# Mechanisms behind the Occurrence of Long-Term Unemployment and the Problems It Causes: A Theoretical Investigation

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This paper is mainly concerned with surveying theoretical literature on the mechanisms behind the occurrence of long-term unemployment and the problems caused by long-term unemployment. Factors behind increases in the incidence of long-term unemployment may be broadly divided into a decrease in the exit probability from unemployment of average duration, and an increase in the negative unemployment duration dependency of the exit probability. A decrease in the exit probability from unemployment of average duration is mostly caused by the same factors as a general increase in unemployment. On the other hand, there are various hypotheses concerning factors that cause the negative duration dependency of the exit probability. For example, (i) the screening hypothesis, whereby the exit probability of long-term unemployed decreases because unemployment duration is used as information showing the ability of workers as a method of recruitment screening, when there are heterogeneities among jobseekers; (ii) the ranking rule hypothesis, whereby the exit probability of long-term unemployed decreases because jobseekers with the shortest unemployment duration are chosen when there are no heterogeneities among jobseekers but there are multiple job applications for a job opening; (iii) the hypothesis that a negative duration dependency arises in the exit probability because workers' skills and willingness to work decrease during unemployment; and (iv) the hypothesis that the exit probability of long-term unemployed decreases because companies discriminate against long-term unemployed even if some unemployed workers invest financially in maintaining their skills. It has also been pointed out that long-term unemployment is prone to occur because the loss of skills due to unemployment is particularly pronounced at times when structural changes occur in the economy. Problems caused by long-term unemployment include the fact that increases in long-term unemployment cause wages to rise, make unemployment more persistent, and widen income disparity, and the fact that long-term unemployment significantly reduces the happiness level of the unemployed.

## I. Introduction

In this paper, mechanisms behind the occurrence of long-term unemployment and problems associated with long-term unemployment will be investigated.

There has been increasing concern over long-term unemployment among OECD countries in recent years. Behind this lies the fact that long-term unemployment is increasing in OECD countries, in the wake of a delayed economy recovery following the Lehman shock. A particularly big problem is the prolongation of unemployment, mainly in southern European countries that fell into serious economic difficulties as a result of the Euro crisis (OECD 2012). In the USA, meanwhile, there is major concern over the worst increase in

long-term unemployed since the war (Krueger, Cramer, and Cho 2014; Kroft, Lange, and Notowidigdo 2013). In the past, there was high fluidity in labor markets, and although unemployment rates were high, they mainly concerned the short-term unemployed; the problem of long-term unemployment was not particularly highlighted. The pronounced increase in long-term unemployed during the current economic downturn could indicate some kind of structural change in labor markets. In Japan, the unemployment rate is low but the proportion of long-term unemployed is no lower than in other countries. A particular characteristic here is the high incidence of long-term unemployment for youth.

Long-term unemployment is a very serious problem for the individual concerned. For society, too, the fact that human resources go unused for a long time is a major loss. It will be extremely important to clarify the mechanisms behind the occurrence of long-term unemployment and to devise appropriate policies. Long-term unemployment causes various problems. In particular, the fact that increases in long-term unemployment are transforming unemployment into a persistent phenomenon and widening income disparity is a serious problem in terms of the efficiency and fairness of society. So what sort of problems are caused by long-term unemployment?

The composition of this paper is as follows. Firstly, trends in long-term unemployment in OECD countries will be surveyed in the next section. In section III, based on the theoretical framework of duration analysis, the relationship between the long-term unemployment ratio and unemployment exit probability will be formularized, along with the concept of the unemployment duration dependency of exit probability. In section IV, recent theoretical research on mechanisms behind the occurrence of long-term unemployment will be surveyed. In section V, problems caused by long-term unemployment will be enumerated. And the final section will be a summary.

## II. Trends in Long-Term Unemployment

"Long-term unemployment" normally refers to unemployment with a duration of at least six months or at least one year. This unemployment duration may be the "completed spell of unemployment" at the point when the state of unemployment ends, or the "incomplete spell of unemployment" at a point when there has been no exit from the state of unemployment, as surveyed by Labour Force Surveys and others. As data on the former are often difficult to obtain, the latter unemployment duration will be used. So unless stated otherwise, data on unemployment duration in this paper refer to the incomplete spell of unemployment.

The incidence of long-term unemployment in OECD countries is high in Europe and Japan but low in North America and Scandinavia (Table 1). In Europe, it is particularly high in southern countries like Greece, Spain, Portugal and Italy. The incidence of long-term unemployment is generally high in countries with a high unemployment rate. On the other hand, there are also countries like Japan and Germany where the incidence of long-term

Table 1. Incidence of Long-Term Unemployment[a] and Unemployment Rates in Major OECD Countries (2013)

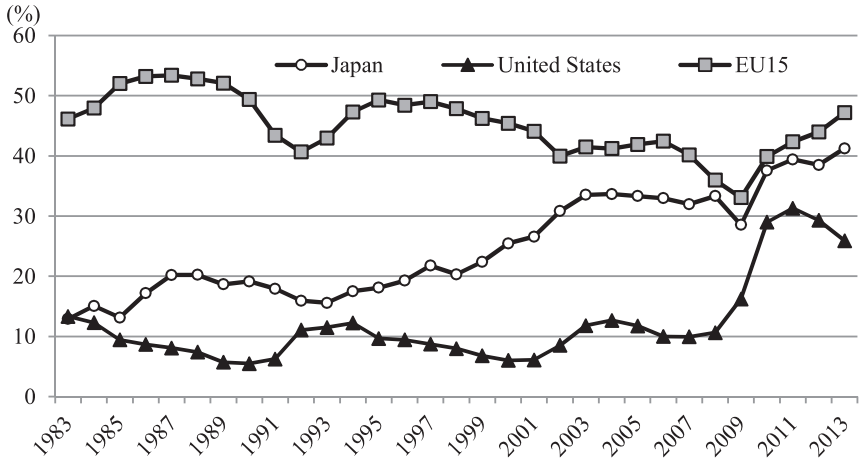
(%)

| | Total | | | Males | | | Females | | |
|---|---|---|---|---|---|---|---|---|---|
| | Incidence of long-term unemployment | | Unemployment rate | Incidence of long-term unemployment | | Unemployment rate | Incidence of long-term unemployment | | Unemployment rate |
| | 6 months + | 1 year + | | 6 months + | 1 year + | | 6 months + | 1 year + | |
| Japan | 56.0 | 41.2 | 4.1 | 63.9 | 48.7 | 4.3 | 43.4 | 29.3 | 3.7 |
| United States | 37.6 | 25.9 | 7.4 | 38.1 | 26.4 | 7.6 | 37.0 | 25.3 | 7.1 |
| EU15[b] | 63.8 | 47.2 | 11.0 | 64.3 | 47.6 | 11.0 | 63.3 | 46.7 | 10.9 |
| Australia | 34.2 | 19.2 | 5.7 | 35.3 | 20.1 | 5.7 | 33.0 | 18.1 | 5.6 |
| Austria | 43.4 | 24.3 | 4.9 | 43.4 | 25.4 | 4.9 | 43.3 | 23.2 | 4.9 |
| Belgium | 63.8 | 46.0 | 8.4 | 64.5 | 46.5 | 8.6 | 62.9 | 45.4 | 8.2 |
| Canada | 22.3 | 12.7 | 7.1 | 22.5 | 12.9 | 7.5 | 22.1 | 12.5 | 6.6 |
| Denmark | 41.9 | 25.5 | 7.0 | 39.4 | 23.5 | 6.7 | 44.5 | 27.5 | 7.3 |
| Finland | 36.0 | 21.2 | 8.2 | 39.8 | 23.6 | 8.7 | 31.3 | 18.1 | 7.6 |
| France | 59.4 | 40.4 | 9.9 | 60.1 | 40.8 | 10.0 | 58.7 | 39.9 | 9.8 |
| Germany | 60.3 | 44.7 | 5.3 | 60.9 | 45.4 | 5.6 | 59.4 | 43.8 | 4.9 |
| Greece | 81.1 | 67.5 | 27.3 | 80.7 | 66.4 | 24.3 | 81.4 | 68.6 | 31.3 |
| Ireland | 74.9 | 60.6 | 13.8 | 79.5 | 67.2 | 15.8 | 67.0 | 49.3 | 11.4 |
| Italy | 71.4 | 56.9 | 12.2 | 72.0 | 56.8 | 11.5 | 70.7 | 57.1 | 13.1 |
| Luxembourg | 48.8 | 30.4 | 5.8 | 49.1 | 30.5 | 5.4 | 48.5 | 30.4 | 6.4 |
| Netherlands | 54.7 | 35.9 | 6.7 | 55.3 | 36.3 | 7.1 | 53.9 | 35.3 | 6.3 |
| New Zealand | 31.9 | 12.1 | 6.2 | 33.2 | 13.6 | 5.6 | 30.7 | 10.7 | 6.9 |
| Norway | 28.7 | 9.2 | 3.5 | 29.5 | 10.5 | 3.7 | 27.8 | 7.5 | 3.3 |
| Portugal | 73.2 | 56.3 | 16.2 | 73.8 | 57.5 | 16.0 | 72.5 | 54.9 | 16.4 |
| Spain | 67.0 | 49.7 | 26.1 | 66.4 | 48.9 | 25.6 | 67.8 | 50.5 | 26.7 |
| Sweden | 33.0 | 17.0 | 8.0 | 35.4 | 18.7 | 8.2 | 30.1 | 15.0 | 7.9 |
| United Kingdom | 53.4 | 36.3 | 7.7 | 56.5 | 39.8 | 8.2 | 49.4 | 31.6 | 7.0 |

*Source*: OECD.Stat (extracted on 13 Jul 2014 00:09 UTC [GMT])

[a]Ratio of long-term unemployed to all unemployed.

[b]EU15 region: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.




*Source*: Same as Table 1.

[a]Ratio of unemployed with unemployment duration of 1 year or more to all unemployed.

Figure 1. Trends in Incidence of Long-Term Unemployment[a] in Japan, United States and Europe

unemployment is relatively high even though the unemployment rate is low.

By gender, the incidence of long-term unemployment is more or less the same in all countries; the exceptions are Japan and Ireland, where the incidence of long-term unemployment for males is considerably higher than that for females.

Chronologically, the incidence of long-term unemployment in Europe started rising in the second half of the 1970s, plateauing at fairly high levels of around 40-50% in the 1980s. Though in a somewhat decreasing trend over the long term since then, it has again risen since 2009 (Figure 1). In the USA, it was at the low level of around 10% between the 1980s and 2008, then rose sharply post-Lehman, reaching 31.3% in 2011 before decreasing slightly. Until then, the highest point since the war had been 13.3% in 1983. Compared to that, the increase in long-term unemployed in the recent downturn was unparalleled since the war. Japan had been trending in the latter 10% range between the beginning of the 1980s and the beginning of the 1990s, but continued to rise from the mid-1990s until around 2003. It then leveled off at around 33%, again rising to 40% post-Lehman. Comparing the above trends in the incidence of long-term unemployment in Japan, USA and Europe, particularly notable changes were (i) the continuous rise since the mid-1990s in Japan, and (ii) the sharp increase in the USA post-Lehman.

By age, the incidence of long-term unemployment generally tends to rise with increasing age (Table 2). However, there are many countries (notably Japan and southern European countries) where the incidence of long-term unemployment is also high at 30-40% or more among younger age groups. In many countries, the incidence of long-term unemployment among young people was lower in 2003 than it had been ten years earlier,

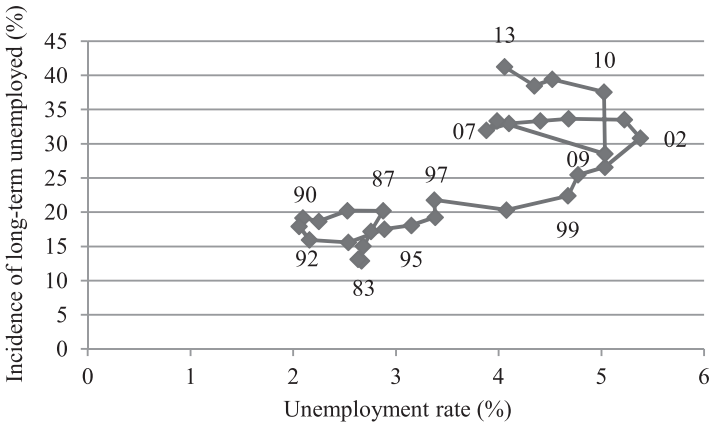
Table 2. Incidence of Long-Term Unemployment[a] by Age in Major OECD Countries

(%)

| | 1993 | | | 2003 | | | 2013 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ages 15−24 | Ages 25−54 | Age 55+ | Ages 15−24 | Ages 25−54 | Age 55+ | Ages 15−24 | Ages 25−54 | Age 55+ |
| Japan | 10.0 | 22.7 | 25.0 | 28.2 | 40.8 | 42.1 | 36.8 | 52.6 | 45.2 |
| United States | 5.5 | 16.2 | 23.6 | 8.0 | 13.4 | 20.4 | 17.7 | 28.6 | 35.4 |
| EU15 | 33.9 | 42.3 | 52.5 | 26.4 | 43.1 | 57.4 | 35.5 | 49.1 | 60.8 |
| Australia | 28.7 | 44.1 | 59.8 | 14.0 | 28.9 | 46.1 | 15.5 | 20.0 | 34.3 |
| Austria | .. | .. | .. | 10.6 | 23.6 | 54.3 | 13.4 | 25.9 | 53.0 |
| Belgium | 27.7 | 51.1 | 73.5 | 25.3 | 50.1 | 72.2 | 29.8 | 49.8 | 68.1 |
| Canada | 9.9 | 18.7 | 27.7 | 3.7 | 11.0 | 20.8 | 5.7 | 13.2 | 18.6 |
| Denmark | 12.3 | 24.6 | 44.2 | 9.6 | 25.2 | 43.4 | 9.3 | 27.9 | 38.2 |
| Finland | 16.8 | 37.9 | 39.7 | 7.5 | 32.3 | 53.8 | 7.4 | 26.5 | 45.2 |
| France | 18.2 | 33.5 | 63.2 | 24.0 | 42.9 | 60.3 | 28.1 | 43.1 | 55.2 |
| Germany | 19.1 | 37.8 | 48.2 | 25.5 | 49.5 | 63.7 | 24.0 | 45.6 | 62.5 |
| Greece | 37.3 | 44.0 | 45.4 | 41.9 | 49.3 | 59.9 | 53.9 | 67.6 | 73.7 |
| Ireland | 51.9 | 67.2 | 71.9 | 24.3 | 45.2 | 49.6 | 48.7 | 70.4 | 77.3 |
| Italy | 57.4 | 53.8 | 51.8 | 55.0 | 59.7 | 62.2 | 55.8 | 56.4 | 62.8 |
| Luxembourg | .. | 35.7 | .. | 26.2 | 34.2 | 22.5 | 28.0 | 28.9 | 50.0 |
| Netherlands | 42.2 | 54.9 | 74.1 | 12.9 | 29.6 | 55.0 | 19.2 | 36.8 | 55.1 |
| New Zealand | 26.9 | 43.4 | 59.3 | 6.5 | 19.0 | 32.7 | 6.3 | 18.3 | 22.9 |
| Norway | 14.3 | 28.9 | 40.0 | 2.4 | 8.6 | 16.5 | 3.4 | 12.8 | 31.2 |
| Portugal | 27.5 | 41.4 | 58.3 | 20.5 | 35.3 | 50.1 | 40.2 | 58.3 | 75.4 |
| Spain | 31.0 | 39.7 | 52.4 | 22.4 | 28.6 | 52.1 | 41.6 | 48.2 | 65.3 |
| Sweden | 11.2 | 18.7 | 33.4 | 6.8 | 19.5 | 40.0 | 5.9 | 24.9 | 31.3 |
| United Kingdom | 35.6 | 51.4 | 55.2 | 12.6 | 31.0 | 40.7 | 32.2 | 43.9 | 48.5 |

*Source*: Same as Table 1.

[a]Ratio of unemployed with unemployment duration of 1 year or more to all unemployed.




*Source*: Same as Table 1.

[a]Ratio of unemployed with an unemployment duration of 1 year or more to all unemployed.

Figure 2. Relationship between Unemployment Rate and Incidence of Long-Term Unemployment[a] (Japan)


*Source*: Same as Table 1.

[a]Ratio of unemployed with an unemployment duration of 1 year or more to all unemployed.

Figure 3. Relationship between Unemployment Rate and Incidence of Long-Term Unemployment[a] (United States)

suggesting a susceptibility to the impact of economic cycles. Nevertheless, while the incidence of long-term unemployment among youth has risen consistently over the last 20 years in Japan, the rise in older age groups has slowed in recent years.

A strong correlation can be seen between the unemployment rate and the incidence of long-term unemployment. In terms of a cross-section, the correlation coefficient for the 2013 data in Table 1 is 0.694. A strong correlation can also be seen between the chronological data in Japan and the USA (Figures 2 and 3).

## III. Dynamic Analysis of Long-Term Unemployment and Duration Dependency[1]

This section presents a theoretical framework for analyzing long-term unemployment, and establishes formulae for the unemployment exit probability and unemployment duration dependency, key concepts when considering long-term unemployment.

### 1. Duration Analysis

Here, the analytical method known as duration analysis will be used as a theoretical framework. This method begins with the unemployment exit probability (hazard probability = the probability at any given moment that a worker will exit unemployment) and derives all other functions from this probability. Where the unemployment duration is $t$, the unemployment exit probability is expressed as $h(t)$. The exit probability could also depend on other observable properties, but for the sake of simplicity, these will not be postulated here. The exit probability function $h(t)$ can be interpreted as a reduced form after individual unobservable heterogeneities have been excluded. It may also be regarded as the probability of exiting unemployment either by being hired or by leaving the labor force. If the exit probability is determined in a manner dependent on the duration of unemployment, a "duration dependency" is said to exist. And when there is a correlation between the two, in that the exit probability decreases as the duration of unemployment increases, a "negative duration dependency" is said to exist.

$G(t)$ expresses the probability distribution of completed unemployment durations. That is, $G(t) \equiv Pr(T < t) \equiv$ the probability that the completed employment duration $T$ for a given unemployed person is shorter than $t$. The density function of this probability distribution is taken as $g(t) \equiv G'(t)$. In this case, the instantaneous exit probability function $h(t)$ is defined as follows. This definition means that the probability that an unemployed person who has still not exited unemployment at point *t* will exit unemployment during the instantaneous time $\Delta t$ (i.e. between $t$ and $t + \Delta t$) is given as $h(t)\,\Delta t$.

$$h(t) \equiv \lim_{\Delta t \to 0} \Pr(t \le T < t + \Delta t \mid t \le T)/\Delta t$$

$$= \lim_{\Delta t \to 0} (G(t + \Delta t) - G(t))/(\Delta t\ (1 - G(t)))$$

$$= G'(t)/(1 - G(t)) = g(t)/(1 - G(t))$$

Thus, the following relational expression is obtained:

$$1 - G(t) = \exp\left(-\int_0^t h(s)ds\right)$$

[1] This section is largely based on Machin and Manning (1999). See their paper for the proofs of the propositions.

It should be noted here that, while the ratio of long-term unemployed is based on the incomplete unemployment duration in statistical data, the distribution of unemployment duration shown above relates to the completed unemployment duration. However, a simple relational expression arises between the incidence of long-term unemployment derived from the uncomplete unemployment duration and the probability distribution $G(t)$ derived from the completed unemployment duration, as shown below. Firstly, this relational expression is derived in a steady state. That is, the number of inflows to unemployment during a unit of time is taken as a constant $N$, and the number of outflows from unemployment is also taken as constant. Unemployed persons with current unemployment duration *t* are those who became unemployed before duration *t* and have not found jobs since. The number of these unemployed persons is $N[1 - G(t)]$. Thus, the following equation expresses the percentage $P(t)$ of unemployed persons whose current (incomplete) unemployment duration is longer than *t* in relation to all unemployed persons:

$$P(t) = \int_{t}^{\infty} [1 - G(s)]\, ds \Big/ \int_{0}^{\infty} [1 - G(s)] ds$$

Here, the following proposition arises:

Proposition 1

$$\frac{\partial ln P(t)}{\partial h(s)} = P(s) - 1 < 0 \qquad for \;\; s < t$$

$$\frac{\partial ln P(t)}{\partial h(s)} = P(s)\left(\frac{P(t) - 1}{P(t)}\right) < 0 \;\; for \;\; s \geq t$$

(Proof omitted)

This proposition means that changes in the incidence of long-term unemployment depend not only on changes in the exit probability from long-term unemployment, but also on changes in the exit probability from unemployment of all durations.

Thus, it may be considered that the incidence of long-term unemployment is determined by (i) the average exit probability from unemployment of all durations and (ii) the duration dependency of the exit probability. The former means that the incidence of long-term unemployment is a decreasing function of the average exit probability. The latter indicates the duration dependency of the exit probability from unemployment, i.e. that the probability of exit from unemployment depends on the duration of unemployment, and that this also influences the incidence of long-term unemployment.

The latter relation can be expressed more precisely as follows. Variable $z$ is taken to influence the unemployment exit function, and the exit function is taken as $h\,(t, z)$. The corresponding distribution function for unemployment duration is taken as $G\,(t, z)$ and the density function as $g\,(t, z)$. Here, with $\tau$ as a suitable given duration, if $z$ functions to increase the exit probability for $t$ where $t \leq \tau$, and works to reduce the exit probability for $t$ where $t > \tau$, it is natural to infer that the negative duration dependency of the unem-

ployment exit probability has increased. In this case, the following proposition arises:

Proposition 2

If $h_z(t,z) \geq 0$ for $t$ where $t \leq \tau$, and $h_z(t,z) < 0$ for $t$ where $t > \tau$, then the incidence of long-term unemployment will increase.

(Proof omitted)

Thus far, the framework for analyzing the incidence of long-term unemployment has assumed that the number of inflows to unemployment remains unchanged. However, how might this be affected if the number of inflows to unemployment were to change? For the sake of simplicity, it shall be assumed that the unemployment exit probability remains the same and only the entry probability changes. $N(s)$ is taken to express the number of inflows to unemployment at point $s$. On examining the unemployment structure at point $\tau$, the number of persons unemployed at point $s$ who have not found jobs at point $\tau$ is expressed as $N(s)[1 - G(\tau - s)]$. Thus, if $P(t, \tau)$ is taken as the incidence of long-term unemployment with unemployment duration $t$ at point $\tau$, the following will apply.

$$P(t,\tau) = \int_t^\infty N(\tau - s)[1 - G(s)]ds \,/\, \int_0^\infty N(\tau - s)[1 - G(s)]ds$$

If inflows to unemployment at the most recent point are numerous, the incidence of long-term unemployment decreases. Since inflows to unemployment increase or decrease as a result of economic cycles, they cause the incidence of long-term unemployment to fluctuate.

In fact, on close examination of the relationship between the incidence of long-term unemployment and the unemployment rate in Japan and the USA, the unemployment rate appears to change first, with changes in the incidence of long-term unemployment following afterwards. As a result, the scatter charts resemble counterclockwise spirals (Figures 2 and 3 above).

## 2. Unemployment Duration Dependency

Negative unemployment duration dependency of the unemployment exit probability may be observed in any country (Machin and Manning 1999). Here, however, a distinction should be made between true duration dependency and duration dependency caused by the unobserved heterogeneities of workers.

True duration dependency means that the long-term unemployed have fewer opportunities to find work. In other words, when a person becomes unemployed and is unable to find work, the unemployment exit probability decreases as the unemployment duration grows longer. Contrastingly, when there are unobserved heterogeneities among the unemployed, a relationship is observed whereby apparently the average unemployment exit probability decreases as the unemployment duration increases. For example, let us assume that there are two types of worker, that the unemployment exit probability of each is $h_0$ and $h_1$, respectively ( $h_0 < h_1$ ), and that this does not change with time. However, let us also assume that the heterogeneities of these two types of workers are unobserved by the

observer. If the share of the first group in all unemployed in period $t$ is taken to be $s(t)$ at this time, the unemployment exit probability of the unemployed as a whole will be given by $h(t) = s(t)h_0 + \big(1 - s(t)\big)h_1$. Since the first group's exit probability is lower than that of the second group, the share in all unemployed $s(t)$ will increase with $t$. Therefore, the exit probability of the unemployed as a whole $h(t)$ gradually decreases as the unemployment duration $t$ grows longer, giving the appearance that there is a negative duration dependency.

## IV. Mechanisms behind the Occurrence of Long-Term Unemployment

The main factors responsible for the increase in the incidence of long-term unemployment are thought to be a low average unemployment exit probability and the presence of negative duration dependency in the probability of exit. The former is associated with the fact that the overall unemployment rate is high. Theoretical analysis of factors behind the increase in the overall unemployment is beyond the scope of this paper; the reader is referred to other literature in the field (Layard, Nickell, and Jackman 2005; Bean 1994; Kuroda 2001; Ohta, Genda, and Teruyama 2008, etc.). As causative factors, many of these authors cite a lack of aggregate demand, generous social welfare benefits, strong bargaining power of labor unions, a high minimum wage, dismissal regulation, advances in skill-oriented technology, and globalization, among others.

Here, the investigation will mainly focus on uncovering the mechanisms that cause negative duration dependency, whereby the exit probability from unemployment decreases as the unemployment duration grows longer. One theory on this explains that, as a factor on the employer's side, the exit probability of long-term unemployed is low because they are not hired, as they are regarded as offering low productivity for one reason or another (whether reasonable or not). On the worker's side, conversely, there are theories that explain that, as the unemployment duration grows longer, disappointment over the failure to find a job leads to a loss of willingness to find work, or that, as the unemployment duration grows longer, skill levels decrease, thus making the unemployment duration even longer. Besides these, institutional factors including the unemployment insurance system and dismissal regulation are also conceivable. These factors are not mutually exclusive; in fact, it has been shown that the synergistic effect of these factors causes the exit probability of long-term unemployed to decrease.

In the following, mechanisms behind the occurrence of long-term unemployment will be clarified by surveying each of these theories.

### 1. Factors on the Labor Demand Side

There is a theory that the long-term unemployed have a low exit probability because companies, as their hiring policy, discriminate against them for one reason or another and thus do not hire them.

(1) The Screening Hypothesis

Lockwood (1991) constructed a theory to the effect that negative duration dependency arises because, in the process of a company screening workers to hire, unemployment duration acts as a signal for workers' ability. This model assumes the heterogeneity of workers. When hiring staff, companies carry out tests to find out a worker's ability. If several companies select new recruits using these tests, the ability of a worker who has not been selected will be relatively low. Therefore, the length of the unemployment duration can become a signal showing the worker's ability. In other words, this means that a worker's ability has the externality of being known by other companies. Companies screen and hire workers based on the results of tests they themselves carry out, and on information in the form of the unemployment duration. If a given company's test results are the same for more than one worker, the one with the shorter unemployment duration will be given priority when hiring. As a result, the unemployment exit probability of the unemployed becomes lower as the unemployment duration grows longer.

Lockwood considers a situation in which a company hires workers as a result of a hiring test. In this case, externality arises in that information on the productivity of workers who were not hired is conveyed to other companies. Then, other companies can make hiring decisions based on this information. In other words, they can get a free ride. If the unemployment duration is longer than a given period, the worker is not hired, and this method makes it possible for workers with higher productivity to be hired.

For this situation to be permanently in equilibrium, a company would need an incentive to carry out tests even if it gives other companies a free ride. Lockwood analyzes the conditions under which such equilibrium exists, and analyzes their characteristics in detail. What this proves is that, firstly, information arising from the tests is always used. However, even if a company were to discover benefit in conducting tests, it would after all be beneficial to the company if long-term unemployed with unemployment duration longer than a certain length were not hired. Secondly, the critical value of unemployment duration for deciding whether or not to hire changes depending on the state of labor supply and demand. The tighter the labor supply and demand, the shorter the critical value of the unemployment duration. Moreover, the lower the cost of maintaining a job offer, the shorter the critical value of the unemployment duration.

These results explain the existence of the negative unemployment duration dependency of the re-employment probability. The negative unemployment duration dependency of the unemployment exit probability could also be explained using factors on the supply side. For example, there is a decrease in willingness to work and obsolescence of skills associated with protracted unemployment. However, the existence of discrimination against the long-term unemployed has also been pointed out. When based on irrational discrimination, this phenomenon should be eliminated in competitive industries where entry is unrestricted. This model provides an explanation based on rational discrimination, and is therefore taken to have clarified the theoretical framework for discussing measures to combat it.

If there are heterogeneities in workers' abilities and it is highly likely that workers with long unemployment duration would have lower ability, it does not necessarily mean the failure of the market if these heterogeneities are not known to the researcher but may be observed by the company. However, if there is private information about these heterogeneities, this screening method introduces a kind of externality, and therefore, the policy response could lead to Pareto improvement.

Nevertheless, unemployment duration dependency (true duration dependency) sometimes arises even when there are no heterogeneities among workers. Even if workers were previously homogeneous, when there are several jobseekers applying for one job opening, the method of hiring the one with the shortest unemployment duration (the ranking rule; see below) is applied, or else the worker sometimes loses skills during the unemployment duration, and subsequently becomes heterogeneous.

(2) The Ranking Rule Hypothesis

Blanchard and Diamond (1994) compare two types of situation in which multiple jobseekers apply for a single job opening, and analyze their respective situations of unemployment, distribution of unemployment duration, and wages. In one situation, companies adopt the method of hiring the worker with the shortest unemployment duration (the ranking rule); in the other, they hire at random, irrespective of the unemployment duration. The authors' first finding is that, when ranking is applied, the duration dependency is stronger if the unemployment rate is higher during a recession. This is in addition to the self-explanatory result that the unemployment exit probability decreases as the unemployment duration lengthens (there is negative duration dependency). If the labor market is tight, there is a smaller ratio of jobseekers to job openings. Therefore, most job openings have either one or zero applications from jobseekers. And therefore, the long-term unemployed have more or less the same employment probability as the short-term unemployed. When labor supply and demand become more relaxed, on the other hand, the number of jobseekers to job openings increases, meaning there are more applicants for each job. Therefore, the long-term unemployed have a markedly lower probability of getting employed than the short-term unemployed. The problem is the attitude of companies to the long-term unemployed. That is, if companies hire jobseekers with the shortest unemployment duration from a long line of applicants (i.e. apply the ranking rule), even if the loss of skills due to the longer unemployment duration is fairly minor, long-term unemployment could become persistent.

Next is the impact on wages. Since wages depend on the future unemployment duration, the existence of long-term unemployed in itself hardly impacts wages at all. If companies adopt the ranking rule when hiring, currently employed workers can assume a strong position in wage negotiations, because even if they became unemployed they would have a higher priority for re-employment. Therefore, compared to cases where the ranking rule is not applied, the equilibrium wage would be higher. Under the ranking rule, moreover, eco-

nomic crises have a larger short-term effect on wages.

## 2. Factors on the Labor Supply Side

### (1) Deterioration of Human Capital, Loss of Willingness to Seek Work

If skills and willingness to seek work decrease during a period of unemployment, the unemployment exit probability acquires duration dependency. The rationale behind this is that, as the unemployment duration grows longer, the worker's ability decreases and companies are less inclined to hire, while the unemployed lose the willingness to seek work. As a result, the probability of transition from unemployment to employment decreases.

Acemoglu (1995) constructed a model whereby a worker endogenously chooses whether or not to maintain skills during a period of unemployment. The model assumes a priori that there are homogeneous workers; that workers must bear certain costs in order to maintain skills during a period of unemployment; and finally, that it cannot be directly observed whether or not they have maintained skills during a period of unemployment, but it is only known on completion of short-term training period after being hired. Based on these assumptions, two types of equilibrium are shown to exist. One is the "skill-loss-equilibrium." With this equilibrium, all long-term unemployed are subject to discrimination by companies in high-skill sectors; in anticipation of this, the long-term unemployed do not bear the costs of maintaining skills necessary for employment in high-skill sectors. As a result, companies in those sectors discriminate against the long-term unemployed when hiring. The other equilibrium is the "non-skill-loss-equilibrium." With this equilibrium, hiring decisions are unrelated to a worker's unemployment duration. With the skill-loss-equilibrium, the long-term unemployed have a lower unemployment exit probability than the short-term unemployed. To put it another way, they have negative duration dependency. Also, compared to the non-skill-loss-equilibrium, the steady state unemployment rate and the incidence of long-term unemployment are both high while the public welfare element is low.

When in a skill-loss-equilibrium, public policies are required. These could include direct subsidies, positive discrimination and labor market policies (re-training). However, direct subsidies and positive discrimination by the private sector are not generally effective. When companies hire long-term unemployed workers, direct subsidies give an incentive to dismiss them as soon as the opportunity arises. In that case, the long-term unemployed themselves will not bother to maintain skills during a period of unemployment, either. Contrastingly, positive discrimination and labor market policies (training policies) by the public sector could be effective. In the case of positive discrimination, based on a policy of employing the long-term unemployed in the public sector, the long-term unemployed will maintain skills in order to be employed in the public sector. In equilibrium, therefore, the long-term unemployed would be hired even in private sector high-skill sectors. If the government has the commitment to hire and test them, the long-term unemployed will take the initiative to improve their skills. However, government labor market policies in the form of re-training programs, though effective, reduce workers' incentives to maintain skills. As

such, there could be an equilibrium with higher Pareto efficiency than this. The transition to the equilibrium with higher Pareto efficiency is difficult when based on labor market policies. By contrast, positive discrimination by the public sector can facilitate such a transition, as long as it is not overused.

Ljungqvist and Sargent (1998) used a general equilibrium search model to show that long-term unemployment arises because workers' skills and their willingness to seek work decrease during a period of unemployment. In particular, when a welfare nation with well-developed systems of unemployment insurance and other social welfare suffers a major economic crisis, as in Europe after the 2nd oil crisis, if workers with long years of service in a structurally depressed industry are dismissed and become unemployed, the value of their skills is significantly lost, and it takes time to acquire the skills needed for employment in a new industry. Again, as a result of unemployment insurance benefit being paid in line with (high) wages in the previous job, the reservation wage is high and the willingness to seek work also weakens. A major causative factor behind the growth in long-term unemployment in Western Europe since the 1980s is said to lie in the loss of skills and decrease in willingness to seek work among the unemployed in welfare nations affected by major economic crises.

(2) Thin Market Externality

If we assume that workers' skills decrease during a period of unemployment, it will inevitably result in negative unemployment duration dependency of the exit probability, and unemployment would persist. However, it is doubtful whether this could have sufficiently long effects to indicate the persistence of unemployment actually observed in Western European countries. If those made unemployed by the crisis in question were re-employed, the persistence of unemployment for this reason would not be expected to be so long. In fact, even in Western European countries, the average unemployment duration is not so long.

Pissarides (1992) used search theory to show that this weakness is compensated by the appearance of thin market externality in the labor market, based on the assumption that workers' skills decrease during unemployment. Pissarides then deduced that the state whereby macro employment deviates from the steady state becomes persistent and the unemployment duration grows longer, and further that the economic crisis could permanently shift the state of employment or unemployment to a new equilibrium. The mechanism of this is as follows. If workers' skills decrease during unemployment, the situation becomes less desirable for companies. In that case, job openings in the following term would decrease. Because the unemployed generally have lower human capital, the market would become a thin market (i.e. a market with few job openings and little matching between job openings and jobseekers). When there is a negative economic shock, job openings tend to be fewer than in past trends. The unemployment duration of the new generation of unemployed would thus be longer than the trend, and human capital would decrease. Therefore, even if all of the former unemployed were to exit from unemployment, the market would

still be thin. Thin markets lead to further shortages in job openings, and this causes the market thinness to persist further. In this way, the impact of the shock is sustained, and if the thin market externality is large enough, the economy can fall into a low-level state of equilibrium. More than one type of equilibrium could even exist under constant returns to scale production and matching technology.

## 3. Institutional Factors

As other factors that cause long-term unemployment, let us now consider institutional factors.

### (1) Unemployment Insurance Systems

If there is an unemployment insurance system, workers' consumption before and after unemployment is leveled out by the payment of unemployment benefit. This results in higher economic welfare than if there were no unemployment insurance system. Again, receiving an income during a period of unemployment means that time can be taken to find the right job, thus increasing the likelihood of finding the right job. In other words, it is effective as a form of insurance. On the other hand, the existence of unemployment benefit reduces incentives to look for work, with the effect that less effort is invested in jobseeking, and the unemployment duration grows longer. How to adjust these opposing effects of insurance and incentives are adjusted is a key point in the design and operation of unemployment insurance systems.

According to the partial equilibrium search theory, the effect of unemployment benefit on unemployment exit probability is as follows (Tatsiramos and van Ours 2014). The unemployed choose a reservation wage at a point where the cost and benefits of continuing to look for work are balanced. They then compare this with the conditions of job openings, and decide whether to apply for job openings. If the benefit level rises, the reservation wage also rises. This then reduces the unemployment exit probability, and the unemployment duration lengthens. This reaction of the unemployed towards more generous unemployment benefit is called the "moral hazard effect." The main effect remains unchanged even if the variable of the job-seeking effort is inserted into the model. If unemployment benefit is increased, not only does the reservation wage rise, but the unemployment exit probability also decreases as a result of the diminished job-seeking effort. If the benefit duration is determined, the value of unemployment falls before the benefit period expires, and the probability of exit rises due to the reduced reservation wage. Extensions of the benefit duration have the effect of increasing the reservation wage and lengthening the average unemployment duration.

On the other hand, increases in benefit levels have different effects on the behavior of the unemployed, depending on how much of the benefit period remains. Unlike the case of benefit duration, a rise in the replacement ratio (the ratio of the unemployment benefit amount to the salary before unemployment) has the largest effect at the beginning of the unemployment duration. For workers who have only recently become unemployed, a rise in

the replacement ratio has the effect of reducing the unemployment exit probability, by virtue of raising the value of unemployment. They demand higher wages in order to accept a job offer. Conversely, higher benefits for the unemployed near the end of the benefit period lead to a higher probability of exit due to the eligibility effect.[2]

### (2) Employment Protection Legislation

Employment protection legislation increases the corporate cost of adjusting employment and has an impact on retirement management and hiring behavior. Theoretically, stricter dismissal regulation will reduce dismissals and diminish the probability of entry to unemployment. On the other hand, the greater difficulty of dismissal makes corporate hiring behavior more cautious and reduces hiring. Therefore, the unemployment exit probability decreases and the unemployment duration lengthens (Blanchard and Portugal 2001). However, it is not certain whether these effects also reduce the average probability of exit from unemployment and strengthen the negative unemployment duration dependency of the exit probability.

## V. Problems Caused by Long-Term Unemployment

Finally, problems caused by long-term unemployment will be enumerated. Long-term unemployment is a serious situation both for the individual concerned and for society at large, and causes various problems. Thus, after first examining problems for the socio-economy in macro terms, i.e. wages, persistent unemployment, and income disparity, the impact on individual happiness levels will be examined.

### 1. Impact on Wages

What impact do the long-term unemployed have on wages? Machin and Manning (1999) use the efficiency wage hypothesis posited by Shapiro and Stiglitz (1984) to show that, with a positive time discount rate and unemployment at a given level, wages increase when the negative duration dependency of the unemployment exit probability is stronger. The intuitive explanation of this is as follows. To prevent workers from growing lazy, it is desirable from the company's viewpoint to reduce the usefulness of this being discovered, leading to dismissal and unemployment. This means that it is desirable to reduce the value of unemployment at the point of newly entering unemployment. At any given unemployment level, a stronger pre-existing negative unemployment duration means a relative fall in the exit probability of the long-term unemployed and a relative rise in that of the short-term unemployed. Therefore, if workers were to discount their future value, the value of unem-

[2] This is the effect whereby unemployed workers with no benefit eligibility and benefit recipients just before the end of the benefit period have greater incentives to enter employment, in order to be eligible for benefits when subsequently re-entering unemployment, and their exit probability therefore rises (Tatsiramos and van Ours 2014, 291).

ployment when the unemployment duration is short would have a greater weight, as a result of which the value of becoming newly unemployed would rise. In this case, the wage level would have to be raised in order to prevent laziness. In other words, wages would rise. The same result is obtained in the above-mentioned Blanchard and Diamond (1994) and other theoretical research.

This has also been confirmed by a number of empirical studies (Machin and Manning 1999). It is also consistent with the relationship between the rise in the incidence of long-term unemployment and a shift in the Phillips curve observed in the USA during the post-Lehman recession (Krueger, Cramer, and Cho 2014). In other words, the fact that wages rise with no impact from long-term unemployment on wage decisions makes it even more difficult for the long-term unemployed to exit from unemployment.

## 2. Long-Term Unemployment and the Persistence of Unemployment

Long-term unemployment is also related to the persistence of unemployment. For example, even if the effect of the ranking rule is not so great in a steady state, it can grow larger in the short term. In particular, if there is negative duration dependency of the unemployment exit probability when the economy makes a sudden recovery, the employment probability of the short-term unemployed rises, leading to a rise in wages. This means that the long-term unemployed remain in a persistent state of unemployment (Blanchard and Diamond 1994). Again, as stated above, Pissarides (1992) used the search theory to show that thin market externality functions if the unemployed lose even a little of their skill during unemployment, and that short-term crises can lead to persistent unemployment.

## 3. Inequality

Unemployment means a loss of income. A high incidence of long-term unemployment shows that the burden of unemployment is concentrated among a small number of workers. This in turn shows that long-term unemployment contributes to a widening of income inequality.

If we are to consider the relationship with disparity in the strict sense, however, we need to focus not only on the long-term unemployed but also on workers who are in recurrent unemployment. To this end, we must use panel data to show to what extent unemployment periods are concentrated in a fixed proportion of workers within a fixed period of time. Machin and Manning (1999) analyze this using data from Germany, the UK and the USA in the 1990s. They suggest that periods of unemployment and non-employment tend to be concentrated in specific workers, and that this tendency is stronger in countries with a higher incidence of long-term unemployment.

## 4. Happiness

Unemployment has a negative impact on the happiness of the individual. This tendency can be seen even when income levels are kept the same (Ohtake 2004). But what

about long-term unemployment? A follow-up survey of unemployed Americans after the Lehman shock reported that, as the unemployment duration became protracted, the unemployed became dispirited and their unhappiness increased (Krueger and Mueller 2011). In particular, in responses related to job-hunting episodes, it became clear that prolonged unemployment duration has a strong tendency to increase unhappiness, and that life satisfaction is lower on days after spending significant time looking for work. They also point out that, if strenuous job-hunting efforts after long-term unemployment do not result in a job being found, the psychological cost of job-hunting seems to increase and this seems to discourage many unemployed.

## VI. Conclusion

Seen over the long term, the incidence of long-term unemployment rose significantly in Western European countries between the second half of the 1970s and the 1980s, and in Japan since 1990s, before plateauing. It also rose to historical levels in the USA from 2008 onwards.

This paper has mainly surveyed theoretical literature on the mechanism behind the occurrence of long-term unemployment and the problems caused by long-term unemployment. The key points are as follows.

(i) A decrease in the unemployment exit probability causes a rise in the incidence of long-term unemployment, whatever the unemployment duration. Factors that cause the incidence of long-term unemployment to rise can be broadly divided into a decrease in the average exit probability from unemployment of all durations and a rise in the negative unemployment duration dependency of the exit probability.

(ii) Decreases in the average exit probability from unemployment of all durations are mostly caused by the same factors as increases in overall unemployment. Therefore, there is a strong correlation between the incidence of long-term unemployment and the unemployment rate. Many factors behind the occurrence of long-term unemployment are the same as those that cause overall unemployment to increase.

(iii) Factors behind the negative duration dependency of the exit probability may be summarized as those on the labor demand side, those on the labor supply side, and institutional factors. Of these, theories concerning factors on the labor demand side include (a) the screening hypothesis, whereby the exit probability of long-term unemployed decreases because unemployment duration is used as information showing a worker's ability, as a method of screening when there are heterogeneities among jobseekers, and (b) the hypothesis that the exit probability of long-term unemployed decreases because jobseekers with the shortest unemployment duration are chosen when there are no heterogeneities among jobseekers but there are multiple job applications for a job opening (the ranking rule).

(iv) Theories related to factors on the labor supply side include (a) the theory that, be-

cause workers' skills and willingness to work decrease during periods of unemployment, companies discriminate against long-term unemployed even if some unemployed workers invest in maintaining their skills during such periods, thereby reducing the exit probability of long-term unemployed, and (b) the hypothesis that, if the skills of unemployed workers decrease during a period of unemployment, persistent long-term unemployment occurs in times of short-term economic crisis, due to the externality of thin markets (i.e. markets with few job openings and little matching between job openings and jobseekers). It has also been pointed out that long-term unemployment is prone to occur because the loss of skills due to unemployment is particularly pronounced at times when structural changes occur in the economy.

(v) Institutional factors consist of the unemployment insurance system and employment protection legislation. Extending benefit duration in unemployment insurance systems has the effect of extending the unemployment duration. Meanwhile, increases in unemployment benefit levels reduce the exit probability of the short-term unemployed but increase the exit probability of benefit recipients approaching the end of their unemployment benefit period.

(vi) As problems caused by long-term unemployment, firstly, an increase in long-term unemployment has the effect of pushing up wages. An increase in long-term unemployment also has the effect of increasing the persistence of unemployment, and of widening income inequality. Finally, long-term unemployment significantly reduces the happiness level of the individual concerned.

In Japan, the incidence of long-term unemployment rose during the long recession after the collapse of the bubble economy, and has remained at a high level since then. The change among younger age groups is particularly pronounced. Discrimination against long-term unemployed by companies and practices such as the ranking rule, as part of Japan's system of employment, are thought to lie behind this.[3] Appropriate policy action based on further theoretical elucidation and empirical analysis of the mechanisms behind the occurrence of long-term unemployment is required.

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