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**Social Security in the Age
of the 4th Industrial Revolution**

Kwang-Taek LEE

Professor Emeritus, Kookmin University, Seoul, Korea

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<Abstract>

The 4th Industrial Revolution is expected to have a positive effect of increasing income and improving the quality of life by enhancing productivity through information technology and high technology convergence, reducing production and transaction costs. However, with the replacement of the production process by artificial intelligence and robots, the gap between "high technology high wages" and "low technology low wages" will be widened. In addition, the middle class will dwindle due to the polarization of labour market. There are many predictions that the 4th Industrial Revolution will deepen the problems of sub-replacement fertility¹, ageing and income inequality.

The pivotal role of social security system in guaranteeing the people's livelihood will be greater in the age of the 4th Industrial Revolution. The basic principles of the social security is the sharing of social risks and income redistribution based on social solidarity. Social risk sharing is the principle of social insurance, and income redistribution is the fair burden of social responsibility based on the economic capability

In dealing with job displacement caused by the 4th Industrial Revolution, implementing policies to increase "flexicurity" and establishing an efficient

¹ The countries or areas that have the lowest fertility are in developed parts of East and Southeast Asia: Singapore, Macau, Taiwan, Hong Kong and South Korea.

mechanism of unemployment insurance will be powerful tools. It will offer a secure safety net for workers displaced by automation. Untethering health and income protection from individual employers or jobs, implementing alternative models of income distribution and basic income by the government will be among the comprehensive and interconnected set of options

Work-based training programs should also be adopted, so the displaced workers can participate in on-the-job training while receiving unemployment benefits. As technology innovation continues, workers have to keep learning to meet the need of different skills of new jobs.

An efficient mechanism of job training and continuing education will help workers be hired or navigate job transitions more successfully. In the course of lifelong education, all workers are required to learn new skills in order to survive in the future labour market.

I . Introduction

South Korea has new administration lead by former human rights lawyer Moon Jae-in, who was inaugurated on May 30, 2017 after winning a landslide victory in presidential by-election. Moon Jae-in's election ended the leadership vacuum caused by the first-ever impeachment of a sitting president Park Geun-hye.

President Moon Jae-in's administration on September 1 has proposed a budget for 2018 worth 429 trillion won (\$382 billion), an increase of 7.1 percent from this year's budget and the largest year-on-year rise since the 2008 global financial crisis, a clear sign that the new government elected just three months ago is not holding back on spending to achieve its goals of expanding income and welfare.

Keeping with the theme, the budget next year will largely focus on creating jobs and providing welfare. About 34 percent of the budget, encompassing 146.2 trillion won (\$130 billion), has been set aside for health, welfare and labour spending. It represents a 12.9 percent increase, the largest among the government's budget items.

Spending on jobs alone will be 19.2 trillion won (\$17.1 billion), up 12.4 percent. This includes 400 billion won (\$356 million) that will be used to hire 15,000 employees of the central government, which includes positions related to public safety. The government has set a goal of hiring 174,000 public servants in the next five years, with plans to hire 3,500 police officers this year and 6,800 workers in fields related to public

safety, including quarantine and border patrol.

The government has also set aside a significant budget to support job creation in the private sector, including financial aid for employees at small and medium-sized enterprises(SMEs). Specifically, 3 trillion won (\$2.38 billion) has been allocated to help SMEs that might be affected by the higher minimum wage set to go in effect next year.

The second-biggest increase is in education, where the government has raised spending by 11.7 percent to 64.1 trillion won (\$57.1 billion), which includes 1.2 trillion won (\$1.07 billion) to fund day care centers and preschools.

Some critics say the government ought to increase funding for R & D instead of focusing on welfare. They believe that growth derived from higher income is limited and supporting companies in creating new industries and technologies will improve productivity.

In other words, hiring increases, readiness towards the transition to the 4th Industrial Revolution, low birth rate, and income inequalities will be the focus of South Korea's fiscal spending for next year.

The budget outline proposes enhanced social security for low-income and senior and disabled citizens as a part of efforts to address widening wealth gap.

The government will appropriate spending to nurture talents and infrastructure in the innovations of big data, artificial intelligence(AI), Internet of Things(IoT) and augmented reality(AR) that will dominate the new industrial age.

This development is to be seen not only in South Korea, but in many developed economies.

II. Theories of the Impact of the 4th Industrial Revolution on Labour Market

Regarding the impact of the 4th Industrial Revolution, some are pessimistic, while some are optimistic though.²

² Chin-Chin Cheng 2017.

1. The Pessimism

The pessimists believe that this time is totally different from the 1st to 3rd Industrial Revolution, and all the jobs will be replaced by automation in the imminent future. They say that the 4th Industrial Revolution will naturally lead to the loss of millions of jobs. In other words, the digitization of entire industrial systems and the rise of AI will be a disaster.

This way of thinking takes into account mainly one of the two effects that regulate the relationship between capital and labour, the so-called substitution effect.

This view tends to highlight the negative aspect of the relationship between men and machines. As a result, new labour-saving technologies will increase unemployment over time.

As the effect of the 4th Industrial Revolution on jobs, human labour is being displaced by automation, robotics and AI. It depends on the occupation. Low-skilled, low-wage workers involving repetitive works will see their jobs disappear to automation. Automated will be the jobs in transportation (truck, taxi and delivery drivers), production work, administrative support, sales, services, and construction. Such workers, as miners, factory workers, bank tellers, travel agents, etc. will be replaced by robots also.

On the extent of what is possible, opinions differ. A 2013 study found that 47% of US employment is at high risk of being automated over the next two decades,³ while a 2016 study of 21 Organisation for Economic Co-operation and Development (OECD) countries, using a different methodology, concluded that only 9% of jobs are automatable.⁴ In general, lower-skilled works are more likely to disappear in an imminent future, increasing their vulnerability and exacerbating societal inequality.⁵

Technologies such as AI, machine learning and software automation applications will not only affect low-wage, low-skilled workers, but will also increasingly enable computers to fulfill jobs that require substantial education and training, such as

³ Frey and Osborne 2013.

⁴ Arntz, Gregory, and Zierahn 2016.

⁵ Arntz, Gregory, and Zierahn 2016.

journalists, teachers, and lawyers. The pessimists argue that no job is totally safe and that automation is blind to the color of workers' collar.

However, jobs that require empathy, communication skills, and close personal interaction would be more difficult to be displaced by robots or automation. These jobs include nurses, teachers, hairdressers, and automated customer service systems.

New technological progress will eventually approach the point where they will match or exceed the average worker's ability to perform most routine jobs. Most jobs can be broken down into a series of routine tasks, most of which can be done by machines. The result is structural unemployment that will affect workers at all levels from the uneducated to the well-educated workers.

2. The Optimism

On the other hand, optimists insist that automation will create more jobs than it destroys in the end. In the past technology has always ended up creating more jobs than it destroys. Automating a certain task, so that it can be done more quickly, cheaply and accurately, increases the demand for workers to do other tasks around it that have not been automated.

Optimists believe that new Jobs will be created in mechanical engineering and construction. The introduction of cyber physical systems(CPS) will require a significant amount of additional employees with specialized technical expertise. Workers with IT and programming skills will have more job opportunities.

The optimism is based upon the so-called compensation (or income) effect. As cheaper capital displaces labour, goods and services become cheaper, raising real incomes across the economy. That boosts the demand for new goods and services and new industries to supply them. To complete the loop, displaced labour then switches to meet this new demand, lowering unemployment.

According to the optimists, as demonstrated by the economic history of the past two centuries, the compensation effect of technological progress has always neutralized the substitution effect. As in the 19th century, today this economic principle is proving to be true.

The optimists insist that in the process of the 1st Industrial Revolution despite the Luddites attempts to stop technological progress and the affirmation of Marxism, over

those decades the condition and well-being of the average worker improved dramatically.

They say that we should fight all those contemporary economists who avoid looking at the huge progress made over the last two centuries and keep predicting a future where AI will completely replace human labour.⁶

In all those countries that have experienced a long and lasting process of economic development, such as the UK, Italy, Singapore, or South Korea average workers' real wages have increased between 15 and 100 times over the last 200, 100 and 50 years.⁷

Giovanni Caccavello has defined three fundamental stylized facts of economic development:⁸

- In the long run, technological progress is the main factor determining economic growth.
- From the 1st Industrial Revolution (1770-1830) to present days, technological advancement has created more jobs than it has destroyed.
- The transition to a more complex system of production marked the beginning of a new era, characterized by: Smithian concept of "division of labour", Schumpeterian concept of "creative destruction"; immense growth of labour productivity and real wages; rapid reduction of weekly working hours.

III. Paradigm Shift in Labour Market

With the increase of "platform economy", the labour conditions become more and more flexible. Within some forms of employment, there is no employment contract, wage standards, working-hour regulations, immobile workplace, access to labour unions. The workers have to be responsible for their own social protection, work health and safety protection. Uber is a good example.

The employer will not provide regular work, but call the workers in on demand. Skilled workers will be hired for a certain project or to solve a specific problem.

⁶ Giovanni Caccavello 2017.

⁷ Deirdre McCloskey, "On The Bourgeois Era, and Articles Relevant to It".

⁸ Giovanni Caccavello 2017.

Workers will provide their service from any place at any time by using new technologies. Online platforms will match employers and workers.

There will be no employment contract, wage standards, working-hour regulations, immobile workplace. The workers have to be responsible for their own social protection, work health and safety protection.

As seen above, the nature of the contract between employer and employee is changing, at the same time that the move to a sharing and collaborative economy increases the prevalence of jobs that fall outside the standard employment contract model. The shift has some positive implications for workers, as it potentially offers more control over when and whether to work and opportunities to supplement their incomes — renting out a room through Airbnb, for example, or driving part-time for a service such as Uber.

But this shift also has negative implications: it means workers can expect more volatility in their earnings and leaves them without the employment protections enjoyed by "standard" employees. The rise of zero-hour contracts is one manifestation of this change. Some governments, such as the government of New Zealand, have already banned their use. New employment models also hinder the collection of taxes from both employer and worker, reducing the amount governments have available to fund social protections.

These transformations are coinciding with four seismic challenges: demographic pressures, low interest rates, mass migration of labour, and increasing levels of wealth and income inequality.⁹

New technologies enable restaurants, retail stores and other companies to predict hourly customer demand and delivery schedules with precision. The employers will be encouraged to create "just-in-time" schedules in which workers are called in or sent home on a short notice.

Such "work without frontiers" is very likely to generate stress and burnout. Information and Communication Technology (ICT)-based mobile work incurs work

⁹ World Economic Forum, "Global Risks Report 2017, Part 2 - Social and Political Challenges".

intensification and increases stress levels. The new form of management, such as continuous monitoring workers' performance by smart devices, also increases the level of stress. It is likely to trigger occupational diseases such as burn-out or Fear of Missing Out (FOMO).¹⁰

IV. New Dimension of Social Security in the Age of the 4th Industrial Revolution

During the 1st Industrial Revolution, individuals bore virtually all risk for their own financial well-being. Over the course of the 2nd and 3rd Industrial Revolutions, the introduction of social protections and risk-sharing among individuals, employers and governments became increasingly prevalent in the developed world.

The 4th Industrial Revolution is threatening to bring this evolution full circle: severely underfunded state social systems are at a breaking point, employers are backing away from traditional employment models and social protection contributions, and individuals once again are shouldering a larger share of the risks. As longevity trends continue to increase and the threat of the automation of jobs becomes very real, the sharing of this risk needs careful rebalancing in order to minimize potential human suffering.¹¹

As the 4th Industrial Revolution accelerates, many individuals – including lower-skilled workers more easily displaced by automation,¹² part-time and self-employed workers without access to employer-sponsored protections, and older workers and retirees without sufficient savings or pensions – face a potential crisis.¹³ There is an urgent need to develop a comprehensive and interconnected set of options that adapt social protection to new-style employment patterns, reskill workers, and respond to the opportunities and threats posed by increasing longevity.

1. Implementing Policies to Increase “Flexicurity”

¹⁰ FOMO is a form of social anxiety leading to an obsessional relationship with the professional communication tool.

¹¹ World Economic Forum, “Global Risks Report 2017, Part 2 - Social and Political Challenges”.

¹² Arntz Gregory, and Zierahn 2016.

¹³ Guy Carpenter 2015/16

The changing needs of businesses and individuals in the 4th Industrial Revolution require giving employers access to a flexible labour force, while providing individuals with the security of a safety net and active help in securing employment.

One way to do this is to increase public spending on active labour market policies(ALMPs) that either reduce the cost of labour or help people find jobs. For example, Denmark brings together more flexible rules for hiring and firing workers with generous guaranteed unemployment benefits, and spends 1.5% of its GDP on active labour market policies to offer guidance, education, or access to a job to all unemployed workers who are looking for one.¹⁴

2. An Efficient Mechanism of Unemployment Insurance

Job displacement is probably one of the most serious negative impacts of the 4th Industrial Revolution. Through establishing an efficient mechanism of unemployment insurance, safety net for workers displaced by automation should be secured. Work-based training programs should also be adopted, so the displaced workers can participate in on-the-job training while receiving unemployment benefits.

In order to secure social security resources and to maintain the fairness of redistribution of income, it will be effective to unify the social insurance premiums by collecting them at the sources. The insufficient resources shall be covered by the taxes.

In addition, clarifying the purpose of taxation for social security, together with efforts to reduce the public's rejection of taxes and distrust, will secure successful social security system in the age of 4th Industrial Revolution.¹⁵

3. Untethering Health and Income Protection From Individual Employers or Jobs

Intermittent part-time and informal employment or self-employment, with frequent career changes, is becoming the norm in developed as well as developing economies,¹⁶

¹⁴ Denmark, Official Website.

¹⁵ Sang-Heon Roh 2017..

¹⁶ World Economic Forum 2016, p. 26.

but most pension systems are still built on the model of continued employment throughout life.¹⁷ Health benefits are provided irrespective of employment in most European nations and Canada, but continue to be largely tied to employment in the United States.¹⁸

Potential responses include creating portable health and pension plans to maintain coverage as workers move geographically and between employers, or between periods of formal employment – by an employer – and periods of unemployment or self-employment; and ensuring that risk and responsibility for social protection continue to be shared by the state, employer and employee. Employers' contributions to funding social protections could be recast to benefit society as a whole rather than their employees only.

4. Alternative Models of Income Distribution

In July, the minimum wage committee of South Korea voted to raise the hourly minimum wage from the current 6,470 won (\$5.73) to 7,530 won (\$6.69) next year. The year-on-year increase rate is 16.4 percent, the largest rise in 17 years after September, 2000.

Raising the minimum wage is expected to increase the purchasing power of the lowest earners, and could revitalize the economy by increasing consumption. narrow wage disparities, contributing to the easing of income inequality.

The rapid increase in the minimum wage, however, is likely to worsen their financial difficulties of small businesses. The government unveiled measures to help them pay the higher wages. The main point of the measures is subsidy of the minimum wage increase exceeding 7.4 percent, the average increase rate in the minimum wage for the past five years. Other steps include a reduction in commissions small businesses pay to credit card companies for card transactions and curbs on rent increases.

The government will spend 3 trillion won (\$2.66 billion) for the minimum wage subsidy and expects other steps to bring effects worth 1 trillion won (\$885.6 million) or more for small business operators.

¹⁷ ILO 2015.

¹⁸ World Economic Forum, "Global Risks Report 2017, Part 2 - Social and Political Challenges".

5. Basic Income by the Government

When more and more workers' jobs are replaced by automation, it is meaningless to raise the minimum wage for workers, when it provides incentives for employers to use more robots to replace workers.

Among the proposals for fundamentally new models of income distribution, which do not tie welfare benefits to being out of work, there is a negative income tax, in which people earning below a certain threshold receive supplemental pay from the government; wage supplements, in which the government makes up the difference between what a person earns and a recognized minimum income; and a universal basic income paid to all members of society regardless of their means.¹⁹ Such income distribution systems would make it much easier for people to take on part-time work or intermittent work as desired.

The voters in Switzerland recently rejected a proposal for a universal basic income,²⁰ but the idea is attracting growing interest around the world. The government of Finland is considering a pilot program that would guarantee citizens a partial basic income whether or not they work.²¹ Other recent experiments include a pilot program funded by UNICEF in eight villages in Madhya Pradesh, India, in which every man, woman and child was provided a monthly payment without conditions for 18 months. Improvements in the pilot villages, compared with "control" villages, were seen in the areas of sanitation, access to drinking water, food sufficiency, number of hours worked, children's nutrition, and enrolment levels in secondary schools, particularly for girls.²²

To prevent displaced workers become dependent, the government should make the payment conditionally. The displaced workers who receive the basic income should be, for example, obligated to engage in government projects that help the community.²³

6. Strengthen Job Training and Continuing Education

¹⁹ Tanner 2015.

²⁰ Switzerland, the Federal Council Portal of the Swiss government.

²¹ Kela 2016.

²² SEWA Bharat 2014.

²³ Chin-Chin Cheng 2017.

It is not necessary that every worker has to become a coder. However, workers without certain level of technical knowledge are more likely to be left behind.

As technology innovation continues, workers need to upgrade their skills. They have to keep learning to meet the need of different skills required by new jobs.

An efficient mechanism of job training and continuing education will help workers be hired or navigate job transitions more successfully.

No one has all the answers regarding the impact of the 4th Industrial Revolution. One thing is for sure though. the 4th Industrial Revolution will speed up computer-related automation, disrupt the labour market. In the course of lifelong education, all workers will be required to learn new skills in order to survive in the future labour market.

Some industries will decline, while new industries will emerge. Without doubt, there will be jobs that nobody in the past ever predicted.

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