poor elderly are specific to a 24-percent increase in individual consumption of durables and a 34-percent increase in consumption of recreation (i.e. traveling expenses and recreation activities). In general, there are significant increases in the consumption of “luxury” goods by these very poor elderly populations. According to Engel’s Law, when poor people increase their spending on recreation, it indicates that their living

standards improve because recreation is a luxury good and a complement to leisure time. Specific to Taiwan, our results perhaps imply that overall the total consumption of very poor elderly increase as well as their living standards improved (measured by increases in luxury good consumption), although public transfers appear to crowd out the net familial transfers. This result is consistent with Chou *et al.* (2003)'s empirical evidence that the NHI alone increases household consumption by 2.4 percent.

Insert Table 5 about here

## 5. CONCLUSIONS AND RECOMMENDATIONS

In this study, we focus primarily on public transfers in the forms of old-age cash allowance and national health insurance program, which are proposed to impact the size of inter-household transfers. We also give special attention to how these welfare policies contribute to children's support to their elderly parents over time and how the consumption of the elderly may alter after implementation of these policies. Several important findings are noteworthy. First, the important contribution of this paper is we examine how public transfers influence inter-household familial transfers in Asia, where old-age supports are heavily relied on families. Our empirical results are consistent with recent evidence (Schoeni,2002), we find that a dollar of public transfers crowds out approximately 20-35 cents of inter-household transfers in Taiwan. This finding holds for all samples and specifications used in this study.

Does it imply that introductions of old-age allowances and NHI with such crowding effects have not reached their goal of providing support to elderly? We investigate the effect of the two public programs on the consumption of the very poor elderly. We find that although public transfers appear to decrease children's support to their elderly parents, elderly's total

welfare (measured by increases in total consumption and luxury goods consumption) has actually increased since the introduction of two Taiwan's public welfare programs.

An important but unanswered question in this analysis is: what is the crowding out effect on familial transfers through co-residency (intra-household transfers)? If intra-household transfers were to be examined together with inter-household transfers, we may witness a larger crowding effect of such public transfers. Detecting such crowding out effects, of course, would require the availability of good data. Having said that, our research findings need to be interpreted with caution because the two public welfare programs (i.e., old-aged allowances and NHI) are still in their infancy. It is likely that the two welfare programs may take time to develop, to become implemented, and to produce noticeable outcomes.

## NOTES

1. Personal assets such as land and house do not exceed NT\$500 millions for Taipei city, NT\$200 millions for Kinmen county and Lienchiang county, and NT\$260 millions for Kaohsiung city and Taiwan other 21 provinces.
2. Public transfer income in this paper excludes retirement pay from Government Employees' Insurance and Labor Insurance. The reason is these pensions are partially funded programs, and therefore may be considered as a mixture of saving and transfers.
3. Consumption here is the individual consumption. Household consumption is allocated to individual members using a combination of individual health consumption allocation, individual education consumption allocation, and equivalent scales (Mason *et al.*, 2006 and Lai, 2006).
4. The survey has a portion of National Health Insurance benefits that are not assigned to any household members. We allocate this portion to household members using a homogenous regression. Details of methods and results are discussed in Lai (2006).
5. The survey report familial transfer income received without tracing the donors. The amount of familial transfer expenditures is reported without tracing the recipients.
6. In our FIES data, usually only one of the elderly reported receiving old-age allowances in the household. If the male elderly reports that he receives the allowances, his spouse likely does not report that she receives any allowances. Therefore, we include both the male and his spouse as reported receiving the allowances for all the treatment groups.
7. To compare consumption over time, we convert consumption into real values using Consumer Price Index (base year 2001).
8. The marginal effect of policy is  $E(Y | policy = 1) - E(Y | policy = 0)$ . The retransformation of log linear model is  $E(Y) = \phi \exp(X\beta)$ , where smearing factor  $\phi = E[\exp(\varepsilon)]$ . The smearing factor is the sample average of the exponentiated least squares residuals (Manning, 1998).
9. In the individual consumption estimates, our assumption is that that allocation of household consumption (except health consumption) between adult children and elderly are equal within a household (same equivalence scale). If public transfers are given to an elderly living with their adult children, an increase in consumption would be shared by both adult children and elderly. This limitation does not affect much the analysis here because more than seventy percent of elderly in Treatment I live independently from their adult children. Also, this limitation probably does not affect NHI because health consumption allocation does not follow the equivalence scale. Household health consumption is allocated to household members, according to the FIES data. Therefore, NHI would likely increase the elderly's health consumption directly.

Figure 1. Average Net Inter-Household Transfers and Public Transfer Income of Poor Elderly (Aged 65+)

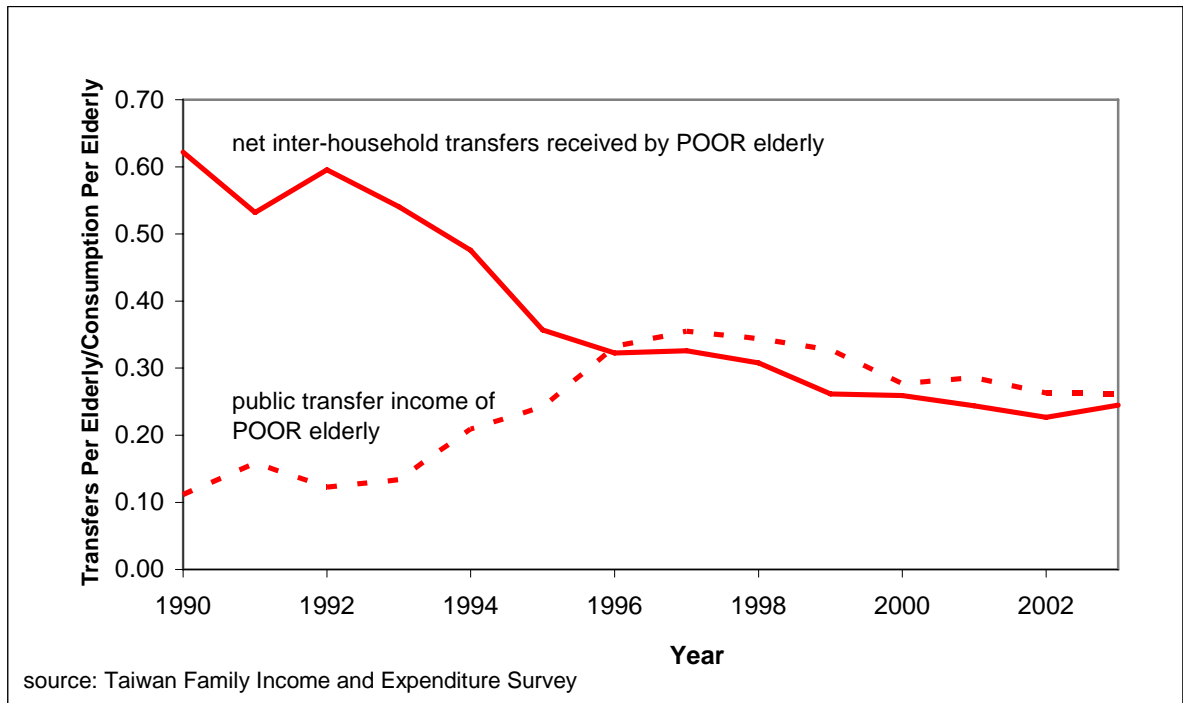


Figure 2. Average Net Inter-Household Transfers and Public Transfer Income of Non-Poor Elderly (Aged 65+)

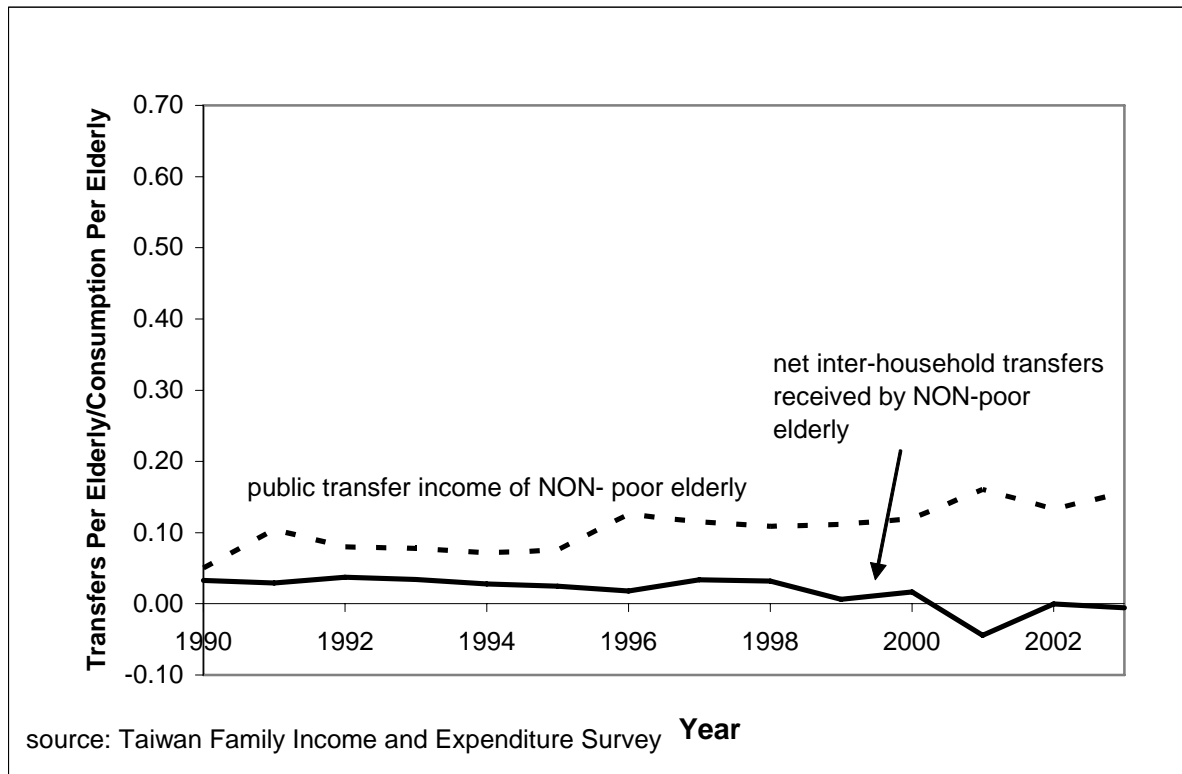


Table 1. Summary of Control and Treatment groups

Variable	Control I	Control II	Treatment I	Treatment II	Treatment III
Description	Elderly live in govt employee households	Elderly live in govt employee households	Very poor elderly, do not live in govt employee households	Treatment I + poor elderly, do not live in govt employee households	Non-poor elderly, but do not live in govt employee households
Had health coverage before NHI?	Yes	Yes	No	No	No
Received NHI since 1995?	Yes	Yes	Yes	Yes	Yes
Receive Old-age Cash?	No	No	Yes	Yes	No

Table 2. Summary of Sample Statistics

1990-2003	Treatment I		Treatment II		Treatment III		Control I		Control II	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
<i>Individual Income Variables (NT \$)</i>										
net interhousehold transfers	55,986.0	(91,452.0)	44,159.4	(76,894.0)	4,806.0	(63,537.9)	3,805.4	(30,553.5)	5,378.5	(31,300.5)
old-age allowance	40,370.0	(33,094.0)	37,456.0	(29,378.6)	-	-	-	-	-	-
national health insurance <sup>1</sup>	21,661.0	(25,654.5)	19,278.0	(22,536.8)	13,957.0	18,662.0	13,573.9	15,995.7	12,581.1	12,934.3
<i>Household Characteristics</i>										
log per capita household income (pre-transfer)	10.4	(1.5)	10.8	(1.5)	12.5	(0.5)	12.4	(0.5)	12.4	(0.5)
age of head	61.7	(17.8)	58.0	(19.4)	48.7	(18.2)	44.4	(12.7)	42.2	(11.3)
femalehead (=1)	0.2	(0.4)	0.2	(0.4)	0.1	(0.3)	0.1	(0.3)	0.1	(0.3)
years of head's education	7.0	(4.9)	7.5	(4.9)	11.3	(4.6)	12.5	(4.4)	12.5	(4.1)
# household member	2.9	(1.9)	3.2	(2.0)	3.7	(1.9)	5.2	(1.5)	5.6	(1.5)
<i>Individual Characteristics</i>										
age	72.9	(5.8)	72.8	(5.9)	71.6	(5.7)	73.7	(6.5)	73.2	(6.2)
married (=1)	1.0	(0.2)	1.0	(0.2)	0.9	(0.3)	1.0	(0.1)	1.0	(0.1)
male (=1)	0.6	(0.5)	0.6	(0.5)	0.6	(0.5)	0.4	(0.5)	0.5	(0.5)
compensation of employee (pre-transfer)	4,860.9	(29,601.6)	7,214.8	(42,142.7)	75,476.0	(209,497.8)	72,757.0	(312,436.6)	33,278.0	(172,748.7)
entrepreneurial income (pre-transfer)	3,280.5	(28,172.0)	8,448.3	(53,831.0)	30,546.7	(192,268.0)	4,225.0	(31,541.4)	11,162.9	(87,781.4)
property income (pre-transfer)	9,627.6	(33,363.0)	15,203.4	(65,695.7)	56,377.4	(207,840.0)	23,368.7	(97,564.8)	14,191.0	(73,204.0)
retirement income (pre-transfer)	3,532.6	(30,993.1)	10,189.3	(61,939.6)	65,297.0	(212,084.8)	39,921.2	(234,010.5)	24,320.5	(234,429.9)
consumption	131,646.9	(73,479.2)	141,194.3	(79,243.7)	208,558.6	(130,839.8)	177,190.1	(97,190.6)	176,749.5	(102,445.4)
# observations	11,033		15,972		14,307		2,264		2,085	

1. Individual national health insurance benefits are derived from allocating household benefits to each member equally

All income and expenditures variables are converted to real values using Consumer Price Index (2001 base year)

Source: Taiwan Family and Income Survey

Table 3. Ordinary Least-Square Estimates of Old-Age Allowance and NHI on Net Inter-household Transfers

	(1)	(2)	(3)	(4)
Control group:	Control I	Control I	Control I	Control II
Treatment group:	Treatment I	Treatment II	Treatment III	Treatment I
	1990-1993(pre) VS 1994- 2003(post)	1990-1993(pre) VS 1994- 2003(post)	1990-1994(pre) VS 1995- 2003(post)	1990-1993(pre) VS 1994- 2003(post)
<b>Dependent Variable: Net Inter-household Transfers,NT\$</b>				
<b>year post*treat</b>	<b>-13,755.288***</b>	<b>-19,222.110***</b>	<b>-3,742.554**</b>	<b>-11,275.907***</b>
	(2,492.920)	(2,240.013)	(1,591.465)	(2,429.437)
year post	7.215	3330.337	17,838.983***	-2953.815
	(3,396.284)	(2,798.710)	(3,891.186)	(3,169.316)
treat	30,254.609***	26,735.676***	4,608.079***	22,092.039***
	(2,160.708)	(2,024.245)	(998.183)	(2,013.359)
age	7,024.086***	6,718.282***	2,545.063*	6,202.556**
	(2,482.077)	(1,937.947)	(1533.452)	(2,565.932)
age square	-48.723***	-45.321***	-12.223	-43.622**
	(1,6.572)	(12.935)	(10.185)	(17.139)
age of household head	815.930***	562.388***	-140.906***	829.364***
	(51.863)	(35.748)	(32.010)	(55.305)
log family income	-6,604.130***	-9,667.901***	-22,286.331***	-6,432.216***
	(827.531)	(667.987)	(3,305.974)	(850.990)
married (=1)	40,952.461***	36,810.862***	10,480.163***	41,417.322***
	(3,100.711)	(2,512.496)	(1,631.188)	(3,134.936)
# of household member	-4,812.255***	-4,382.421***	-2,473.908***	-5,049.949***
	(414.251)	(2,78.214)	(263.462)	(422.064)
female head (=1)	20,815.259***	19,937.059***	9,835.229***	20,090.474***
	(2,064.438)	(1,705.281)	(1,654.489)	(2,121.322)
years of head's education	1,018.268***	650.698***	442.647***	1,032.724***
	(187.105)	(147.761)	(136.741)	(196.293)
area	303.998***	298.444***	122.722***	326.615***
	(51.366)	(42.801)	(30.722)	(52.278)
constant	-244,220.769***	-184,559.886**	155,753.550*	-206,898.600**
observations	12,985	17,889	16,571	12,806
R-squared	0.16	0.16	0.04	0.16

Robust standard errors in parentheses. Regressions include year dummies. All income and expenditure variables are converted to real values using CPI

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Table 4. Crowding Effects using Ordinary Least Square Regression (OLS)

	Column (1)	Column (2)	Column (3)
Control group	Control I Government employee hh	Control I Government employee hh	Control I Government employee hh
Treatment group	Treatment I Very Poor: Received NHI and cash allowances	Treatment II Poor: Received NHI and cash allowances	Treatment III Non-Poor: Received NHI, but not cash allowances
Time period	1990-1993(pre) VS 1994-2003(post)	1990-1993(pre) VS 1994-2003(post)	1990-1994(pre) VS 1995-2003(post)
Dependent Variable: Net Inter-household Transfers			
Interaction terms from OLS (NT\$)	-13,755***	-19,222***	-3,742***
Average old-age cash subsidy (NT\$)	40,370	37,456	-
Average NHI benefits (NT\$)	21,661	19,278	13,957
<b>Crowd out of \$1.00 public transfers</b>	<b>-0.222</b>	<b>-0.339</b>	<b>-0.194</b>
Interaction terms from Tobit (NT\$) (Marginal effect conditional on positive transfers)	-25,099***	-31,563***	-5,756***

\* statistically significant at 10%, \*\* statistically significant at 5%, \*\*\* statistically significant at 1%

Table 5. Ordinary Least-Square Estimates of Old-Age Allowance and NHI on Consumption

	Column (1)		Column (2)		Column (3)	
Control group	Control I		Control I		Control I	
Treatment group	Treatment I		Treatment I		Treatment I	
Time period:	1990-1993(pre) VS 1994-2003(post)		1990-1993(pre) VS 1994-2003(post)		1990-1994(pre) VS 1995-2003(post)	
	coeff.	std err.	coeff.	std err.	coeff.	std err.
Dependent variable:	log individual consumption		log household consumption on durables		log household consumption on recreation	
<b>year post*treat marginal effect</b>	<b>0.079***</b>	<i>(0.018)</i>	<b>0.236***</b>	<i>(0.030)</i>	<b>0.376***</b>	<i>(0.078)</i>
	<b>[0.055]</b>		<b>[0.271]</b>		<b>[0.318]</b>	
year post	0.669***	<i>(0.023)</i>	0.639***	<i>(0.038)</i>	0.719***	<i>(0.120)</i>
treat	-0.455***	<i>(0.015)</i>	-0.528***		-1.125***	<i>(0.065)</i>
<i>individual, household and demographic characteristics</i>						
age	0.003	<i>(0.012)</i>	0.004	<i>(0.022)</i>	-0.058	<i>(0.074)</i>
age square	0.000	<i>(0.012)</i>	0.000	<i>(0.000)</i>	0.000	<i>(0.000)</i>
age of household head	0.002***	<i>(0.003)</i>	0.007***	<i>(0.000)</i>	-0.003**	<i>(0.001)</i>
log family income	0.039***	<i>(0.002)</i>	0.080***	<i>(0.004)</i>	0.295***	<i>(0.016)</i>
married (=1)	-0.009	<i>(0.018)</i>	0.048***	<i>(0.034)</i>	0.628***	<i>(0.147)</i>
male (=1)	0.019***	<i>(0.007)</i>	0.049***	<i>(0.034)</i>	0.043	<i>(0.047)</i>
# of household member	-0.070***	<i>(0.002)</i>	-0.153***	<i>(0.004)</i>	0.297***	<i>(0.011)</i>
female head (=1)	0.079***	<i>(0.011)</i>	0.175***	<i>(0.019)</i>	-0.397***	<i>(0.071)</i>
years of head's education	0.012***	<i>(0.001)</i>	0.023***	<i>(0.014)</i>	0.108***	<i>(0.005)</i>
area	0.003***	<i>(0.000)</i>	0.006***	<i>(0.000)</i>	0.007***	<i>(0.001)</i>
# of observations	13,297		13,297		13,297	

Notes: Standard errors are in parentheses. Regression includes year dummies. All income and expenditure variables are converted to real values using Consumer Price Index (2001 base year)

\*\*\* Statistically significant at the 1% level, \*\* Statistically significant at the 5% level, \* Statistically significant at the 10% level.

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