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Intergenerational altruism and the transfer paradox in an overlapping generations model

Kojun Hamada [a], Mitsuyoshi Yanagihara [b,*]

[a] Faculty of Economics, Niigata University, 8050 Ikarashi 2-no-cho, Nishi-ku, Niigata City 950-2181, Japan
[b] Graduate School of Economics, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, Aichi 464-8601, Japan

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ABSTRACT

This study investigates how intergenerational altruism affects the possibility of the transfer paradox occurring in a two-country, one-sector overlapping generations model. We derive the conditions under which the transfer paradox occurs in our model where a generation within each country has altruism toward the subsequent generation. Contrary to earlier results in the literature, we find that altruism does not enter the conditions under which the transfer paradox occurs in the steady state. Moreover, we show that although altruism affects the condition of the transfer paradox along the transition path, its effect on this condition vanishes as the economy converges to the steady state.

1. Introduction

Ever since the seminal paper of Bernheim and Ray (1987) considered intergenerational altruism in an aggregative growth model, many macroeconomists have been interested in intergenerational altruism itself and the issues that arise within a framework of intergenerational altruism.[1] For example, Bernheim and Ray (1987) examined the properties of equilibrium behavior in an aggregative growth model and analyzed the normative properties of the steady-state equilibrium. Ray (1987) and Hori and Kanaya (1989) described the characteristics of the steady-state equilibrium and investigated the conditions for its existence and uniqueness in a model of nonpaternalistic intergenerational altruism. Moreover, Bernheim (1989) characterized the welfare properties of a dynastic equilibrium within a framework of intergenerational altruism, while Hori (1997) considered dynamic allocation in an altruistic overlapping generations (OLG) economy and pointed out the possibility that an equilibrium path is generally Pareto suboptimal. Following these studies, a considerable number of authors have dealt with various issues related to intergenerational altruism. For example, environmental issues are a significant concern within a framework of intergenerational altruism because future generations suffer from negative pollution externalities (Jouvet, Michel, & Vidal, 2000).

This study focuses on another issue related to intergenerational altruism, namely the analysis of the transfer problem, which holds a central place in the literature on the theory of international trade in both static and dynamic frameworks. The transfer problem has long attracted the attention of economists since Keynes (1929) pointed out that, in contrast to the general perception, a transfer is likely to reduce the transferer's welfare. Over the past 85 years, the possibility of such a paradoxical result, namely the transfer paradox, occurring has attracted a substantial amount of theoretical attention by international trade researchers. In a static framework in which the transfer problem is considered, it is widely established that some distortions or hindrances to free trade are required for the transfer paradox to occur in a two-country model, such as the exogenous distortions of trade barriers (tariffs or subsidies) or endogenous distortions (rent seeking or the administrative

* Corresponding author. Tel.: +81 52 789 5952.
E-mail addresses: khamada@econ.niigata-u.ac.jp (K. Hamada), yanagi@soec.nagoya-u.ac.jp (M. Yanagihara).

[1] Michel, Thibault, and Vidal (2006) have comprehensively surveyed intergenerational altruism in neoclassical growth models.

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costs of transfer).[2] By contrast, in a dynamic framework, the existing literature has clarified that because of capital accumulation and international capital movements, the transfer paradox can occur under free trade and dynamic efficiency, even when there is no distortion. For instance, by using an OLG model, Galor and Polemarchakis (1987) argued that a permanent lump-sum transfer can bring about the transfer paradox in the steady-state equilibrium. Haaparanta (1989) proved that a transfer paradox can occur when the temporary transfer is financed by public debt in the donor country and/or is used for debt relief in the recipient country. This occurs because a temporary transfer involving debt-financed debt relief is equivalent to a permanent lump-sum transfer. Further, Cremers and Sen (2008) extended the analysis to the transition to the steady state and proved that the results obtained in Galor and Polemarchakis (1987) could also be applied to the transition. Overall, in a dynamic framework, it is not unusual for the transfer paradox to occur in the dynamically efficient region.

Thus, we have a question: if individuals are intergenerationally altruistic within a country, is the transfer paradox likely to occur in the steady state? Generally, when individuals are altruistic, they take the utility of other individuals into account as a component of their own utility, which implies that altruism could be regarded as a type of externality and, as a result, could cause distortion. Thus, the introduction of altruism into a dynamic model might change the conditions under which the transfer paradox occurs. Although very few studies have examined the transfer paradox with altruism in an OLG model, Hamada and Yanagihara (2014) clarified that the introduction of altruism toward the individuals of the other country in the model affects the likelihood of the transfer paradox in the steady state under dynamic efficiency. They demonstrated that no transfer can enrich a donor as long as the donor is highly altruistic, whereas a transfer may immiserize a recipient if the recipient is highly altruistic. Stated differently, in contrast to conventional wisdom, as individuals become highly altruistic, the transfer is likely to cause a Pareto-inferior outcome for both countries. However, Hamada and Yanagihara (2014) dealt only with the altruism that exists between a donor and a recipient country, not with intergenerational altruism within a country.

This study bridges this gap in the body of knowledge by attempting to examine whether and how the condition under which the transfer paradox occurs in the steady state is affected by the introduction of intergenerational altruism into a one-sector OLG model. It demonstrates that although intergenerational altruism amplifies the effect of the transfer on welfare, it never affects whether the transfer paradox occurs. This result on intergenerational altruism is in sharp contrast to that when a donor displays altruism toward a recipient, as already shown in Hamada and Yanagihara (2014). These results indicate that, depending on what kind of altruism one considers, the effect of altruism on the likelihood of the transfer paradox differs. We also present the condition for the transfer paradox to occur on the transition path and demonstrate that the effect of intergenerational altruism on this condition vanishes as the economy converges to the steady state. In sum, intergenerational altruism affects only the effect of the transfer on the welfare of transitional generations, but not in the steady state.

The remainder of this paper is organized as follows. Section 2 describes the two-country, one-sector OLG model wherein each generation in a country has intergenerational altruism for the next generation. Section 3 presents the condition under which the transfer paradox occurs in the steady state when intergenerational altruism exists. Section 4 investigates the welfare effect of the transfer for the initial young and old generations and transitional generations. Section 5 provides concluding remarks.

2. The model

We consider a one-sector OLG model with two countries. A donor and a recipient of an international income transfer, indexed by $i = D$ and R, respectively, are identical except for the time preferences of individuals. Between the two countries, capital is fully mobile, but labor is immobile. Time is discrete and the economy lasts forever. The populations of both countries grow equally and exogenously with a population growth rate of $(1+n) \geq 0$, which is constant over time.

2.1. Individuals

In each period, both countries are populated by two generations, the young, who supply one unit of their labor inelastically and earn wages either to consume or to save, and the old, who retire and consume savings accumulated in the young period. All individuals except for the initial old live for both periods. Individuals who are young in period t in country $i = D, R$ choose levels of consumption in their young period t and in their old period $t+1$, (c_t^i, d_{t+1}^i), to maximize their utility, subject to the budget constraints in their young and old periods. Henceforth, we call the individuals who are young in period t generation t.

We formalize the intergenerational altruism, defined as the situation in which generation t in a country cares about the next generation $t+1$ in the country, as follows. The utility of generation t in country i consists of two subutilities. The first is the subutility obtained from consuming goods by themselves, which is often acknowledged in the usual OLG model. We define this subutility of generation t in country i as $u^{i,t}(c_t^i, d_{t+1}^i)$, which is referred to as the self-subutility of generation t in country i. It is assumed that the self-subutility function is twice differentiable, increasing, and quasi-concave in (c_t^i, d_{t+1}^i). The second subutility is that of the *next* generation, which represents the intergenerational altruism of generation t. We call this an altruistic subutility. As the altruistic subutility of generation t in country i is denoted as $u^{i,t+1}(c_{t+1}^i, d_{t+2}^i)$, we can define the utility of generation t in country i with intergenerational altruism as follows[3]:

$$U^{i,t} \equiv U^{i,t}(u^{i,t}, u^{i,t+1}) = U^{i,t}\left(u^{i,t}(c_t^i, d_{t+1}^i), u^{i,t+1}(c_{t+1}^i, d_{t+2}^i)\right). \quad (1)$$

We call $U^{i,t}$ the total utility of generation t in country i. It is also assumed that the total utility function is twice differentiable and increasing in $(u^{i,t}, u^{i,t+1})$: $U_t^{i,t} \equiv \partial U^{i,t}/\partial u^{i,t} > 0$ and $U_{t+1}^{i,t} \equiv \partial U^{i,t}/\partial u^{i,t+1} \geq 0$. Moreover, we assume that $U_t^{i,t} \geq U_{t+1}^{i,t}$, which implies that the effect of the generation's self-subutility on total utility is larger than the effect of its altruistic subutility.

The budget constraints of generation t in their respective young and old periods are as follows:

$$c_t^i + s_t^i = w_t + T^i \text{ and } d_{t+1}^i = (1 + r_{t+1})s_t^i, \quad (2)$$

[2] For a seminal paper, see Bhagwati, Brecher, and Hatta (1985). Brakman and van Marrewijk (1998) presented a concise survey of the transfer problem in a static model.

[3] We simplify the utility function considerably in order to focus on how the intergenerational altruism affects the welfare impact of the transfer. Although our formalization in which a generation is concerned only about the subsequent one does not seem to be common, apart from the well-known dynasty model of Barro (1974), this simplification is easy to examine and the qualitative results continue to hold even if we consider the dynasty model. Moreover, there are several articles in which parents only care about their children in an OLG framework. Gaumont and Mesnard (2001), Thibault (2004), and Constantinides, Donaldson, and Mehra (2007) developed models in which parents' utility includes the level of bequest to the child. Viaene and Zilcha (2002) and Kunze (2014) assumed that the utility depends on the income level of the child.