Fair Shares between Worker and Investor:

Economic Experiments on Functional Income Distribution

Natsuka Tokumaru and Hiroyuki Uni

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I.   INTRODUCTION

Raise of capital distribution rate accompanied with decline of labor wage is a worldwide tendency since 1980s. According to Lavoie and Stockhammer (2013), labor distribution rate that was 68.2% from early 1980 to early 90s in the U.S. declined 65.87% in the beginning of 2000s to 2008 until it reaches 65.87%. During the same time, labor distribution rate declines from 67.11% to 63.37% in Germany. Japanese enterprises, of which management styles have been described as stakeholder companies, are not exception. Labor distribution rate declined from 72.38% to 65.75% during a period above, that may be results of deregulation of labor market after the end of 90s, wage decline and increase of non-regular workers. On the other hand, capital distribution rate such as dividend is apparently increasing after 2002, two or three times more compared with 1990s. These figures show that a shift from stakeholder-oriented governance to shareholder-oriented governance is occurring in most enterprises, partly may be triggered by market-focused deregulation in financial and labor market.

Some empirical studies in macro-level discusses that decline tendencies of labor distribution rate in developed countries, in other words, changes in functional distribution of income[1] in different production elements (capital, labor and so on), were caused by structural change and institutional change after 20s: such as change in a change of a structure of international labor division, a change in power balance in industrial relationship, extension of neo-liberalistic ideology, and deregulation in labor. For instance, Stochhammer (2013) performs double regression analysis setting technological change, globalization, financialization and decline of welfare-state as explanatory variable and labor distribution rate as explained variable. According his analysis, the most important factors that brought decline of labor distribution rate are financialization, then decline of welfare-state, and globalization come in developed countries. Some other studies implies that decline of labor distribution rate suppresses innovation and consumption in wage-leaded economy and thus brings minus economic growth.

Whereas empirical as well as theoretical analysis on functional income distribution in macro-level has been developed, there are few studies that analyze it from micro-level perspective, that is, distribution justice between investor and worker. However, recent decline of labor distribution rate stem from institutional changes that cannot be separated from norm or consciousness that each economic agent holds. Thus one may say that micro-level analysis in functional distribution is necessary for understandings change of labor distribution rate in macro-level.

By performing economic experiments consisting of investment, production and distribution, we attempt to clarify fairness ideals on distribution of production income between worker and investor and their determinative factors. In our experiment each subject is pair-matched with another subject to constitute a two-player's team and each team member is assigned a role of

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[1] Strictly, functional income distribution does not only contain distribution of worker and investor, but also other production elements such as rent, land and so on. But for simplicity his paper focused in distribution between worker and investor.

either investor or worker. A subject assigned a role of investor decides whether he/she invest his/her investment fund to a calculator. Then another subject assigned worker in the two-player's team engages in production, that is, works out a sum with a calculator in a case when his/her pair invests to a calculator, and in another case without it when his/her pair does not invest to a calculator. After stages of investment and production, both an investor and a worker in the same team is asked to distribute a team income, that is earned by engaging in computational problems in a condition of either with or without calculator, with his/her team member. We performed two treatments, that is, "*with* investor labor" and "*without* investor labor", which differs in whether investors are required to engage in works (computational problems) to earn their investment fund or they are given investment funds as endowments, in order to examine a role of labor in fairness ideals.

 The Structure of this paper is following. In the second section, we identify some factors that may affect in distribution justice between worker and investor, and propose some models that may explain fairness ideals in functional income distribution. Then explain experimental design we performed in our research in section third section and thereafter we analyze result of experiments we got in the fourth section. After having discussed the result of experiment in fifth section, we summarize and conclude this paper.

II.   DIFFERENT MODELS IN FUNCTIONAL DISTRIBUTION

Discussion on functional distribution stem back to classical economics, as Recard (1817) states in the preface of *On The Principles of Political Economy and Taxation.* According to Recard, "the produce of the earth—all that is derived from its surface by the united application of labour, machinery, and capital", then he continues, "…to determine the laws which regulate this distribution, is the principal problem in Political Economy" (Ricardo 1817, p.5). Thus question may arise, what are the determinant factors that regulate functional distribution of income, among different production factors that contribute a production process such as labor and capital? Or if we put it differently, what is a fair distribution principle for splitting production income among different production factors?

Model 1: Libertarian-Marginalist
Libertarian such as L.v.Mises, F.v. Hayek or M. Friedman believes that fair distribution basically should be counted as multiplication of one's inputs of production factors (labor, capital, land and so on) he owns and marginal productivity that each production factor has. The analysis on marginal productivity has developed independent from distribution theory by Menger, Walras or Jevons as is known as marginal revolution in the first place, but thereafter distribution theories combined with marginal productivity have developed from the end of 19th century. Those distribution theories based on marginal productivity has developed by libertarians as political philosophy such as Hayek and Friedman. Friedman states that "…if there is a principle that can be a ground for income distribution in market economy", that would be "each person should get according to their production by production measurement they own" (Friedman 1962).

  According to Libertarian, people may lose their incentives to work hard or to raise productivity by making use of their ingenuity if people cannot expect to be distributed shares that are equal with what they produced by their production measurements. In libertarian view, what is called utilitarian goal 'greatest number of the greatest people' may be well achieved via market mechanisms, which are accelerated free and voluntary transactions by people. Thus not only

appropriate allocation of resources, but also economic efficiency can be achieved via market mechanisms in their view.

From their trust on market mechanisms, libertarians justifies what is called lasseiz-faire policies, that is, individuals' liberties are utmost respected, and minimum intervention by a government such as setting basic transaction rules. Hayek believed that by setting up minimum rules of transaction by government, 'spontaneous order' emerges as a result of free transactions of participants in a market. Thus they believe individuals' property rights including inheritance from foregoing generation should be protected and economic disparities in a society should not be rectified by a coercive political measurement such as progressive taxation. Otherwise poorer may not work depending on social welfare and richer may decrease their investments that accelerate market growth. Thus we could summarize two libertarian theses on distribution as follows:

1. Distribution should be decided according to what one has produced by using his production measurement whatever he owns, including his labor power, capital, production measurement and so on.
2. Whatever one owns should be protected as his property, and should *not* be redistributed to others.

Model 2: Labor-Value Radicalist

Classical Economists such as Adam Smith, Ricard, Lock had regarded labor that one invested as a basis of property. In a chapter on property in *Second Treatise of Civil Government,* Locke states "The labour of his body and the work of his hands, we may say, are strictly his. So when he takes something from the state that nature has provided and left it in, he mixes his labour with it, thus joining to it something that is his own; and in that way he makes it his property". (Locke 1960, Chap.5)

From the labor value theory by classical economists Recardian Socialist such as T. Hodgskin W. Thomson developed the "theory of labour's claim to the whole product of industry" that claims all properties should be entitled by labors. According to Hodgskin, fixed capitals are primarily an outcome of labour, because "fixed capital consists of the tools and instruments the labourer works with, the machinery he makes and guides, and the buildings he uses either to facilitate his exertions or to protect their produce. Unquestionably by using these instruments man adds wonderfully to his power" (Hodgskin 1825). He also maintains that machineries or instruments workers use for production cannot be separated from skilled manpower by them, thus fixed capitals should be regarded as the same with skilled labor force (*Ibid.*, p.108). Therefore, for labor-value radicalist such as Hodgskin, all production elements including fixed capital, machineries and so on stem from labour, all income by production process should be distributed to workers.

However, a realization of the thought as such, 'every labour should receive all values which he produces' as A. Menger points out, depend on a form of production measurements use (private use or common use) and a form of ownership (private property or common property). and a combination of private use of production measurement and common ownership of property only allow such distribution and with other combinations of production measurements use and ownership one cannot achieve such labour's claim to the whole products. (Menger, A. 1904)

Regarding ownership of fixed capital, Marx developed discussions on 'transition of the laws of property' in *Capital* (Marx 1867, p.609). According to Marx, if a fixed capital is produced by

capitalist's own labor, property of the capital is based on his own-labor. Thus profit that capitalist earn by using the fixed capital in the first place is an outcome of appropriation of others' labor based on his labor. However, according to Marx, characteristics of capital stock change as accumulation process of capital progresses. If a capitalist earn profits by additional capital gained by profits in previous production and others' labor, it is appropriation of others' labor without an equivalent, that is, his own labor. Marx is illustrating the change giving a case of spinner. A spinner, who has £10,000 by virtue of his "primitive labour" as his first capital, invest the money to machinery and cotton in £8,000 and wages for £2,000. Then he got £12,000 for producing yarns and selling it in a market. In the first stage of the spinner, the earned £2,000 is outcome of his labour, however, if the spinner buys a labour with the earned £2,000 and earns profits, this would be no more outcome of investor's labor, but capitals. Here Marx found clear distinction between first stage of an investment based on labor by an investor and an investment in next stage where invested capitals are no more labor-originated.

Marx regarded the process of changing characteristics of capital stock as a transition from 'the laws of commodity production' to 'the laws of capitalist production'. Marx maintained that fairness ideals between actors (capitalists and workers) also should have changed as characteristics of capital stock change, however, they do not change because of limits of historical and social perspectives. Since both of capitalists and workers see the employment relationship in short run, and do not consider a historical process of productions and changes of characteristics of capital stocks as well. And they just regards those relationship as social contracts, and do not find injustice in capital stock which is not based on labor. Thus we could summarize a position of labor-value radicalist as following:

1. Distribution share should be decided only according to whether one contributes a production via his/her labor.
2. Whether an investment capital is earned by investors' labor or it is just given as an endowment brings clear distinction for distribution justice of labor radicalist: an investor has a right to be distributed in the former, whereas the latter does not have legal rights.

III. EXPERIMENTAL DESIGN AND TREATMENTS

Based on discussions on functional distribution above explored, we designed experiments consisting of investment, production and distribution that are revised and extended versions of previous experiments (Hoffman et al. 1985; Cappelen et al. 2007; Tokumaru & Uni 2014). All participants are randomly pair-matched by a computer and constitute two players' teams with other participants, keeping their anonymity. One member of a team is assigned a role of an investor, and another member is assigned a role of a worker and they participates one-shot game.

In an investment stage, participants, who are assigned investor's roles are asked to decide whether they invest production equipment, that is, to buy a calculation machine or not. In a next production stage, participants, who are assigned worker's roles, engage in productions that are computational problems, and earn certain amount of money. In this stage, those workers whose pairs invest production equipment can engage in computational problems using calculation machines displayed in screens of their computers, whereas those workers whose pairs do not invest should do the same work without the machines. Computational problems workers engaged in are scored and converted to points that constitute team productions. In a final distribution stage, both team members are asked to give a proposal to distribute a team production to his/her share and his/her pair's share. One of given two proposals is selected randomly by a computer

and final profit of each team member is decided according to the selected proposal. Final profit points are converted to cash (yen) and paid after the experiment with show-up fee.

For comparison, we performed these following two experimental treatments that differ in whether there is investors' work for earning investment fund as follows:

1.   Treatment with Investors' Labor (hereafter *with*-Labor)

In this treatment, participants, who are assigned investors' roles, are required to earn investment funds, by engaging in computational problems for 10 minutes in the beginning of a game. Thereafter they are required decide whether they invest or not, that is, to buy a calculation machine or not paying 150 points from investment funds earned by themselves (around 230 points in average). Those who earn less than 150 points are not allowed to invest. The points that are not invested automatically are automatically added to investors' final profit points: whole points of earned investment funds in a case of without investment; the rest points of investment funds after reduced 150 points for investments in a case of investment. In the next stage, workers engage in computational problems for 10 minutes, using or not using calculation machine depending on their pairs' decision on investments.

2.   Treatment without Investors' Labor (hereafter *without*-Labor)

In this treatment, participants, who are assigned investors' roles, are not required to engage in any computational problem, but they are automatically given 250 points as their endowments for investments. They are required whether they invest to calculation machine by paying 150 points from given 250 endowment points. To final profit points of those who invest to production equipment, 100 points (250 endowment points minus 150 points for investment) automatically added; to final profits of those who do not invests whole 250 points are added. Other rules and procedures are the same with above *with*-Labor treatment.

IV.   FAIRNESS IDEALS AND ITS CLASSIFICATIONS

1.   Fairness Ideals

Based on past discussions on functional distribution described in section II as well as experimental design in section III, we propose three fairness ideals that subjects may adhere: selfish (labor-value radicalist); libertarian egalitarian; radical egalitarian. Libertarian-marginalist[2] should be put in the list according to the Friedman's discussions in section II, however, we converted it to libertarian egalitarian because few adhered to libertarian marginalist in our experimental settings as is explained later.

● *Selfish* (*Labor-value Radicalist*)

Individuals who hold strict selfish position distribute whole of team incomes to themselves. If a worker distributes whole of team income to himself in *without*-Labor treatment, one may interpret the position as labor-value radicalist, not as selfish, but we call it selfish for descriptive purposes, taking into account possibilities of the latter position.

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[2]Strictly writing, this game settings consisting of a labor and a calculation machine, its production should be expressed mathematically as a function with a fixity coefficient, thus cannot be applied the concept of marginality. However, we use this term for convenience based on Friedman's statement of extended interpretation of production marginality and distribution: "each person should get according to their production by production measurement they own." (Friedman 1962)

- *Libertarian Marginalist*

Strict libertarian marginalist explained in section II distributes team earning according to a rate of one's contribution to a team earning. In functional distribution, investors' contributions may be calculated by multiplying marginal productivity of their invested production equipment by production period, and workers' contribution may be calculated by their marginal productivity without equipment by production period. In our experimental settings, an individual's contribution rate to team earnings may be counted as comparison between a case in which workers use a calculation machine and a case they did not. Since each individual participates a game only for one time, so we displayed 'an average production earning without calculation machine' on the screen of all participants in their distribution stages for comparison. Thus a worker should regards his contribution to a production, as is almost the same with average production earning without calculation machine; whereas an investor should regard her contribution as a given production earning with calculation machine after deduction of average production earning.

With respect to marginal liberalists, we compared functional distribution and non-functional distribution in different experimental settings in our previous paper[3] (Tokumaru and Uni 2014). However, it is interesting that few libertarian marginalists are observed in experiments of functional distribution as is discussed in the following section. Thus we focused the study to libertarian egalitarian below explained which many subjects adhered. Perhaps this may come from that counting one's 'contribution' to a production may be more cognitive barrier in functional distribution[4].

- *Libertarian Egalitarian*

A strict libertarian egalitarian separates team earnings half to half, without taking into consideration investors' rest amount of investment fund. For instance, suppose the case that an investor earns 250 points as his investment fund and invests it to calculation machine (by paying 150 points), then, his pair worker earns 600 points in a production stage in with-Labor treatment. A strict egalitarian separates team earnings into 300 and 300, thus final earning of an investor of this team will be, according to the proposal, 400 for an investor and 300 for a worker. Investor's rest investment fund is regarded as his property and thus should not be considered for distribution by this position.

- *Radical Egalitarian* (*Labor-value Radicalist*)

In contrast with Libertarian Egalitarian, a strict radical egalitarian separates a team earning to let final profits of team members to be equal, taking into account investor's rest investment fund for her distribution. For instance, suppose the same case with that above described in which an investor has 100 points of rest investment funds after her investment and worker earns 600 points as a team earning. In this case a radical egalitarian distributes 600 team earnings to 250 for an investor and to 350 for a worker, thus final earning for both of the investor and the worker is the same 350 points. Here distribution for an investor is discounted for rest investment fund he has. In this sense, one may say this is a kind of redistribution process of a property (from an investor to a worker). This position describes the same labor-value radicalist model explained in the

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[3] In chapter 3, libertarian marginalist position is classified as 'performance-based'. In the experimental settings of the study, participants are asked to engage in the same tasks inner the team. Thus it might be easier to count and compare one's contribution to team earnings.

[4]

previous section in *with*-labor treatment where both of worker and investor have to work in a production process.

2. Classification Criteria for Fairness Ideals

As discussed above, we assumed four possible fairness ideal, however, since we could observe only few libertarian marginalist, as it is described in the next section, we have focused on other three fairness ideals selfish: 1) selfish; 2) libertarian egalitarian; and 3) radical egalitarian. We have classified them according to a following classification criteria consisting of two indexes d_1 and d_2, and their combinations.

Index d_1 indicates distance from libertarian egalitarian distribution, defined as follows:

- *Index* d_1: $d_1 = \left| 0.5 - \frac{y}{\Pi} \right|$ $(0 \leq d_1 \leq 0.5)$

Where Π indicate a team earning (production by a worker) and y indicates one's self-distribution amounts. Here whole pie to be distributed half-to half is assumed to be equal to team earning gained by worker's labor in a production stage. As d_1 of an individual decreases, a distance between his self-distribution rate and libertarian egalitarian distribution rate decreases, that implies he is getting closer to libertarian egalitarian. On the contrary, if he distribute whole of team earnings to himself and leave nothing to his pair, he is selfish and $d_1 = 0.5$ in that case.

Index d_2 indicates distance from radical egalitarian distribution defined as follows:

- *Index* d_2: $d_2 = \left| 0.5 - \frac{y}{\Pi + a} \right|$ $(0 \leq d_2 \leq 0.5)$

Where a indicates a rest investment fund that are not invested by an investor in the same team (oneself if he is an investor or one's pair if he is a worker). Here whole pie to be distributed half-to-half is assumed as a sum of a team earning and a rest investment fund an investor keeps. As d_2 of an individual decreases, a distance between her self-distribution rate and radical egalitarian distribution rate decreases, that implies she is getting closer to radical egalitarian. On the contrary, if she distributed whole of team earnings and rest investment fund to herself and leave nothing to her pair, she is selfish and $d_2 = 0.5$ in that case.

For classification we plot individuals' distribution proposals to a plane, where d_2 is the horizontal axis and d_1 is the vertical axis and classified selfish, libertarian egalitarian and radical egalitarian following criterion values:

- (a) Selfish: $0.5 \leq d_1 + d_2$
- (b) Libertarian Egalitarian: $0 \leq d_1 + d_2 < 0.5$ *and* $d_1 \leq d_2$
- (c) Radical Egalitarian: $0 \leq d_1 + d_2 < 0.5$ *and* $d_2 < d_1$

These classification criteria are arranged in a plane in figure 1.

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Figure 1.
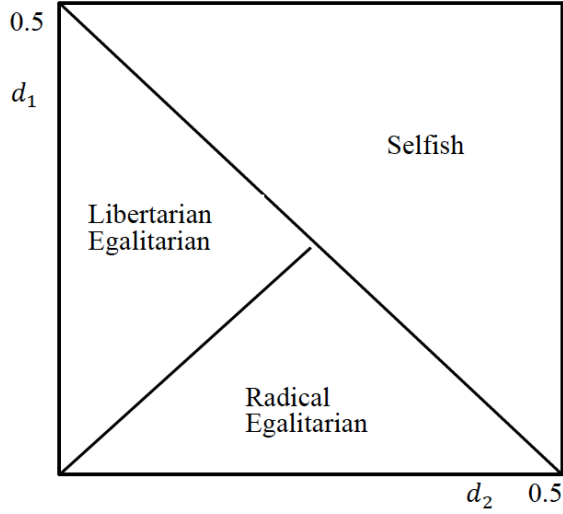
3. Models, Hypothesis and Predictions

Bowls (2004) explains a social preference function that consists of 'other-regarding' and 'process-regarding' for making one's behavioral decision (p.109). Based on this hypothesis, we defined individuals' social preference as a function of 'other-regarding' and 'process-regarding' and expressed function as follows:

$$S = f(o,p) \qquad \frac{\partial S}{\partial o} > 0, \quad \frac{\partial S}{\partial p} > 0$$

Where o indicates one's intensity of other-regarding and p indicates one's intensity of process-regarding. Fehr and Schmidt described value function as such a liner combination of utility function and preference to fairness, which may be regarded as social preferences is independent from utility function. However, for simplicity, we defined the function of social preference as such that is continuous with material utility: one's weight on material utility relatively decreases if one's weight on social preference gets stronger. Other authors like Babcock and Loewenstein (1997) discuss 'self-serving bias' may mute one's fair decision-making or social preference.

In our classification of fairness ideals above discussed one may regards radical egalitarian as the most enhanced version of social preference, since it treat with oneself and others in completely equal way, that is, it separates whole of earnings and properties among two persons half-to-half. Naturally, selfish should be regarded as the weakest version of social preference. Libertarian egalitarian, especially for investors, may be between them, since it respect one's own property as well as social fairness in the same time.

Table 1   Social Preference Intensity and Prediction by treatment and function

	Process-Regarding Intensity	Other-regarding Intensity	Social Preference	Predictions
With-labor/Investor	Max	Mid	Mid	Libertarian Egalitarian
With-labor/Worker	Max	Max	Max	Radical Egalitarian
Without-labor/Investor	Mid	Mid	Mid	Libertarian Egalitarian

Without-labor/Worker	Min	Min	Min	Selfish

Based on hypothesis above, we may be able to presume intensities of social preference by treatment and function as is shown in Table 1. Regarding *with*-labor treatment, both of investors and workers may regard the production process as fair and collaborative that may enhance social preference for both of them. However, other-regarding intensity may be muted a little in investor's side in this treatment because of 'self-serving bias' they may have, that is, they may regard their rest investment fund as established interest and should be kept for themselves, not to workers. With respect to *without*-labor treatment, the process may be regarded as unfair and uncooperative that may lead to mute their social preference, especially for workers who are required to work unilaterally. Further, other regarding intensity in *without*-labor treatment may be decreased drastically for workers: workers may just get angry and feel uncomfortable because they have to work whereas their pairs do not; for investors side, other-regarding attitude may be supposed to be not so high in this treatment, since investors may hardly feel sympathy with their pair-matched workers, because they simply do not share the experiences to work with workers that make them insensible workers' efforts or hardness. Thus one may summarizes predictions on fairness ideals by treatment and function as following:

- Prediction 1: Investors in *with*-labor treatment may have tendency to adhere libertarian egalitarian, since they have the highest process-regarding intensity and other-regarding intensity may be muted by self-serving bias they may have. They may recognize the production process is fair, and feel much sympathy with their pair-matched workers, thus tend to be egalitarian. However, because of their self-serving bias, they may prefer libertarian egalitarian, which enable them to keep their endowment and is more advantageous for their final profit, to radical egalitarian, the most strongest version of social preference.

- Prediction 2: Workers in *with*-labor treatment who keeps both highest version of other-regarding and process-regarding intensity may adhere radical egalitarian, because of the strongest social preference. Self-serving bias do not block their preference to radical egalitarian, because it does not disadvantage their final earnings by redistribution investor's endowments.

- Prediction 3: Investors in *without*-labor treatment may have tendency to adhere libertarian egalitarian with middle process-regarding intensity and other-regarding intensity. They may regard the production process is objectively not so fair, but their self-serving bias may serve to mute the feeling because the situation is rather easy and preferable for them. They may find their pair-matched workers situations are hard, but may not feel substantial sympathy with them because they themselves do not have the same experiences.

- Prediction 4: Workers in *without*-labor treatment may simply have the lowest version of 'process-regarding' and 'other-regarding' feelings that break social preference and lead them to adhere selfish distribution. With respect to 'process-regarding' they just feel the production situation, in which workers only have to work whereas all of that required to investors is to click a button for investment-decision, unfair and uncomfortable. With respect to 'other-regarding', they hardly have sympathies with their pair-matched investors for the imbalanced situation.

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VI. RESULTS OF EXPERIMENTS

1. Overview

The experiments have been performed from December 2014 to February 2015 in a laboratory of Kyoto University for 11 times, using experimental software z-tree (Fishbacher 2007). Participants were gathered from all faculties of Kyoto University and 100 undergraduate students participated the experiments. The average participants were 9.3 people for one time. Each of them participated in either *with*-Labor or *without*-Labor treatment and average time for one experiment including instruction period, game period and payment period was around 50 minutes. The average payment was around 1168 yen ($\cong$ \$10). This satisfies opportunity cost for participants[5]. Actually, in a questionnaire survey after experiments more than half of participants answered 'very satisfied' or 'satisfied' with payments they get, top two of satisfaction levels inner 5 intensity levels.

Investors earned around 251 points in average in *with*-labor treatment that is almost the same conditions with that of without-labor treatment, in which all investors are given 250 investment funds as endowments. 42 out of 50 investors invested to calculation machine[6], 8 investors (5 in with-labor treatment; 3 in without labor treatment) did not buy calculation machine[7]. This indicates that some investors recognized a risk that in case their pairs adhere selfish distribution, their final profit may be only rest investment fund in one-second probability, and 8 investors had a risk-aversion preference. Since this study focus on a situation that an investor contributes to production by an investment, data consisting of investors, who did not buy calculation machines, and their pairs basically excluded out of the analysis[8]。

Table 1 shows average values of team earnings, self-distribution amount, self-distribution rates by treatment and function. Interestingly, in spite both workers' conditions of *with*-labor and *without*-labor in production are the same, however, the average team earnings of two treatments have a difference in more than 110 points degree, which is statistically significant (p=0.0031 by Dunnett Test). This result implies that workers' motivations were muted in *without*-labor treatment, compared with *with*-labor treatment. Further, workers in *without*-labor treatment have higher self-distribution rates in 8 % compared with *with*-labor treatment. These differences may stem from subjects' social preference, consisting of 'other-regarding' and 'process-regarding' as is explained in the previous section. One may say that for workers the former may be so 'uncomfortable' situation compared with the latter, that they lost their industriousness as well as generosities to others. It is also interesting that almost no difference was observed in average self-distribution rate of investors by treatment. From these analysis, we could derive the following thesis:

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[5]According to survey on the average hourly payment for part-time job by jobs research center, average hourly payment in west Japan is 921 yen.

[6]On questionnaires survey after experiments, investors who bought calculation machines answered to the reasons why they did so like 'expecting a raise of productivity'; and most of workers who were bought calculation machines by their pair-matched investors wrote they felt gratitude for it.

[7]On questionnaires survey after experiments, investors who did not buy calculation machines answered to the reasons why they did not like 'productivity may not raise so much' 'expecting whole pie may be taken by workers'; and most of workers who were not bought calculation machines by their pair-matched investors wrote they felt angers at that time.

[8]Average production income of 8 participants those who engaged in calculation tasks without calculation machine was 251 points. Compared with average 625 points of those with calculation machine, productivity is raised by calculation machine around 2.49 times.

- THESIS 1: Workers in *with*-labor treatment have a significant tendency to be more productive and generous than workers in *without*-labor treatment.

Table 1   Average team earnings and self-distribution rate by treatment and function

	Team earning	Self-distribution	Self-distribution rate
With-labor/Investor (N=20)	687.0	439.8	64.3%
With-labor/Worker (N=20)	687.0	435.5	65.0%
Without-labor/Investor (N=22)	568.6	366.1	65.0%
Without-labor/Worker (N=22)	568.6	422.7	73.8%

## 2.   Libertarian Marginalist in functional and non-functional distribution

According to the fairness ideals of Libertarian marginalist, individuals should get share according to what they have earned by using their measurements of production including labor and production equipment. We have examined whether subjects adhered libertarian marginalist fairness ideals in functional distribution in comparison with results of non-functional distribution experiments. In Tokumaru and Uni (2014), we have performed similar experiments consisting of production and distribution, where team members do not have functional difference for production but they engage in the same works to produce team earnings.

Table I shows correlations between predicted values by libertarian marginalism and observed values in non-functional distributions, where we could find correlations in many individuals. The transverse line indicates points where predicted values and observed values are the same and horizontal line indicates points where self-distribution rate is 0.5, that is, egalitarian in observed values. CW with-PI indicates a treatment, where subjects engage in collaborative working style that requires collaboration with their team members, and they were informed of performance information of each team member after their production. IW without-PI indicates a treatment, where each team member works independently and they were not informed of the performance information of team members. We can find a lot of observed values are on the transvers line or closer spaces, that imply many participants adhered liberatarian marginalist in the experiments of non-functional distribution.

Table II also shows correlations between predicted values by libertarian marginalism and observed values in functional distributions, where we could find almost no correlation. Some observed values are on line of (libertarian) egalitarian, however, not on libertarian egalitarian. If we regard observed values more than 0.7 rather belong to selfish, we could find few observed values correlated with predicted values. It is interesting that participants did not tend to take into account of their contributions to productions, even though a calculation of one's contribution rate to a production in itself was not so hard in our experimental settings as is explained in the previous section. This may imply that individuals tend to not recognize one's contributions and other's contributions on the same ground when they take different roles in production. From this comparison we could derive a second thesis as following:
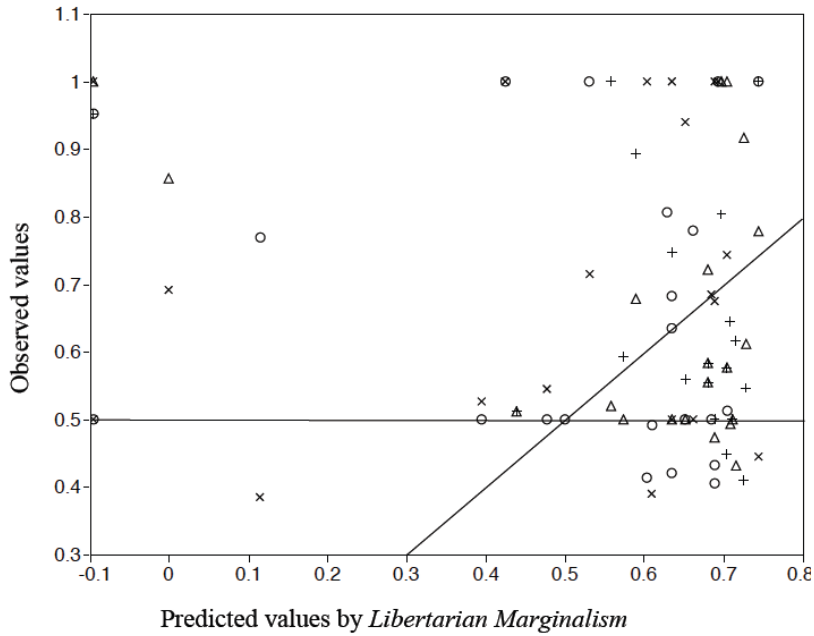
- THESIS 2: Compared with non-functional distributions, libertarian marginalists were hardly observed in functional distribution.

Graph I
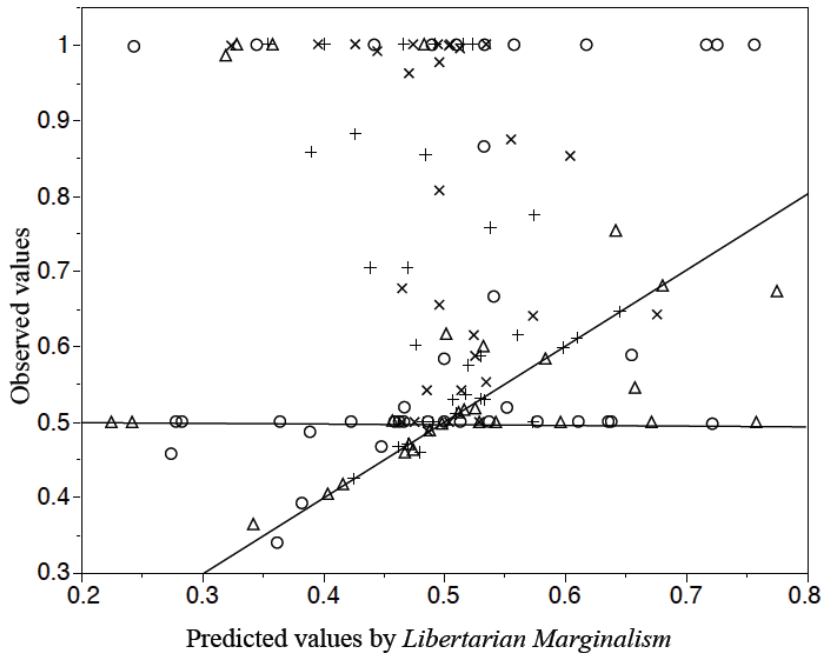
△CW *with*-PI ○CW *without*-PI ＋IW *with*-PI ×IW *without*-PI

Graph II

＋Worker *with-L*; △ Investor *with-L*; ×Worker *without-L*; ○Investor *without-L*
  Diagonal line designates points where predicted valus and observed values are the same
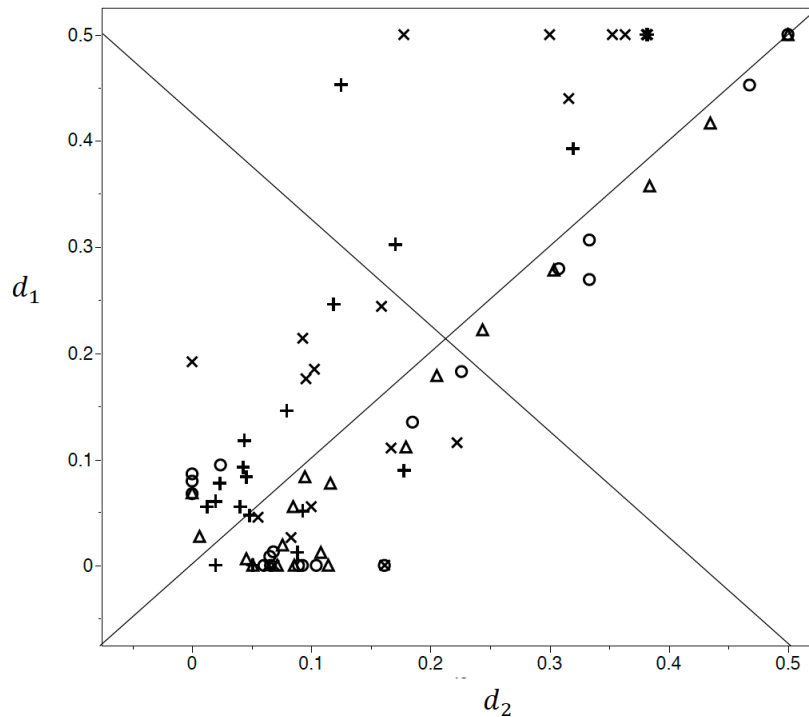
3. Fairness Ideals

Graph III Table 2 shows subjects' fairness ideals by treatment and function classified according to classification criteria given in section IV.

Both of workers and investors in *with*-L treatment shows lower rates of selfishness (one forth) compared with *with*-L treatment. These rates are also low if one compares them with results of independent working style in non-functional distribution experiments (50% were selfish in a treatment without individuals' performance information; 34.8% in a treatment with the information), where subjects were required to earn team income independent from other team members and thus there is no interdependency of each team member's contribution to production (Tokumaru and Uni 2014). Here in functional distribution we could see that subjects may have regarded production consisting of each-other's different function as a kind of collaborative working process, which leads unselfish distribution of both sides. Actually, in our previous non-functional distribution experiments, subjects who were engaged in collaborative working style showed lower rate of selfishness in their distributions: only 13.33% were selfish in a treatment with individuals' performance information; 31.58% in a treatment with the information. Thus we could derive following thesis:

- THESIS 3: In case both of workers and investors contribute production via their labor, there is a significant tendency that they tend to be unselfish in functional distribution, compared with non-functional distribution without labor interdependency in production.

Graph III

$\triangle$ CW *with*-PI $\circ$ CW *without*-PI $+$ IW *with*-PI $\times$ IW *without*-PI

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Table 2. Fairness ideals by treatment and function

|	Selfish	Libertarian Egalitarian	Radical Egalitarian	Total
With-L/ Investor	5 (25%)	13 (65%)	2 (10%)	20 (100%)
With-L/ Worker	5 (25%)	5 (25%)	10 (50%)	20 (100%)
Without-L/ Investor	8 (36.4%)	10 (45.5%)	4 (18.2%)	22 (100%)
Without-L/ Worker	9 (40.9%)	8 (36.4%)	5 (22.7%)	22 (100%)

As is predicted in our hypothesis, Workers in *without*-Labor treatment have a significant tendency to be selfish: this may be quite natural since they feel uncomfortable in unequal situation between them and their pairs (see Table 2). This tendency may also be interpreted that workers adhered labor-value radicalist positions. Here we could see whether one contributed to productions via one's labor or not is a significant factor for fairness in functional distribution. In Graph IV and V, we can find distribution amounts of many workers in *without*-labor treatment are plotted relatively upper space, where is far from diagonal lines. This means they adhered selfish distribution without considering egalitarian fairness ideals.

It is interesting that investors, who did not need to engage in their works to earn investment funds, showed rather selfish distributions than that of investors with labor as is shown in table 2. This certainly contradicts the fairness ideals of labor-value radicalist: an investor who never contributed to production by his own labor wants more; whereas an investor who contributed to production by her own labor wants less. This may imply that, investors with labor have been more other-regarding than investors without labor, since their works made them more sympathetic to their pair-matched workers' labor. From these observed tendencies, we could derive a thesis as follows:

- THESIS 4: Workers have significant tendency to become selfish when investors do not contribute to production via their labors. Investors without labor also have a significant tendency to be more selfish than investors with labor.

Both *with*-L and without-L treatment, investors have a significant tendency to adhere libertarian egalitarian as is show table 2. This may partly come from that investors' *self-serving bias*, since they are more benefitted from libertarian distribution than radical egalitarian distribution, and libertarianism may be more supported by those who already have properties and do not want to be redistributed them. In Graph V, we could see correlations between predicted values by libertarian egalitarian and observed values on each individual's self-distribution. Many investors' self-distribution amounts are plotted on diagonal line or around the line, which designates points where predicted values and observed values are the same.

Graph IV. Correlations between predicted values by selfish distribution and observed values of self-distributions
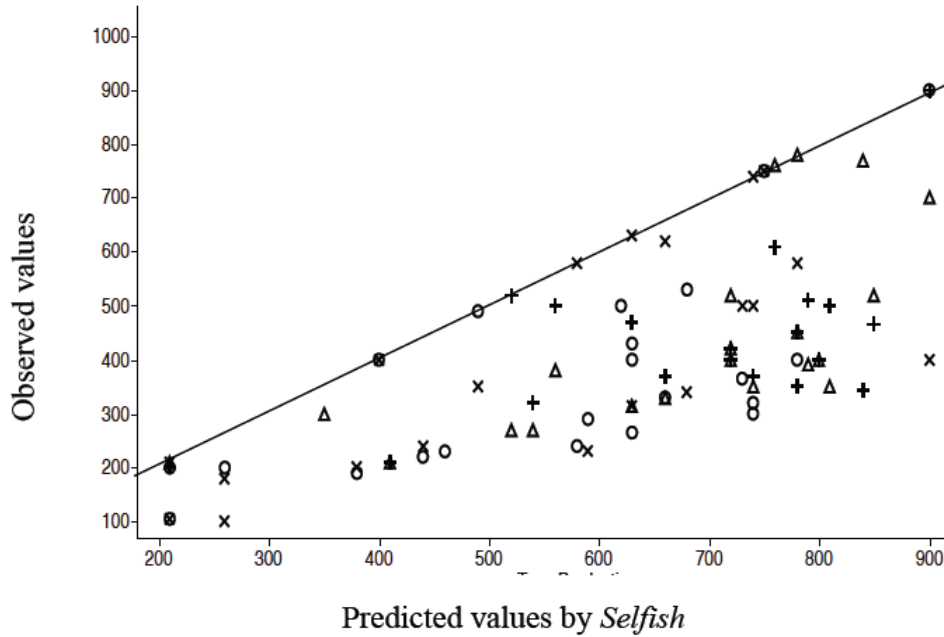
+Worker *with-L*; △ Investor *with-L*; ×Worker *without-L*; ○Investor *without-L*
Diagonal line designates points where predicted valus and observed values are the same

Graph V. Correlations between predicted values by libertarian egalitarian distribution and observed values of self-distributions
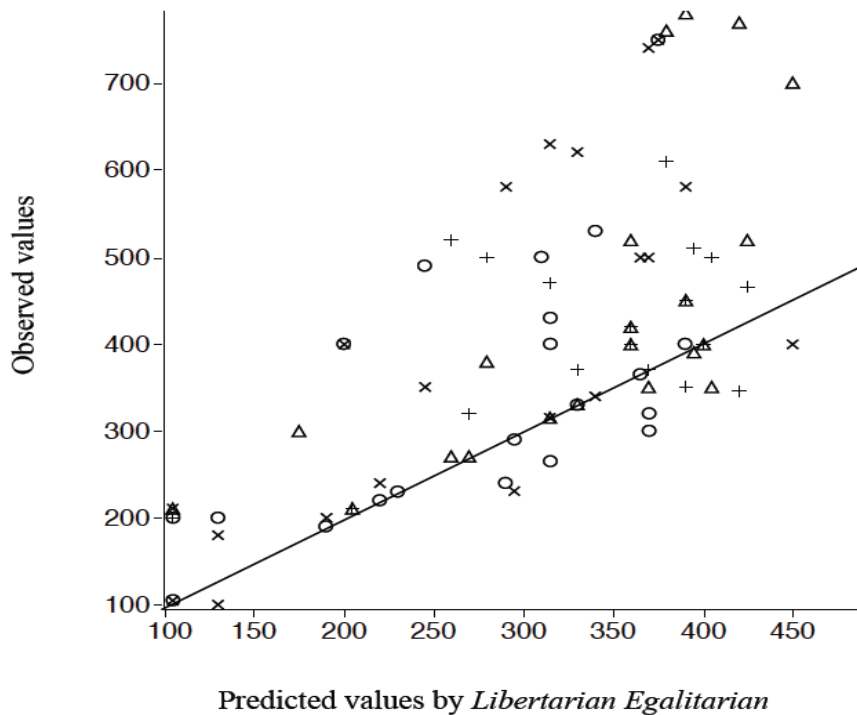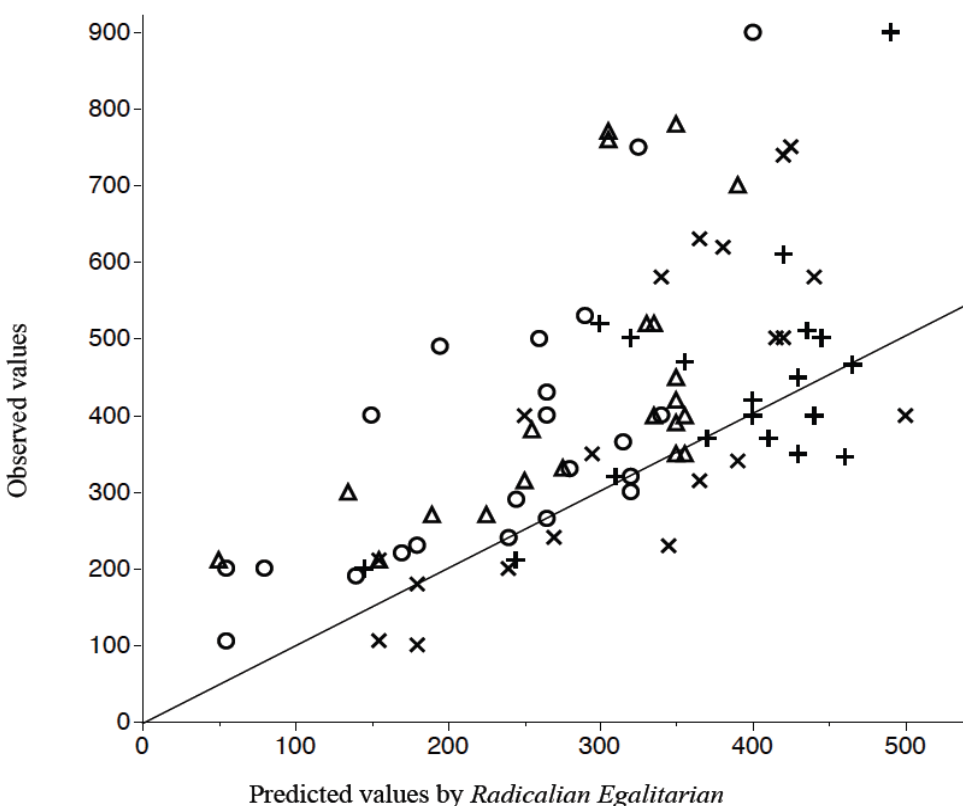

+Worker *with-L*; △ Investor *with-L*; ×Worker *without-L*; ○Investor *without-L*
Diagonal line designates points where predicted valus and observed values are the same

Table 2 shows that a half of workers in *with*-Labor treatment adhered radical egalitarian. This is also clear in graph IV, where many of them are on the line or near the line of expected values of radical egalitarian. From these analyses on different tendencies between investors and workers, we could derive following thesis:

- THESIS 5: Investors have a significant tendency to adhere libertarian egalitarian distribution, whereas workers have significant tendency to be radical egalitarian in *with*-Labor Treatment.

Graph VI. Correlations between predicted values by radical egalitarian distribution and observed values of self-distributions

+Worker *with-L*; △ Investor *with-L*; ×Worker *without-L*; ○Investor *without-L*
Diagonal line designates points where predicted valus and observed values are the same

VII. Discussions

In the previous section we have seen the results of experiments in functional distributions. We have found interesting and implicative findings from three perspectives. Firstly, our experimental results described that functional distribution have its own specific figures compared with non-functional distributions. Secondly, whether investment fund or capitals are earned via investors' labor or not has large impact for subject's fairness ideals both for investors and

workers. Thirdly, functional or positional difference in production also have affected on both investors' and workers' preference on their fairness ideals. After having analyzed each points experimental results brought I shall discuss on implications that they may bring in actual economic situations.

Functional or non-functional

As is shown in Thesis 2 and 3, we could have found clear distinction between functional and non-functional distribution: 1) libertarian marginalists were hardly found in functional distribution; 2) individuals were more unselfish in functional distribution with-labor than independent working style of non-functional distribution. Thus one could say *functional distribution matters* for fairness ideals.

The first difference implies that an individual does not strictly compare each team member's amount of contribution to production when he/she and his/her pair take different roles in production. This may come from that it gets more difficult to imagine other's contribution in comparison with one's. However, as is discussed below, whether one or one's pair contributes via labor or not largely matters one's fairness ideals. Thus in functional distribution, one could say how much other people contribute to production is not important; but whether people contribute by their labors is more important.

The second difference implies that in functional distribution, especially in *with*-labor treatment, individuals tend to regard the production process as a kind of collaboration; a worker may be grateful to his pair investor for buying calculation machine which raise productivity radically; an investor may also be grateful to her pair worker to engage in works to earn money. Since there is an interdependency of production process between a worker and an investor, they may have recognized that their pair's contribution is essential for production until to be less selfish.

Capitals are gained via investors labor or not

Thesis 1 and 4 shows that different experimental settings in *with*-labor and –labor treatment brought about significant difference in fairness ideals in both of workers and investors: 1) workers in *with*-labor treatment were more productive than in *without*-labor treatment; 2) workers tend to be significantly selfish in *without*-labor treatment than *with*-labor treatment; 3) investors in *without*-labor treatment were also more selfish than investors in *with*-labor treatment. Thus one could say *whether capitals are gained via investors labor or not matters* for fairness ideals in functional distribution.

Regarding worker's behavior shown in thesis 1 and 4 seems to be easily understandable if one tries to imagine psychological situations workers were in: they have felt more 'unfair' and 'uncomfortable' when one should work during all of what his/her pair is doing is just clicking a button to decide to buy a calculation machine. It is reasonable if workers lose their motivation in their production and become selfish in *without*-labor treatment. As is discussed above, even though individuals have different roles in production, they may recognize them as collaborative works, however, the prerequisite conditions for the recognition is that investors contribution are based on their labors. Here we could see Marx's analysis on qualitative difference in capital stock discussed in section II matters in fairness ideals between workers and investors. One may say that a distribution justice based on labor-value radicalist works in this situation.

Marx had maintained that those change of capital stock characteristics do not change of fairness ideals of individuals, because of their cognitive limitations. Since individuals recognize employment relationship not in a long run history, but also just contracts in short time. However,

in our experiments we could find that individuals' fairness ideals had been changed by the difference of capital characters on whether it based on labor or not.

The reason why subjects recognized the difference of capital in our experimental settings are clear: in our experiments subjects only participate one-time production and distribution process, and it is easy to grasp characteristics of capitals in the game; and the relationship between worker and investor is clearly recognized by participants. One may conclude that if conditions to recognize source of capitals are satisfied, it affect on distribution justice among individuals.

In contrast with reasonable behaviors of workers, who get unmotivated and selfish in *without*-labor treatment, it is intriguing fact that investors in *without*-labor treatment showed more selfish distribution pattern than *with*-labor treatment. Even though what they have done in the production processes were just decide to buy a calculation machine and had no other engagement, 36.4% of them wish to distribute all of production earnings and leave nothing to their pair-matched workers. One may say that investors who do not work may have had difficulty to imagine worker's hardships since they do not have such experiences in the game. In other words, 'other-regarding' attitude, which is prerequisites for social preferences according Bowls, may be enhanced by sharing one's experiences with others, and muted if one does not have the same experiences *vice versa*. Since investors without labor treatment did not share labor experiences, their evaluations on workers' labor may have been weakened by lack of 'other-regarding' attitude.

Investor or worker
Even though both investors and workers were relatively unselfish, however, they showed a clear distinction on adhering egalitarian distribution: a significant number of investors (65%) adhered libertarian egalitarian distributions, whereas a half of workers adhered radical egalitarian distribution as is shown in thesis 5. This means that, even though experimental settings are the same, roles for production have significant influence on individuals' decision making: in other words, *functional roles (investor or worker) matter* for fairness ideals.

This may be well understood with the idea of self-serving bias or opportunistic behaviors, as Babcock and Loewenstein (1997) and also Tokumaru (2014) had pointed out. According to them, individuals tend to judge that reflect on self-serving bias in a bargaining processes that may imply they consciously or unconsciously select rather advantageous distributions for themselves. Regarding to investors, they can get more advantageous distribution if they adhere libertarian egalitarian distribution that respect their rest investment fund as their endowed property. For workers side, it is clear that adhering radical egalitarian fairness ideals enable them to redistribute investors' rest investment fund and more advantageous than libertarian egalitarian distribution.

From these discussions above based on results of experiments, we may derive some implications on recent changes of macro-level functional distributions: decline of labor wages and increasing stock dividend rate, accompanied with recent institutional changes in financial market. Our experimental results implied investors and workers tend to construct a cooperative relationship, that is significant gap is not observed in fairness ideals of both sides if both of them recognizes with each others' labors and contributions in production. On the contrary, if investors do not contribute production process via their labors, both of workers and investors tend to be selfish.

Recent change of financialization and globalization in financial market may have undermined

relationship between investors and workers that lead to imbalanced distributions. Because of radical deregulations in financial markets, long-term shareholders or banks were substituted for increasing numbers of foreign investors, individual investors or corporate investors who seek their capital gain in short run. This situation may have contributed to extend fairness gap in functional distribution.

With respect to situations in Japan, before the 1980s when financial markets were relatively regulated and globalizations in finance had not developed well yet, cross-share holding among group companies ('Keiretsu') or main bank systems were the most prevailed and popular form of financing for enterprises, that contributed to harmonious management relationship. At that time, investors were limited consisting of main banks or shareholders of group companies. The dividend rate was relatively low, but investors hold the shares for long time without complaining about it, because many of them more or less got involved in the enterprise, and might have had basis to recognize worker's efforts or contributions to the company. In workers side, while wage rate kept also relatively high levels in Japanese companies, Japanese business people were worldwide known as the hardest workers keeping loyalty to their companies. Since in most cases CEOs were selected from employees who work for the companies for long time stepping up corporate ladder, it may be easier to enhance 'other-regarding' attitude to investors or management from worker's side. Although these financial and management customs in Japan were condemned as 'closed' to a global market, however, Japanese companies were also known with harmonious labor relations, which had contributed stable development in Japanese economy in some extents.

However, accompanied with a set of deregulations of financial market after 1990s that leads to rapid capital flow by opening the market to foreign investors, individual investors and other corporate investors, those cooperative relationships between investors and workers gradually come to be broken. Since foreign investors or individual investors aim to earn capital gain in short time and do not care about workers side of companies of which share they posses, and sometimes implicitly threat a company to reduce its value in order to get higher divides. Those changes in financial market constitute one of main causes to decline labor distribution rate in macro level whereas shareholder distribution rate is growing.

By applying our experimental studies, how above described institutional change in financial situation in Japan cause a shift from labor-weighted to investor-weighted functional distribution may be well explained from a micro-level. Most of investors from group companies or main banks have working experiences in similar domestic companies in Japan and they often participates in management processes of the companies, thus it may easy for them to recognize or imagine worker's efforts in working processes, whereas it would be hard for foreign investors or individuals investors. In other words, investors of main banks or group companies are in the situation that enables them to enhance their 'other regarding' attitudes to workers and keep their shares with relatively small capital gain for long them, whereas foreign investors as well as individual investors are not in those situations that lead them to require higher shareholder distribution rate. From worker's sides, most of the managers or CEOs are selected from employees who had worked at the company for long time, thus workers are also easy to imagine that managers or CEOs, as well as investors from group companies and main banks are contributing the company's production by 'their labors', whereas they cannot do the same about foreign investors or individual investors. Harmonious relationships between employers and employees in traditional Japanese management styles were necessary outcome from those conditions that enhance 'other-regarding' as well as 'process-regarding' social preferences of

both of investors and workers. On the other hand, financializations necessarily constitute conditions that reduce 'other-regarding' and 'process-regarding' attitudes of both of investors and workers that leaded to lower wage-rate, reinforced by weakened worker's bargaining power. Stockhammer (2013) referred in the beginning concludes that one of the significant causes that brought labor-distribution rate in developed countries is financialization from his correlation analysis in macro-level. Our experimental analysis corroborates his claim from micro-level behaviors.

Other implications we may be able to derive from our experiments concerns with compromises between workers and investors in income distribution process largely depend on characteristics of investment funds, that is, whether it originates investors' labor or not. Our experiments showed in the case both of investors and workers works for productions, the interdependencies of their labor process makes them more unselfish. Although their self-serving bias made investors tend to prefer libertarian egalitarian distributions that enable them to keep their endowment properties, whereas workers prefer radical egalitarian that enable them redistribute investors' properties, however, those differences on preferred fairness ideals are relatively so small that there seems to be much room for achieving a compromise between them through negotiations. However, in the case investors have investment fund as their endowment and do not work for production, most workers as well as most investors adhere to selfish distributions that seems to make them difficult to find compromise between them.

VIII. CONCLUDING REMARKS

In order to examine individuals' fairness ideals in functional income distribution, we have performed distribution experiments consisting of worker and investor, who take different roles in a production process. We could find different pattern of fairness ideals in functional distribution from that of non-functional distribution. Not whether how much an investor or a worker contributed to a production, but whether an investor earned their investment fund by their labor was important for distribution justice in functional distribution. Both of investor and worker tend to be unselfish and egalitarian when investor earned their investment fund by their labors. A difference in egalitarian direction was observed that may stem from self-serving bias of both sides, that is, workers prefer radical egalitarian distribution whereas investors prefer libertarian egalitarian distribution was observed, it is not so serious that presume workers and investors may have enough possibility to find compromise between them. In case investors' investment funds are their endowment and they do not need to work to earn them, a gap on distribution between investors and workers seems to be too serious to fin a compromise between them. Our experimental results showed that both of them tend to be more selfish in that case, in addition to workers' reduced motivation and productivity. Our experimental results and analysis may partly explain recent declines in labor-wage as well as increases of dividend accompanied with institutional change. Financialization may have constituted a condition that makes investors more selfish without regarding workers. Our experimental studies are only limited in an artificial conditions in laboratory, however, they seems to have some implications in macro-level situations in recent days. This experimental study consisting one-shot game experiment should be developed to a repeated version of the game that may bring better approximation to actual situation in a long term.

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APPENDICES
- ## Instruction for *with*-Labor Treatment

Thank you very much for attending this economic experiment. An experimenter will now explain the rules of the game. Please read the instructions below carefully and understand rules of the game. You can always raise your hand to ask if you find anything unclear.

1. Handouts
Please check that all handouts are on the table: an instruction page a blank sheet of paper, an answer sheet and a sheet for writing a distribution proposal.

2. Show-up fee
You get 800 points (= 800 yen) as a show-up fee, simply by participating in this game. This show-up fee is going to be paid to all participants regardless of the total income points they earned in a game.
Pairs (two-member team)

3. Investor and worker
Each participant is assigned a role of either investor or worker. Each investor is pair-matched with each worker. The individual who becomes you partner is randomly decided by a computer. No participants, including any experimenter, can know who is an investor or a worker, or who paired with whom during and after an experiment.

4.   Investor's calculation task to earn investment fund
In the beginning of a game, 100 questions of triple digit (Q1,Q2,Q3....) are displayed on screens of participants assigned investor's role. A correct answer is the figure given <u>by multiplying 37 by every triple digit</u>.

   Ex. Q1. 123   Correct answer: 4551(= 123×37)

Investors earn their investment funds by engaging in calculation task. Investors can get 10 points by giving a correct answer to a question. Participants those who are assigned roles of investors, please input those data to each answer column on the screen. One can move a cursor to the next answer column by pressing the Tab key. One can make use of the blank sheet of paper on the desk for your calculation. The time for calculation is 10 minutes. When an experimenter indicates, "10 minutes have passed. Please stop your calculations and press the OK button in the lower right portion of the screen," please stop your calculation and press the OK button on the screen. <u>Please do not press the OK button until an experimenter gives the signal.</u>

Those who are assigned a role of a worker, please wait during this time.

5.   Investment decision by investor
After investor's work to earn investment fund has finished, investment fund obtained by an investor is displayed on the investor's screen. Investors those who obtained more than 150 points investment funds can buy a right to use a calculation machine by investing 150 points out of their

investment funds. Rest investment fund points automatically become a part of investor's final profit. Those who are assigned investor's role, please answer a question 'Do you buy a right to use a calculation machine?', by pressing 'Yes' or 'No' button on the screen. However, in case an investor obtained less than 150 points, he/she cannot buy a right to use calculation machine.

Those who are assigned a role of a worker, please wait during this time.

6. Calculation task and calculation machine

In the second place, 100 questions of triple digit（Q1,Q2,Q3….）are displayed on screens of participants assigned worker's role. A correct answer is the figure given by multiplying 37 by every triple digit.

   Ex. Q1. 123   Correct answer: 4551(= 123×37)

Workers earn production income by engaging in calculation task. Workers can get 10 points of production income by giving a correct answer to a question.

   On the screen of a worker, whose pair bought a right to use calculation machine, calculation button is displayed at the right-bottom of the screen, with a statement 'you are a worker. Please engage in production. Since an investor of your team bought a right to use calculation machine, you can use a calculation machine. Please use calculation machine by pressing calculation button at right-bottom on the screen'. For using a calculation machine, workers can use a numeric keypad on the right of a keyboard. One can release or implement the numeric keypad by pressing Num Lock bottom. Multiplication （×）is designated by * key of numeric keypad, All Clear is Esc button on the upper-left of a keyboard. Please do not press the OK button until an experimenter gives the signal.

Numeric keypad
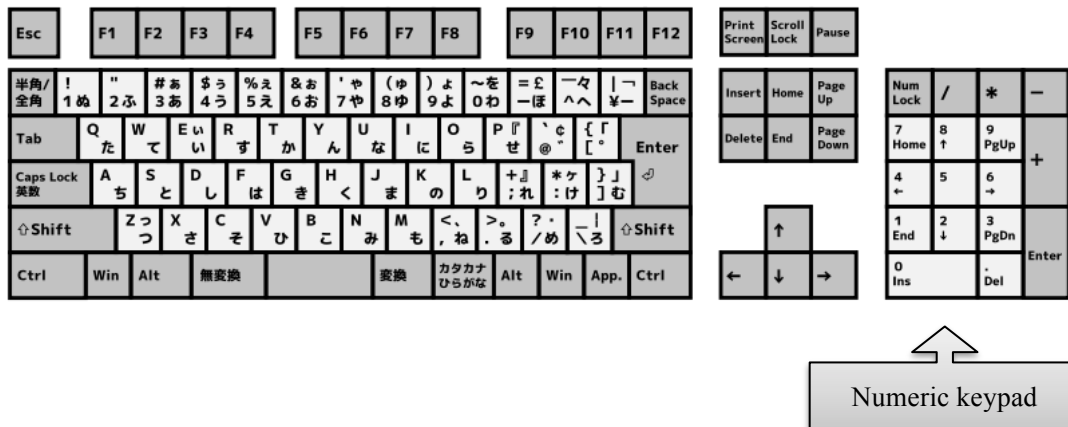
You can move a cursor to the next answer column by pressing the Tab key. You can make use of the blank sheet of paper on the

   On the screen of a worker, whose pair did not buy a right to use calculation machine, a statement 'you are a worker. Please engage in production. Since an investor of your team did not buy a right to use calculation machine, you cannot use a calculation machine ' is displayed.

Participants those who are assigned roles of workers, please engage in calculation tasks and write answers in an answer sheet. Those workers who have a right to use a calculation machine can use a calculation machine can make use of the blank sheet of paper on the desk for your calculation. When an experimenter indicates, "10 minutes have passed. Please stop your calculations and press the OK button in the lower right portion of the screen," please stop your calculation and press the OK button on the screen. <u>Please do not press the OK button until an experimenter gives the signal.</u>

Those who are assigned a role of a investor, please wait during this time.

7.   Entry Screen

After the time for calculation, entry screen is displayed on the workers' screen. Those who are assigned workers, please entry the answers of calculation tasks on the screen. One can move a cursor to the next answer column by pressing the Tab key. The time for entry is 6 minutes. When an experimenter indicates, "6 minutes have passed. Please stop your calculations and press the OK button in the lower right portion of the screen," please stop your calculation and press the OK button on the screen. <u>Please do not press the OK button until an experimenter gives the signal.</u>

Those who are assigned a role of a investor, please wait during this time.

8.   Distribution proposal
After a production process by workers has finished, 1) average numbers of correct answers in case without using a calculation machine $\times 10$; 2) production income of your team (= a worker's production income) are displayed on screens of both of workers and investors. Please give a distribution proposal that separates the team's earnings into your share and your partner's share. The sum of your share and your partner's share should equal total team earnings.

   Ex. when total team earnings are 600 points, if your share is x, and your pair's share is y in your distribution proposal, then $x + y = 600$.

Please fill in your distribution proposal sheet first, and then enter your distribution proposal after an experimenter gives the signal.

9.   Final profit of a game
A computer randomly selects one distribution proposal out of those proposed by you and your partner. Total team earnings are distributed according to the selected proposal. Adding these to the 800 show-up fee points, distributed team earnings constitute the final profit points of each participant.
   The rest points that an investor has not invested are added to the investor's final profit points. For instance, an investor who earned 230 investment funds, 80 points are added to his/her final profits in a case he/she buys a right to use a calculation machine, whole 230 points are added in a case he/she does not buy a right to use a calculation machine.

10. Points conversion and payment
Points are converted as 1 point = 1 yen and paid to each participant after the game finishes.

※If you feel anything is unclear, please raise your hand.

● **Instruction for *without*-Labor Treatment**
Items 1～3 and 6～10 are the same with *with*-Labor Treatment. Item 4 and 5 are substituted to explanations as following.

4. Investment decision by investor
250 points are given to participants who are assigned to investors as their endowments. Investors can buy a right to use a calculation machine by investing 150 points out of their investment funds. Rest investment fund points, 100 points in a case of investment or whole 250 points in a case without investment, automatically become a part of investor's final profit. Those who are assigned investor's role, please answer a question 'Do you buy a right to use a calculation machine?' by pressing 'Yes' or 'No' button on the screen.

Those who are assigned a role of a worker, please wait during this time.