

# Trust system and Reconstruction from the 3.11 Disasters

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## 1 Introduction

The East Japan Great Earthquake and Tsunami 11th March 2012 and the following meltdown in the local economy of the devastated areas have confronted our economic policies with unprecedented challenges. The purpose of this thesis is to examine an effectiveness of the trust system as a means of reviving the economic function of regions hit by the disaster.

Our discussions are basically constructed upon two perspectives. First, the revival of the economic function from the earthquake should be understood as asset transformation from existing managers whose economic resources are lost by the earthquake to new and active managers with productive investment opportunities and management skills. In other words, we need some devices or institutions that bound old and new managers together. Without such devices, existing managers would be stuck with the status quo, i.e., they have to keep standing in front of the damaged assets, without the done way<sup>2</sup>.

Secondly, we can say that trust system can play an important role as the intermediary in the sense of last paragraph, to channel some assets between deferent economic agents. Good example is a bequest that is a property repeatedly transferred between generations. However, there is sharp contrast between the earthquake-hit assets and bequests. In the latter case, a successor (heir, heiress) has normally an enough incentive to accept the inherited assets, but it must be hard to expect that earthquake-damaged assets can easily find the person with an incentive to succeed the damaged asset and try to make profit by utilizing them. In what follows, with considering the fact that the damaged economic resources cannot be activated as they are, we state the special characteristic of the trust system can be used to utilize such the resources.

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<sup>1</sup> This research is granted by Nomura Foundation. The author appreciates very much to the Foundation and its committee. Remaining errors are needless to say my sole responsibilities.

<sup>2</sup> Of course, an existing manager and a new manager may be identical. However, it is worth to consider them separately because, by so doing, we can focus on their functional differences.

Our discussions are structured as follows. First we schematically illustrate the transfer process of damaged properties which is consisted from two different parts. Next, conflicts of interest between the existing property owner and the trust system is examined, during the first part of the process. In addition, the second part of the process, from the trust system to a new manager, is clarified, from the viewpoint of maintenance of the productivity of the resource. Based on these analyses, the reasons why trust system is beneficial and useful as the reconstruction schemes. Finally, some policy implications obtained from such a theoretical discussion are stated. In the theoretical analysis on the process, the results of the previous works of the author are intensively used<sup>3</sup>.

## 2. Reconstruction Scheme as an Asset transformation Mechanism<sup>4</sup> – overview -

From the view point of recovering the socio-economic structure from the 3.11 disaster, the problem we are confronting with is how we can restore the devalued assets, which will be a cradle for the profitable economic activities in future. This needs to channel the damaged assets from the exiting owners (person who was directly hit by the earthquake) to new owners who have the productive investment opportunities.

Similar situations are often observed when we are interested in the succession of business which has recently been attracting much attention in most aging-society, like Japan. By paying attentions to conflicts of interest between an incumbent managers and the new managers, Fukaura(2012) analyzed the conditions for smooth succession of business and he discussed the situations under which the succession would fail. According to his discussion, if incumbent managers' time preferences are enough small and the set-up cost for new enterprise for young generation is enough small, the former hopes for the succession of business to young generation and the latter prefers to start its own business newly. As a result, conflicts of interests are caused between two generations.

One possible remedy for this hazard is to set-up the conduits which keeps the ownership of the existing business temporarily and channels it to a new business manager. Here, candidates for a new manager should be recruited from not only the relatives of incumbents but also the outsiders. Although details are left to the original

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<sup>3</sup> In what follows, we use a word “trust system” to show an economic entity that acts as trustee. So it includes “trust company”.

<sup>4</sup> In this article, “reconstruction” implies a full recovery of socio-economic system from the disasters. On the other hand, “restoration” means a repairmen or amendment of infrastructures, such as power supply, immediately after the disasters.

paper, the point here is the establishment of conduits that keeps and passed the some economic assets. In other words, this is *the succession of business with an intermediary*.

To maximize the benefit of succession of business, this conduit must hold existing assets' value constant at least, or improve it if possible. A trust system makes a sense in this context, because it is a tax-neutral entity and value of trusted asset can be appreciated if an able-trustee is nominated.

Our starting point is to apply this results Reconstruction scheme. See Figure1 that shows our analytical framework schematically. Here, current generation is the generation who ran the corporation when the earthquake occurred. His/her business was heavily damaged by the disaster and lost its worth. Although businesses have to be restored and revived because it contributes to the over-all socio-economic reconstruction, it must be very hard to make a firm and optimistic expectation for future business environments. This means the immediate re-start and rehabilitation of damaged assets is difficult, as shown by white arrow in Figure 1.

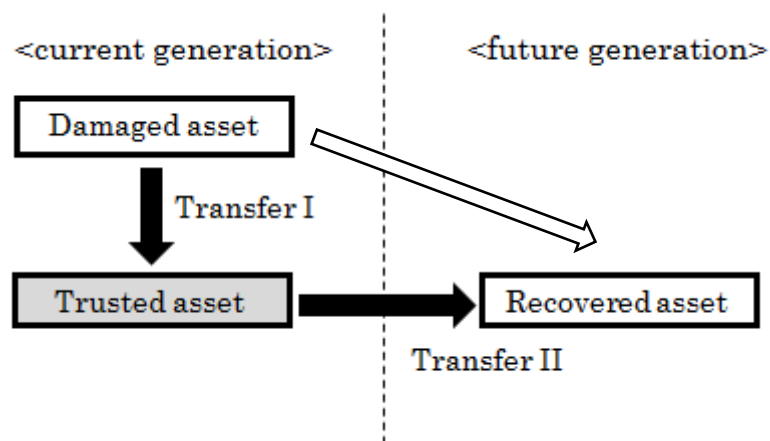


Figure1

The alternative way is to introduce an intermediary between damaged and recovered assets. In the following discussion, Transfer I (II) means the first (last) parts of this channeling process. However, this intermediation is worthless unless conduits can verify that the value of recovered asset is higher than the damaged one. Hence, for well-functioned asset transformation, conduits must have the ability to deal with two impediments, (1) to eliminate conflicts of interest between existing manager and conduits, (2) to find the new productive manager with the ability to utilize the recovered asset.

### (1) Conflicts of interest

Because the value of assets hit by the earthquake is deeply depreciated, conflicts of interest between the current and future managers remain. That means that no one has an incentive to acquire them for their future businesses. On the other hand, the existing managers try to pass the damaged assets to the new managers to revive them. These conflicts cannot be removed unless conduits can improve the asset value to the level enough to form an expectation that those assets are profitable.

It is worthwhile to note that “recovering asset value” does not mean the direct improvements of asset value, such as installing new machines, building new factory, etc. Instead, in the case of 3.11 disasters, improvement of business environments, like restoration of infra-structure, special legal arrangements for disposing the assets etc. is classified into “recovering will contribute to “recovering asset value”. To improve the asset directly

### (2) Productive manager

An importance of lessening conflicts of interest is to be remembered, however, it is only a sufficient condition for well-performed asset transformation process. Because if the new manager who takes over the assets are not necessary an able-manager to run firms by using the succeeded assets, then the ultimate purpose to recover the socio-economic foundation will end to failure.

This is perfectly the same situation, in the succession of business, that an incapable manager, such as extravagant son, spoils the parents’ business. Even if damaged assets are restored by conduits in the above sense, that asset does not yield any profit, without any productive decision-makings by the new manager, for example, equipping new facilities or machines, optimizing the human resource allocation, etc. These activities are direct improvement of assets by managers that should be distinguished from the indirect improvements by conduits. In order to complete the asset transformation process, conduits have to allocate the recovered assets to able managers who have an incentive to take over the recovered assets and start new stage of business, which leads the full-seize recovery of devastated area<sup>5</sup>.

## 3 Transferring Damaged Assets into Trusted Asset transformation I

Transfer I is a process that promotes the flow of damaged assets to a trust system,

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<sup>5</sup> It is rational to say that these two requirements, potential assets and able manager, are very general requirements for the health businesses.

which includes some effort to appreciate an economic value of those assets, just as mentioned before. Or, we can say Transfer I is a process that a trust system sorts out the good assets with high potentiality for the prospective businesses from the bad ones.

For simplicity, we here ignore asymmetric information – a situation that arise when the future managers' insufficient knowledge about the damaged assets or their holders interferes with the efficient functioning of asset markets – because our discussions will focus on the physical qualities of the damaged assets. This specifies the special role of conduits, that is, conduits act as physical property improvers, not as information producers within Transfer I<sup>6</sup>.

One way, and alternative way, to describe the effects of damaged assets is to say that they make conflicts of interest between owners of damaged assets and conduits. Because assets that are damaged physically, socially and economically are not profitable, any economic agents, even if those are conduits, would not buy them for their own businesses. This does not align the incentives of current owners with those of others who are competent, because damaged assets' owners have an incentive to dispose that assets or hand over them to other person. Therefore, with setting aside the technical or engineering aspects of recovering damaged assets, the key to change situations is to make two agents (existing owners and conduits) incentive-compatible.

We are now in the place where we can apply the discussions developed by Fukaura(2011), which has formalized the hazards for a smooth succession of business in the contexts of conflicts of interest between old managers and young (prospected) managers.

His discussion can be summarized as follows: typically smooth succession of business is hindered when old manager plans to hand over his business to young manager, the latter (for example son of old manager) denies to do it. This is mainly because costs for starting-up a new business for young manager (= he/she prefers to run his/her own business to succeed parent's business) is expected to be low than the costs to take over the existing businesses. This makes the young manager refuse the succession. On the other hand, if the time preference of old manager is so small, then he considers the succession of business is also beneficial for his son, too. This causes the conflicts of

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<sup>6</sup> Most elementary textbooks teach us that financial intermediaries play an important role as the information producers because of asymmetric information in financial markets. In general, asymmetric information problems cannot be ignored in the confused society, like Japan after 3.11 earthquakes, however, in this paper, we concentrate the other aspect of social confusion that is caused by the physical/geographical damage of social infrastructures. Further, it is safe to say that the situations or circumstance of the devastated region are widely known.

interest between two generations<sup>7</sup>.

In the consideration of reconstruction from the earthquake, owners/managers of damaged assets correspond to old managers and prospective managers who may take over the assets are a counterpart of young managers. The formers try to hand over the damaged assets to the people who use them as the income-earning assets<sup>8</sup>. Accordingly, the two roles of conduits that intermediate two managers is derived from the above.

### 3-1 costs for succeeding the existing business

First, conduits must be structured to minimize the costs for succeeding the existing business, compared to starting-up new business, which include activities like providing information about current assets, collecting information about local market or industries, and so on. More importantly, during the reconstruction-phase, it is very likely that urgent or emergent measures are necessary. This would be a time-consuming and costly process for the damaged asset's owners then he needs someone to help him. To reflect the necessity of such measures to the administration, it is necessary to summarize the requests by the individual managers, with considering the current business environment. Further, transferring the assets needs long legal documents with provisions that restrict and specify certain activities that the related managers concerned can engage in. This role must be greater in the reconstruction phase from natural disasters, because legal legislations that has never been before are required<sup>9</sup>.

Hence, we can say that the smaller role played by individual manager in the reconstruction process leaves a greater and wider role played by conduits. In other words, conduits with high degree of freedom, i.e., huge discretion on decision making, are desirable. Fortunately, a trust system enjoys some preferable features in this point, for example, trustees can discretionally manage/operate the trusted property, trusted property has an independence (trusted property is nobody's property), etc. Section 3 will explore more detail discussions about the usefulness of a trust system as conduits.

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<sup>7</sup> For an in-depth discussion, see Fukaura(2012).

<sup>8</sup> There is a big difference between succession of business and reconstruction. In succession of business, the young managers' decision makings are heavily restricted or bind by the ones of first generation managers. This is because of time lags between two generations' decision makings, that is, very often parent's decisions are given and predetermined when son makes his own decision making. In the case of reconstruction, prospective future managers' decisions are dominant over the damaged asset holders' decision making.

<sup>9</sup> In normal situation, complicated legal arrangements are needed in the successions of business too. But in normal circumstances, managers and lawyer can refer the precedents. As to the reconstruction process from the disaster once every 100 years, no precedents are available.

### 3-2 time preference of current managers

Second role of conduits is to keep the time preference of current manager low. When the time preference, representing the effects of “impatience”, is low, the lighter future utility is discounted. This means current managers have a tendency to attach more importance to “future” than “present”, therefore, in successions of business, such managers try to find an opportunity to hand over the businesses in order not to terminate them. By analogy, we can regard that his time preference is low (high), if the current manager considers keeping his business (to go out of business) after 3.11 disasters.

Needless to say, keeping the business after 3.11 is the most powerful driving force for the reconstruction of the socio-economic structure from the earthquake, although some current managers would be replaced with new ones. Namely, people's minds should be social and future-oriented, that is to say, the time preference of current managers should be kept low during the reconstruction process.

It is rational here to summarize the foregoing discussions that show some important requirements that help Transfer I more effective. Conduit, an entity to intermediate existing managers and future managers, should eliminate the costs paid by the prospective managers for succeeding the damaged assets, with keeping the time preference of the current manager low. The first task pave the way on which the future managers start the activities to revive businesses and the second task provides the canvas on which the current managers draw the picture of future image of the businesses.

In the context of the trust-system, assets in bad shape are trusted to conduits (trustees) and the damaged assets sorted out by conduits *transmogrify* it to the trusted assets. Damaged assets has no potential for the productive activities, on the other hand, trusted assets has the potential that is not cultivated yet. In the later section, we will more closely discuss the useful and desirable features of “trust” to pursue the above strategies.

## 4 Transferring Trusted Assets into Recovered Assets: Transfer II

In short, Transfer I is the remedy process that removes the technical and social hazards that keep away the prospective new managers from entering the reconstruction businesses. However, this does not guarantee the person who shows some appetites to take over the damaged assets is an able manager or not. Because this study is considering the reconstruction scheme by recovering the damaged assets' economical

potentiality, we can say the transfer of assets is successful only if the transferred assets are managed with equal efficiency at least or more efficiently if possible. The reason is clear and simple: trusted assets need a high management skill to realize its productive potential. Without such a skill, nobody can recover the value of assets and make profits. In this sense, Transfer II completes the transferring process.

Prior to develop the formal model to describe this point, take a soccer game for instance. In the close game, some members are changed at the last phase of the game, by replacing tired players with new players (for example, during the last 10 minutes of second half). This is the important tactics to maintain the team-power. However, to maintain the team-power as before, an alternative player should be able player at least as the former player. If not, member-change does not contribute to win the game.

Similar problem arises in the reconstruction scheme from the earthquake – managers of damaged assets and managers of recovered assets. Suppose that existing manager is an excellent entrepreneur, however, cannot run firms because he was heavily injured by the earthquake. However, if his son who takes over a firm would not have an enough incentive to be a good manager like his father or be incompetent, his business would go into bankruptcy, even though the company's facilities are not damaged. That is, new manager should be capable manager like old manager, or be more capable one, because new manager must face with the social environment that might be more severe after the disaster. On the contrary, only if corporations that were managed by a good manager was transferred to another excellent manager, such succession of business would contribute to improve an efficiency and to revive the devastated area. In what follows, we state the formal model to describe this story.

#### 4-1 succession of business and labor productivity

Our analytical framework is summarized as follows; we can regard the succession of businesses as a kind of human resource management. That is, a firm can replace some workers during the working hours or production period. In the succession of business, during the lifetime of firms, the managers are replaced. Of course, managers are not identical to workers, however, both managers and workers belong to the category of human resource. Thus, if we construct a theoretical and microeconomic model for analyzing the workforce management, we can expect to derive some interesting implications that contribute to understand the succession of business.

○strategy I; Benchmark strategy

Here,



$$Y = f(L) \quad \dots (1)$$

is the well-behaved production function of the existing firm, where  $L$  is labor input and  $Y$  is output produced. As Figure 2 illustrates, which shows the production function, indicates when  $L_{\max}$  is employed then  $Y_{\max}$  is produced, for example. At  $(L_{\max}, Y_{\max})$ , total wage bill is

$$W_1 = f'(L_{\max})L_{\max} \quad \dots (2)$$

and firm's profit is

$$\pi_1 = pY_{\max} - f'(L_{\max})L_{\max}^{10} \quad \dots (3)$$

○strategy II ; separating workers (identical production function)

Now, suppose firm lays off a part of workers whose marginal productivity is relatively small and replaces them with newly hired workers – total employment is constant. Then workers  $(L_{\max} - L_F)$ , whose marginal productivities are low, experience the lay-off and remaining workers  $L_F$  produce  $Y_F$ .

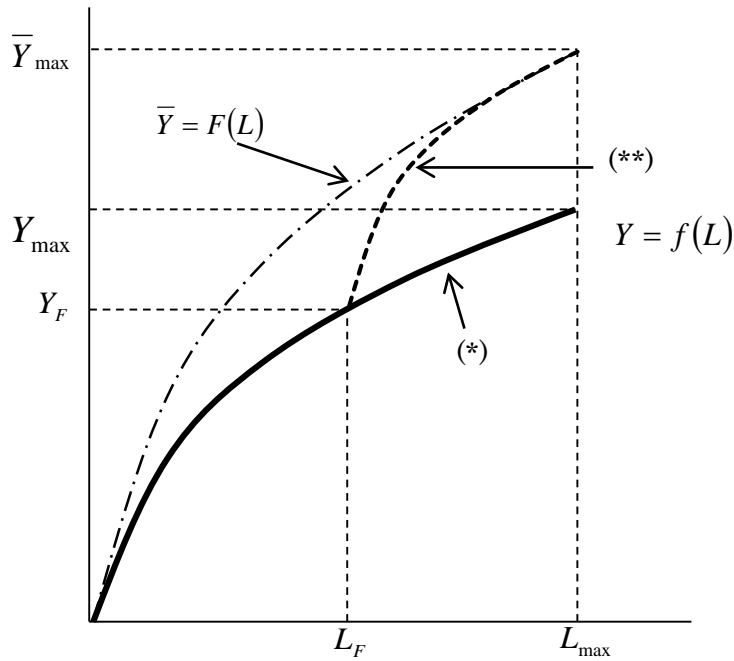


Figure 2

This kind of replacement of workers, i.e., substituting workers with high productivity for workers with low-productivity, looks like profitable if new workers' production,

$$Y_n = f(L_{\max} - L_F) \quad \dots(4)$$

is equal to the contribution lost by laid-off workers. This can be attained when new

<sup>10</sup> Here we assume the labor and goods markets are competitive. Then wage is determined by the workers' marginal productivity.

workers have the same production function as the unemployed workers, that is, in Figure 2, the new workers' production function have the identical shape as the second part of the original one starting from  $(L_F, Y_F)$  as shown by (\*). Now, firm can produce  $Y_F$  by existing workers and  $Y_{\max} - Y_F$  by newly hired workers. Because total production is still  $Y_{\max}$  then firm's revenue is constant.

However, total wage bill is given by

$$W_2 = f'(L_F)L_F + f'(L_{\max})(L_{\max} - L_F) \quad \dots(5)$$

This means firm's profit is decreased by

$$W_2 - W_1 = L_f (f'(L_f) - f'(L_{\max})). \quad \dots(6)$$

This is because that this firm is operating the deal wage systems, the one is applied to the existing workers whose wage is determined by  $f'(L_F)$  and the other is wage scheme for new employed workers with  $f'(L_{\max})$ . Decreasing of revenue is natural result from higher wages for new workers, with holding the total production constant.

Therefore, we can safely state that this kind of substitution of workers where unskilled workers are replaced by other workers whose productivity is same, is not desirable<sup>11</sup>.

○strategy III ; separating workers (improved production function)

On the contrary, if firm can find workers whose marginal productivity is higher than fired worker  $(L_{\max} - L_F)$ , such a replacement is surely profitable for firm. For example, suppose newly employed workers' marginal productivity is identical to the first part of existing workers' ones, that is, firm employs new workers of  $L_{\max} - L_F$ , and their production functions, notated by (\*\*), are identical to the first part of original one which start from the origin. As illustrated by dotted line, existing workers' production function is *reproduced* from  $(L_F, Y_F)$ . In another way to say this, the production activities that corresponds to the region from the origin to  $(L_F, Y_F)$  is repeated, first by existing workers and later by new employed workers. Here, total output reaches

$\bar{Y}_{\max} (= Y_F \times 2)$ , which is beyond  $Y_{\max}$ , hence,

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<sup>11</sup> It is likely that a firm considers it can reduce the wage bill by replacing some full-timers who engaged in the simple-routine works with part-timers whose wages are low. However, facing with the change of employment strategy, full-timers with high skill may demand a rise in wages. Under the dual wage standards, workers can easily compare their own wages with others. Then workers who have high, firm-specific skills may pursue the more aggressive wage negotiations.

$$W_3 = f'(L_F)L_F + f'(L_{\max} - L_F)(L_{\max} - L_F) \quad \dots(7)$$

gives the total wage bill.

For simplicity, assume  $L_{\max} = 2L_F$ . Total wage bill and profit can be rewritten as

$$W_3 = f'(L_F)L_F + f'(L_F)L_F = 2f'(L_F)L_F \quad \dots(11)$$

$$\pi_3 = 2Y_F - 2f'(L_F)L_F = 2\{Y_F - f'(L_F)L_F\} \quad \dots(12)$$

We know  $\pi_1 = Y_{\max} - f'(L_{\max})L_{\max} = Y_{\max} - 2f'(2L_F)L_F$  from the former discussion,

$$\text{thus, } \bar{Y}_{\max} - Y_{\max} > 2\{f'(L_F) - f'(2L_F)\} \quad \dots(13)$$

should be kept for  $\pi_1 < \pi_3$ , which means this replacement of workers is worthwhile for firms. An important point to recognize is that an increment of wage bill resulted from this rearrangement of workers should be covered by an increment of revenue. In short, two different types of workers are employed simultaneously, that is, the manager should take into account of the difference of shape of each worker's production function, which determines the profitableness for firms.

This is our first finding that can be explained intuitively as follows. Under the normal situation with well-behaved production function, worker's marginal productivity would be decreasing. Here consider the following working-hour management that half of workers work from 9:00am to 1:00pm and another half works from 1:00pm to 5:00pm. If all workers have the same productivity, this system can guarantee the replication of production function from  $(L_F, Y_F)$ , shown in Figure 2.

Therefore, it is very easy to say, in order to pursue this employment strategy (separating workers strategy), that firms need to keep the productivities of both groups of workers same level. However, this is not easy task for the managers, because, in many cases, such a separation of workers is applied by replacing full timers with part-timers, whose productivities are generally low. Further, under this strategy, total wage bills are simply calculated by "wage rate per hour  $\times$  working hours", then if working hours are same, each workers' income may be decreased. To examine these points in detail, see Figure 2 again.

○strategy IV ; united workers (improved production function)

$\bar{Y}_{\max}$  indicates the maximum production when two types of workers are employed simultaneously and both groups' production functions are identical, i.e.,  $Y = f(L)$ . Here we can assume a hypothetical production function,  $\bar{Y} = F(L)$ , which achieves  $\bar{Y}_{\max}$

without separating the workers. At a glance, we recognize  $\bar{Y} = F(L)$  is obtained by multiplying  $Y = f(L)$  by  $\frac{\bar{Y}_{\max}}{Y_{\max}} (>1)$ , just like the shift of production function by the technological progress. Let us consider the case when a firm employs  $L_{\max}$  whose productivity is  $\bar{Y} = F(L)$ . This corresponds to the new employment strategy that a firm can do its business under  $\bar{Y} = F(L)$  without separating workers. Now we know total wage bill and firm's profit are given by

$$\begin{aligned}\bar{W} &= F'(L_{\max})L_{\max} = \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max} \\ \bar{\pi} &= \bar{Y}_{\max} - \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max}\end{aligned}\quad \dots(14)$$

By mentioning the former discussions, we know,

$$\begin{aligned}\bar{\pi} - \pi_1 &= \bar{Y}_{\max} - \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max} - Y_{\max} + f'(L_{\max})L_{\max} \\ &= Y_{\max} \left( \frac{\bar{Y}_{\max}}{Y_{\max}} \right) - Y_{\max} + f'(L_{\max})L_{\max} \left( 1 - \frac{\bar{Y}_{\max}}{Y_{\max}} \right) \\ &= (Y_{\max} - f'(L_{\max})L_{\max}) \left( \frac{\bar{Y}_{\max}}{Y_{\max}} - 1 \right)\end{aligned}\quad \dots(15),$$

which shows firm's profit is increased proportionally with the shift of its production function. At the same time, total wage bill is also increased because the marginal productivity is increased. Thus we can say this shift of production function is desirable both for a firm and workers.

Next, let us compare (14) with (11) and (12). For simplicity, we use  $f' = w$ ,  $f' = w + \frac{C_0}{L}$  and  $L_{\max} = 2L_F$ <sup>12</sup>. Then we have

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<sup>12</sup> Original production function is given by  $Y = f(LN)$ , where  $L$  is working hours and  $N$  is number of worker. Total wage bill is  $W = (C_0 + wL)N$ , where  $C_0$  is fixed cost per workers and  $w$  is wage rate per hour. Then firm's profit  $\pi$  is  $\pi = pY - W = pf(LN) - (C_0 + wL)N$ . From here, we can get first order conditions for optimization as  $f' = w$  and  $f' = w + \frac{C_0}{L}$ .

$$\begin{aligned}
\bar{W} - W_3 &= \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max} - 2f'(L_F)L_F \\
&= \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max} - 2\left(f'(L_{\max}) - \frac{C_0}{L_F}\right)L_F \\
&= f'(L_{\max})\left[\frac{\bar{Y}_{\max}}{Y_{\max}}L_{\max} - 2L_F\right] + 2C_0 = f'(L_{\max})2L_F\left[\frac{\bar{Y}_{\max}}{Y_{\max}} - 1\right] + 2C_0 > 0
\end{aligned}
\tag{16}$$

If and only if  $\frac{\bar{Y}_{\max}}{Y_{\max}} > 1$ , (16) is positive so total wage bill is increased<sup>13</sup>.

On the other hand, comparing firm's profit by (12) to (19), with remembering

$\bar{Y}_{\max} = 2Y_F$  and  $L_{\max} = 2L_F$ , yields

$$\begin{aligned}
\bar{\pi} - \pi_3 &= \bar{Y}_{\max} - \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_{\max} - 2\{Y_F - f'(L_F)L_F\} \\
&= 2f'(L_F)L_F - 2\frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})L_F = 2L_F\left(f'(L_F) - \frac{\bar{Y}_{\max}}{Y_{\max}} f'(L_{\max})\right)
\end{aligned}
\tag{17}$$

The sign of (17) is positive if

$$f'(L_F) > \alpha f'(L_{\max}), \text{ where } \alpha = \frac{\bar{Y}_{\max}}{Y_{\max}}, \text{ vice versa, } \dots(18).$$

If  $\alpha = 1$ , (18) is always positive under the well behaved production function. The right-hand side shows the unit labor cost when the damaged assets are reconstructed and full employment is regained. The left-hand side represents the unit labor cost before the reconstruction program starts where only  $L_F$  is employed. Hence, (18) shows that firm's profit is increased if a firm can keep its unit labor cost lower than the former wage level, in other words, (18) determines the upper limit of wage per worker at  $L_{\max}$  when the recovery is completed.

This conclusion is straightforward because our model assumes implicitly the price is constant or one<sup>14</sup>. Therefore, technological growth brings the increase in unit wage

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<sup>13</sup> The following discussions do not change essentially even if we apply more general definition as  $L_{\max} = \alpha L_F$  ( $\alpha > 1$ ).

<sup>14</sup> Alternatively speaking, we do not consider the change of price. Needless to say this simplification does not mean that we may able to ignore the movement of price of goods. However, when the economy of the damaged regions is going through a highly tough situation after the earthquake, it is not irrational to assume that strong deflationary

and the decrease in profit when a firm employs the same number of workers and faces with the same price of goods. If the prices of goods produced under a new production function are appreciated after the reconstruction activities, firm's profit will be increased as well. Following table and Figure 3 is summarizing the discussions.

Strategy	Profit	Wage bill	Resulted point
I; Benchmark strategy	$\pi_1$	$W_1$	$E_0$
II ; separating workers ( identical $f$ )	$\pi_2 < \pi_1$	$W_2 > W_1$	$E_0$
III; separating workers (improved $f$ )	$\pi_3 > \pi_1$	$W_3 > W_1$	$E_2$
IV; united workers (improved $f$ )	$\bar{\pi} > \pi_1$	$\bar{W} > W_1$	
	$\bar{\pi} \geq \pi_3$	$\bar{W} > W_3$	

#### 4-2 model's implications for Transfer II

Above discussion is, needless to say, the framework to analyze the succession of business. However, we are sure that this model is highly applicable when we consider the way to channel the damaged assets from existing managers to prospective managers.

Assets transferred to conduits are generally damaged by the earthquake. Suppose the performance before the earthquake is  $(L_{\max}, Y_{\max})$  and  $(L_F, Y_F)$  after the disaster. Here, notice conduits accept asset at  $(L_F, Y_F)$ , which jeopardizes the regional economy by creating unemployment of  $L_{\max} - L_F$  and loss of products of  $Y_{\max} - Y_F$ . By referring Table and Figure 3, we can categorize the reconstruction scheme into three types.

○ simple reconstruction scheme(strategy II)

This scheme corresponds to the strategy II in above Table, in which the situation before the earthquake is simply reproduced ((II) in Figure 3). To put it concretely, lost resources, including physical assets and human assets, have to be restored, identically with the former circumstance. Hence, this strategy determines the minimum level any reconstruction program should accomplish<sup>15</sup>.

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pressures exist.

<sup>15</sup> If the economy locates at  $E_n$ , the economy is not recovered because  $E_n < Y_F$ . However, we cannot evaluate the outcome of the reconstruction scheme if  $E_M$  results, because  $E_M < Y_{\max}$ .

It is not unreasonable to say the economy at  $E_0$  is a recovered economy, however, if we take into account of years consumed for recover-process, which normally takes long years, even if  $E_0$  is attained, economic growth that would have been obtained during these years cannot be recovered. If we consider these sunk costs, next two schemes are more desirable. However, because this brings the decrease in firms' profit as shown before ( $\pi_2 < \pi_1$ ) in the short run, this option is not accepted by firms. In the damaged economy or region, this might strongly discourage entrepreneurs from engaging in such an industrial restructuring.

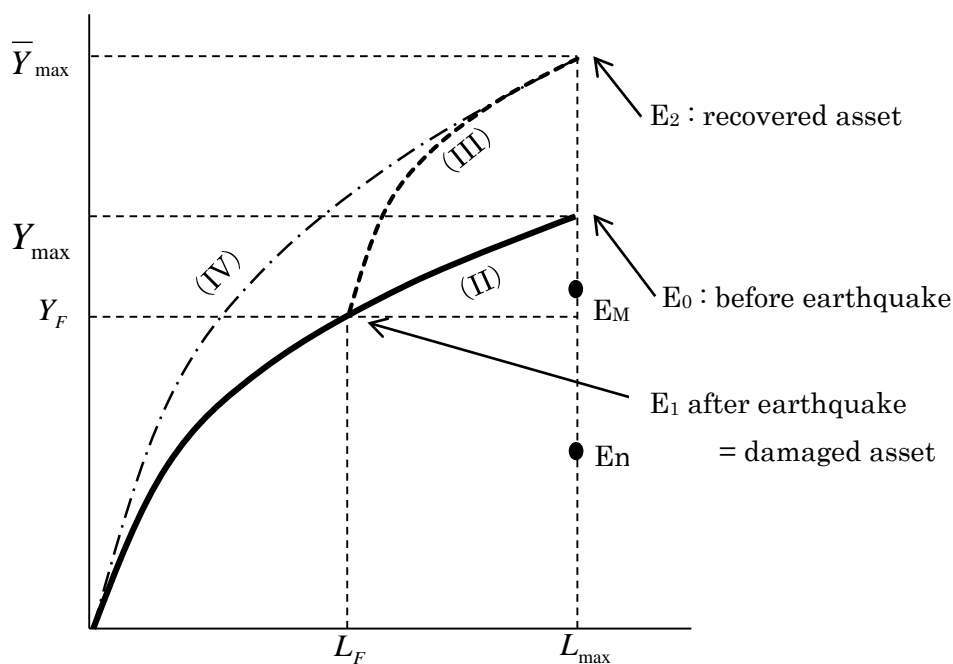


Figure 3

- reconstruction scheme with improved productivity(strategy III)

This scheme corresponds to the strategy III in above Table, in which the resulted economy would be beyond  $Y_{\max}$ <sup>16</sup> ((III) in Figure 3) To put it concretely, new production processes should be established and they employ the second part of labor force  $L_{\max} - L_F$ , on the other hand, survived firms keep their employment  $L_F$  and follow an old technology then full employment is achieved. However, notice a technology level of  $L_{\max} - L_F$  must be improved as shown by dotted line in Figure 2. This corresponds to the theoretical expression that the identical production function is reproduced from  $E_1$ .

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Only when the economy is at  $Y_{\max}$  or over, the reconstruction program is to be successful.

<sup>16</sup> Intuitively, we may say sunk costs mentioned above are recovered, although this statement is contradictory to the definition of sunk costs.

Firm's profit is increased as derived before.

Here we have some interesting implications. Very often, after the economic framework is badly damaged by some reasons such as 3.11 disasters, it is described that it is a heaven-sent opportunity for upgrading the industrial structure, by establishing a cutting-edge industries. Because, normally, new industries are supposed to coexist with survived old industries, this is equal to emphasis that a part of work force is employed by the existing firms and remaining part of workers gets their jobs at the new industries. Needless to say, intensive training programs must be provided to the workers in new industries.

○ reconstruction scheme with integrated work force(strategy IV)

This scheme corresponds to the strategy IV in above Table, in which the resulted economy reaches to  $\bar{Y}_{\max}$  ((IV) in Figure 3 and full employment is secured at  $L_{\max}$ .

Critical difference from strategy III is that this strategy needs to an overall improvement of the regional production function. In strategy III, technological progress occurs only in new industries. Conversely, in strategy IV, productivity increases must appear all over the economy, which means the region-wide vocational training programs are to be organized.

In the earlier section, we explored a discussion about the short-run effects posed by technological progress. It brings a decline in profit, but workers are fully employed and the price level is kept constant. Here we have to confront a trade-off; the more emergent victim's life rebuilding is, the higher priority is given to providing the employment opportunities, which costs firms the loss of profitability. However, we can expect some long-run effects as well. If a firm successfully installs new technologies and allocates trained workers on it, the value-added goods are produced and supplied to the market. Such goods will be highly evaluated in the marketplace, which lead the increase in firms' profit in future<sup>17</sup>.

## 5 Trust system and Reconstruction Process

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<sup>17</sup> In this sense, technological progress we discussed here can be interpreted as a process of structural change. Damages due to natural disasters make clear what vulnerability to the natural disasters the damaged regions have. Then in many cases, some reconstruction programs include not only simple restorations but also a huge-scale economic restructuring process.



## 5-1 Two types of asset transformation

Up to this point, we have investigated a mechanism of the succession of business by generalizing it as the transformation mechanism of assets between different economic agents. This last section presents some proposals to establish the effective reconstruction scheme after the 3.11 disasters, by mentioning several implications derived from above considerations. Especially, understanding the role of trust system as a conduit will occupy us in this section.

Let's start by looking at what our discussion has found so far. Although we have derived many results which are closely related with each other, the most important ones are twofold.

The first point is that the rate of time preference of existing managers (managers of damaged assets) should be low. In other words, to encourage an asset transformation, owners of damaged assets should not be myopic, instead should have long-term view. However, as we can easily imagine, it is very plausible that the managers of damaged assets, who is likely to be victims of the disasters, is rather short-sighted because they might be deeply obsessed with finding a way of going through daily life. Here we have to ask how trust system can overcome these hardships and what an essential attribute of trust system for this point is.

The point we emphasis next is that conduits should have the ability (1) to consolidate economic resources that have scattered and lost due to the disasters and (2) to introduce the technical improvement which perfectly fits the trusted assets' characteristics. Because this requirement will guarantee the economy will follow the pass labeled (IV). Please note here the first point is crucial for Transfer I and second for Transfer II, both of which needs to complete the whole reconstruction process. Especially, second requirement works as catalyst which sublimes a simple reconstruction (strategy II) to a reconstruction with technological progress (strategy IV).

## 5-2 Some advantages of financial intermediaries

As to the above two implications, trust system have the following advantages. To understand how trust system works, we start by confirming our theoretical foundation. Our discussion was originated by two primary concerns. The first one relates that scheme of the reconstruction programs has a common feature with the succession of business, and the second one is to consider the latter can be systematically analyzed by regarding as asset transformation between two parties.

Just like basic textbooks tells, the process of asset transformation is carried out by

so-called financial intermediaries, then we have to check a list of them and find the preferable financial intermediary for the purpose of transforming very particular assets, a damaged business assets by the earthquake, with taking into account some economic factors that are very specific to the 3.11 disasters.

Here the factors we have to remind are; (1) time preference of existing managers (owners of damaged assets) might be high because they have to secure their normal lives immediately, in other words, their perspectives tend to be short-sighted. (2) Of course, this is not be blamed, however, we should consider the special environment after the catastrophe, where, for example, socio-economic infrastructures, including both hard and soft ones, are in horribly bad shape, labor forces flowed out, etc.. This means a competitiveness of the region cannot be supplemented by only simple returning to the prior state. Hence, the damaged region should attain the long term technological growth which is enough to compete with other areas.

In short, the first point reflects the short term aspect of reconstruction scheme and the second describes the long term aspect. We can emphasis financial intermediaries are very suitable to manage above factors as conduits, on two fronts as reasoned just after.

○time preference and expertise of financial intermediaries

The first task of conduits in reconstruction program is to channel damaged assets from the individuals with high time preference to those whose time preference is relatively low. What this really means is to find the entrepreneur who can regard damaged assets as inputs for the worthwhile investment projects that are likely to reach their full potential.

The financial intermediary is generally an expertise to find such an individual or institution who is not risk averse (their attitudes toward risks are relatively aggressive), and to find productive investment opportunities by evaluating and screening inherent risks in the projects. In addition, very often, they are so prominent about legal matters that they excel in the negotiation technique against local authority which conducts some regulations over devastated area. It is an expected role of financial intermediary that encourages the local authority to plan a policy package that allows the individuals in the area to benefit from engaging in setting up new businesses by using damaged assets.

○technological growth and economies of scope/scale

As seen in the early discussion, it is natural to suppose an economic potentiality (productivity) of damaged area is deadly deteriorated by the earthquake. Such deteriorations include not only physical ones, but also damages caused by harmful

rumors or misinformation. Especially, the latter are hard to be denied immediately (sunk costs). Therefore, in order to regain competitiveness against other regions, an upward shift of local production function, i.e., technological growth, is necessary.

This means the reconstruction program should not be a “get-rich-quick, in fact, in ordinary cases, the technological progress is caused from consolidating, exchanging and proliferating existing knowledge. However, it is also undeniable that the situation is urgent for people in the hit area. In such an emergent situation, a kind of “information center” is needed, which works as the hub that collects, selects and passes useful information to regional society. Financial intermediaries are one of the most preferable institutions for this purpose. This makes sense if we focus on two special advantageous features the financial intermediaries have, i.e., economies of scope and scale.

As introductory textbook describes, arranging useful information becomes more efficient as the amount and type of information increase because information causes externality (information externality). Further, after information is shared by the society, another externality (network externality) strengthens the usefulness of information, knowledge and provides seeds of new technology.

The presence of economies of scope in financial intermediaries enables them to collect many kinds of information at once with low costs (especially, fixed costs) due to economies of scale. They can provide a kind of “forum” where locals can access useful information and knowledge. It is no arguable that such information reshuffling is the decisive factor for innovation and technological progress. A point is, without any help of financial intermediaries, scientific knowledge spreads spontaneously in long run. However, in the case of emergency, the role of financial intermediaries as an information hub is indispensable<sup>18</sup>.

### 5-3 venture capital vs. trust system

With taking into account these points we can find two candidates as conduits and information hubs; venture capitals and trust system. In this section, we examine the pros and cons of two kinds of intermediaries in turn.

#### ○venture capital

With disregarding realistic aspects, a venture capital is the one which suits these situations. Venture capital assembles money provided by its partners and makes investment to budding entrepreneurs.

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<sup>18</sup> If we are allowed to compare the devastated region's economy to the developing countries' one, it is easy to understand the primary importance of indirect finance, in which financial intermediaries play great role.

The advantage of venture capital is its “closeness”, the fact that partners’ shares are not marketable ones and all shares are traded over the counter. Then, without being partners, investors cannot free ride on venture capital’s activities<sup>19</sup>. This enables investors to acquire the full benefits of investment, which makes their time preference keep low.

On the other hand, venture capital acts as pure agent of investors. It might assess the possibility that investors would be rewarded in future, but it doesn't necessarily to commit to manage budding business. Only when someone in venture capital takes a seat at the board of managing directors at the business, it can directly propose to install some cutting edge technology or make investment in which the fruits would be realized in far future. Therefore, it is whether venture capital can be a driving force for technological progress depends on the preferences of partners, i.e., if most of partners are short-sighted, it cannot.

Anyway, it is safe to say that a characteristics of venture capital works as a mechanism to ensure low time preference in Transfer I, although it also brings the technological growth if it is lucky.

#### ○trust system

Trust system has, on the other hand, some desirable attributes when we pay our attention to the long-run role that conduits should play. As mentioned earlier, principal parallels between reconstruction schemes and the business succession is starting point of this study. The reason why trust system is suitable for the business succession is because it can design forms of trust contracts in order to control existing businesses (=trusted assets)<sup>20</sup>. For example, under the trust act in Japan, several kind of trust systems have been legalized, including declaration of trust(=*Jiko-shintaku*) , business trust(=*Jigyō-shintaku*), individual pension trust (= *Kojin-nenin-shintaku*), testamentary trust(=*Igon-shintaku*), and so on. Such the wide menus of trust system illustrate the flexibility of design and applicability to different situations eloquently.

By the way, recruiting innovative entrepreneurs is crucial for successful reconstruction program, however, innovative entrepreneurs are not necessarily the persons who are interested in persuading a short term gains from damaged assets. This

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<sup>19</sup> If shares are tradable and priced at the market, outsiders can get useful information about productive investment opportunities just by watching the prices of shares, i.e., highly priced shares mean that venture capital’s investment is successful.

<sup>20</sup> For example, by structuring divine trusts, incumbent manager can select his grandson as the successor who takes over the business, not his son who is direct legal heir. Or it is possible for existing manager to transfer equity claims on the income and assets of a business to his elder son, with entitling his younger son to control and manage a business.

leads us to recognize an importance of separation between equity claims on the income and assets of a business and claims for controlling a business. And the persons with technology-oriented mind are desirable as the latter.

In summary, as shown in Figure 4, both of venture capitals and trust system are powerful candidates for reconstruction scheme, while both have some shortages. Can we find the best scheme by combining preferable features of both?

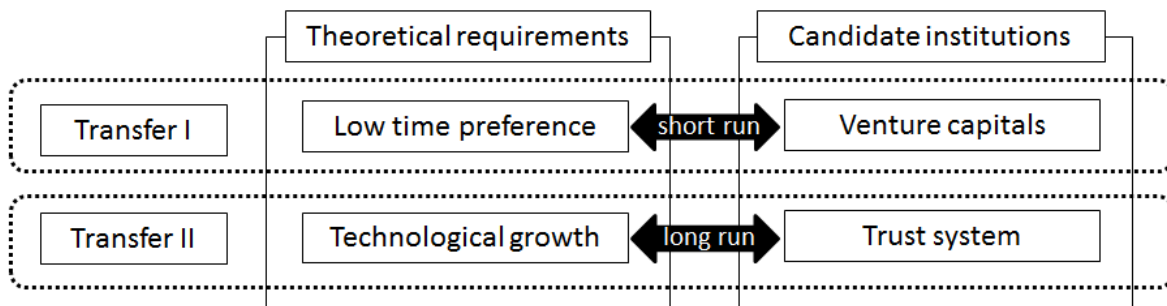


Figure 4

#### 5-4 some proposals

To accomplish Transfer I and II, to satisfy two requirements and to capture each advantages of venture capitals and trust system, 金融機関としての優位性

Reconstruction = risky projects = verification needed

Reconstruction = a kind of social reform ( not for returning back to status quo)= growth

21

## 6 Summary and concluding remarks

This paper has been discussing the availability of trust system as an effective reconstruction programs. Especially, we have paid much attention to the reality where restoration and reconstruction of small and medium enterprises in desparately needed.

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<sup>21</sup> Our discussion may be regarded as advocating the "market-oriented reconstruction programs". It may be true.

In comparing reconstruction scheme for small and medium size companies in damaged regions with the succession of business scheme, we can find some commonalities.

First, it is necessary to raise money revive corporations. So, investors like venture capitals is needed. Second aspect to be considered is that the reconstruction program aims not to restore a status quo, but to make some technological progress. This is because, without any improvement of productivity, it is impossible to keep competitiveness against competitors in the region far from stricken areas. These implications are derived from the result of analyzing the structure of the succession of business.

Trust system is effective as the scheme that meets these two requirements. The reason is trust contracts can be freely designed according to the situation over the trust properties. Moreover, the comparative advantages as financial intermediaries are also supportive. Especially, the last point clarifies the difference with the revival plan that an administrative organization takes the initiative.