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Strategic Interaction between Inter Vivos Gifts and Housing Acquisition

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Strategic interaction between inter vivos gifts and housing acquisition

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Abstract

To consider the policy event of a gift tax reduction earmarked for housing acquisition, the interdependence of parental gifts and children's housing investments is modeled, considering an informal care issue behind such decision making. The empirical results, which use a sample of households who purchased a house in Japan, demonstrate that such a tax cut would appear to have the following limited effects on boosting housing investment in equilibrium. First, even though transfers are encouraged, they consequently reduce housing investment because the housing investment function is negatively related to gifts. Second, increments in housing investment are further discouraged because the slopes of the gift and housing investment functions have opposite signs.

JEL classification: D11, D12, H14, J14, R21

Key words: Intergenerational transfer, housing investment, gift tax

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1 Introduction

To stimulate domestic demand, the Japanese government introduced a special gift tax abatement when children receive a gift of money from their parents for acquisition of a residence. As questioned by the government and the housing industry, does this policy really facilitate parental transfers and promote housing investments? To address this issue, we offer a theoretical model and empirical results of the strategic interaction between inter-vivos gifts and housing investments.

Previous studies have suggested that gifts by parents to their adult children tend to assist home acquisition in many countries (Engelhardt and Mayer, 1994; Guiso and Jappelli, 2002; Spilerman and Elmelech, 2003; Cox and Stark, 2005; Duffy and Roche, 2007; Helderman and Mulder, 2007; Cirman, 2008; Luea, 2008).[1] Because a conventional mortgage requires a down payment of 5–20% (Engelhardt and Mayer, 1998), home-buying households have to build substantial savings, and thus down payment constraints may distort optimal housing consumption (Artle and Varaiya, 1978). Intergenerational transfers are likely to relax this borrowing constraint. Engelhardt and Mayer (1998), Guiso and Jappelli (2002), and Duffy and Roche (2007) estimated that transfer recipients can reduce savings, increase down payments, and purchase higher-priced dwellings. Luea (2008) also demonstrated that receiving gifts appears to have a positive impact on the housing demand of children.

Although substantial inter vivos gifts are frequently earmarked toward acquiring a dwelling, there are few papers that investigate the motives behind transfer decisions. Cirman (2008) demonstrated that intergenerational transfers for acquiring a residential property increase when both housing prices and interest rates are relatively high. She concluded that transfers can act as an informal source of housing finance and play a cushioning role in terms of

[1] In the US, Engelhardt and Mayer (1994) found that a fifth of all first-time home-buying households receive a financial transfer from their relatives. Similar to the share in the US, in the Netherlands, Helderman and Mulder (2007) found that approximately 20% of children receive a parental gift to purchase a home. In Slovenia, Cirman (2008) demonstrated that a quarter of homeowners receive a financial transfer from their family. In Ireland, Duffy and Roche (2007) found that evidence on parental assistance in the Irish housing market has been mixed, namely from 15% to 33% of first-time home buyers receive transfers. In Italy, one country where family bonds are especially strong (Hank, 2007), Guiso and Jappelli (2002) showed that one-third of homeowners receive transfers earmarked for a home purchase. In Israel, Spilerman and Elmelech (2003) produced evidence that 36% of parents stated that they have a high parental responsibility of assisting their children's homeownership.

harsh market conditions. This suggests that parents have an altruistic preference, i.e., parents care about the well-being of their children, and therefore parents help their children when they are confronted with a deterioration in housing-related conditions. The motive behind transfer decisions, however, is a controversial issue. Many studies in relation to intergenerational transfers or bequests have suggested parents are more likely to possess an exchange motive rather than an altruistic motive (Bernheim, Shleifer, and Summers, 1985; Cox, 1987; Horioka, 2002; Tomassini, Wolf, and Rosina, 2003; Yamada, 2006; Angelini, 2007; Kureishi and Wakabayashi, 2009; Yin, 2010). That is, parents tend to enter an agreement with their children whereby their adult children agree to provide a service in exchange for receiving gifts. Tomassini, Wolf, and Rosina (2003), Yamada (2006), and Yin (2010), for example, demonstrated that transfers are made when children choose to locate their home close to their parents' home, because one's adult children nearby may facilitate more regular contact with the children.[2]

The remainder of this paper consists of three parts. The first part offers a theoretical model. As Duffy and Roche (2007) mentioned, existing studies related to intergenerational transfers targeted toward home purchases have mainly focused on empirical issues. In this paper, we develop a model of strategic interaction between two-generation families: children and parents. This model extends the theoretical model of Cox (1987), which captures both the altruism and the exchange motives. The theoretical model in this paper differs from that of Cox (1987) as follows. In the model of Cox (1987), services provided by children to parents are endogenous, while in our model, services are given and completely controlled by parental gifts. That is, services are assumed to be an increasing function of gifts. This may reflect the previous empirical results that gifts are provided by parents for an exchange motive.[3] Instead, we consider housing investment decisions by children, because our paper focuses on housing decision issues. Moreover, Cox (1987) did not consider the interdependence of players'

[2] Alternatively, transfers earmarked for homeownership are made because housing is complementary to the birth of grandchildren (Cox and Stark, 2005). Wolff (2001), Johar, Maruyama, and Nakamura (2010), and Yamada (2006), however, found evidence against the demonstration-effect hypotheses.

[3] In Japan, the Japanese Civil Law may be justified by this assumption. According to the Civil Law, a successor who has made substantial contributions to the maintenance or increase in the value of the predecessor's estate through medical treatment or nursing of the predecessor, or other means, is entitled to receive a gift of greater value than his/her legal portion of an inheritance. This is called a contributory portion.

decisions, while we consider it in this paper. That is, we assume that the behavior of a two-generation family can be described by a Nash equilibrium, and, consequently, gifts provided by the parent depend on housing investment spent by the child, whereas housing investment depends on gifts. Under the pure altruistic motive, the housing investment function is positively related to gifts, as suggested by Engelhardt and Mayer (1998), Guiso and Jappelli (2002), and Duffy and Roche (2007). This implies that an increase in parental gifts has only an income effect on housing investment. The situation, however, becomes more complex if parents possess an exchange motive. That is, the effect of gifts on housing investment becomes either positive or negative.

The second part of this paper undertakes empirical analysis. We test for strategic interaction between inter vivos gifts and housing investment. Therefore, unlike previous studies, which have examined decisions related to gifts and housing investment in isolation, we estimate both the gift and the housing investment functions. A fundamental problem in estimating these reaction functions is the endogeneity of key covariates: the reaction function of parents' choice to children's decisions, and vice versa. The two-stage procedure, where the first stage involves estimating regressors for both gifts and housing investment, is used to overcome this problem (Nelson and Olsen, 1978).

The third part considers policy implications. We focus theoretically and empirically on how an exogenous policy event of the gift tax reduction alters parents' and children's decisions. Although studies concerning the effect of the gift tax on the residential housing market have been quite limited, Bellettini and Taddei (2009) and Smolders (2010) considered this issue.[4] Smolders (2010) found that the 2003 Flemish gift tax reduction significantly increased the supply of new housing starts. Bellettini and Taddei (2009) developed a theoretical model featuring intergenerational altruism. The model suggests that a reduction in the gift tax reallocates agents' housing stock away from the market and toward donation, and consequently it increases the market price of real estate. Their theoretical results are supported by an empirical model, which used the 2001 abolition of bequest and donation taxation in Italy

[4] A number of previous studies of gift taxes and transfers have focused on the tax minimization problem of donors (Joulfaian, 2004, 2005; Nordblom and Ohlsson, 2006).

as a case study. In contrast with Bellettini and Taddei (2009) and Smolders (2010) who used city (community)-level aggregate data, we use Japanese individual micro data. Japanese evidence may provide an interesting setting as well, because it includes a time period when the government has reduced gift tax rates earmarked for housing acquisition. Moreover, the individual micro data may have merit in that it can consider tax differences between individuals. However, an effective gift tax rate, which is used in both reaction functions, has a potential endogeneity problem. In the first stage of estimation, we also consider this endogenous issue by estimating generated regressors. Therefore, three generated regressors, namely gifts, housing investment, and effective gift tax rates, are used to estimate inter vivos gifts and housing investment.

The remainder of the paper is organized as follows. Section 2 provides a brief description of the Japanese gift tax. In Section 3, we present a theoretical model of gifts provided by parents and housing investment made by children. The data and empirical model used are discussed in Section 4, along with the empirical results. Section 5 theoretically and empirically demonstrates the exogenous event of a gift tax reduction on housing investment. Section 6 offers some suggestions for future research. Finally, Section 7 summarizes the main conclusions.

2 Gift tax in Japan

We will briefly review the background of the Japanese gift tax and its reform.[5] Japanese gift tax is payable by the person who receives the gift. In the estimation stage, the data from 2001 to 2008 are used. At that time, three different schedules of effective gift tax rates τ_j $(j = 1, 2, 3)$ existed. The detailed methods for calculating τ_j are shown in Tables A1, A2 and A3 in the Appendix. The regular effective tax rate τ_1 follows a progressive schedule to produce the solid line in Figure 1.

However, since the 1984 Japanese tax reform, there has been a special gift tax abatement for persons who receive transfers from their parents or grandparents for the purpose of acquiring a residence. At that time, it was widely believed that Japanese dwellings are substantially

[5] For more detail about the Japanese gift tax, see Darcy (2007).

inferior in quality compared with other developed countries. For example, the 1986 Annual Economic Report issued by the Economic Planning Agency showed that the ratio of nominal housing equity to national income was 1.40 in the UK and 1.04 in the US, while it is only 0.65 in Japan.[6] Therefore, this tax policy was aimed at increasing the number of high-quality dwellings. If the special gift tax abatement applies, the special effective tax rate τ_2 follows a progressive schedule shown as a broken line in Figure 1. To receive this abatement, however, the gift must be used to purchase a residence located in Japan. Moreover, donees whose total taxable income for the year is in excess of 12 million yen (14.31 million yen for salaried employees) cannot enjoy the abatement. In addition, the donee must sell a exsisting dwelling, when he/she purchases a new dwelling.

The Japanese government has further reduced the special tax rate of gifts since 2003, as part of a general fiscal stimulus package. In Japan, the majority of financial assets are held by senior citizens. The government has thus attempted to facilitate the transfer of assets from seniors to their children, because this may stimulate the purchase of housing by the younger generation.[7] The 2003 Japanese tax reform decreased the special effective tax rate τ_3, shown as a dotted line in Figure 1. Although τ_3 only applies to gifts from a parent to a child to purchase a residence, it applies regardless of income and previous homeownership.

3 The model

The analysis in this section focuses on the behavior of a two-generation family. There are two players in the model: a donor, say the parent, and a recipient, the child. The parent decides how much to give in terms of nonnegative inter vivos gifts g to the child. As mentioned in Section 1, one of the reasons that gifts are provided by the parent is the exchange motive: the child devotes services s, e.g., nursing care, in exchange for g. However, the level of services provided by the child cannot be observed from our data. To avoid this problem, assume that

[6] Kanemoto (1997), however, demonstrated that the condition of owner-occupied housing in Japan is not bad compared with the US and European countries, using other statistics such as housing prices, floor space, the share of housing expenditure in total national expenditure, and so on.

[7] In December 2010 , the Japan Tax Commission announced their proposed 2011 tax reform. It calls for an increase in the inheritance tax, and suggests a decrease in the gift tax for some taxpayers to promote transfers of assets to younger generations.

the services are a nondecreasing linear function of g. Then $s = s(g)$, where $s(0) = 0$, $s_g \geq 0$, and $s_{gg} = 0$.[8] This implies that the parent and the child make a one-to-one relation contract between g and s. These settings allow us to derive a testable hypothesis about players' behavior that can be tested using the data. On the other hand, the child decides how much to spend on (positive) housing investment h. The gift tax is payable by the child.

We adopt a strategic-interaction model: the parent decides the value of the gift given the level of housing investment made by the child, and vice versa.

Assume that the utility function of the child depends on housing investment h, services to the parent s, and the composite good x. Because all observations in the data have positive housing investment, h is assumed to be positive. To keep the model tractable, the utility function of the child, U^C, is assumed to be separable as follows:

$$U^C = u^C(h, s) + v^C(x).$$

Both the subutility functions, $u^C(\cdot)$ and $v^C(\cdot)$, are assumed to increase at a decreasing rate: $u^C_h > 0$, $u^C_{hh} < 0$, $v^C_x > 0$, and $v^C_{xx} < 0$. We assume that the child derives disutility from nursing services at an increasing rate, namely, $u^C_s < 0$ and $u^C_{ss} < 0$. The former assumption, $u^C_s < 0$, corresponds to the assumption of Cox (1987). In his model, the child provides some services to the parent, and the child derives disutility from them. Similar to Cox (1987), we assume that $u^C_{hs} < 0$.[9] The negative sign implies that increases in services decreases the child's

[8] In the theoretical model of Cox (1987), a child's welfare is represented by the utility function $U^C(x, s)$, where x is the child's consumption, $U^C_x > 0$, $U^C_{xx} < 0$, $U^C_s < 0$, and $U^C_{sx} < 0$. The child's income constraint is given by $y^C + g = x$, where y^C is the child's income. In the exchange motive case, to induce a child's services, parents suggest the following participant constraint to their children:

$$U^C(y^C + g, s) = U^C(y^C, 0).$$

Let us consider how the child reacts when the parent increases the gift. Differentiating the above equation with respect to s and g, we have:

$$\frac{\partial s}{\partial g} = -\frac{U^C_x}{U^C_s} > 0.$$

This is consistent with our assumption $s_g > 0$. We also obtain:

$$\frac{\partial^2 s}{\partial g^2} = -\frac{U^C_{xx}U^C_s - U^C_{sx}U^C_x}{(U^C_{sx})^2} < 0.$$

On the other hand, we assume $s_{gg} = 0$, because this assumption always ensures the second-order condition of a maximum in our model.

[9] Cox (1987) assumed a negative mixed partial derivative of utility with respect to the child's consumption

marginal utility of housing. This phenomenon is more likely to occur when informal care tends to be a heavy burden for children, namely $u_s^C < 0$.[10]

Let y_C be the income of the child, t be the gift tax rate, p be the price of the composite good, and l_0 be the value of the child's land endowment (a lot with no buildings on it). Although the actual burden of gift tax rates (τ) partially depends on the value of the gift, as shown in Figure 1, we only consider t because this simplification does not alter the theoretical results. We consider the endogeneity of gift tax rates in the empirical section. Let us suppose that the child can deduct l_0 from the construction expenses of the dwelling. Then the budget constraint of the child becomes:

$$y_C + g(1-t) + l_0 = h + px.$$

When the child receives a positive amount of the gift, then the child will have to pay the gift tax and therefore the after-tax receipt becomes $1-t$.[11]

From this constrained utility maximization problem, the reaction function of housing investment is defined by:

$$h = h(g, t, y_C, p, l_0), \tag{1}$$

where

$$\frac{\partial h}{\partial g} \gtreqless 0, \frac{\partial h}{\partial t} < 0, \frac{\partial h}{\partial y_C} > 0, \frac{\partial h}{\partial p} \gtreqless 0, \frac{\partial h}{\partial l_0} > 0. \tag{2}$$

Increasing the gift tax rate reduces the availability of gifts, and consequently decreases housing investment ($\partial h/\partial t$). The income effect ($\partial h/\partial y_C$) is positive. While, the price effect ($\partial h/\partial p$), which implies housing prices are lowered relatively, is undetermined because it depends on the negative substitution effect and the positive income effect. Similar to the income effect, land endowment has a positive impact on housing investment.[12]

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and the child's service.

[10] Consider $u^C = h^\alpha(A - s^\kappa)$, where parameters α and κ must satisfy $0 < \alpha < 1$ and $\kappa > 1$, respectively. Parameter A is the constant term, where $A > s^\kappa$. Then $u_{hs}^C = -\alpha\kappa h^{\alpha-1}s^{\kappa-1} < 0$. The marginal rate of substitution (MRS) between housing and nursing care services becomes positive (as nursing care services increase more and more, an increasingly higher amount of housing investments is required in order to maintain the same level of utility) when the utility function satisfies these assumptions. The positive MRS can be natural, because we assume that the child must increase nursing care services in exchange for receiving gifts, and providing nursing care services generates disutility for the child.

[11] The inter vivos gift is only intended for a housing acquisition in the data used in the empirical section. The following theoretical results do not depend on this if we only consider an inner solution.

[12] Appendix A shows how Eqs. (2) are calculated.

The sign of $\partial h/\partial g$ affects the slope of the reaction function of housing investment with respect to a given amount of an inter vivos gift. The gift increases the housing investment of the child through the budget constraint: an increase in g has a similar impact to an increase in income. We call this the first channel. Engelhardt and Mayer (1998), Guiso and Jappelli (2002), Duffy and Roche (2007), and Luea (2008) examined the first channel, although their econometric model assumed that the value of the gift was exogenous. The gift, however, decreases housing investment through the utility function: the mixed partial derivative, u^C_{hs} is negative. We call this the second channel. Because there are two opposite channels, the sign of $\partial h/\partial g$ is ambiguous and it becomes an empirical issue.

Next, let us consider the behavior of the parent. Similar to Cox (1987), we assume that the parent cares about both his/her own private utility and the child's utility: $V^P = U^P + U^C$, where U^P is the parent's private utility. The parent thus cares about the child's well-being. In this sense, the parent is assumed to possess altruistic preferences. We, however, assume that the parent does not care about the child's endowment (l_0) when he/she considers the welfare of the child. Furthermore, the parent considers not the partial cost of the dwelling (l_0) but the total cost of the dwelling (h).

Assume that the parent's private utility depends on services provided by the child, s. The exchange motive can describe this assumption in our model, because we assumed that the services are a nondecreasing function of g. In addition, assume that the parent's private utility depends on care services purchased in the market, m. This is because there may be a substitute relationship between care services supplied by the market and the child. Contrary to the inheritance case (e.g., Bernheim, Shleifer, and Summers, 1985; Angelini, 2007), the existence of market substitutes is important when we consider the inter vivos transfers. This is because, if there are no market substitutes, the beneficiary can break the contract, and consequently the benefactor cannot pose a threat. The existence of market substitutes is a unique point, which has been overlooked in existing studies. However, we drop the parent's consumption, to reduce the number of endogenous variables.[13] We also suppose that the parent

[13] This simplification does not alter the theoretical results, but alters an interpretation of it. See Appendix B.

derives private utility from a housing investment spent by the child, h. Namely, the parent considers the child's investment as an own consumption good. For example, the parent can consume housing services invested in by the child when the parent visits the child's house. Furthermore, the parent can enjoy it when the child offers coresidence. Alternatively, the parent receives utility because homeownership of a large dwelling may proxy for the success of the child.

Because the income of the parent is not observed from the data, the private utility function of the parent is assumed to be quasilinear: $U^P = u^P(h, s) + m$. Both housing and services provided by the child are assumed to increase utility at a decreasing rate. Therefore, $u^P_h > 0$, $u^P_{hh} < 0$, $u^P_s > 0$, and $u^P_{ss} < 0$. Similar to Cox (1987), we also assume that $u^P_{hs} > 0$. The positive sign implies that the parent's utility increases when the child dwells in a large house and simultaneously provides a large amount of services. The parent may guess that the child is filial to the parent in this case.

From the above assumptions, the parent's utility function can be rewritten as:

$$V^P = u^P(h, s) + m + u^C(h, s) + v^C(x).$$

The parent faces the following three constraints: nonnegative inter vivos gifts $g \geq 0$ and the two budget constraints:

$$y_P = g + qm,$$
$$y_C + g(1 - t) = h + px,$$

where y_P is parent's income, and q is the price of m.

Consider the case $g > 0$. Solving the constrained utility maximization problem, the gift function is then defined as:

$$g = g(h, t, y_C, p, q), \tag{3}$$

where[14]

$$\frac{\partial g}{\partial h} \gtrless 0, \frac{\partial g}{\partial t} \lesseqgtr 0, \frac{\partial g}{\partial y_C} < 0, \frac{\partial g}{\partial p} \lesseqgtr 0, \frac{\partial g}{\partial q} > 0. \tag{4}$$

[14] Appendix B shows how Eqs. (4) are calculated.

The first sign, $\partial g/\partial h$, attempts to calculate the slope of the gift function with respect to a given level of housing investment. This depends on the sign of the mixed partial derivatives u^P_{sh} and u^C_{hs}, which are assumed to work in opposite directions.

The next three signs may reflect whether or not the parent possesses altruistic preferences. The negative sign of the child's income ($\partial g/\partial y_C$) suggests that the parent has a tendency to help the child when the child's earnings are low. The price effect ($\partial g/\partial p$) is ambiguous because the substitution effect and the income effect work in opposite directions. These results may be consistent with the empirical result of Cirman (2008). She mentioned that intergenerational transfers play a strong cushioning role in terms of grim market conditions. Interestingly, we find that the price effect has a completely different impact on transfers and housing investment: when $\partial h/\partial p$ is positive, then $\partial g/\partial p$ becomes negative, and vice versa. The effect of the gift tax ($\partial g/\partial t$) is ambiguous as well. On the one hand, increases in t have the same power of reducing the income of the child, and thus it increases g. On the other hand, increasing the gift tax relatively decreases the effectiveness of the gift for the child; the parent thus reduces the amount of gifts.

Finally, the partial derivative of q has the following two roles. First, it may reflect the parent's exchange motive. This is because formal care (m) only appears in the parent's utility, and formal care (m) and informal care (s) are assumed to be substitutes. The positive sign implies that a rise in the market price of formal care services increases the amount of inter vivos transfers. This result suggests that the parent must depend on attention provided by the child when the market is limited. Then, the assumption of a contract to exchange a gift for a service provided by the child may become a real possibility. Second, q can be used as an instrument variable (IV) in the housing function, because it shifts the gift function while not affecting the housing investment function.

The gift function can be identified as well, because l_0 only shifts the housing investment function.

4 Empirical analysis

4.1 The empirical model

We must account for the fact that optimizing behavior leads to a corner solution response for some significant fraction of parents. To consider this problem, $g_i^{\#}$ is an unobserved latent variable of a gift for household i. In addition, we may not use gift tax rates t_i in the empirical section, because a two-generation family may actually consider the effective gift tax rates τ_i. Considering these points, we specify Eqs. (1) and (3) in the following linear form:

$$h_i = \gamma_C g_i^{\#} + \delta_C \tau_i + X_{Ci}\beta_C + \varepsilon_{Ci}, \tag{5}$$

$$g_i^{\#} = \gamma_P h_i + \delta_P \tau_i + X_{Pi}\beta_P + (\varepsilon_{Pi} | \, g_i^{\#} > 0), \tag{6}$$

where h_i is an observed housing investment, X_{Fi} is a vector of explanatory variables ($F = P, C$), γ_F, and δ_F, and β_F are coefficients. On the one hand, the vector X_{Ci} includes y_i, p_i, and instrumental variable l_{0i}. On the other hand, the vector X_{Pi} includes y_i, p_i, and instrumental variable q_i.

However, although $g_i^{\#}$ in Eq. (5) and h_i in Eq. (6) are assumed to be exogenous for each player, we only observe pairs of $g_i^{\#}$ and h_i that are endogenously determined by the model. In addition, the effective gift tax rates τ_i are endogenous as well, because they generally depend on the size of the gifts, as shown in Figure 1. Before considering the endogeneity of these variables, the average gift tax rates that are given for parents and children are calculated. The average gift tax rates are instruments for $g_i^{\#}$, h_i, and τ_i. The details of these instruments are discussed in the following section.

Two-step procedures developed by Nelson and Olson (1978) are used to examine endogeneity. In the first procedure, not only the reduced form of $g_i^{\#}$ and h_i, but also τ_i are respectively estimated, using the average gift tax rate. On the one hand, h_i is estimated by ordinary least squares (OLS). On the other hand, $g_i^{\#}$ is estimated as a Tobit model, which takes into account the fact that gifts cannot have negative values. The effective gift tax rate is estimated by the Tobit model as well. From the first step procedure, generated regressors $\hat{g}_i^{\#}$, $\hat{h}_i$, and $\hat{\tau}_i$ are obtained. In the second procedure, Eq. (5) is estimated by OLS, by replacing $g_i^{\#}$ and τ_i in

Eq. (5) with $\hat{g}_i^{\#}$ and $\hat{\tau}_i$, while Eq. (6) is estimated as a Tobit model, by replacing h_i and τ_i in Eq. (6) with $\hat{h}_i$ and $\hat{\tau}_i$. From the two-stage procedure, consistent estimators are obtained, because the endogeneity issues of the right-hand-side in both Eqs. (5) and (6) are considered.

4.2 The average gift tax rate

In the estimation stage, the data from 2001 to 2008 are used. During years 2001 to 2008, there were three different schedules of effective gift tax rates τ_j $(j = 1, 2, 3)$; these were introduced in Section 2. In the estimation stage, we assume that children who receive a gift are subject to the lowest tax schedules. That is, children who receive a gift before 2003 but who cannot enjoy the special gift tax abatement pay τ_1; children who receive the gift before 2003 and who can enjoy the special gift tax abatement pay τ_2; and children who receive the gift from 2003 onwards pay τ_3.

As mentioned, however, the problem is that the effective tax rate depends on the size of the gift. In making the tax reduction an exogenous event, we follow Engelhardt and Mayer (1998) and Guiso and Jappelli (2002). In their model, a player considers the average price of housing, which is controlled by cross-sectional and time variations when the player makes a decision. In our model, we examine the following two types of average gift tax rates. The first type uses an average down payment, which is calculated as follows:

$$\bar{D}_{i,k,r} = \frac{0.20 \times \sum h_{i,k,r}}{N_{k,r}},$$

where $\sum h_{i,k,r}$ is the total value of housing investment in year k (years 2001 to 2008) in region r, and $N_{k,r}$ is the number of observations. Engelhardt and Mayer (1998) suggested that a conventional mortgage requires a down payment of 5–20% in the US, and intergenerational transfers may relax the borrowing constraint of children. Following this, we assume that both parents and children consider the average down payment to calculate their own tax rate. Households in Japan usually require a 20% down payment on the house price to obtain a loan. The average down payment thus corresponds to 20% (0.20) of the average house price. Substituting $\bar{D}_{i,k,r}$ into g in Table A1, we then calculate the first type of average gift tax rate.[15]

[15] Although the assumption of 20% of the average house price seems reasonable, we also consider average gift

The second type uses the average value of gifts. The average value of a gift is calculated as follows:

$$\bar{G}_{i,k,r} = \frac{\sum g_{i,k,r}}{N_{k,r}},$$

where $\sum g_{i,k,r}$ is the total value of a gift. Substituting $\bar{G}_{i,k,r}$ into g in Table A1, we then calculate the second type of average gift tax rate.

On the one hand, the effective gift tax rate reflects the tax rate difference between individuals. As mentioned, however, it involves an endogeneity issue. On the other hand, the average gift tax rate cannot precisely measure the tax difference between individuals, but it is exogenous for individuals. Considering this, we employ the average gift tax rate as an instrument for the effective gift tax rate. The average gift tax rate is expected to have an influence on the effective tax rate of each player, but may be uncorrelated with each player's decision.

4.3 The data

The data come from the customer survey collected by the Japan Federation of Housing Organizations (JHO). The JHO is authorized by the Ministry of Land, Infrastructure and Transport. Its members consist of housing suppliers in Japan. Enterprises of various sizes are members of the JHO, not only the large enterprises but also the medium and small enterprises. Various kinds of construction methodologies for housing suppliers are also included; e.g., prefabricated construction suppliers, wooden home suppliers, two-by-four home builders, and foreign-designed homes.[16] The JHO distributes a questionnaire to home builders who sold a detached house in the three major metropolitan areas of Tokyo, Nagoya, and Osaka, and four provincial cities of Sapporo, Sendai, Hiroshima, and Fukuoka. The Tokyo metropolitan area includes Saitama, Tokyo Metropolitan, Chiba, and Kanagawa prefectures; the Nagoya metropolitan area includes Gifu, Aichi, and Mie prefectures; and the Osaka metropolitan area includes Kyoto, Osaka, Hyogo, and Nara prefectures. Although the observations are limited to the above areas, the number of newly owner-occupied houses accounts for approximately 46.6%

tax rates of 25%, 50%, 75%, and 100% of the average house price. We do not report the empirical results, because the results are similar.

[16] Details about the JHO are available at http://www.judanren.or.jp/english/index.html (accessed on 15 March, 2011).

of such houses in Japan (the 2008 Housing Starts, Ministry of Land, Infrastructure, Transport and Tourism). Home builders do ask their customers to report transfers received, total earned income of household members, and the price paid for property. The JHO conducts this survey every year and collects micro-level cross-sectional data on approximately 3,000 home-buying households. We use the data for 2001 to 2008. The number of observations in the full sample is 3,131 in 2001; 3,000 in 2002; 3,047 in 2003; 2,794 in 2004; 3,634 in 2005; 3,540 in 2006; 3,241 in 2007; and 3,206 in 2008. Screening the data for complete information on the selected variables produces a sample of 23,939 observations, which are 93.5% of the full sample.

Table 1 presents the variable definitions for the endogenous, explanatory, and instrumental variables. The notations in Table 1 correspond to the notations in the theoretical section. Table 2 provides summary statistics. As in Table 2, gifts include zero values. Table 3 indicates that approximately 18.5% of observations receive a positive gift. On average, children's income without a gift is 1.51 million yen higher than for children with a gift. Although children with a gift receive approximately ten million yen on average, they invest 1.17 million yen less than children without a gift.

Details of the gift tax rates were explained in the previous sections. The results in Table 2 suggest that Average tax 1 is most likely to ensure sufficient variation in the average gift tax rate. This may reflect the fact that Average tax 1, which depends on the average down payment, allows us to examine not only the average tax rate difference between years (k), but also the average tax rate difference across regions (r).

For the child's income we use the total annual income before tax earned by all members of a child's household. For the price of the composite good, we calculate the regional CPI data in each year by multiplying the nationwide CPI and the regional differences in the index of consumer prices, which are obtained from Statistics Bureau, Ministry of Internal Affairs and Communications.

From the theoretical model, the date of land acquisition which we use as an instrument for the gift function is also included in X_{Ci}, while the market price of care services which we use as an instrument for the housing investment function must be included in X_{Pi}. There

are, however, the following three problems in obtaining the latter variable. First, we cannot obtain the parents' residential location from the data. We thus assume that children and parents reside in the same region. According to the 2004 wave of the Keio Household Panel Survey, sponsored by the Ministry of Education, Culture, Sports, Science and Technology, approximately 80 percent of senior parents and adult children dwell in the same prefecture in Japan.[17] Second, we must find market substitutes of informal care. In this paper, we consider the long-term care (LTC) services provided by the market. Third, however, we cannot obtain the market price of long-term care services. Instead, we use the capacity of LTC institutions in each prefecture, which is obtained from Survey of Institutions and Establishments for Long-term Care (Ministry of Health, Labor and Welfare). The capacity may proxy the competition in the care services market: an increase in the capacity decreases the market price of care services. Thus, contrary to the expected sign of the market price, the expected sign of LTC capacity becomes negative.

Four geographical categories are considered, comprising: Tokyo area (reference); Nagoya area; Osaka area and provincial cities.

4.4 Estimation results of reaction functions

Table 4 demonstrates the estimation results, which use the first type of average gift tax (Average tax 1) in the first step.[18] Because $\hat{g}_i^{\#}$, $\hat{h}_i$, and $\hat{\tau}_i$ are generated, we modify the covariance matrix using 200 bootstrap replications.

First, let us examine the strategic interaction between gifts and housing investment. On the one hand, column 1 in Table 4 indicates that Gift has a significant and negative impact on housing investment: the larger the gift, the smaller the housing investment. The negative slope of housing investment reflects that the negative mixed partial derivative with respect to housing and nursing services (the second channel) outweighs the positive income effect (the first channel). The results suggest that an informal care responsibility tends to be quite a weight

[17] The Keio Household Panel Survey is available at http://www.pdrc.keio.ac.jp/en/ (accessed on 15 March, 2011).

[18] The estimation results of the reduced form and the effective gift tax rates are demonstrated in Table A4.

on children's shoulders. On the other hand, column 2 in Table 4 suggests that Housing has a significant and positive impact on gifts. This indicates that the effect of u_{sh}^P is relatively large. This is an interesting case, because even though parents are assumed to consider children's welfare (u_{hs}^C), their own private consideration (u_{sh}^P) outweighs it.[19] Although the child and the parent react differently, the significant coefficients suggest that a strategic interaction between inter vivos gifts and housing acquisition may exist.

Next let us consider the impacts of the gift tax rate, children's income, and the price of the composite good. As expected, column 1 demonstrates that an increase in the gift tax rate has a significantly negative impact on housing investments. The Child's income in column 1 has the expected and significant sign. The Price index in column 1 suggests that the substitution effect outweighs the income effect, because the coefficient is significant and positive. Therefore, children tend to increase housing investment when housing-related conditions are a favorable situation for them.

The Child's income and Price index in column 2 have different signs to their counterpart. This may indicate that parents possess altruistic preferences. As mentioned, parents increase the value of gifts when their children are confronted with deterioration in housing-related conditions. When the gift tax rate increases, altruistic parents react as well. A negative sign implies that parents reduce the value of their gifts, because it decreases the effectiveness of the gift for supporting children.

Let us briefly refer to other explanatory variables. The significantly positive sign of Land indicates that households who obtained land in advance make larger investments than others. The coefficient of LTC capacities in column 2 has the expected negative sign, indicating that parents reduce the value of gifts when access of seniors to LTC institutions is improved. This may indicate that parents possess the exchange motive as well. Moreover, this result may be consistent to some extent with that of Izuhara (2004). She suggested that the link between children's support and transfers are increasingly being broken in Japan.[20]

[19] Precisely, see Eq.(13).

[20] Family wealth goes disproportionately to the next generation of men, especially the eldest son, because patriarchy has been common practice in many Asian countries (Izuhara, 2008). In exchange, the eldest son tacitly provides care to his parent. Japan, however, faces the most rapid growth in the proportion of elderly

Although Gift tax, Price index, and LTC capacity may be correlated with regional characteristics, Table 5 adds three geographical dummies to Table 4, because there may be other (cultural) differences in both the children's and parents' behavior between areas. Although the coefficient of the gift tax in column 2 is insignificant, the signs of the coefficients are the same as those in Table 4.

Table 6 demonstrates the estimation results, which use the second type of average gift tax (Average tax 2) in the first step. Only the main variables are reported in Table 6, because again the signs of the coefficients are the same as those in Tables 4 and 5. Table 6 indicates that the results were similar, but less significant. This appears to indicate that two-generation families have a tendency to examine not the average gift, but the average down payment in their vicinity.

5 The effect of the gift tax cut on equilibrium housing investment

The joint determination of housing investment and gifts, i.e., the Nash equilibrium, is described by the intersection of the reaction functions Eqs. (1) and (3). One of concerns in this paper is to examine whether or not a small decrease in the gift tax rate increases housing investment at the equilibrium. Let us denote the equilibrium level of investment as:

$$h^* = h^*(t, y, p, l_0, q).$$

Then we can calculate this equation result as follows:[21]

$$\frac{\partial h^*}{\partial t} = \underbrace{\Phi}_{\text{strategic}} (\underbrace{\partial h/\partial t}_{\text{first}} + \underbrace{\partial h/\partial g \times \partial g/\partial t}_{\text{second}}). \tag{7}$$

We call the first term in parentheses of the right-hand side of Eq. (7) the first effect, the second term the second effect, and Φ the strategic effect. The strategic effect depends on the slope of

in the population in the world. Reflecting the heavy burden of care service provided by traditional families to elderly people, the LTC insurance system has been designed to promote a social care service through a market approach as part of the socialization of care since 2000 (Izuhara, 2004).

[21] Appendix C shows how this relationship is calculated.

the reactions functions:

$$\Phi = \frac{1}{1 - h_g \times g_h},$$

where h_g $(= \partial h/\partial g)$ is the slope of the housing investment function, and g_h $(= \partial g/\partial h)$ is the slope of the gift function. The size of Φ follows the following relationships:

$$\begin{array}{ll} \Phi > 1 & \text{if} \quad \text{sign } h_g = \text{sign } g_h \\ 0 < \Phi < 1 & \text{if} \quad \text{sign } h_g \neq \text{sign } g_h \end{array} . \tag{8}$$

Because both the theoretical and empirical results indicate a negative first effect, a decrease in the gift tax rate unambiguously encourages housing investment in the equilibrium. The second effect suggests that the gift tax cut has an opposite impact on the equilibrium investment induced by the first effect if $\partial h/\partial g$ and $\partial g/\partial t$ have the same sign. In fact, the empirical results suggest that both $\partial h/\partial g$ and $\partial g/\partial t$ are negative. Thus, promotion of housing investment via the first effect is dampened by the second effect. In an extreme case, housing investment decreases in equilibrium if the negative second effect outweighs the positive first effect. That is, our theoretical results suggest that there is a case where the Japanese gift tax reduction produces a perverse effect on housing investments, which is unexpected by the government and housing industry. Lastly, Eq. (8) suggests that both the first and second effects are strengthened by the strategic effect when the slopes of the reaction functions have the same sign, while they are weakened when the slope of the reaction functions have opposite signs. The empirical results demonstrate that children and parents react differently, and thereby the strategic effect becomes less than 1.

We can calculate how the gift tax reduction may change children's housing investment in the equilibrium using the estimation results in Table 4. From the linear specification in Eqs. (5) and (6), Eq. (7) can be rewritten as:

$$\underbrace{\frac{\partial h_i^*}{\partial \tau_i}}_{\text{total}} = \underbrace{\frac{1}{1 - \gamma_C \gamma_P}}_{\text{strategic}} \Big(\underbrace{\delta_C}_{\text{first}} + \underbrace{\gamma_C \delta_P}_{\text{second}} \Big).$$

First, given g, a one percent reduction in the gift tax rate increases housing investment by approximately 115 thousand yen (the first effect) from Table 4. Second, however, the one percent reduction of the gift tax rate increases intergenerational transfers, and consequently it

reduces housing investment along with the housing investment function by approximately 86 thousand yen (the second effect). Because the first effect outweighs the second effect, reducing the gift tax rate encourages housing investment by approximately 29 thousand yen. Thus, a perverse effect seems not to occur. The strategic effect, however, weakens the effect of the gift tax reduction on promoting housing investment from approximately 29 thousand yen to 24 thousand yen ($1/(1-\gamma_C\gamma_P) \doteqdot 0.84$).

6 Discussion

There are several other items of note in this paper. First, the observations are primarily about households who acquired a new detached house in the urban areas. Because condominiums and apartment buildings are quite popular in these places, we need these observations to consider the overall impact of the gift tax reduction on housing acquisition.

Second, the data do not provide details of parents' characteristics. We thus cannot consider whether or not parents have already passed away, whether parents are wealthy or not, and so on. This information may have a critical impact on parents' behavior.

Third, housing demand tends to depend on permanent income rather than on annual income. Children who have a high permanent income frequently purchase an expensive dwelling. Moreover, parents whose children have a high permanent income may not donate a gift, because of altruism. Then, the lack of this information has a tendency to induce $\partial h/\partial g < 0$. To obtain data on permanent income, however, we need more information on the children's job, such as occupation and size of the company (Goodman and Kawai, 1982).[22]

Fourth, we may need to undertake more cross-national replications of this research. The exchange model appears to be applied in many developed countries; such as European countries

[22] To consider the second point, we limit the observation age to under 70. This is because parents whose children are aged 70 or over are more likely to pass away. Moreover, to consider the third point, we limit observations to those with a mortgage. Children who do not have mortgages are more likely to have a high permanent income. In addition to this sample selection, we control children's income as follows. Householder's salary is generally based on the seniority system in Japan. Thus, if we control the tenure of householders, we can measure children's income based on their talents and abilities, which is suitable for examining the altruistic motives of their parents. Instead of using realistic values of the child's income, we thus use residuals of the regression of the child's income on householder's age (proxy variable for tenure) and its squared value. Even considering these points, the empirical results are consistent with those in Table 4.

(Tomassini, Wolf, and Rosina, 2003; Angelini, 2007), the US (Bernheim, Shleifer, and Summers, 1985; Cox, 1987), and East Asian countries (Horioka, 2002; Yamada, 2006; Kureishi and Wakabayashi, 2009; Yin, 2010). However, there are usually cultural differences in parents' (children's) attitudes toward children (parents) between countries. In some countries, it is expected by society that children will look after their parents. In relation to this point, suppose that children with a high permanent income possess the altruistic motive.[23] They may invest a relatively large amount of money in housing, and at the same time have a tendency to provide a service for their parents, while refusing parental gifts. This case also induces $\partial h/\partial g < 0$.

Fifth, basic exemption from the gift tax creates nonlinear budget constraints (Moffitt, 1986). An econometric approach of the piecewise linear budget constraints may be more appropriate in considering this problem. We defer these issues to future research.

7 Conclusion

This paper offered both a theoretical model and empirical results to examine strategic interaction between an inter vivos gift provided by parents and housing investment made by children. This paper then theoretically and empirically considered whether a reduction in a gift tax has a tendency to promote children's housing investment or not.

First, we developed a theory of a two-generation family: parents and children. The theoretical model suggested that housing investment and gifts are dependent on each other. Japanese detached house data are used to confirm this theoretical result. Ironically, the empirical results demonstrated that the housing investment function is negatively related to inter vivos gifts. The negative slope indicated that the child's utility is assumed to decrease when housing investment and informal care increase simultaneously. This is more likely to occur when informal care tends to be a heavy burden for children. This assumption might be true in an aging society such as Japan. In addition, the empirical results suggested the interesting case where parents have the opposite reaction: the inter vivos gift function is positively related to

[23] For example, Johar, Maruyama, and Nakamura (2010) demonstrated that evidence for the exchange motive is generally tenuous. Instead, they found that the role of filial altruism has a positive and significant effect on parent–child coresidence. That is, children are more likely to start to live with their parent when their parent has a health deterioration issue, while the income and assets of parents are not dominating factors of coresidence.

housing investment.

Second, the theoretical results indicated that the gift tax cut alters children's behavior toward an increase in housing investment for all gift values (the first effect). The theoretical result also suggested that there is a possibility that the gift tax cut increases the value of the parental gift at all levels of housing investment. An increase in the gift, however, may discourage housing investment when housing investment is negatively related to inter vivos gifts (the second effect). In fact, the empirical results indicated the housing investment function has a negative slope. The empirical results appeared to indicate that the first effect barely outweighs the negative second effect. However, our theoretical and empirical results demonstrated that the opposite slopes of the reaction functions are likely to weaken the promotion of housing investment made by the gift tax reduction (the strategic effect). In sum, as expected by the government and housing industry, the gift tax reduction tends to encourage housing investment in equilibrium, using one of the empirical results. The government and housing industry, however, should consider both the second effect and the strategic effect, because these have a tendency to depress the promotion of housing investment in equilibrium.

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Appendix

A The sign of the housing investment function

The optimal level of housing investment satisfies:

$$u_h^C - \frac{1}{p} v_x^C = 0. \tag{9}$$

From the assumptions, the second-order condition satisfies:

$$U_{hh}^C = u_{hh}^C + v_{xx}^C \frac{1}{p^2} < 0.$$

The sign of the housing investment function then becomes:

$$\frac{\partial h}{\partial g} = -\frac{u_{hs}^C s_g - v_{xx}^C (1-t)/p^2}{U_{hh}^C}, \tag{10}$$

$$\frac{\partial h}{\partial t} = -\frac{v_{xx}^C g/p^2}{U_{hh}^C} < 0, \tag{11}$$

$$\frac{\partial h}{\partial y_C} = \frac{v_{xx}^C/p^2}{U_{hh}^C} > 0,$$

$$\frac{\partial h}{\partial p} = -\frac{v_x^C/p^2 + v_{xx}^C x/p^3}{U_{hh}^C},$$

$$\frac{\partial h}{\partial l_0} = \frac{v_{xx}^C/p^2}{U_{hh}^C} > 0.$$

B The sign of the gift function

The optimal value of the gift satisfies:

$$u_s^P s_g - \frac{1}{q} + u_s^C s_g + v_x^C \frac{(1-t)}{p} \leq 0. \tag{12}$$

The optimal amount of the gift is zero when Eq. (12) holds with inequality, while it is positive when Eq. (12) holds with equality.

The second-order condition for a maximum satisfies:

$$V_{gg}^P = (u_{ss}^P + u_{ss}^C) s_g^2 + v_{xx}^C \left[\frac{(1-t)}{p}\right]^2 < 0.$$

The sign of the gift function then becomes:

$$\frac{\partial g}{\partial h} = -\frac{u^P_{sh}s_g + u^C_{sh}s_g - v^C_{xx}(1-t)/p^2}{V^P_{gg}}, \tag{13}$$

$$\frac{\partial g}{\partial t} = \frac{v^C_x/p + v^C_{xx}(1-t)g/p^2}{V^P_{gg}}, \tag{14}$$

$$\frac{\partial g}{\partial y_C} = -\frac{v^C_{xx}(1-t)/p^2}{V^P_{gg}} < 0,$$

$$\frac{\partial g}{\partial p} = \frac{v^C_x(1-t)/p^2 + v^C_{xx}(1-t)x/p^2}{V^P_{gg}}, \tag{15}$$

$$\frac{\partial g}{\partial q} = -\frac{1/q^2}{V^P_{gg}} > 0.$$

The interpretation of $\partial g/\partial p$ differs when we consider the parent's consumption. We rewrite the parent's utility function as follows:

$$V^P = u^P(h,s) + v^P(x^P) + m + u^C(h,s) + v^C(x^C),$$

where x^F $(F = P, C)$ is F's consumption. The budget constraint can be rewritten as follows:

$$y_P = g + x^P + qm.$$

Then Eq. (15) can be rewritten as follows:

$$\frac{\partial g}{\partial p} = \frac{v^P_x/p + v^P_{xx}x^P/p - v^C_x(1-t)/p - v^C_{xx}(1-t)x^C/p}{\Delta},$$

where Δ is the bordered Hessian and its sign is positive. Thus, in the case where the parent consumes the composite goods, the parent considers not only changing the child's welfare but also changing his/her welfare.

C The Nash equilibrium and comparative statics

Suppose that Eq. (12) holds with equality: $g > 0$. The joint determination of housing investment and gifts, i.e., the Nash equilibrium, is then described by the conditions Eqs. (9) and (12). Differentiating these equations with respect to t, we then can calculate $\partial h^*/\partial t$ as follows:

$$\frac{\partial h^*}{\partial t} = \frac{-U^C_{ht}V^P_{gg} + U^C_{hg}V^P_{gt}}{U^C_{hh}V^P_{gg} - U^C_{hg}V^P_{gh}}, \tag{16}$$

where U_{ht}^{C} and V_{gt}^{P}, are respectively the numerator of the right-hand side in Eqs. (11) and (14). The denominator indicates the stability condition of the Nash equilibrium; we assume that it is positive for stability. Substituting Eqs. (10), (11), and (14) for Eq. (16), we then obtain:

$$\frac{\partial h^*}{\partial t} = \Phi \left(\frac{\partial h}{\partial t} + \frac{\partial h}{\partial g} \frac{\partial g}{\partial t} \right).$$

Table 1

Definition of variables

Variable	Definition	Notation
Endogenous		
Housing	The value of housing investment, in millions of yen	h
Gift	The value of gifts, in millions of yen	g
Gift tax (τ)	An effective gift tax rate, percentage	t
Explanatory		
Child's income	The total annual income before tax earned by all household members, in millions of yen	y
Price index	The regional CPI which is the product of the CPI (2005=100) and the regional difference index of consumer prices (national average set equal to 100), percentage	p
Instrument		
Land	A binary variable indicating that the household bought land in the last three years	l
LTC capacity	The capacity of long-term care institutions in each geographical category, thousand hospital beds per hundred thousand elderly	q
Average tax 1	The average gift tax rate controlled by the average down payment in each geographical category, percentage	-
Average tax 2	The average gift tax rate controlled by the average gift value in each geographical category, percentage	-
Other control		
Tokyo area	A binary variable indicating the unit is located in the Tokyo area (reference)	-
Nagoya area	A binary variable indicating the units is located in the Nagoya area	-
Osaka area	A binary variable indicating the unit is located in the Osaka area	-
Provincial city	A binary variable indicating the unit is located in one of the provincial cities	-

Note: Geographical category in Average tax 1 and 2 corresponding with the prefecture level for three major metropolitan areas and the city level for four provincial cities. However, because LTC capacity is only observed at the prefecture level, the four major cities are converted to the prefecture level.

Table 2

Descriptive statistics of variables

Variable	Mean	Std. Dev.	Min.	Max.
Housing (millions of yen)	42.23	23.64	0.25	524.00
Gift (millions of yen)	1.90	6.34	0.00	310.00
Gift tax (percent)	0.17	1.88	0.00	56.73
Child's income (millions of yen)	8.77	6.89	0.00	450.00
Price index (percent)	105.29	3.56	99.09	112.61
Land (dummy)	0.43	0.49	0.00	1.00
LTC capacity (1,000 beds/100,000 elderly)	2.31	0.34	1.60	3.26
Average tax 1 (percent)	1.28	4.58	0.00	35.55
Average tax 2 (percent)	0.06	0.45	0.00	5.49
Tokyo area (dummy)	0.36	0.48	0.00	1.00
Nagoya area (dummy)	0.18	0.38	0.00	1.00
Osaka area (dummy)	0.23	0.42	0.00	1.00
Provincial city (dummy)	0.23	0.42	0.00	1.00
Observations		23,939		

Table 3

Mean for households with and without a gift

Variable	Total	With a gift	Without a gift
Observations	23,939	4,440	19,499
Housing (millions of yen)	42.23	41.28	42.45
Gift (millions of yen)	1.90	10.23	0.00
Child's income (millions of yen)	8.77	7.54	9.05

Table 4

Estimation result (Average tax 1)

	Housing		Gift	
Variable	Coeff.	Std.Err.	Coeff.	Std.Err.
Gift	–0.541***	0.235	-	-
Housing	-	-	0.349***	0.038
Gift tax	–0.115**	0.048	–0.159*	0.091
Child's income	1.140***	0.246	–0.824***	0.260
Price index	1.351***	0.071	–0.332***	0.072
Land	23.503***	1.200	-	-
LTC capacity	-	-	–7.777***	0.816
Constant	–136.761***	8.217	17.410***	7.877
Adj. R^2	0.369			
Log likelihood			–26,302.3	

Std.Err. obtained by bootstrap approximation using 200 resamples.

***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5

Estimation result with regional dummies (Average tax 1)

	Housing		Gift	
Variable	Coeff.	Std.Err.	Coeff.	Std.Err.
Gift	–0.854***	0.391	-	-
Housing	-	-	0.346***	0.025
Gift tax	–0.136**	0.056	–0.142	0.089
Child's income	1.039***	0.311	–0.811***	0.271
Price index	1.038***	0.123	–0.439***	0.089
Land	25.604***	2.140	-	-
LTC capacity	-	-	–6.745***	1.883
Nagoya area	1.163	1.264	1.150	0.716
Osaka area	0.436	0.901	0.357	0.676
Provincial city	–6.089***	1.437	–2.192***	0.787
Constant	–109.854***	12.026	27.508***	9.108
Adj. R^2	0.371			
Log likelihood			–26,302.3	

Std.Err. obtained by bootstrap approximation using 200 resamples.
***, ** indicate significance at the 1% and 5% levels, respectively.

Table 6

Estimation results (Average tax 2)

Variable	Housing	Variable	Gift
without regional dummies			
Gift	–0.795*	Housing	0.378***
Gift tax	–0.051	Gift tax	–0.199
with regional dummies			
Gift	–0.960	Housing	0.388***
Gift tax	–0.109	Gift tax	–0.213

***, * indicate significance at the 1% and 10% levels, respectively.

Table A1

Calculation method for the effective gift tax rate

Gift taxes	Effective tax rates		
Regular calculation	$\tau_1 = \{(g-b)t_1 - d_1\}/g$		
Special calculation for gifts to acquire residence			
Before 2003	$\tau_2 = \{(\zeta - \eta) + 5\eta\}/g$		
	$\zeta = (g/5 - b)t_2 - d_2$	if	$g \leq \tilde{g}_2$
	$\zeta = (\tilde{g}_2/5 + g - \tilde{g}_2 - b)t_2 - d_2$	if	otherwise
	$\eta = \delta$	if	$g \leq \tilde{g}_2$
	$\eta = (\tilde{g}_2/5 - b)t_2 - d_2$	if	otherwise
From 2003 onwards	$\tau_3 = (g - \tilde{g}_3)t_3/g$		

Notes: b is the basic exemption, where b =1.1 million yen.
t_j $(j = 1, 2, 3)$ is the gift tax rate. See Table A2 for the values of t_j.
d_n $(n = 1, 2)$ is the deduction. See Table A3 for the values of d_n.
$\tilde{g}_o$ $(o = 2, 3)$ is the cumulative exemption, where $\tilde{g}_2$= 15 million yen and $\tilde{g}_3$= 35 million yen.

Table A2

The gift tax rate table before 2003

g (million yen)	$t_1 = t_2$ (%)	$d_1 = d_2$ (ten thousand yen)
1.5 or less	10	-
2 or less	15	7.5
2.5 or less	20	17.5
3.5 or less	25	30
4.5 or less	30	47.5
6 or less	35	70
8 or less	40	100
10 or less	45	140
15 or less	50	190
25 or less	55	265
40 or less	60	390
100 or less	65	590
More than 100	70	1,090

Source: National tax agency

Table A3

The gift tax rate table from 2003 onwards

g (million yen)	t_3 (%)
2 or less	10
3 or less	15
4 or less	20
6 or less	30
10 or less	40
More than 10	50

Source: National tax agency

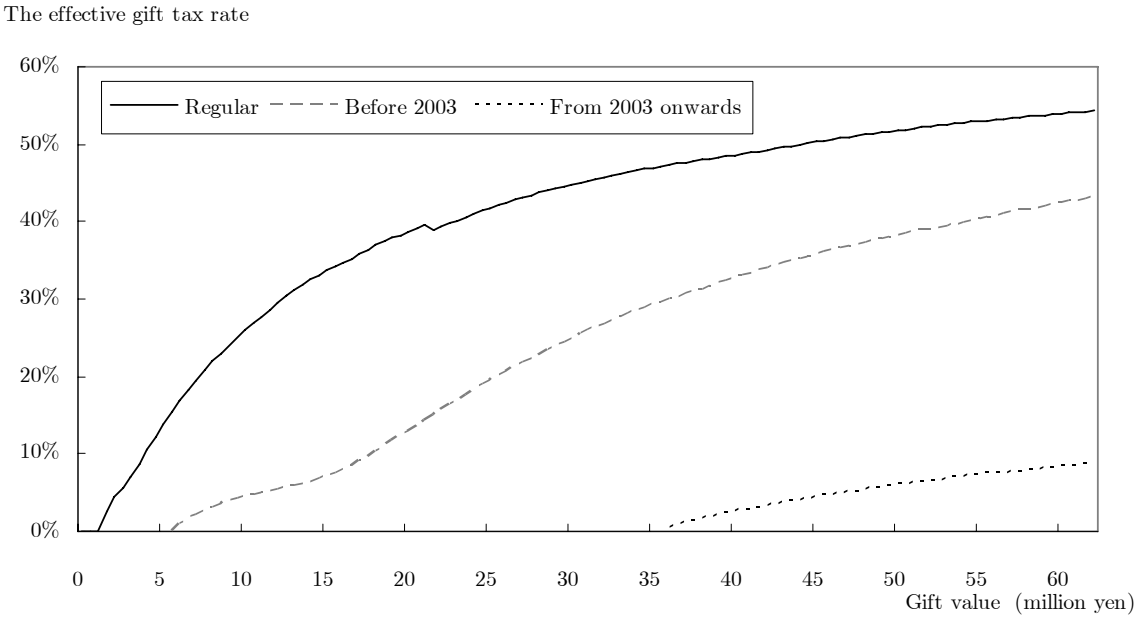
Table A4

Estimation result of the first stage

	Housing		Gift		Gift tax	
Variable	Coeff.	Std.Err.	Coeff.	Std.Err.	Coeff.	Std.Err.
Average tax 1	–0.024	0.072	–0.169***	0.060	1.007***	0.095
Child's income	1.339***	0.248	–0.320*	0.176	–0.227	0.190
Price index	1.272***	0.066	0.015	0.062	0.614***	0.155
Land	19.601***	0.314	5.732***	0.424	7.001	1.122
LTC capacity	3.872***	0.390	–4.224***	0.590	–13.851***	1.833
Constant	–120.750***	6.040	–10.217	6.311	–91.469***	16.386
Adj. R^2	0.369					
Log likelihood			–26302.3		–3247.8	

Std.Err. represents robust standard errors.

***, * indicate significance at 1% and 10% levels, respectively.



Source: Authors' calculations based on data in National Tax Agency

Figure 1. Gift tax schedule