Preventing Widening Inequality: Economic Rents and Sustainable Heterogeneity

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Abstract

There has long been a deep-rooted view that economic rents are foremost among the origins of high levels of economic inequality. In this paper, economic rents generated by ranking preference are examined as an important source of widening inequality based on the concept of sustainable heterogeneity. Ranking preference generates widespread and large monopoly rents across an economy because they can be obtained through firms' product differentiations, but this topic has not been studied as a source of economic inequality. This paper shows that these monopoly rents can greatly accelerate economic inequality because access to these rents is intrinsically heterogeneous among households and are unevenly distributed and persistent. Nevertheless, if a government appropriately intervenes, the acceleration of inequality can be prevented.

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1 INTRODUCTION

Numerous empirical studies have concluded that income inequality has increased in many countries since the 1980s (Piketty, 2003, 2013; Piketty and Saez, 2003; Atkinson et al., 2011; Parker, 2014). In addition, within-country wealth inequality has increased in many countries in the same period (Piketty, 2013; Saez and Zucman, 2016). Several explanations for the recent increase in income inequality have been presented. Among them, "skill-biased technological change" (SBTC) was the most favored explanation until the early 2000s (Katz and Murphy, 1992; Autor et al., 1998, 2003). However, SBTC has not been sufficiently supported empirically (Card and DiNardo, 2002). On the other hand, explanations based on globalization have also been widely accepted; in particular, those based on the Stolper–Samuelson theorem (Stolper and Samuelson, 1941) were favored before the 21th century. These explanations were also not sufficiently supported empirically (Leamer, 1998; Goldberg and Pavcnik, 2007) in the 2000s, so the main underlying mechanisms of globalization-based explanations changed to heterogeneity of firms, labor market frictions, and offshoring of tasks (Helpman, 2016). In addition, Pickety (2013) argued that the increases in income and wealth inequalities can be attributed to uneven capital accumulation across households.

Why, however, have high levels of economic inequality arisen in the first place? Various kinds of explanations for the origin of inequality have been presented (e.g., Kuznets, 1955; Boix, 2010; Pickety, 2013; Milanovic, 2016). It seems highly unlikely that the huge income gaps that have been observed among people in many countries can be explained by arguing that they are simply reflecting proportional differences in people's absolute abilities. Rather, there has been a deep-rooted view that wealthy persons, from the start, have exclusionary sources of wealth (i.e., economic rents), and these rents are foremost among the origins of high levels of economic inequality (Stiglitz, 2015a, 2015b, 2015c, 2015d). If economic rents are left as they are, inequalities in income and wealth will accelerate and eventually reach an extreme level, but economic rents may be less important economically today than they were in the past. In developed countries, monopolies are strictly regulated. Oil and other natural resource rents may no longer play a significantly important role in the degree of inequality within countries, except in some resource-rich developing countries. Regardless, it is undeniable that there are still significant income and wealth inequalities in many countries today. Stiglitz (2015d) argued that "exploitation rents" are another type of economic rent that contribute to inequality, although his arguments are narrative and remain suggestive.

Harashima (2016, 2018b) introduced a different type of economic rent that had not been discussed previously: monopoly profits (rents) derived from people's ranking

preference. These rents enable some players or artists to be superstars in the sport, art, and music industries (Harashima, 2016, 2018a, 2018b) and enable some corporate executives to earn extremely high compensations (Harashima, 2018c). In addition, ranking preference is an important element in product differentiation, which provides large amounts of monopoly rents to companies (Harashima, 2017b). Because the strategy of product differentiation is one of the most important strategies a company uses to prosper (Porter, 1980, 1985) and has been intensely pursued by many companies, monopoly rents derived from product differentiations owing to ranking preference are highly likely to prevail widely, ubiquitously, and massively across economies. In addition, directly regulating monopoly powers stemming from ranking preference would be significantly harmful to an economy (Harashima, 2018c); therefore, these powers have not been directly regulated and will not be in the future. Because they are so widespread and large and are not directly regulated, they are economically very important, not only today but also into the future. Another important feature of this type of monopoly rent is that access to them is highly likely to be heterogeneous among households. Accessibility will depend on the relative differences in abilities of people who make up each household. As a result, many of these monopoly rents will be enjoyed only by a small number of households and family lines, meaning that the monopoly rents will be distributed very unevenly. Hence, this type of monopoly rent can be an important origin of high levels of economic inequality. The purpose of this paper is to examine this possibility and what a government should do if monopoly rents are really an important origin of the high level of economic inequality that is currently observed.

The possibility of widening inequality and the role of government to prevent it are examined on the basis of the concept of "sustainable heterogeneity" (SH) presented by Harashima (2010, 2012, 2017a). In this context, heterogeneity is defined as being sustainable if all optimality conditions of all heterogeneous households are satisfied indefinitely. In an economy in which households are heterogeneous in time preference and risk aversion, SH is achieved if all households behave multilaterally, but not if advantaged households behave unilaterally unless a government appropriately intervenes. Conversely, if a government appropriately intervenes, SH can be achieved even if households behave unilaterally. In this paper, Harashima's (2010, 2012, 2017a) models, which assume an environment in which households receive only labor and capital incomes, are extended to include an environment in which households also receive economic rents. I show that a government has to intervene with regard to unevenly distributed economic rents as well as other heterogeneities to achieve SH. Because monopoly rents resulting from ranking preference are economically important and unevenly distributed, the government's responsibility to prevent widening inequality by taking appropriate actions is also important.

2 ECONOMIC RENTS

2.1 Conventional economic rents

There are various kinds of economic rents—for example, benefits that accrue from natural resource or land ownership, corruption, monopolies, and patents. In the past, economic rents seem to have been an important source of income of wealthy people and therefore also to have been an essential origin of economic inequality. However, they may be far less important economically today for a variety of reasons. Monopolies are now strictly regulated in most developed countries. Corruption is still a serious problem in many developing countries, but it may no longer be as economically important in many developed countries. Although oil and other natural resource rents are still important in some resource-rich developing countries, they may not play an important role in the degree of inequality in developed countries, because incomes from labor and capital are far larger. Patents remain important, but they are constrained by patent periods, and more importantly, creating profitable patents requires a large research investment.

2.2 Monopoly rent from ranking

Harashima (2016, 2018b) introduced the concept of ranking value and preference and showed that some people can obtain much higher incomes than ordinary people because ranking value and preference generate monopoly powers. Thanks to these monopoly powers, producers can obtain economic rents (profits). Because the concept of the ranking value of preference is new, this type of economic rent has not previously been studied or considered as a contributor to economic inequality.

Harashima (2017b) showed that ranking preference plays an important role in product differentiation, and the monopoly rents obtained from product differentiation resulting from ranking preference are essential for a firm's prosperity. Because the strategy of product differentiation is one of the most important for companies (Porter, 1980, 1985) and is actually pursed by many companies, the monopoly rents generated from differentiation will be large and widespread across the economy today and in the future. Furthermore, Harashima (2016, 2018a, 2018b, 2018c) showed that these monopoly rents will be distributed very unevenly within a firm, team, or organization. In particular, they will be distributed largely to a few relatively more talented persons; this has the potential to generate a high level of inequality.

2.2.1 Ranking value and preference

The concept of ranking value and preference is briefly explained in this section. Two kinds of value are considered: practical value and ranking value. Practical value is the value that people feel when consuming a good or service for practical purposes. Ranking value is the value that people feel from the rank of a good or service in a set of similar types of goods or services that people use, possess, or observe. In other words, ranking value is the value people place on goods or services on the basis of their ranks (e.g., the ranking of a book on a best-seller list or that of a baseball team in a professional league).

Goods and services have three properties: quantity, quality, and ranking. Quality is related to practical value, ranking is related to ranking value, and quantity is related to both. Suppose that the quality and ranking of each good or service are given exogenously and fixed. Here, for simplicity, I assume that there is only one type of good or service in the economy (these goods or services are hereafter called "goods"), and that all goods belong to this type and are substitutable for each other for households' practical uses. Although the goods are substitutable from the point of view of practical uses, they are differentiated from the point of view of ranking.

Let R (= 1, 2, 3, …) be the rank of goods. The good with $R = 1$ is most preferred by households; $R = 2$ indicates the next most preferred, and so on. For simplicity, no tied ranks are assumed. A household's utility derived from consuming the good with rank R is

$$u(q_{n,R}, q_{l,R}, R)$$

where $q_{n,R}$ and $q_{l,R}$ are the quantity and quality of the good with rank R, respectively. For simplicity, the utility of the household is modified to

$$u(\tilde{q}_R, R)$$

where $\tilde{q}_R$ is the "quality-adjusted quantity" of the good with rank R, and $\tilde{q}_R = q_{n,R}\, q_{l,R}$.

The utility function has the following conventional characteristics:

$$\frac{\partial u(\tilde{q}_R, R)}{\partial \tilde{q}_R} > 0$$

and

$$\frac{\partial^2 u(\tilde{q}_R, R)}{\partial \tilde{q}_R^2} < 0 .$$

In addition, for any $r \in R$,

$$u(\tilde{q}_r, r+1) < u(\tilde{q}_r, r)$$

and

$$u(\tilde{q}_r, r+2) - u(\tilde{q}_r, r+1) > u(\tilde{q}_r, r+1) - u(\tilde{q}_r, r) .$$

2.2.2 Implicit ranking

Although some goods and services have explicit rankings (e.g., a book on a best-seller list), most goods and services do not because there is no open or formal competition among them. However, it is highly likely that people still feel a sense of ranking, possibly unconsciously, from many goods and services because they usually want to know which products most people are paying attention to and to buy the products that are the most popular and well known. Fame is valuable because it provides information about "implicit rankings" and generates a sense of ranking. Because implicit rankings are formed essentially on the basis of information about which product is preferred and sold, they do not represent an individual household's unique and personal rankings; rather, they are socially and widely recognized rankings. That is, implicit rankings basically represent the common knowledge of all households.

2.2.3 Monopoly power and rent from ranking

Ranking value and preference provide monopoly powers to the producers of high-ranked goods and services because selling ranking value to consumers requires no additional cost; that is, the marginal cost of producing a ranking value is zero, and thereby such producers can set prices above their marginal costs. Hence, they can obtain monopoly profits (rents). I call this type of monopoly rents "ranking monopoly rents"—that is, they are the monopoly rents derived from ranking. As Harashima (2017b) showed, the strategy of product differentiation is particularly important for obtaining these monopoly rents. There are numerous kinds of products, and numerous firms pursue ranking monopoly rents by differentiating their products, which means that ranking monopoly rents are widespread and large across the entire economy.

Who receives the ranking monopoly rents: shareholders, ordinary employees, consumers, or executives? It may be reasonable that those who contribute to the generation of ranking monopoly rents obtain a portion equal to the extent of their contribution, but it is difficult to judge who contributes to the generation of these rents

and how much they contribute. Hence, in some cases, ranking monopoly rents may be mostly distributed to a few persons within a company (e.g., its owners or executives).

Individuals who do not obtain ranking monopoly rents suffer decreases in their labor and capital incomes because the total production (total income) in an economy does not increase as a result of the generation of ranking monopoly rents (i.e., people are in a situation that can be represented as a zero-sum game). In other words, to compensate for the ranking monopoly rents distributed to some people, the incomes of other persons must be reduced by the same amount directly or indirectly through lower wages or higher prices. Therefore, some amount of income from one group of households is transferred to, or exploited by, people in the other group (i.e., those who receive the ranking monopoly rents).

An important nature of ranking monopoly rents is that it is likely that some particular family lines will obtain them and, conversely, the incomes of some other family lines will consistently be reduced. To be in the position to obtain ranking monopoly rents, some types of special abilities—particularly higher abilities than those of ordinary people—will be necessary. Because of the nature of heredity, some family lines may have higher probabilities of having such abilities and thereby obtaining the rents. These family lines may obtain monopoly rents "persistently" in the sense that the mean of monopoly rents they obtain over generations is positive. In addition, the distribution of the ranking monopoly rents generated in a company may be inherited; that is, the power to control or influence the company (and the distributions) may pass from generation to generation in a specific family line. If no tax, such as an inheritance tax, is imposed, a private company will likely continue to be owned by a family line persistently. Hence, there will not only be "temporary" ranking monopoly rents for some individuals, but also "persistent" ranking monopoly rents for some family lines.

Furthermore, because different family lines most likely have different probabilities of obtaining economic rents persistently and obtain different amounts of these rents, we can construct a model in which there are heterogeneous infinitely living households (i.e., family lines) whose economic rents are heterogeneous, similar to the models in which there are heterogeneous time preferences, risk aversions, and/or productivities in infinitely living households, as shown by Harashima (2010, 2012, 2017a).

As noted previously, monopoly rents are highly likely to be unevenly distributed. Moreover, these uneven distributions are likely to persist over time. The distribution of ranking monopoly rents has another important nature, however. Even if these rents are collected by a government as taxes, the amount of these rents generated in the economy does not change, because the efforts of executives of firms are irrelevant to the utilities that households eventually obtain from ranking values. In other words, the underlying

economic activities are not disturbed even if these rents are collected and redistributed by government. Harashima (2018c) indicated that ranking monopoly rents derived from ranking values themselves can be socially justified, but the uneven distributions of these rents (e.g., the distribution of most of these rents to executives) cannot necessarily be socially justified because a household's ranking preference is not related to the absolute abilities of the highly compensated executives; rather, the ranking is related to the executive's (or player's) relative abilities. The utilities households derive from ranking values are not affected by the historical level of absolute abilities of executives. Hence, even if the motivation of executives to work harder is enhanced through a high level of compensation, their enhanced efforts are irrelevant to the utilities that households eventually obtain from ranking values.

3 SUSTAINABLE HETEROGENEITY

The conditions for SH are briefly explained in this section on the basis of the work of Harashima (2010, 2012, 2017a).

3.1 The model of SH

Suppose for simplicity that there are only two economies—Economy 1 and Economy 2—that are identical except for time preference. Each economy consists of identical households. Let θ_1 and θ_2 be the rates of time preference of households in Economies 1 and 2, respectively, and $\theta_1 < \theta_2$. The population growth rate is zero in both economies. The two economies are fully open to each other, and goods, services, and capital are freely transacted between them, but labor is immobilized in each economy. Because the economies are fully open, they are integrated through trade and form a combined economy. The combined economy can be interpreted as the world economy (the international interpretation) or the national economy (the national interpretation). Usually, the concept of the balance of payments is used only for the international transactions, but because both national and international interpretations are possible, this concept and terminology are also used for the national economy model in this paper.

Because a balanced growth path requires Harrod neutral technological progress, the production function of Economy i is assumed to be

$$y_{i,t} = A_t^{\alpha} k_{i,t}^{1-\alpha}$$

for $i = 1$ or 2 where $y_{i,t}$ and $k_{i,t}$ are the per capita production and capital of Economy i in period t, respectively; A_t is the technology in period t; and α ($0 < \alpha < 1$) is a constant. The

current account balance in Economy 1 is τ_t and that in Economy 2 is $-\tau_t$. The accumulated current account balance

$$\int_0^t \tau_s ds$$

mirrors capital flows between the two economies. The economy with current account surpluses invests them in the other economy. Since $\frac{\partial y_{1,t}}{\partial k_{1,t}}$ $\left(=\frac{\partial y_{2,t}}{\partial k_{2,t}}\right)$ are returns on investments,

$$\frac{\partial y_{1,t}}{\partial k_{1,t}} \int_0^t \tau_s ds \quad \text{and} \quad \frac{\partial y_{2,t}}{\partial k_{2,t}} \int_0^t \tau_s ds$$

represent income receipts or payments on the assets that an economy owns in the other economy. Hence,

$$\tau_t - \frac{\partial y_{2,t}}{\partial k_{2,t}} \int_0^t \tau_s ds$$

is the balance on goods and services of Economy 1, and

$$\frac{\partial y_{1,t}}{\partial k_{1,t}} \int_0^t \tau_s ds - \tau_t$$

is that of Economy 2. Because the current account balance mirrors capital flows between the economies, the balance is a function of capital in both economies such that

$$\tau_t = \kappa\left(k_{1,t}, k_{2,t}\right) .$$

The government (or an international supranational organization under the international interpretation) can intervene in economic activities in Economies 1 and 2 by transferring money between the two economies. The transfer amount from households in Economy 1 to households in Economy 2 in period t is g_t, and it is assumed that g_t depends on capital such that

$$g_t = \bar{g}_t k_{1,t} .$$

$\bar{g}_t$ is an exogenous variable for households and firms and is appropriately adjusted by the government (or an international supranational organization) in every period so as to achieve SH. Because $k_{1,t} = k_{2,t}$ and $\dot{k}_{1,t} = \dot{k}_{2,t}$,

$$g_t = \bar{g}_t k_{1,t} = \bar{g}_t k_{2,t} .$$

Each household in Economy 1 maximizes its expected utility

$$E \int_0^\infty u_1(c_{1,t}) \exp(-\theta_1 t) dt$$

subject to

$$\frac{dk_{1,t}}{dt} = A^\alpha k_{1,t}^{1-\alpha} - c_{1,t} + (1-\alpha) A^\alpha k_{1,t}^{-\alpha} \left(\int_0^t \tau_s \, ds + z_0 \right) - \tau_t - \bar{g}_t k_{1,t} ,$$

and each household in Economy 2 maximizes its expected utility

$$E \int_0^\infty u_2(c_{2,t}) \exp(-\theta_2 t) dt$$

subject to

$$\frac{dk_{2,t}}{dt} = A^\alpha k_{2,t}^{1-\alpha} - c_{2,t} - (1-\alpha) A^\alpha k_{2,t}^{-\alpha} \left(\int_0^t \tau_s \, ds + z_0 \right) + \tau_t + \bar{g}_t k_{2,t} ,$$

where $c_{i,t}$ is the per capita consumption of Economy i in period t, u_i is the utility function of Economy i, and E is the expectation operator.

3.2 SH

In an endogenous growth model, Harashima (2010, 2017a) showed that if, and only if, $\lim_{t\to\infty} \frac{\dot{c}_{1,t}}{c_{1,t}} = \lim_{t\to\infty} \frac{\dot{c}_{2,t}}{c_{2,t}} =$ constant, all the optimality conditions of both economies are satisfied (i.e., SH is achieved). In addition, if Economy 1 behaves multilaterally in the sense that it behaves fully considering the optimality conditions of Economy 2, SH is achieved, but if Economy 1 behaves unilaterally in the sense that it behaves without

regarding the optimality conditions of Economy 2, SH is not achieved unless a government appropriately intervenes. If SH is achieved, the growth rates of consumption in both economies are equally

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}}=\lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}}=\varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}-\frac{\theta_1+\theta_2}{2}\right], \tag{1}$$

where m, v, and ϖ are positive constants, and $\varepsilon=-\frac{c_{1,t}u_1''}{u_1'}=-\frac{c_{2,t}u_2''}{u_2'}$ is the degree of relative risk aversion and is constant.

Note that Harashima (2010, 2017a) showed that this model can be easily extended to multi-economy (i.e., more than two economies) models and that the results in multi-economy models are basically the same as those in the two-economy model.

3.3 Government intervention

Harashima (2012) showed that if a government intervenes such that

$$\lim_{t\to\infty}\bar{g}_t=\frac{\theta_2-\theta_1}{2},$$

then SH is achieved even if Economy 1 behaves unilaterally, and equation (1) is satisfied.

4 SH WITH RENT INCOME

As discussed in Section 2, some households can obtain economic rents or equivalently rent incomes and some cannot (i.e., they are heterogeneous). Hence, we can construct a heterogeneous rent income model similar to the heterogeneous time preference model shown in Section 3; this also applies to the heterogeneous risk aversion and productivity models shown by Harashima (2010, 2012, 2017a).

Suppose that there are only two economies, Economies 1 and 2, which are identical except for rates of time preference ($\theta_1 < \theta_2$) and the rent incomes they obtain. Households within each economy are identical. As shown in Section 2, some households can obtain rent incomes at the expense of decreases in incomes of other households. Suppose that households in Economy 1 obtain rent incomes—particularly ranking monopoly rents. In addition, all of them obtain the same amount of rent income simultaneously when they obtain rent income. Conversely, if households in Economy 1 obtain rent incomes, the income of a household in Economy 2 is reduced by the amount a household in Economy 1 obtains. Finally, households in Economy 1 may receive rent incomes only once in a certain period, but they may obtain them in every period.

4.1 SH with temporary rent income

To start, in this section I examine the case where households in Economy 1 obtain rent incomes only once (i.e., a temporary rent income).

4.1.1 Consumption growth

Suppose that each household in Economy 1 obtains rent income z_0 in period 0 at the expense of a reduction of income of each household in Economy 2 by z_0 in period 0. Suppose for simplicity that a household in Economy 1 does not consume the rent income z_0 but lends the money equivalent to z_t to a household in Economy 2 in period 0. Each household in Economy 1 lends this money to only one household in Economy 2.

Each household in Economy 1 maximizes its expected utility

$$E\int_0^{\infty} u_1(c_{1,t})\exp(-\theta_1 t)dt$$

subject to

$$\frac{dk_{1,t}}{dt} = A^{\alpha}k_{1,t}^{1-\alpha} - c_{1,t} + (1-\alpha)A^{\alpha}k_{1,t}^{-\alpha}\left(\int_0^t \tau_s\, ds + z_0\right) - \tau_t - \bar{g}_t k_{1,t}\,,$$

where $u_{1,t}$ and $c_{1,t}$ are the utility function and per capita consumption, respectively, in Economy 1 in period t. Because $A_t = \frac{\varpi\alpha}{mv(1-\alpha)}k_{i,t}$ and $\frac{\partial y_{i,t}}{\partial k_{i,t}} = \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}$ for i = 1, 2 (see Harashima, 2010, 2017a),

$$\begin{aligned}\frac{dk_{1,t}}{dt} &= \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}k_{1,t} - c_{1,t} \\ &\quad + \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\left(\int_0^t \tau_s\, ds + z_0\right) - \tau_t - \bar{g}_t k_{1,t}\,.\end{aligned}$$

Similarly, each household in Economy 2 maximizes its expected utility

$$E\int_0^{\infty} u_2(c_{2,t})\exp(-\theta_2 t)dt$$

subject to

$$\frac{dk_{2,t}}{dt} = A^{\alpha}k_{2,t}^{1-\alpha} - c_{2,t} - (1-\alpha)A^{\alpha}k_{2,t}^{-\alpha}\left(\int_0^t \tau_s\, ds + z_0\right) + \tau_t + \bar{g}_t k_{2,t}\ .$$

where $u_{2,t}$ and $c_{2,t}$ are the utility function and per capita consumption, respectively, in Economy 2 in period t. Also, because $A_t = \dfrac{\varpi\alpha}{mv(1-\alpha)}k_{i,t}$ and $\dfrac{\partial y_{i,t}}{\partial k_{i,t}} = \left(\dfrac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}$ for $i = 1, 2$,

$$\begin{aligned}\frac{dk_{2,t}}{dt} = &\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}k_{2,t} - c_{2,t} - \bar{z}k_{2,t}\\ &-\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\left(\int_0^t \tau_s\, ds + z_0\right) + \tau_t + \bar{g}_t k_{2,t}\ .\end{aligned}$$

As a result of optimizations, the consumption growth rate in Economy 1 can be expressed as

$$\frac{\dot{c}_{1,t}}{c_{1,t}} = \varepsilon^{-1}\left[\begin{array}{c}\left(\dfrac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} + \left(\dfrac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\dfrac{\partial\left(\int_0^t \tau_s\, ds + z_0\right)}{\partial k_{1,t}}\\ -\dfrac{\partial\tau_t}{\partial k_{1,t}} - \theta_1 - \bar{g}_t\end{array}\right] \qquad (2)$$

and that in Economy 2 as

$$\frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\begin{array}{c}\left(\dfrac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \left(\dfrac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\dfrac{\partial\left(\int_0^t \tau_s\, ds + z_0\right)}{\partial k_{2,t}}\\ +\dfrac{\partial\tau_t}{\partial k_{2,t}} - \theta_2 + \bar{g}_t\end{array}\right]. \qquad (3)$$

4.1.2 Multilateral path without any government intervention

First, I examine the case where households in Economy 1 behave multilaterally. Suppose that the government does not intervene with regard to both heterogeneous time preference and rent income. That is, $\bar{g}_t = 0$ for any period. By the same procedures as those for Proposition 1-1, Proposition 2-1, and Lemma 3-1 in the work of Harashima (2010, 2017a), if SH is satisfied,

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}} = \lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}} \tag{4}$$

and

$$\lim_{t\to\infty}\frac{\tau_t}{k_{1,t}} = \lim_{t\to\infty}\frac{\tau_t}{k_{2,t}} = \Xi\,, \tag{5}$$

where Ξ is a constant. In this case, if

$$\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}[1-(1-\alpha)\varepsilon] < \frac{\theta_1+\theta_2}{2}\,, \tag{6}$$

then

$$\Xi = \frac{\theta_1-\theta_2}{2}\left\{\varepsilon\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}-\frac{\theta_1+\theta_2}{2}\right]^{-1}-1\right\}^{-1} < 0\,.$$

This balanced growth path is called a "multilateral path," and it satisfies the conditions for SH. Note that condition (6) is generally satisfied for reasonable parameter values.

Therefore, even though the government does not intervene, if each household in Economy 1 sets its initial consumption so as to satisfy equations (4) and (5) (i.e., if they behave multilaterally), SH is achieved.

4.1.3 Unilateral path without government intervention in rent incomes

Next, I examine the case where households in Economy 1 behave unilaterally, which I call the "unilateral path." Suppose that, although the government intervenes with regard to heterogeneous time preference, it does not intervene for the purpose of dealing with rent incomes. That is, it intervenes so as to satisfy

$$\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\lim_{t\to\infty}\frac{\partial\left(\int_0^t\tau_s\,ds\right)}{\partial k_{1,t}} = \lim_{t\to\infty}\frac{\partial\tau_t}{\partial k_{1,t}}\,, \tag{7}$$

$$\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\lim_{t\to\infty}\frac{\partial\left(\int_0^t\tau_s\,ds\right)}{\partial k_{2,t}} = \lim_{t\to\infty}\frac{\partial\tau_t}{\partial k_{2,t}}\,, \tag{8}$$

and

$$\lim_{t\to\infty}\bar{g}_t = \frac{\theta_2 - \theta_1}{2} \tag{9}$$

as shown by Harashima (2012).

In this case, because $\frac{\partial z_0}{\partial k_{2,t}} = 0$,

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}} = \lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \frac{\theta_1+\theta_2}{2}\right] = \text{constant} \tag{10}$$

by equations (2) and (3). Equation (10) holds regardless of the multilateral or unilateral behavior of households in Economy 1. That is, even if households in Economy 1 behave unilaterally and the government intervenes with regard to heterogeneous time preference (but does nothing about rent incomes), SH can be achieved.

Equation (10) is the same as equation (1), and it shows the case where there is no rent income. Therefore, even with temporary rent income, SH is eventually achieved by the government's appropriate manipulation of the value of $\bar{g}$ with regard to heterogeneous time preference, exactly in the same manner as in the case without rent income shown in Section 3.

4.2 SH with persistent rent incomes

As discussed in Section, 2.2.3, some family lines (indefinitely living households) can obtain rent incomes persistently over generations. Persistent rent incomes may be obtained deterministically or stochastically (e.g., some generations obtain relatively large amounts of them but other generations obtain relatively small ones). In this section, I examine the case where households in Economy 1 persistently obtain rent incomes, whether deterministically or stochastically.

4.2.1 Deterministic case

4.2.1.1 Consumption growth

Suppose that a household in Economy 1 obtains rent income z_t in period t, and conversely, the income of a household in Economy 2 is reduced by z_t in period t. Suppose again for simplicity that a household in Economy 1 does not consume z_t in period t but lends the money equivalent to z_t to a household in Economy 2 in period t. Because z_t is composed of ranking monopoly rents, it is assumed to be proportional to $k_{i,t}$ such that

$$z_t = \bar{z}k_{1,t} \ , \tag{11}$$

where $\bar{z}$ (> 0) is a constant. A positive value of $\bar{z}$ means that the mean of monopoly rents that households (family lines) in Economy 1 obtain over generations is positive because of the reasons shown in Section 2.2.3. Equation (11) means that rent income z_t is not a stochastic variable and households in Economy 1 obtain rent incomes deterministically in every period.

Each household in Economy 1 maximizes its expected utility

$$E\int_0^\infty u_1(c_{1,t})\exp(-\theta_1 t)dt$$

subject to

$$\frac{dk_{1,t}}{dt} = \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}k_{1,t} - c_{1,t} + \bar{z}k_{1,t} + \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\int_0^t \tau_s\, ds$$
$$-\tau_t - \bar{g}_t k_{1,t} \ .$$

On the other hand, each household in Economy 2 maximizes its expected utility

$$E\int_0^\infty u_2(c_{2,t})\exp(-\theta_2 t)dt$$

subject to

$$\frac{dk_{2,t}}{dt} = \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}k_{2,t} - c_{2,t} - \bar{z}k_{2,t} - \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\int_0^t \tau_s\, ds$$
$$+\tau_t + \bar{g}_t k_{2,t} \ .$$

As a result of optimizations, the consumption growth rate in Economy 1 is

$$\frac{\dot{c}_{1,t}}{c_{1,t}} = \varepsilon^{-1}\left[\begin{array}{c}\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} + \bar{z} + \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\frac{\partial\left(\int_0^t \tau_s ds\right)}{\partial k_{1,t}} \\ -\frac{\partial\tau_t}{\partial k_{1,t}} - \theta_1 - \bar{g}_t\end{array}\right],$$

and that in Economy 2 is

$$\frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\begin{array}{c}\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \bar{z} - \left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\frac{\partial\left(\int_0^t \tau_s ds\right)}{\partial k_{2,t}} \\ + \frac{\partial \tau_t}{\partial k_{2,t}} - \theta_2 + \bar{g}_t\end{array}\right].$$

4.2.1.2 Multilateral path without government intervention

First, I examine the case where households in Economy 1 behave multilaterally, and the government does not intervene with regard to either heterogeneous time preference or rent income (i.e., $\bar{g}_t = 0$) for any period.

By the same procedures used in Proposition 1-1, Proposition 2-1, and Lemma 3-1 of Harashima (2010, 2017a), if SH is satisfied, equations (4) and (5) hold. In this case, if condition (6) is satisfied, then

$$\Xi = \left(\frac{\theta_1 - \theta_2}{2} - \bar{z}\right)\left\{\varepsilon\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{1-\alpha}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \frac{\theta_1+\theta_2}{2}\right]^{-1} - 1\right\}^{-1} < 0\,.$$

Therefore, in the cases of both temporary and persistent rent incomes, SH is achieved even though the government does not intervene if households in Economy 1 behave multilaterally in the sense that each household in Economy 1 sets its initial consumption so as to satisfy equations (4) and (5).

4.2.1.3 Unilateral path without government intervention in rent incomes

Next, I examine the case where households in Economy 1 behave unilaterally. Suppose that the government intervenes only with regard to heterogeneous time preference and, therefore, it intervenes so as to hold equations (7), (8), and (9). In this case, by equations (2), (3), (7), (8), and (9),

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} + \bar{z} - \frac{\theta_1+\theta_2}{2}\right]$$

and

$$\lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \bar{z} - \frac{\theta_1+\theta_2}{2}\right].$$

Because $\bar{z} > 0$,

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}} > \lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}}$$

and therefore, it is not possible for all optimality conditions of households in Economy 2 to be satisfied even though all optimality conditions of households in Economy 1 are satisfied. This result is the same as in the cases of heterogeneous time preference and risk aversion shown by Harashima (2010, 2017a). That is, in the case of persistent rent incomes, if households in Economy 1 behave unilaterally and the government does not appropriately intervene, then households in Economy 2 will eventually fall into a devastated state that is similar to that described by Becker (1980). Persistent rent incomes that are heterogeneously endowed across economies can therefore be an important obstacle to achieving SH.

4.2.1.4 Unilateral path with government intervention in both heterogeneous time preference and rent income

Next, I examine the case where households in Economy 1 behave unilaterally and the government intervenes with regard to both heterogeneous time preference and rent income. In this case, if the government appropriately manipulates the value of $\bar{g}$ in every period during the transition period before achieving SH so as to hold equations (4), (7), and (8), then

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \theta_1 + \bar{z} - \lim_{t\to\infty}\bar{g}_t\right], \tag{12}$$

$$\lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \theta_2 - \bar{z} + \lim_{t\to\infty}\bar{g}_t\right], \tag{13}$$

and equation (4) hold. Equations (4), (12), and (13) indicate that, to achieve SH, the government has to manipulate the value of $\bar{g}$ such that

$$\lim_{t\to\infty}\bar{g}_t = \bar{z} + \frac{\theta_2 - \theta_1}{2} = \text{constant}. \tag{14}$$

Unlike in equation (9), $\bar{z}$ is included in equation (14). To achieve SH, the government has to transfer the persistent rent income ($z_t = \bar{z}k_{1,t}$) entirely from a household in Economy 1 to households in Economy 2 in every period.[1] If the government transfers

[1] Households in Economy 2 share the transfer equally with each other.

rent income in this way, the consumption growth rate will become identical for both economies, such that

$$\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}}=\lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}}=\varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha}-\frac{\theta_1+\theta_2}{2}\right]. \tag{15}$$

Equation (15) is identical to equation (1); that is, it shows the consumption growth rate in the case of no rent income. By intervening in this way, the government can remove the obstacle to achieving SH.

Note that in the case of multiple economies such that there are H economies (Economy 1, Economy 2, …, Economy H) that are identical except for rate of time preference and rent income and that only Economy H obtains rent income, as Harashima (2012) showed for an analogous case, SH requires government (positive or negative) transfers from a household in Economy 1+2+ · · · + (H – 1) to households in Economy H by

$$\lim_{t\to\infty}\bar{g}_t=\frac{\theta_H-\frac{\sum_{q=1}^{H-1}\theta_q}{2}}{H-1}-\frac{\bar{z}}{H-1},$$

where Economy 1+2+ · · · + (H – 1) is the combined economy of Economy 1, Economy 2, …, and Economy (H -1), and SH is satisfied among these economies.[2] In this case, conversely, the amount of government (positive or negative) transfers from a household in Economy H to households in Economy 1+2+ · · · + (H – 1) is

$$-(H-1)\,k_{1+2+\cdots+(H-1),t}\lim_{t\to\infty}\bar{g}_t=\;k_{1+2+\cdots+(H-1),t}\left[\left(\frac{\sum_{q=1}^{H-1}\theta_q}{2}-\theta_H\right)+\bar{z}\right],$$

where $k_{1+2+\cdots+(H-1),t}$ is the capital of a household in Economy 1+2+ · · · + (H – 1) in period t and is equal to $k_{H,t}$.[3]

4.2.2 Stochastic case

Finally, I examine the case where rent incomes are stochastically obtained. I do not examine the multilateral and unilateral paths without government intervention in rent income, because the results of these cases are the same as those in the above sections.

[2] Households in Economy H share the transfers equally with each other.
[3] Households in Economy 1+2+ · · · + (H – 1) share the transfer equally with each other.

That is, SH is achieved if households in Economy 1 behave multilaterally, and it is not achieved if households in Economy 1 behave unilaterally and the government intervenes only with regard to heterogeneous time preference. Hence, I only examine the case of the unilateral path with government intervention with regard to both heterogeneous time preference and rent income.

Suppose that households in Economy 1 behave unilaterally and that the rent income z_t that a household in Economy 1 obtains persistently in each period is a stochastic variable, such that

$$z_t = \bar{z}(1 + \varepsilon_t)k_{1,t} \ ,$$

where $\bar{z}$ (> 0) is a constant and ε_t is an i.i.d. process with a zero mean. The other elements are the same as those in the deterministic case.

If the government manipulates the value of $\bar{g}$ during the transition period before achieving SH so as to hold equations (4), (7), and (8), then

$$\lim_{t\to\infty} \frac{\dot{c}_{1,t}}{c_{1,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \theta_1 + \bar{z}(1+\varepsilon_t) - \lim_{t\to\infty}\bar{g}_t\right] , \qquad (16)$$

$$\lim_{t\to\infty} \frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \theta_2 - \bar{z}(1+\varepsilon_t) + \lim_{t\to\infty}\bar{g}_t\right] , \qquad (17)$$

and equation (4) hold. Equations (4), (16), and (17) indicate that, to achieve SH, the government has to manipulate the value of $\bar{g}$ such that

$$\lim_{t\to\infty}\bar{g}_t = \bar{z}(1+\varepsilon_t) + \frac{\theta_2 - \theta_1}{2} \ . \qquad (18)$$

The government therefore has to indefinitely change $\bar{g}_t$ largely in each period according to the value of ε_t in equation (18).

Nevertheless, in both the deterministic and stochastic cases, the equation

$$E\left(\lim_{t\to\infty}\frac{\dot{c}_{1,t}}{c_{1,t}}\right) = E\left(\lim_{t\to\infty}\frac{\dot{c}_{2,t}}{c_{2,t}}\right) = \varepsilon^{-1}\left[\left(\frac{\varpi\alpha}{mv}\right)^{\alpha}(1-\alpha)^{-\alpha} - \frac{\theta_1+\theta_2}{2}\right] \qquad (19)$$

commonly holds where E is the expectation operator. The right side of equation (19) is identical to those of equations (1) and (15). That is, even if the government does not intervene according to equation (18) but instead according to equation (14) (i.e., in the

same manner as in the deterministic case) and thus does not change the value of $\bar{g}_t$ largely in each period indefinitely, the result in the long run in the stochastic case is the same as that in the deterministic case. That is, there is no need for a government to change the value of $\bar{g}_t$ largely in each period indefinitely to maintain SH, even in the stochastic case.

Note that in the case of multiple economies (as shown in Section 4.2.1.4), SH requires a government (positive or negative) transfer from a household in Economy 1+2+ $\cdots$ + (H – 1) to households in Economy H by

$$\lim_{t\to\infty}\bar{g}_t = \frac{\theta_H - \frac{\sum_{q=1}^{H-1}\theta_q}{2}}{H-1} - \frac{\bar{z}(1+\varepsilon_t)}{H-1}\ ,^{4}$$

and conversely, the amount of government (positive or negative) transfers from a household in Economy H to households in Economy 1+2+ $\cdots$ + (H – 1) is

$$-(H-1)\,k_{1+2+\cdots+(H-1),t}\lim_{t\to\infty}\bar{g}_t = k_{1+2+\cdots+(H-1),t}\left[\left(\frac{\sum_{q=1}^{H-1}\theta_q}{2}-\theta_H\right)+\bar{z}(1+\varepsilon_t)\right].^{5}$$

5 ACHIEVING SH WITH RENT INCOMES

5.1 Necessary government interventions

Section 4 indicates that if rent incomes are temporary, a government need not intervene with regard to the income, but if they are persistent—whether deterministic or stochastic—a government needs to intervene appropriately to achieve and maintain SH. Therefore, what a government must first do is to distinguish whether rent incomes are temporary or persistent. If the government judges that they are temporary, it needs to take no action. However, if it deems them to be persistent, it then has to correctly evaluate their mean (i.e., $\bar{z}$) and intervene appropriately on the basis of this estimated value. Note that, as discussed in Sections 3 and 4, the two-economy model used in this paper can be easily extended to multi-economy models, and the role of government in multi-economy models is basically the same as that in the two-economy model.

As mentioned in the Introduction, monopoly rents derived from ranking currently prevail and will continue to prevail indefinitely in the future because the strategy of product differentiation is one of the most important strategies for firms (Porter, 1980,

[4] Households in Economy H share the transfers equally with each other.
[5] Households in Economy 1+2+ $\cdots$ + (H – 1) share the transfer equally with each other.

1985). The economic importance of other types of rent incomes may have decreased and may continue to decrease in the future as industrialized economies develop, but the economic importance of ranking monopoly rents will not decrease, or may even increase, because the strategy of product differentiation almost certainly will continue to be important. Because of this, it is very important for a government to intervene according to either equation (14) or (18) to achieve SH in an economy with rent incomes—particularly ranking monopoly rents.

In addition, as discussed in the previous sections, because of the nature of ranking preference, ranking monopoly rents will be very unevenly distributed to households. Moreover, some family lines can obtain them persistently because of their relatively high abilities or because of the prevailing system of distribution. In addition, most of the ranking monopoly rents generated in a company and systematically distributed to a specific family line may be inherited across generations. In this way, only a small number of family lines may persistently obtain a large amount of rent income. Furthermore, as mentioned in Section 2.2.3 and shown by Harashima (2018c), there is no harm to economic activities even if ranking monopoly rents are collected and redistributed by the government. In sum, the government's role to achieve SH in an economy with rent income (particularly ranking monopoly rents) by intervening according to equation (14) or (18) is both important and indispensable.

5.2 Heterogeneity in people's abilities can accelerate inequality

The heterogeneous persistent rent income model has the same nature as heterogeneous time preference, risk aversion, and productivity models in that they commonly assume that heterogeneity among indefinitely living households (family lines) is kept indefinitely. The heterogeneous persistent rent income and productivity models also have the common feature that heterogeneity in abilities of indefinitely living households is kept indefinitely. However, the necessity for government intervention to achieve SH is entirely different in these two ability-related models. Harashima (2010, 2012, 2017a) showed that, in the case of heterogeneous productivities, government interventions are not necessary to achieve SH because households in Economy 1 will spontaneously choose the multilateral path, and therefore SH will be naturally achieved. This means that heterogeneity in people's abilities with regard to productivity will not result in acceleration of inequality. In this paper, I showed that heterogeneity in people's abilities with regard to access to ranking monopoly rents does accelerate inequality if governments do nothing. The reason for this difference is explained below.

Suppose a two-economy heterogeneous productivity model consists of Economy 1 and Economy 2 (see Harashima, 2010, 2017a). Furthermore, the two economies are

identical except for their productivities, such that the production function of Economy 1 is $y_{1,t} = \omega_1^{\alpha} A_t^{\alpha} f\left(k_{1,t}\right)$ and that of Economy 2 is $y_{2,t} = \omega_2^{\alpha} A_t^{\alpha} f\left(k_{2,t}\right)$, where $\omega_1 (0 < \omega_1 \leq 1)$ and $\omega_2 (0 < \omega_2 \leq 1)$ are constants and $\omega_2 < \omega_1$. Harashima (2010, 2017a) showed that, regardless of whether households in Economy 1 behave unilaterally or multilaterally,

$$\lim_{t\to\infty} \frac{\dot{c}_{1,t}}{c_{1,t}} = \lim_{t\to\infty} \frac{\dot{c}_{2,t}}{c_{2,t}} = \varepsilon^{-1} \left\{ \left[\frac{(\omega_1 + \omega_2)\varpi\alpha}{2mv(1-\alpha)} \right]^{\alpha} - \theta \right\} \tag{20}$$

holds, where θ is the common rate of time preference of the two economies. That is, equation (4) is naturally satisfied and SH is naturally achieved. Equations (4) and (20) naturally hold because capital is adjusted between the two economies to satisfy equation (4) through arbitration in markets, because the production functions and the returns on capital are heterogeneous between the two economies. That is, the model contains a market mechanism that adjusts capital to satisfy equation (4).

On the other hand, in the heterogeneous persistent rent income model, the production functions of the two economies are identical and therefore their returns on capital are also identical, similar to the heterogeneous time preference and risk aversion models. Hence, there is no capital adjustment mechanism in markets with regard to rent income to satisfy equation (4) in the process of production. The difference between the two economies emerges only after outputs are produced, and these two economies differ in how the produced outputs are distributed, consumed, and invested. Because equation (4) is not yet satisfied, appropriate government interventions are necessary in the processes of distribution, consumption, and investment to achieve SH when households in Economy 1 behave unilaterally.

From the point of view of productivity, therefore, heterogeneous abilities do not accelerate inequality, as Harashima (2010, 2017a) showed. They produce a certain level of inequality in that people's incomes are determined to be proportionate to their absolute abilities (productivities), but the level of inequality is uniquely determined and inequality will not accelerate. Hence, some people may argue that the current level of inequality simply reflects the proportional differences in people's absolute abilities and therefore is justifiable. However, as shown in this paper, heterogeneity in people's abilities actually can accelerate inequality through heterogeneous access to persistent rent incomes—particularly ranking monopoly rents—and the inequality can reach an extreme level. Appropriate government interventions are significantly important for the level of inequality to be stabilized at a proper level—that is, for SH to be achieved.

6 CONCLUDING REMARKS

There has been a long-held and deep-rooted view that wealthy persons can exclusively obtain high incomes irrespective of their absolute abilities because of economic rents. However, most traditional economic rents may currently be less economically important even though there is still significant income inequality in most countries, indicating that there may be another important type of economic rent.

In this paper, ranking monopoly rents were examined on the basis of the model of ranking value and preference and the concept of SH. Ranking preference generates monopoly powers, profits, and rents, and these monopoly rents can be obtained through product differentiation. Because product differentiation is one of the most important strategies for firms and is actually pursued intensely by many firms, these monopoly rents are large and widespread across economies.

Access to ranking monopoly rents will largely differ among people, depending on their inherited relative abilities or because some system of uneven distribution exists. Hence, ranking monopoly rents will be very unevenly distributed among households; that is, only a small number of households (and family lines) will be able to frequently access them. Unlike heterogeneity in productivity, heterogeneous accessibility to ranking monopoly rents among households does not necessarily guarantee SH. If advantaged households behave unilaterally and the government does not intervene, inequality will accelerate and eventually reach an extreme level.

Because ranking monopoly rents can be an important factor for widening inequality, a government bears the responsibility to prevent the increasing inequality and to achieve SH by appropriately dealing with heterogeneous rent incomes as well as heterogeneous rates of time preference and degrees of risk aversion.

References

Atkinson, Anthony B., Thomas Piketty and Emmanuel Saez (2011) "Top Incomes in the Long Run of History," *Journal of Economic Literature*, Vol. 49, No. 1, pp. 3-71.

Autor, David H., Lawrence F. Katz and Alan B. Krueger (1998) "Computing Inequality: Have Computers Changed the Labor Market?" *The Quarterly Journal of Economics*, Vol. 113, No. 4, pp. 1169-1213

Autor, David H., Frank Levy and Richard J. Murnane (2003) "The Skill Content of Recent Technological Change: An Empirical Exploration," *The Quarterly Journal of Economics*, Vol. 118, No. 4, pp. 1279-1333.

Becker, Robert A. (1980) "On the Long-run Steady State in a Simple Dynamic Model of Equilibrium with Heterogeneous Households," *The Quarterly Journal of Economics*, Vol. 95, No. 2, pp. 375–382.

Boix, Carles (2010) "Origins and Persistence of Economic Inequality," *Annual Review of Political Science*, Vol. 13, pp. 489-516.

Card, David and John E. DiNardo (2002) "Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles," *Journal of Labor Economics*, Vol. 20, No. 4, pp. 733- 783

Goldberg, Pinelopi Koujianou and Nina Pavcnik (2007) "Distributional Effects of Globalization in Developing Countries," *Journal of Economic Literature*, Vol. 45, No. 1, pp. 39-82.

Harashima, Taiji (2010) "Sustainable Heterogeneity: Inequality, Growth, and Social Welfare in a Heterogeneous Population," *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 24233.

Harashima, Taiji (2012) "Sustainable Heterogeneity as the Unique Socially Optimal Allocation for Almost All Social Welfare Functions," *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 40938.

Harashima, Taiji (2016) "Ranking Value and Preference: A Model of Superstardom," *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 74626.

Harashima, Taiji (2017a) "Sustainable Heterogeneity: Inequality, Growth, and Social Welfare in a Heterogeneous Population," in Japanese, *Journal of Kanazawa Seiryo University*, Vol. 51, No.1, pp. 31-80.（原嶋　耐治「持続可能な非均質性―均質ではない構成員からなる経済における不平等、経済成長及び社会的厚生―」『金沢星稜大学論集』第 51 巻第 1 号（通巻 130 号）31～80 頁）

Harashima, Taiji (2017b) "The Mechanism behind Product Differentiation: An Economic Model" *Journal of Advanced Research in Management,* Vol. 8, No. 2. pp. 95-111.

Harashima, Taiji (2018a) "Superstars in Team Sports: An Economic Model," *MPRA* (*The*

Munich Personal RePEc Archive) *Paper* No. 86360.

Harashima, Taiji (2018b) "Ranking Value and Preference: A Model of Superstardom," in Japanese, *Journal of Kanazawa Seiryo University*, Vol. 52, No.1, pp. 27 - 40.（原嶋耐治「順位価値と順位選好―スーパースターの経済モデル―」『金沢星稜大学論集』第 52 巻第 1 号（通巻 132 号）27～40 頁）

Harashima, Taiji (2018c) "Why Is Executive Compensation So High? A Model of Executive Compensation" (2018) *Journal of Advanced Research in Management*, Vol. 9, No. 2. pp. 59-68.

Helpman, Elhanan (2016) "Globalization and Wage Inequality," *NBER Working Paper*, No. 22944.

Katz, Lawrence F. and Kevin M. Murphy (1992) "Changes in Relative Wages, 1963-1987: Supply and Demand Factors," *The Quarterly Journal of Economics*, Vol. 107, No. 1, pp. 35-78.

Kuznets, Simon (1955) "Economic Growth and Income Inequality," *The American Economic Review*, Vol. 45, No. 1, pp. 1-28

Leamer, Edward E. (1998) "In Search of Stolper-Samuelson Linkages between International Trade and Lower Wages," in *Imports, Exports, and the American Worker*, Susan M. Collins (ed), Brookings Institution Press, Washington, D.C.

Milanovic, Branko (2016) *Global Inequality: A New Approach for the Age of Globalization,* The Belknap Press of Harvard University Press, Cambridge, MA.

Parker, Nicholas (2014) "Divergence: Wealth and Income Inequality in the United States," *EconSouth*, Federal Reserve Bank of Atlanta, Vol. 16, No. 3.

Piketty, Thomas (2003), "Income Inequality in France, 1901–1998," *Journal of Political Economy*, Vol. 111, No. 5, pp. 1004-1042.

Piketty, Thomas (2013) *Le Capital au XXIe siècle* translated by Arthur Goldhammer in English in 2014 with the title *Capital in the twenty-First Century Capital in the Twenty-First Century*, Belknap Press of Harvard University Press, Cambridge, MA.

Piketty, Thomas and Emmanuel Saez (2003) "Income Inequality in the United States, 1913–1998," *The Quarterly Journal of Economics*, Vol. 118, No. 1, pp. 1-41.

Porter, Michael E. (1980) *Competitive Strategy*, Free Press, New York.

Porter, Michael E. (1985) *Competitive Advantage*, Free Press, New York.

Saez, Emmanuel and Gabriel Zucman (2016) "Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data," *The Quarterly Journal of Economics*, Vol. 131, No. 2, pp. 519-578.

Stiglitz, Joseph E. (2015a) "New Theoretical Perspectives on the Distribution of Income and Wealth among Individuals: Part I. The Wealth Residual," *NBER Working paper*, No. 21189.

Stiglitz, Joseph E. (2015b) “New Theoretical Perspectives on the Distribution of Income and Wealth among Individuals: Part II: Equilibrium Wealth Distributions,” *NBER Working paper*, No. 21190.

Stiglitz, Joseph E. (2015c) “Inequality and Economic Growth,” *The Political Quarterly*, Vol. 86, No. S1, pp. 134-155. DOI: 10.1111/1467-923X.12237.

Stiglitz, Joseph E. (2015d) “The Origins of Inequality, and Policies to Contain It,” *National Tax Journal*, 2015, Vol. 68, No. 2, pp. 425–448.
DOI: dx.doi.org/10.17310/ntj.2015.2.09

Stolper, Wolfgang F. and Paul A. Samuelson (1941) “Protection and Real Wages,” *The Review of Economic Studies*, Vol. 9, No. 1, pp. 58-73.