Economic Inequality Exacerbated by Economic Rents from Exploitative Contracting

Harashima, Taiji

Kanazawa Seiryo University

18 November 2020

Economic Inequality Exacerbated by Economic Rents from Exploitative Contracting

HARASHIMA Taiji*

November 2020

Abstract

According to contract theory, exploitative contracting probably exists widely and on a large scale, and it generates economic rents. In this paper, I show that the origin of these economic rents is heterogeneity in fluid intelligences, and heterogeneity in honesty aggravates the situation. Even without asymmetric information and irrationality, and even if economic agents have no malicious intent and are always honest, economic rents from mistakes in business deals are generated. Some households or family lines persistently obtain these economic rents with higher probability than others, and, as a result, extreme economic inequality will be generated. This means that there is a built-in mechanism such that the level of economic inequality in an economy is naturally exacerbated. Hence, a government has to intervene in economic activities to eliminate the negative effects of these economic rents by appropriately redistributing incomes among households.

JEL Classification code: D33, D63, D86, E25, H23

Keywords: Contract; Economic rents; Exploitative contracting; Fluid intelligence; Inequality

---

*Correspondence: HARASHIMA Taiji, Kanazawa Seiryo University, 10-1 Goshomachi-Ushi, Kanazawa, Ishikawa, 920-8620, Japan.

Email: harashim@seiryo-u.ac.jp or t-harashima@mve.biglobe.ne.jp.

1 INTRODUCTION

Exploitative contracting has been an important subject of study in contract theory (e.g., DellaVigna and Malmendier, 2004; Laibson and Gabaix, 2004; Gabaix and Laibson, 2006; Heidhues and Kőszegi, 2010; Koszegi, 2014). These studies show that, if economic agents are heterogeneous in behaviors with regard to making decisions in business dealings (e.g., consumers are either naïve or sophisticated), competition in markets cannot sufficiently protect naïve consumers from their cognitive biases, errors, or mistakes. Therefore, some agents obtain the economic rents derived from exploitative contracting while others are exploited. It seems highly likely that economic agents are actually heterogeneous in such behaviors, and thereby the economic rents from exploitative contracting actually exist ubiquitously, most likely on a large scale.

The existence of exploitative contracting means that economic rents are generated—that is, some economic agents obtain factor payments that exceed costs (i.e., extra profits). At the same time, some agents suffer losses that are equivalent to the economic rents. These economic rents will lead to two important economic consequences: inefficiency and inequality. In this paper, I particularly focus only on the inequality brought about by these economic rents.

In contract theory, the reason for exploitative contracting is often explained by using the concepts of asymmetric information and irrationality (or bounded rationality). Nevertheless, as noted above, exploitative contracting occurs essentially because economic agents are heterogeneous (e.g., there are naïve and sophisticated consumers). Why are economic agents heterogeneous? Possibly because of heterogeneity in the intelligences of people—particularly, heterogeneity in fluid intelligence. According to Cattell (1963, 1971), fluid intelligence is the ability to solve novel problems by thinking logically and without depending only on previously acquired knowledge. The importance of fluid intelligence has been emphasized in psychology and psychometrics.

Another possible origin of the heterogeneity is that people have heterogeneous personalities; in particular, they are heterogeneous with regard to honesty because contract negotiations are a kind of game. If all agents are always honest, it is possible that no exploitative contracting occurs and no economic rents derived from it will be generated, because no honest agent will want to exploit others. However, people have strong desires to "win" whatever game they may be playing. As a result, some people may act more dishonestly than others, and some relatively more dishonest people may take advantage of the opportunities that exploitative contracting provides.

In this paper, I examine the phenomenon of exploitative contracting from a

broader perspective; that is, I consider not only exploitative contracting but also "mistakes" made by economic agents in business dealings. Here, a "mistake" means, for example, that a household purchases a product at a price that is higher than the cost to produce it plus a normal margin, or that a worker accepts a wage that is lower than their marginal productivity would indicate is appropriate. In business dealings, the economic agent who makes fewer mistakes wins and the one who makes more mistakes loses. An economic agent may win by intentionally misleading the other agent, but in any case, the winner obtains the economic rents.

The model in this paper shows that heterogeneity in fluid intelligence generates heterogeneity in the ability to make fewer mistakes in business dealings. Because the economic rents from mistakes include those from exploitative contracting, the naïve and sophisticated consumers mentioned in the literature of contract theory may correspond to consumers with relatively low and high fluid intelligences, respectively. They may also correspond to relatively more and less honest consumers. If fluid intelligences are heterogeneous among agents, economic rents from mistakes in business dealings are generated even if no economic agents have any malicious intent and all agents are always honest. This means that heterogeneity in fluid intelligence is the primary source of the economic rents from mistakes. Although heterogeneity in honesty is not the primary source of the economic rents, it can be an important factor because it aggravates the situation generated by heterogeneity in fluid intelligence.

Fluid intelligences are highly likely to be heterogeneous among people. Therefore, most business dealings and contracts must be made between economic agents with different fluid intelligences, and the economic rents from the mistakes probably exist ubiquitously and at a large scale across an economy. In addition, some households or family lines may persistently obtain economic rents with a higher probability than others, because fluid intelligences are probably exogenously given and biased. This persistence generates a serious problem. Harashima (2020d) showed that, if persistent economic rents exist, extreme economic inequality is generated unless a government appropriately intervenes in its economy. Heterogeneity in fluid intelligences therefore means that there is a built-in mechanism such that the level of economic inequality in an economy is naturally exacerbated.

The model in this paper indicates that a government has to intervene in economic activities to eliminate the negative effects of these economic rents and escape from extreme economic inequality. Moreover, a government should not strengthen regulations but instead should appropriately redistribute incomes among households, for example, through a progressive income tax or an inheritance tax.

2 MISTAKES IN BUSINESS DEALINGS AND ECONOMIC RENTS

2.1 Mistakes

2.1.1 Mistakes and victory or defeat

When making a deal in business, an agreement is reached between the two parties after negotiations (e.g., after exchanging offers and proposals with one another). At the time of an agreement, both parties think that they have won—or at worst, that it was a tie—and, even if there is a loser, each party thinks it is the other and not themselves. However, from an objective point of view, it is highly likely that, in many cases, one party made more mistakes than the other party and one party should objectively be considered to have lost. Nevertheless, it may take a long time before the loser recognizes the loss, and in some cases, the objectively defeated party may never recognize its mistakes or the loss.

Consider a board game such as chess or go. Players do their best to win games, but a player is not always able to choose the best move at any point in time. Relatively inferior moves are often chosen, at least to some extent. Nevertheless, if a player's moves on average are better—even if only slightly—than those of the opponent, that player eventually wins. In such a game, even if the difference in ability between players is very small, one player wins and one player loses. Taking this property into consideration, it seems highly likely that there are some economic agents who usually make fewer mistakes in business dealings than other agents because heterogeneity in the probability of making mistakes exists across economic agents. Even if the difference in the agents' abilities with regard to making mistakes is very small, some economic agents will win more often than others; that is, economic agents who usually make fewer mistakes can "win" business dealings more often than those who usually make more mistakes.

2.1.2 The reason for making mistakes

Why do economic agents misunderstand and make mistakes in business deals? One reason is that households or workers may become more or less confused, because they have to deal with information about price and quality in addition to many other kinds of related information (e.g., contract details or information on rival products). For example, a consumer needs to consider information on monthly installments or supplemental payments and additional functions when purchasing a product. Similarly, a potential employee needs to consider the term of employment, bonuses, company benefits, promotion opportunities, and the growth potential of company when making a wage

contract. A household or worker has to decide whether a proposal is acceptable fully considering all of this information—that is, it has to make the decision in a very complicated environment. This complexity is an important source of confusion, misunderstandings, and mistakes.

2.1.3 Misleading conduct

Because of the complexity of business transactions, many opportunities for exploitation exist. Some people may intentionally mislead other people and take advantage of their misunderstandings and mistakes. For example, a household may be coaxed into buying a product that is actually less valuable than its price indicates, or a worker may be convinced to accept lower wages than the level that marginal productivity would indicate is appropriate. In these cases, the winners are the seller and employer who have successfully misled the consumer and worker. In some cases, techniques such as lies, bluffs, exaggeration, and misinformation may be used, and there may be many people who use these techniques as much as possible on a daily basis. Conversely, it seems likely that there are large numbers of people who are misled in their business transactions on a daily basis.

Some activities intended to mislead others or to promote misunderstandings and mistakes may be illegal, but other similar activities may be entirely lawful. In this paper, regardless of whether these activities are legal or technically illegal but in essence are practically legal because of weak law enforcement, conduct that intentionally misleads other economic agents or promotes misunderstandings and mistakes but is not punished by the authorities is called “misleading conduct.”

2.2 Economic rents

Winners in business deals can obtain economic rents in the sense that a winner can receive a payment that exceeds the costs needed to receive it. At the same time, losers receive smaller amounts of compensation than they could obtain. For example, sellers can obtain economic rents if they can successfully sell a less valuable product than its price would indicate to consumers, or employers can obtain economic rents if they can successfully persuade their employees to accept lower wages than their marginal productivity would indicate. Moreover, winners can obtain these economic rents even if they are obtained as a result of misleading conduct.

3 HETEROGENEITY IN MAKING MISTAKES AND FLUID INTELLIGENCE

If the probability of making a mistake is identical for all economic agents, these mistakes do not matter to economic inequality because advantages and disadvantages derived from the mistakes are cancelled out on average for any economic agent; therefore, there will be no effect on economic inequality. However, it seems highly likely that the probabilities of making a mistake are heterogeneous across people and that mistakes matter in terms of economic inequality.

3.1 Mistakes and unexpected problems

Most business deals are not only complex: they are also *ad hoc*. Conditions vary by deal and often change temporally and unexpectedly. In addition, various types of ambiguity or unpredictability exist. For example, the following situations will commonly be observed during negotiations:

- Prices offered change temporally and differ in every proposal for various reasons.
- Quality cannot be perfectly tested and guaranteed at the time of purchase.
- Difference in qualities or functions among competing products cannot easily be evaluated by buyers.
- Payment schedules vary in each proposal.
- Conditions for the sale of the same product differ in each proposal and can be complex.
- Working conditions are not perfectly or correctly known before a worker accepts an employment offer.
- A company's future is uncertain for a newly recruited worker.

As a result, each economic agent has to evaluate an offer or proposal comprehensively by fully considering many points before making a decision.

In these complicated situations, however, economic agents can avoid mistakes if they more correctly and comprehensively identify potential problems in proposals or offers. But what is needed to discover these potential problems more correctly and comprehensively *ex ante*? It seems highly likely that a higher intelligence is needed, but what kind of intelligence? These situations are so complicated that unexpected problems are usually hidden in offers or proposals in negotiations because of their complexity, variability, ambiguity, and unpredictability. If an economic agent can anticipate unexpected problems and reduce their number *ex ante* more so than the agent's opponent, that agent will make fewer mistakes and eventually win. In this sense, the type of intelligence that is most important is one that enables an agent to anticipate unexpected

problems and thereby prevent them *ex ante*.

3.2 Fluid intelligence

In psychology and psychometrics, many types of intelligence have been considered, including fluid intelligence, crystallized intelligence, short-term memory, long-term storage and retrieval, reading and writing ability, and visual processing. Among these, the important differences between fluid intelligence and crystallized intelligence have been particularly emphasized. According to Cattell (1963, 1971), fluid intelligence is the ability to solve novel problems by thinking logically without depending only on previously acquired knowledge—for example, from schooling or previous experience. With the help of fluid intelligence, people can flexibly adapt their thinking to new problems or situations. By contrast, crystallized intelligence is the capacity to acquire and use knowledge or experience. This is the ability to communicate one's knowledge and to reason by using previously learned experiences.

As discussed in Section 3.1, the intelligence required to reduce mistakes in business deals is the one that enables people to anticipate, prevent, and avoid unexpected problems *ex ante*. Therefore, intelligence, particularly fluid intelligence is required to deal with these types of conditions. Moreover, an economic agent's probability of making a mistake in business transactions will be highly likely negatively correlated with the level of fluid intelligence of the agent.

3.3 Heterogeneity in the probability of making a mistake

Raven's Progressive Matrices has been regarded as the best test to measure fluid intelligence (Raven, 1962; Snow et al., 1984; Raven et al., 1998). In this test, a subject (i.e., the test taker) is presented with a matrix of images and is asked to identify the missing element that would complete the matrix from among a given set of possible answers. The images in the matrix are arranged by a rule; hence, selecting the correct answer is equivalent to correctly uncovering the rule.

Tests scores vary across test takers, indicating that fluid intelligence is heterogeneous across people. Therefore, the probabilities of making mistakes in business deals are also heterogeneous, and some economic agents will make more mistakes than others. Particularly, economic agents with lower fluid intelligences will make more mistakes than those with higher fluid intelligences.

3.4 Heterogeneous fluid intelligences and misleading conduct

As indicated in Section 2.1.3, mistakes are made not only because of inherent inability but also because an agent has been misled by another agent. If there is no correlation

between fluid intelligence and the ethical conduct of economic agents, misleading conduct will be attempted by economic agents at similar rates regardless of their fluid intelligences.

Even if everybody engages in misleading conduct equally, the success rates of that conduct will vary among economic agents. It seems natural to assume that an economic agent with a higher fluid intelligence will more often succeed in misleading other agents than an economic agent with a lower fluid intelligence; that is, an economic agent with a lower fluid intelligence not only makes more mistakes because of their own lower ability but also because they are more often misled by economic agents with higher fluid intelligences.

Considering the reality that most people are seeking profits in their business dealings, it seems likely that many people will intentionally utilize as much misleading conduct as possible because this conduct is lawful, at least in the practical sense previously discussed (i.e., there is little enforcement of laws prohibiting some misleading conduct). If this is true, the number of mistakes made by agents with relatively low fluid intelligence as a result of the intentional misleading conduct of agents with relatively high fluid intelligence agents may be far larger than that stemming from simply having relatively low fluid intelligence.

4 MODEL OF ECONOMIC RENTS FROM MISTAKES IN BUSINESS DEALINGS

4.1 The model

Suppose that there are two economic agents, Agent 1 and Agent 2. The two agents are identical except for their fluid intelligences: the fluid intelligence of Agent 1 is higher than that of Agent 2. Because fluid intelligences cannot prevent all unexpected problems, both agents naturally make mistakes in business deals, but the probability that Agent 1 makes a mistake is lower than that of Agent 2.

During negotiations between Agents 1 and 2, many proposals or offers to reach an agreement are presented by each agent. Suppose that the probability that a proposal is advantageous to Agent 1 is x ($0 < x < 0.5$) and the probability that it is advantageous to Agent 2 is also x ($0 < x < 0.5$); that is, proposals are, on average, neutral for both Agents 1 and 2. Hence, the probability that a proposal is neither advantageous nor disadvantageous to both agents is equally $1 - 2x$ for both agents.

It is assumed that the probability that Agent i (= 1, 2) judges that a proposal is advantageous even if it is actually disadvantageous is p_i, and the probability that Agent i

wrongly judges that it is disadvantageous even if it is actually advantageous is also p_i. That is, the probability that Agent i makes a mistake is p_i. Mistakes are made by agents regardless of misleading conducts of the opposing agents. In the model, misleading conducts are only described by heterogeneity in honesty as will be explained below. In addition, if a proposal is neither advantageous nor disadvantageous to both agents, the probability that Agent i wrongly judges that it is disadvantageous is $0.5p_i$, and the probability that Agent i wrongly judges that it is advantageous is also $0.5p_i$. Therefore, the probability that Agent i correctly judges that a proposed deal is neither advantageous nor disadvantageous is $1 - p_i$. Because the fluid intelligence of Agent 1 is higher than that of Agent 2, $p_2 > p_1$.

In addition, suppose that Agent 1 is honest with the probability q_1 ($0 \leq q_1 \leq 1$) and dishonest with the probability $1 - q_1$, and Agent 2 is honest with the probability q_2 ($0 \leq q_2 \leq 1$) and dishonest with the probability $1 - q_2$. Here, an "honest" agent is one who, if he recognizes that the other agent is making a mistake, informs the other agent of the mistake. Conversely, a "dishonest" agent covertly aims to exploit any opportunity the other agent provides (i.e., it never informs the other agent of any mistakes). As mentioned above, it is assumed for simplicity that the effect of misleading conduct is reflected not in p_i but only in q_i in the model. This means that misleading conducts are represented only by being dishonest after mistakes were made by the opposing agent. In addition, the probability p_i does not change regardless of whether the opposing agent is more honest or not. Of course, an honest agent can only inform the other agent of a mistake if the agent recognizes the other agent's mistake. Suppose that the probability that Agent i recognizes a mistake made by Agent j is $1 - p_i$ for any i and j ($i \neq j$).

If both agents are dishonest, the probability that Agent 1 accepts a proposal and an agreement is reached ($P_{1,1-q_1,1-q_2}$) is

$$\begin{aligned} P_{1,1-q_1,1-q_2} = {} & x(1-p_1)p_2 \\ & +(1-2x)(1-p_1)(1-p_2) \\ & +xp_1(1-p_2)\ . \end{aligned} \tag{1}$$

The first term in equation (1) indicates the case that the proposal is advantageous to Agent 1 (i.e., x), and Agent 1 does not make a mistake (i.e., $1 - p_1$) but Agent 2 does make a mistake (i.e., p_2). The second term indicates the case that the proposal is neither advantageous nor disadvantageous (i.e., $1 - 2x$), and both agents do not make a mistake (i.e., $1 - p_1$ and $1 - p_2$). The third term in equation (1) indicates the case that the proposal is disadvantageous to Agent 1 (i.e., x) and Agent 1 makes a mistake (i.e., p_1), but Agent 2 does not make a mistake (i.e., $1 - p_2$).

Next, if Agent 1 is honest but Agent 2 is dishonest, the probability that Agent 1 accepts a proposal and an agreement is reached ($P_{1,q_1,1-q_2}$) is

$$\begin{aligned} P_{1,q_1,1-q_2} = {} & x(1-p_1)p_2p_1 \\ & +(1-2x)(1-p_1)(1-p_2) \\ & +xp_1(1-p_2) \\ & +(1-2x)(1-p_1)p_2(1-p_1)\ . \end{aligned} \tag{2}$$

The first term in equation (2) is different from that in equation (1) because honest Agent 1 informs Agent 2 of any mistake with the probability $1-p_1$; even if Agent 1 is honest, however, Agent 1 cannot inform Agent 2 of any mistake with the probability p_1. The second and third terms in equation (2) are the same as those in equation (1). The fourth term indicates the case where the proposal is neither advantageous nor disadvantageous (i.e., $1-2x$), and only Agent 2 makes a mistake with the probability $(1-p_1)p_2$, but honest Agent 1 informs Agent 2 of the mistake with the probability $1-p_1$.

Third, if Agent 1 is dishonest but Agent 2 is honest, the probability that Agent 1 accepts a proposal and the agreement is reached ($P_{1,1-q_1,q_2}$) is

$$\begin{aligned} P_{1,1-q_1,q_2} = {} & x(1-p_1)p_2 \\ & +(1-2x)(1-p_1)(1-p_2) \\ & +xp_1(1-p_2)p_2 \\ & +(1-2x)p_1(1-p_2)(1-p_2)\ . \end{aligned} \tag{3}$$

The first and second terms in equation (3) are the same as those in equation (1). The third term in equation (3) is different from that in equation (1), because honest Agent 2 informs Agent 1 of any mistake with the probability $1-p_2$; even if Agent 2 is honest, however, Agent 2 cannot inform Agent 1 of a mistake with the probability p_2. The fourth term in equation (3) indicates the case where the proposal is neither advantageous nor disadvantageous (i.e., $1-2x$) and only Agent 1 makes a mistake with the probability $p_1(1-p_2)$, but honest Agent 2 informs Agent 1 of the mistake with the probability $1-p_2$.

Finally, if both agents are honest, the probability that Agent 1 accepts a proposal and an agreement is reached (P_{1,q_1,q_2}) is

$$\begin{aligned} P_{1,q_1,q_2} = {} & x(1-p_1)p_2p_1 \\ & +(1-2x)(1-p_1)(1-p_2) \\ & +xp_1(1-p_2)p_2 \end{aligned}$$

$$+(1-2x)(1-p_1)p_2(1-p_1)$$
$$+(1-2x)p_1(1-p_2)(1-p_2)\ . \quad (4)$$

The first and fourth terms in equation (4) are the same as those in equation (2). The second term in equation (4) is the same as that in equation (1). The third and fifth terms in equation (4) are the same as the third and fourth terms, respectively, in equation (3).

Hence, the overall probability that Agent 1 accepts a proposal and an agreement is reached (P_1) is

$$P_1 = (1-q_1)(1-q_2)P_{1,1-q_1,1-q_2} + q_1(1-q_2)\,P_{1,q_1,1-q_2} + (1-q_1)q_2P_{1,1-q_1,q_2} + q_1q_2P_{1,q_1,q_2}\ . \quad (5)$$

Similarly, the probability that Agent 2 accepts a proposal and an agreement is reached ($P_{2,1-q_1,1-q_2}$) if both agents are dishonest is

$$P_{2,1-q_1,1-q_2} = xp_1(1-p_2) + (1-2x)(1-p_1)(1-p_2) + x(1-p_1)p_2\ . \quad (6)$$

If Agent 1 is honest but Agent 2 is dishonest, the probability that Agent 2 accepts a proposal and an agreement is reached ($P_{2,q_1,1-q_2}$) is

$$P_{2,q_1,1-q_2} = xp_1(1-p_2) + (1-2x)(1-p_1)(1-p_2) + x(1-p_1)p_2p_1 + (1-2x)(1-p_1)p_2(1-p_1)\ . \quad (7)$$

If Agent 1 is dishonest but Agent 2 is honest, the probability that Agent 2 accepts a proposal and an agreement is reached ($P_{2,1-q_1,q_2}$) is

$$P_{2,1-q_1,q_2} = xp_1(1-p_2)p_2 + (1-2x)(1-p_1)(1-p_2) + x(1-p_1)p_2 + (1-2x)p_1(1-p_2)(1-p_2)\ . \quad (8)$$

If both agents are honest, the probability that Agent 2 accepts a proposal and an agreement is reached (P_{2,q_1,q_2}) is

$$
\begin{aligned}
P_{2,q_1,q_2} = {} & xp_1(1-p_2)p_2 \\
& +(1-2x)(1-p_1)(1-p_2) \\
& +x(1-p_1)p_2p_1 \\
& +(1-2x)(1-p_1)p_2(1-p_1) \\
& +(1-2x)p_1(1-p_2)(1-p_2)\ . \qquad (9)
\end{aligned}
$$

Hence, the overall probability that Agent 2 accepts a proposal and an agreement is reached (P_2) is

$$
\begin{aligned}
P_2 = {} & (1-q_1)(1-q_2)P_{2,1-q_1,1-q_2} + q_1(1-q_2)\,P_{2,q_1,1-q_2} + (1-q_1)q_2P_{2,1-q_1,q_2} \\
& +q_1q_2P_{2,q_1,q_2}. \qquad (10)
\end{aligned}
$$

4.2 Persistent economic rents

If an agreement is objectively a win for Agent *i* (i.e., an advantageous deal), Agent *i* obtains the economic rents from that deal. Let *z* be the amount of these rents, and suppose that *z* is identical for any agreement. Conversely, if a deal is objectively a defeat for Agent *i*, Agent *i* suffers losses equivalent to $-z$ for any agreement. Even if a deal is an objective loss, the agents can only recognize a defeat at a later point in time or perhaps never recognize it, as discussed in Section 2.1.1.

4.2.1 Economic rents under heterogeneous fluid intelligences

4.2.1.1 Economic rents of Agent 1

The probability that Agent 1 accepts a proposal (P_1) is shown by equation (5), but the acceptance itself does not mean that Agent 1 will obtain the economic rents. Rents are obtained only when the deal is advantageous and no mistake is made (i.e., $x(1-p_1)$); if it is disadvantageous and mistakes are made (i.e., xp_1), Agent 1 is exploited. If the deal is neither advantageous nor disadvantageous (i.e., $1-2x$), no rents are generated. Therefore, by equations (1)–(5), the expected economic rents of Agent 1 in a business deal, $E(Z_1)$, are

$$
\begin{aligned}
& E(Z_1) = \\
& (1-q_1)(1-q_2)\{zx(1-p_1)p_2 + 0\times(1-2x)(1-p_1)(1-p_2) - \mathrm{z}xp_1(1-p_2)\} \\
& +q_1(1-q_2)\begin{Bmatrix} zx(1-p_1)p_2p_1 + 0\times(1-2x)(1-p_1)(1-p_2) - \mathrm{z}xp_1(1-p_2) \\ +0\times(1-2x)(1-p_1)p_2(1-p_1) \end{Bmatrix} \\
& +(1-q_1)q_2\begin{Bmatrix} zx(1-p_1)p_2 + 0\times(1-2x)(1-p_1)(1-p_2) - \mathrm{z}xp_1(1-p_2)p_2 \\ +0\times(1-2x)p_1(1-p_2)(1-p_2) \end{Bmatrix}
\end{aligned}
$$

$$+q_1q_2\begin{Bmatrix} zx(1-p_1)p_2p_1+0\times(1-2x)(1-p_1)(1-p_2)-\mathrm{z}xp_1(1-p_2)p_2 \\ +0\times(1-2x)(1-p_1)p_2(1-p_1)+0\times(1-2x)p_1(1-p_2)(1-p_2)\end{Bmatrix}$$
$$=zx\{p_2-p_1+q_2p_1-q_1p_2+p_1p_2[q_2p_2-q_1p_1+2(q_1-q_2)]\}\,. \quad (11)$$

If $q_1=q_2=1$ (i.e., both agents are always honest), by equation (11),

$$E(Z_1)=zx[p_1p_2(p_2-p_1)]>0 \quad (12)$$

because $p_2 > p_1$. Inequality (12) is important because it indicates that even if both agents are always honest, Agent 1 persistently obtains economic rents and Agent 2 is persistently exploited because $p_2 > p_1$, which means that heterogeneity in fluid intelligence is the essential origin of the economic rents.

If $q_1=q_2=0$ (i.e., both agents are always dishonest), by equation (11),

$$E(Z_1)=zx[p_2-p_1]>0 \quad (13)$$

because $p_2 > p_1$. Inequality (13) indicates that Agent 1 also persistently obtains the economic rents when both agents are always dishonest, as was the case when both agents are always honest.

Third, if $q_1=0$ but $q_2=1$ (i.e., Agent 1 is always dishonest but Agent 2 is always honest), by equation (11),

$$E(Z_1)=zxp_2[1-p_1(2-p_2)]\,.$$

Because $1-p_1(2-p_2)>0$ for any $0<p_1<p_2<1$,

$$E(Z_1)>0\,.$$

That is, Agent 1 again persistently obtains the economic rents.

Finally, if $q_1=1$ but $q_2=0$ (i.e., Agent 1 is always honest but Agent 2 is always dishonest), by equation (11),

$$E(Z_1)=zxp_1[p_2(2-p_1)-1]\,.$$

Let $p_2=\gamma p_1$ where $\gamma>1$. The solution of

$$p_2(2-p_1)-1=-1+2p_1-\gamma p_1^2=0$$

is

$$p_1 = 1 - \sqrt{1 - \gamma^{-1}} = 1 - \sqrt{1 - \frac{p_1}{p_2}} ,$$

and therefore if

$$p_2 > \frac{1}{2 - p_1} ,$$

then

$$E(Z_1) > 0 ,$$

but if

$$p_2 < \frac{1}{2 - p_1} ,$$

then

$$E(Z_1) < 0 . \tag{14}$$

Inequality (14) indicates that if Agent 1 is always honest but Agent 2 is always dishonest, for some values of γ, Agent 2 obtains the economic rents even if $p_2 > p_1$.

Here,

$$\frac{dE(Z_1)}{dq_1} = -zxp_2(p_1 - 1)^2 < 0 , \tag{15}$$

and

$$\frac{dE(Z_1)}{dq_2} = zxp_1(p_2 - 1)^2 > 0 . \tag{16}$$

Inequalities (15) and (16) indicate that as Agent 1 is more often honest (i.e., as q_1 increases), the economic rents of Agent 1 $E(Z_1)$ decrease, and as Agent 2 is more often

dishonest (i.e., as q_2 decreases), the rents of Agent 1 also decrease. If Agent 2 is dishonest sufficiently frequently, Agent 1 may be exploited by Agent 2, as inequality (14) indicates. However, as inequality (13) indicates, even if Agent 2 is always dishonest, if Agent 1 is also always dishonest (i.e., $q_1 = q_2 = 0$) then Agent 1 will persistently obtain the economic rents because $p_2 > p_1$.

4.2.1.2 Economic rents of Agent 2

The expected economic rents of Agent 2 in a business deal, $E(Z_2)$, are similarly, by equations (6)–(10),

$$E(Z_2) = zx\{p_1 - p_2 - q_2 p_1 + q_1 p_2 + p_1 p_2 [q_1 p_1 - q_2 p_2 - 2(q_1 - q_2)]\} . \quad (17)$$

If $q_1 = q_2 = 1$ (i.e., both agents are always honest), by equation (17),

$$E(Z_2) = zx[p_1 p_2 (p_1 - p_2)] < 0 \quad (18)$$

because $p_2 > p_1$. That is, if both agents are always honest, Agent 2 is persistently exploited, as inequality (18) indicates. If $q_1 = q_2 = 0$ (i.e., both agents are always dishonest), by equation (17),

$$E(Z_2) = zx(p_1 - p_2) < 0 \quad (19)$$

because $p_2 > p_1$. That is, if both agents are always dishonest, Agent 2 is also persistently exploited as inequality (19) indicates. If $q_1 = 0$ but $q_2 = 1$ (i.e., Agent 1 is always dishonest but Agent 2 is always honest), by equation (17),

$$E(Z_2) = zxp_2 [p_1 (2 - p_2) - 1] .$$

Because there is no solution for

$$p_1 (2 - p_2) - 1 = 2p_1 - \gamma p_1^2 - 1 = -1 + 2p_1 - \gamma p_1^2 = 0 ,$$

then

$$E(Z_2) < 0 .$$

That is, Agent 2 is again persistently exploited. Finally, if $q_1 = 1$ but $q_2 = 0$ (i.e., Agent 1 is always honest but Agent 2 is always dishonest), by equation (17),

$$E(Z_2) = zxp_1[1 - p_2(2 - p_1)] .$$

Hence, opposite to the case of $E(Z_1)$, if

$$p_2 > \frac{1}{2 - p_1} ,$$

then

$$E(Z_2) < 0 ,$$

but if

$$p_2 < \frac{1}{2 - p_1} ,$$

then

$$E(Z_2) > 0 . \tag{20}$$

Inequality (20) indicates that if Agent 1 is always honest but Agent 2 is always dishonest, for some values of γ, Agent 2 can obtain the economic rents even if $p_2 > p_1$.

Here,

$$\frac{dE(Z_2)}{dq_1} = zxp_2[1 - p_1(2 - p_1)] > 0 , \tag{21}$$

and

$$\frac{dE(Z_2)}{dq_2} = zxp_1[p_2(2 - p_2) - 1] < 0 . \tag{22}$$

Inequalities (21) and (22) indicate that, as Agent 1 is more often honest (as q_1 increases), the suffering of Agent 2 decreases (i.e., $E(Z_2)$ increases); as Agent 2 is more often dishonest (i.e., as q_2 decreases), the suffering again decreases. Furthermore, if Agent 2 is sufficiently frequently dishonest, Agent 2 may obtain the positive economic rents as inequality (20) indicates. However, as inequality (19) indicates, even if Agent 2 is always

dishonest, if Agent 1 is also always dishonest (i.e., $q_1 = q_2 = 0$), Agent 1 still can persistently obtain the economic rents because $p_2 > p_1$.

4.2.2 How honest are economic agents?

The results in Section 4.2.1 indicate that if an economic agent is honest more frequently than another agent, the agent may gain less economic rent or suffer more losses. In addition, inequalities (12) and (18) indicate that, if the fluid intelligence of an economic agent is very low compared with that of another agent, the former agent will be inevitably exploited in most cases, even if both agents are always honest. That is, being honest is clearly disadvantageous for economic agents—particularly for those with relatively low fluid intelligences. Therefore, it seems true that agents with relatively low fluid intelligences are strongly motivated to be dishonest as often as possible in business dealings. Similarly, agents with relatively high fluid intelligences also have incentive to be dishonest.

Therefore, it is highly unlikely that all agents are always honest. Moreover, it is highly likely that most agents are often dishonest in business dealings (i.e., $q_i > 0$).

4.2.3 Roles of asymmetric information and irrationality

As discussed in the Introduction, in contract theory, exploitative contracting is often explained on the basis of the concept of asymmetric information or irrationality. However, the results in Sections 2, 3, and 4 indicate that the economic rents derived from mistakes are generated without the need for asymmetric information and irrationality. Furthermore, even if all agents are always honest (i.e., without any malicious intent), economic rents are generated. These economic rents are generate by heterogeneity in fluid intelligence even in the absence of assumptions of asymmetric information and irrationality.

The factor of misleading conduct that is represented by heterogeneity in honesty in this paper aggravates the situation, as do the elements of asymmetric information and irrationality. In particular, malicious agents can intentionally utilize asymmetric information and irrationality to amplify and maximize economic rents.

4.2.4 Economic rents under identical fluid intelligence

What will happen if fluid intelligence is homogeneous among economic agents? Suppose that $p_1 = p_2 = \bar{p}$ (i.e., the fluid intelligences of Agents 1 and 2 are identical) but $q_1 \neq q_2$ (i.e., their degrees of honesty are different). By equations (11) and (17), the expected economic rents of Agents 1 and 2 are respectively

$$E(Z_1) = zx(q_2 - q_1)\bar{p}(\bar{p} - 1)^2 , \tag{23}$$

and

$$E(Z_2) = zx(q_1 - q_2)\bar{p}(\bar{p} - 1)^2 \ . \tag{24}$$

Inequalities (23) and (24) indicate that, if Agent 2 is more honest than Agent 1 (i.e., $q_1 < q_2$), Agent 1 obtains the economic rents and Agent 2 is exploited (i.e., $E(Z_1) > 0$ and $E(Z_2) < 0$), but if Agent 1 is more honest than Agent 2 (i.e., $q_1 > q_2$), Agent 2 obtains the economic rents and Agent 1 is exploited (i.e., $E(Z_1) < 0$ and $E(Z_2) > 0$).

If not only fluid intelligences but also honesty are identical (i.e., $p_1 = p_2$ and $q_1 = q_2$), by equations (11) and (17),

$$E(Z_1) = 0 \ ,$$

and

$$E(Z_2) = 0 \ .$$

That is, no economic rent from mistakes is generated.

4.3 Fluid intelligence and persistent economic rents

Sections 3 and 4.2 indicate that, because of intrinsic heterogeneity in fluid intelligence and the consequent heterogeneity in people's mistake-making behavior, some economic agents can persistently obtain economic rents from other agents' mistakes in business deals. These persistent economic rents from mistakes will exist ubiquitously and probably at a large scale in an economy. As will be shown in Section 5, this persistence is very important from the point of view of economic inequality, particularly because it has significantly negative effects on economic inequality.

5 SUSTAINABLE HETEROGENEITY AND RENTS FROM MISTAKES IN BUSINESS DEALS

5.1 Heterogeneity in obtaining persistent economic rents

5.1.1 Persistent economic rents

A heterogeneous p_i indicates a heterogeneous population, and a heterogeneous population indicates the possibility that there is no steady state or balanced growth path except for

corner solutions (Becker 1980; Harashima, 2014, 2017, 2020a). [1] Nevertheless, Harashima (2014, 2017, 2020a) showed that there is a state (or balanced growth path) in which all the optimality conditions of all heterogeneous households are satisfied and "sustainable heterogeneity" (SH) is achieved. As Harashima (2020a) showed, the state in which SH is achieved is the unique socially optimal state for almost all generally usable (i.e., preferences are complete, transitive, and continuous) social welfare functions in an economy with a heterogeneous population.

Although SH is naturally achieved only if household (worker) productivities are heterogeneous, SH is not naturally achieved if household preferences are heterogeneous. With heterogeneous preferences, a devastating state of extreme economic inequality is generated unless a government appropriately intervenes in the economy to achieve SH (Harashima, 2020a). In addition, Harashima (2020d) showed that heterogeneity in abilities to obtain persistent economic rents also results in the same state as the case of heterogeneous preferences without appropriate government interventions.

Although heterogeneous fluid intelligences will certainly result in heterogeneous productivities, they may not result in heterogeneous preferences. Hence, at first glance, SH may appear to be naturally achieved even if fluid intelligences are heterogeneous, but that is not the case. As shown in Sections 3 and 4, heterogeneity in fluid intelligence generates heterogeneity not only in productivity but also in the abilities to obtain persistent economic rents from mistakes in business dealings. Therefore, if fluid intelligences are heterogeneous, SH is not necessarily naturally achieved.

5.1.2 Family lines

The reason economic rents from mistakes are persistent is that fluid intelligences are highly likely given exogenously and change little over time. Nevertheless, the human lifespan is limited. Therefore, if fluid intelligences are given exogenously but randomly, the effect of the persistency will be nil, on average, in the long run. However, fluid intelligence may not necessarily be given randomly. Family lines consist of households that are descended from common ancestors and that share similar traits. In addition, in accordance with custom, and for other reasons, many groups of people mostly marry within the same or similar groups. Therefore, it is highly likely that fluid intelligences are exogenously given with bias.

Because of the bias, the average fluid intelligence of people in a given group (or family line) will basically be indefinitely different from those in other groups. This means that there are groups (or family lines) that indefinitely obtain the persistent economic rents

[1] Harashima (2017) is also available in English as Harashima (2010), and Harashima (2020a) is also available in English as Harashima (2012a).

from mistakes in business deals. At the same time, there are groups (or family lines) that are indefinitely exploited.

5.2 Extreme economic inequality

5.2.1 Extreme economic inequality

As shown in Sections 3.3 and 4.2, the economic rents from mistakes in business dealings most likely exist widely and on a large scale. Nevertheless, it is not the scale that is important—it is the persistence. Harashima (2020d) showed that temporary economic rents have no effect on SH, but persistent ones greatly affect SH, to the extent that SH cannot be achieved.

The economic agents who can persistently obtain economic rents (in this case, those with relatively high fluid intelligence) eventually become extremely rich, whereas those who are persistently exploited (those with relatively low fluid intelligence) eventually become extremely poor. That is, because of the persistent nature of the situation, extreme economic inequality is naturally generated.

5.2.2 Built-in mechanism that naturally generates extreme economic inequality

Heterogeneity in fluid intelligence causes heterogeneities, not only in productivity (Harashima, 2020c)[2] but also in the rate of time preference (RTP) (Harashima, 2020b); in economic rents from ranking preference and value (Harashima, 2020d); and (as discussed in this paper) in the economic rents from mistakes made in business transactions.

Among these heterogeneities, heterogeneity in productivity does not have a great effect on SH and thereby does not generate extreme economic inequality. It does, however, generate a moderate economic inequality in the sense that a household's incomes and wealth are proportional to its productivity (Harashima, 2014, 2017, 2020a). Judging only from the perspective of productivity, therefore, being very poor may be condemned as being the result of a household's own characteristics; that is, it is the poor who are to blame for their poverty, not society or the economic system.

However, heterogeneities in RTP and economic rents result in an extreme economic inequality regardless of household characteristics, even if the magnitudes of the heterogeneities are small, unless a government appropriately intervenes (Harashima, 2014, 2017, 2020a, 2020d). Hence, the very existence of heterogeneity in fluid intelligence means that a mechanism that naturally generates extreme economic

[2] Harashima (2020c) is also available in English as Harashima (2012b).

inequality is built into an economy from the beginning. Extreme economic inequality therefore is not necessarily the result of household characteristics (e.g., work ethic or risk tolerance).

5.3 Government interventions

Nevertheless, extreme economic inequality is not necessarily inevitable. We can escape from it if a government appropriately intervenes in its economy (Harashima, 2020d). In fact, government interventions are indispensable to escaping from it. Because the origin of the persistent economic rents from mistakes in business dealings is heterogeneity in fluid intelligence, part of the incomes generated by agents with higher fluid intelligence should be redistributed (transferred) by the government to those with lower fluid intelligences.

5.3.1 Government transfers

Suppose that there are two economies (Economy 1 and Economy 2) in a country. Each economy represents a group of identical households, and the two economies are identical except for household fluid intelligence. The fluid intelligence of a household in Economy 1 is higher than that in Economy 2. Therefore, persistent economic rents from mistakes in business deals are generated, and government intervention is required to achieve SH. Let $z_t = \bar{z}k_{1,t}$ be the per capita persistent rents of households in Economy 1, where $k_{i,t}$ is the per capita capital of households in Economy i (= 1, 2) in period t and $\bar{z}$ (> 0) is a constant. As Harashima (2020d) indicates, the RTPs of households are also heterogeneous between the two economies because fluid intelligences are heterogeneous. Let θ_i be the RTP of Economy i (= 1, 2).

The government intervenes by transferring money or other economic resources between the two economies to achieve SH. The per capita transfer 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 in every period so as to achieve SH. Through arbitrage in markets, $k_{1,t} = k_{2,t}$ and $\dot{k}_{1,t} = \dot{k}_{2,t}$ are kept, and therefore,

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

Harashima (2020d) showed that, to achieve SH, the government has to manipulate the value of $\bar{g}$ such that

$$\lim_{t\to\infty}\bar{g}_t = \bar{z} + \frac{\theta_2 - \theta_1}{2} \quad . \tag{25}$$

Here, if there are no persistent economic rents, the value of $\bar{g}$ is

$$\lim_{t\to\infty}\bar{g}_t = \frac{\theta_2 - \theta_1}{2} \tag{26}$$

as shown by Harashima (2020a). Unlike in equation (26), $\bar{z}$ is included in equation (25). To achieve SH, therefore, the government has to transfer the entire amount of persistent economic rents ($z_t = \bar{z}k_{1,t}$) from households in Economy 1 to households in Economy 2 in each period.[3]

The results in the models with more than two economies are basically the same as those in the two-economy model. Suppose that there are H economies (Economy 1, Economy 2, … , Economy H) in a country. Each economy represents a group of identical households, and all the economies are identical except for the fluid intelligences of households. Harashima (2020d) showed that SH requires government transfers (positive or negative) from a household in Economy 1+2+ · · · + (H – 1) to households in Economy H by

$$\lim_{t\to\infty}\bar{g}_t = \frac{\theta_H - \frac{\sum_{q=1}^{H-1}\theta_q}{H-1}}{H} - \frac{\bar{z}}{H-1} \ , \tag{27}$$

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.[4] In this case, conversely, the amount of government transfers (positive or negative) from a household in Economy H to households in Economy 1+2+ · · · + (H – 1) is

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

where $k_{1+2+\cdots+(H-1),t}$ is the capital of a household in Economy 1+2+ · · · + (H – 1) in

[3] Households in Economy 2 share the transfer equally with each other.
[4] Households in Economy H share the transfers equally with each other.

period t and is equal to $k_{H,t}$.[5]

Equations (25) and (27) indicate that the appropriate government interventions (i.e., the appropriate transfer of z_t in each period) are indispensable to achieve SH and prevent extreme economic inequality. An important point is that the scale of the economic rents does not matter. Even if the sum of the economic rents in the country is not large, the economic rents eventually generate extreme economic inequality unless the government appropriately intervenes, as equations (25) and (27) indicate.

Another important point is that, as discussed in Section 3.4, it seems likely that the economic rents derived from agents engaging in intentionally misleading conduct are far larger than those derived from simply having relatively high fluid intelligences. As discussed, these types of misleading conduct are legal, at least practically, but they may not be ethical, which means that justice does not necessarily prevail. In this sense, interventions to remove the negative effects of misleading conduct and to achieve SH are indispensable missions of government.

5.3.2 Types of government interventions

As indicated in Section 5.3.1, government transfers are effective, but is it possible for a government to directly ban these economic rents themselves by strengthening government regulations? It may be possible to some extent, but it probably would require an extremely large amount of money to do so. It would be very difficult for a government to transfer money between the parties concerned for each individual deal (contract) in business as each contract is made. In some cases, such as in the case of egregious malicious conduct, a government will of course directly intervene in individual contracts. In addition, governments will regularly caution consumers not to make mistakes and be exploited in conducting business. However, in most cases, a government does not have the resources to be able to directly intervene in all contracts. Therefore, the necessary government intervention is not the strengthening of regulations but income redistribution *ex post*. As a result, government transfers to remove the negative effects of these economic rents will be implemented as part of an overall package or scheme of income redistribution to achieve SH, for example, through a progressive income tax and an inheritance tax (Harashima, 2020e).

6 CONCLUDING REMARKS

According to contract theory, if economic agents are heterogeneous in behaviors with

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

regard to making decisions in business transactions, competition in markets cannot sufficiently protect naïve consumers, and therefore some obtain economic rents while others are exploited. The reason for exploitative contracting is often explained by using the concepts of asymmetric information and irrationality (or bounded rationality).

In this paper, I show that the economic rents from mistakes in business dealings are essentially generated by heterogeneity in fluid intelligence among economic agents. These economic rents include not only those from exploitative contracting but also those obtained without any malicious intent. The model in this paper indicates that heterogeneity in fluid intelligence generates heterogeneity in mistake-making behavior in business dealings. An economic agent who makes fewer mistakes obtains the economic rents, and the one who makes more mistakes is exploited. Furthermore, an economic agent may win (i.e., gain economic rents) by intentionally misleading the other agent.

Even without assuming asymmetric information and irrationality, economic rents from mistakes are generated. Furthermore, even if no economic agents have malicious intent and all agents are always honest, these rents are still generated because the essential origin of these economic rents is heterogeneity in fluid intelligence. Heterogeneity in honesty aggravates the situation, as do the misuse of asymmetric information and irrationality.

Economic rents derived from mistakes most likely exist widely and at a large scale across the economy. Furthermore, some households or family lines can persistently obtain economic rents with a higher probability than others. This persistency leads to an extreme economic inequality unless a government appropriately intervenes. That is, there is a built-in mechanism in the economy such that the level of economic inequality is naturally exacerbated to the limit. To avoid this situation, a government has to intervene in economic activities to remove the negative effect of these economic rents and achieve SH by appropriately redistributing incomes among households—for example, through a progressive income tax or an inheritance tax.

References

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.

Cattell, Raymond Bernard (1963) “Theory of Fluid and Crystallized Intelligence: A Critical Experiment,” *Journal of Educational Psychology*, Vol. 54, pp. 1-22.

Cattell, Raymond Bernard (1971) *Abilities: Their structure, growth, and action*, Houghton Mifflin, Boston.

DellaVigna, Stefano and Ulrike Malmendier (2004) “Contract Design and Self-Control: Theory and Evidence,” *The Quarterly Journal of Economics*, Vol. 119, No. 2, pp. 353–402.

Gabaix, Xavier and David Laibson (2006) “Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets,” *The Quarterly Journal of Economics*, Vol. 121, No. 2, pp. 505–540.

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 (2012a) “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 (2012b) “A Theory of Intelligence and Total Factor Productivity: Value Added Reflects the Fruits of Fluid Intelligence,” *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 43151.

Harashima, Taiji (2014) “Sustainable Heterogeneity in Exogenous Growth Models: The Socially Optimal Distribution by Government’s Intervention,” (2014) *Theoretical and Practical Research in Economic Fields*, Vol. 5, No. 1, pp. 73-100.

Harashima, Taiji (2017) “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 (2020a) “Sustainable Heterogeneity as the Unique Socially Optimal Allocation for Almost All Social Welfare Functions,” in Japanese, *Journal of Kanazawa Seiryo University*, Vol. 54, No. 1.（原嶋　耐治「殆ど全ての社会的厚生関数に対して唯一の社会的に最適な配分をもたらすものとしての持続可能な非均質性」『金沢星稜大学論集』第 54 巻第 1 号）

Harashima, Taiji (2020b) “The Correlation between Time Preference and Incomes Is Spurious: They Are Bridged by Fluid Intelligence,” *Journal of Applied Economic Sciences,* Vol. 15, No. 1. pp. 107-123.

Harashima, Taiji (2020c) “A Theory of Intelligence and Total Factor Productivity: Value Added Reflects the Fruits of Fluid Intelligence,” in Japanese, *Journal of Kanazawa Seiryo University*, Vol. 53, No. 2, pp. 65-82.（原嶋　耐治「知能の理論と全要素生産性―流動性知能の成果としての付加価値」『金沢星稜大学論集』第 53 巻第 2 号 65-82 頁）

Harashima, Taiji (2020d) “Preventing Widening Inequality: Economic Rents and Sustainable Heterogeneity,” *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 103377.

Harashima, Taiji (2020e) “Rethinking the Ability-to-Pay and Equal Sacrifice Principles of Taxation: An Alternative Rationale for a Progressive Income Tax,” *MPRA* (*The Munich Personal RePEc Archive*) *Paper* No. 102937.

Heidhues, Paul and Botond Kőszegi (2010) “Exploiting Naïvete about Self-Control in the Credit Market,” *American Economic Review*, Vol. 100, No. 5, pp. 2279-2303.

Koszegi, Botond (2014) “Behavioral Contract Theory,” *Journal of Economic Literature*, Vol. 52, No. 4, pp. 1075-1118.

Laibson, David and Xavier Gabaix (2004) "Competition and Consumer Confusion," *Econometric Society 2004 North American Summer Meetings* 663, Econometric Society.

Raven, John Carlyle. (1962). *Advanced Progressive Matrices*: *Sets I and II,* H. K. Lewis, London.

Raven, J., John Carlyle Raven and J. H. Court, (1998) *Manual for Raven’s Progressive Matrices and Vocabulary Scales. Section 1: General Overview*. Harcourt Assessment, San Antonio, TX.

Snow, Richard E., Patrick C. Kyllonen and Brachia Marshalek. (1984) “The Topography of Ability and Learning Correlations,” in Sternberg, Robert J. ed. *Advances in the Psychology of Human Intelligence Vol. 2*, Erlbaum, Hillsdale, NJ.