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Hyungkee Kim

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**The Knowledge-Led Accumulation Regime: A Theory
of Contemporary Capitalism**

Hyungkee Kim

Visiting Scholar, Center for Korean Studies
University of California, Berkeley
Professor, Kyungpook National University, Korea

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The Knowledge-Led Accumulation Regime: A Theory of Contemporary Capitalism

Hyungkee Kim

(Kyungpook National University, Korea)

Abstract

The knowledge-led accumulation regime (KLAR) is a new accumulation regime that emerged as a way out of the crisis of Fordism. Even though it has a polarization tendency, KLAR has elements of an alternative development model beyond both Fordism and neoliberalism, since it could upgrade workers' knowledge and enhance autonomy of workers. I attempted to propose a theory of KLAR that is an economic base of contemporary capitalism. Based on the Regulation theory with a relational approach and a micro-macro nexus analysis, I investigated the structures and dynamics of KLAR on the micro-and macro-level. On the micro-level, the analysis focused on the knowledge firm in which knowledge capital and knowledge labor interacts in employment relations. On the macro-level, I tried to show how the macroeconomic circuit of KLAR is completed. Moreover, the directions of institution building for a sustainable KLAR were suggested. Lastly, I clarified how institutional diversity results in alternative KLARs

I. Introduction

The latter half of the twentieth century of Western capitalism might be characterized as the era of the rise and fall of Fordism. Fordism, which was an accumulation regime that prevailed from the 1950s to the early 1970s in the developed countries, fell into crisis in the mid-1970s. With the decline of Fordism and subsequent undermining of social democracy in the late 1970s, neoliberalism emerged in the 1980s. Financial liberalization and globalization due to a deregulation policy of neoliberalism facilitated the emergence of finance-led accumulation regime (FLAR). FLAR is an accumulation regime in which

financial capitals subordinate industrial capitals and flows of finance dominate the macroeconomic circuit.

Meanwhile, knowledge-based economy (KBE) has been rising since the 1990s as a way out of long stagnation of the mass production economy in the 1980s. Information technology revolution and globalization facilitated the transition from the mass production economy to the KBE. A new pattern of accumulation has been emerged in the KBE. From the observation of these trends, I have coined a concept, 'knowledge-led accumulation regime' (KLAR) (Kim 2007) as a new accumulation regime after Fordism. KLAR is an accumulation regime in which knowledge and innovation play major roles in value creation, income distribution and economic growth.

Therefore, in the last decade of the twentieth century, we can identify the two different accumulation regimes, FLAR and KLAR, which are two different ways out of the crisis of the Fordist accumulation regime. In some countries, especially in the US, FLAR and KLAR emerged in sequence, and finally, the two have merged. However, in principle, the socio-economic context from which each regime emerges is quite different. While one of the main factors of the rise of FLAR is political supremacy of financial capital, that of KLAR is technical supremacy of information technology. In the former case, there was a power shift from industrial capital toward financial capital, while, in the latter case, there was a shift of technological paradigm from automation technology to information technology.

FLAR has been established in the countries with a liberal market economy in which financial liberalization is completed and financial capitals dominate industrial capitals through corporate governance. The U.S. economy which is dominated by Wall Street might be a typical example of FLAR. Since the U.S. leads the world economy and international financial markets are dominated by the multinational financial capitals originated from the U.S., it could be said that almost all the countries in the world are under the influence of the FLAR in the U.S.

KLAR emerged in countries in which both the proportion of knowledge investment and the knowledge level of the workers are high, regardless of the type of the market economy, that is, liberal market economy and coordinated market economy. In major OECD countries, there was a shift in accumulation regime from Fordism to KLAR. Knowledge and innovation have become key factors of capital accumulation and economic growth in those countries. The pattern of economic development in a KLAR is often characterized as 'innovation-driven development' in contrast to the input-driven development in Fordism.

The primacy of shareholder value and subsequent short-termism, which are main characteristics of FLAR, have broken down the compromise made between labor and management under Fordism and have given rise to severe volatility. Therefore FLAR has an inherent tendency to intensify inequality and instability. Finance-led accumulation regime would not be sustainable because it might bring about a socio-political crisis (Boyer 2000). KLAR also tends to accompany polarization by widening the knowledge gap and creating a digital divide. Nevertheless, knowledge-led accumulation regime has elements of an alternative development model beyond both Fordism and neoliberalism, in that it could upgrade workers' skill and knowledge and enhance autonomy of workers in knowledge firms.

Even though numerous articles and books have been written on the KBE, we can seldom find any attempt to construct a theoretical framework of KLAR comparable to Fordism analyzed by the Regulationist approach. Some tried to theorize about FLAR from the perspective of Regulation theory (Chesnais 2002, Boyer 2004). One can find a lot of research on the effects of knowledge upon business management and economic growth. And we can see many micro-level studies on the behavior of firms in the KBE. Theories of knowledge firm (Nonaka 1991, Burton-Jones 1999) would be a promising result of those studies. In contrast, it is not easy to find out macro-level studies on accumulation pattern in the KBE. Moreover, a comprehensive theory about KLAR from a micro-macro nexus approach remains to be achieved.

In this paper, I attempt to propose a theory of knowledge-led accumulation regime that is an economic base of contemporary capitalism. My theoretical framework is built on the Regulation theory with a relational approach and a micro-macro nexus analysis. Regulation theory has a viewpoint that dynamics of accumulation is mediated by institutions that are formed through struggles between social groups¹. According to Regulation theory, specific institutions create a mode of regulation that causes a specific macroeconomic dynamics in an accumulation regime (Billaudot 2002). Relational approach tries to clarify interactions between opposing entities within system or between systems (Sherman 1995). And a micro-macro nexus analysis attempts to find out both macro-foundations of the micro and micro-foundations of the macro (Coriat and Dosi 2002). In other words, it tries to show how macroeconomic structures and microeconomic structures are interacting (Brown and Reich 1997). A loop that generates interactions between macroeconomic structures and microstructures is

¹ Regulation theory has a theoretical common ground with Social Structures of Accumulation theory in that both of them consider the capital accumulation process as the product of the supporting role played by a set of social institutions (Kotz 1994).

institution. According to this theoretical perspective, institution is a key parameter in analyzing capital accumulation and economic growth.

I will investigate the structures and dynamics of KLAR on the micro- and macro-level. First, on the micro-level, the analysis will focus on knowledge firm in which knowledge capital and knowledge labor interacts in employment relations. Secondly, on macro-level, I will show how the macroeconomic circuit of KLAR is completed. Thirdly, I will suggest the direction of institutional building for a sustainable KLAR. Lastly, I will clarify how institutional diversity in terms of type of market economy and development model results in alternative KLARs.

II. Structures and Dynamics of the Knowledge-led Accumulation Regime

Relational Approach to Knowledge: Knowledge Capital or Knowledge Labor?

In order to understand the structures and dynamics of KLAR on the micro- and macro- level, a relational approach² to knowledge as well as a functional approach is necessary. The relational approach to knowledge focuses on 'production relations' aspect of knowledge, while the functional approach on 'productive forces' aspect of knowledge.

The functional approach treats knowledge, which comprises science, technology, and skills, as productive forces³. Knowledge, as a factor of production, plays a major role in value creation and thus is the main source of wealth. Knowledge includes explicit or codified knowledge and tacit knowledge. In value-creating by knowledge, productive interplay between explicit and tacit knowledge within a firm and between firms is important (Harrison and Kessels 2004: 50). Tacit knowledge plays a decisive role in group innovation within the firm (Leonard and Sensiper 1998). Research and development (R&D) and human resources development (HRD) are two major knowledge-creating activities. In the KBE, value-creation begins from knowledge-creating activities in the universities or research institutes. The functional approach focuses on the effects of knowledge on productivity and economic growth.

² The relational approach is defined as one that begins with relations in society rather than with individuals or things (Sherman 1995: 25)

³ Types of knowledge includes know-what, know-why, know-how, and know-who (OECD 1996) For the workers in the production processes, knowledge is also problem-recognizing or problem-solving abilities.

The relational approach focuses on relationships between knowledge capital and knowledge labor⁴ in the accumulation processes and analyzes their effects on the economy. In the production processes, knowledge is embodied in either capital or labor. Thus knowledge takes the form of either knowledge capital (such as patents, copyrights, software) or knowledge labor (such as skill, ability, creativity) in the firm. Unlike the Drucker's argument that as knowledge becomes the prime factor distinction between capital and labor does not have a meaning any longer in a knowledge society (Drucker 1994), capital-labor relations take a new form of 'knowledge capital-knowledge labor relations'. The owner of knowledge labor (knowledge workers) and the owner of simple labor (simple workers) enter into production relations with the owner of physical capital and with the owner of knowledge capital. The status of intellectual property rights and the pattern of knowledge investment in the firm shape the characteristics of the relations between knowledge capital and knowledge labor. The relational approach focuses on the structures and dynamics of these relations.

The two approaches should be combined in analyzing the KLAR. Most literature on the KBE is based on the functional approach without combining the relational approach. This one-sided approach is incomplete and misleading in clarifying the structures and dynamics of the KLAR. First of all, relations between knowledge capital and knowledge labor have significant effects on productivities of the firm. Moreover, they are basic elements of structures and dynamics in the KLAR. In this paper I adopt the relational approach to knowledge while still taking into account the effects of the functional aspects of knowledge.

Starting point of analysis should be the commodification of knowledge, which is the foundation of the KBE. Originally, knowledge as a heritage of human being was a common assets and thus has been public goods. In the knowledge-based economy, knowledge itself is the object of selling and buying and is privatized extensively. Through commodification, knowledge is transformed into either knowledge capital or knowledge labor. Knowledge capital finds its institutional form in intellectual property rights. Knowledge labor exists only in living labor. Knowledge capital is transformed into value in knowledge firms by knowledge labor of knowledge workers.

⁴ In neoclassical literatures, the term 'human capital' is used for knowledge labor. Here, we define the concept of capital by the relational approach not by the functional approach. According to the relational approach, capital is a subject of domination and appropriation of surplus value in capital-labor relations. Functional approach consider capital as assets from which flow of returns accrue.

When knowledge capital is transacted in the market and used in the production processes, the problem of intellectual property rights is raised. Optimal protection of intellectual property rights for knowledge creation and dispersion is the core problem. As for knowledge labor, there will be problems of the knowledge gap and digital divide among workers. Knowledge gap might become the most important factor in wage inequality in the KBE.

From the perspective of relational approach to knowledge, what is a more fundamental problem is whether knowledge is embodied in knowledge capital or in knowledge labor. This has a decisive meaning in shaping income distribution pattern and the structures and dynamics of an accumulation regime. As we will discuss below, the more knowledge is embodied in knowledge capital rather than in knowledge labor, the greater inequality will be, and the stronger the knowledge capital-led accumulation will be.

Knowledge Firms, Productivity Regime, and Income Distribution

From the relational approach, we can derive the micro constituents of KLAR: knowledge capital, knowledge labor, knowledge firm, and knowledge workers. These elements comprise the productivity regime. An accumulation regime in the macro-level has its own productivity regime in the micro-level. Productivity regime represents the ways by which firms gain productivity. Productivity regime is one of the major determinants of the pattern of income distribution. Both knowledge capital and knowledge labor are main elements of productivity regime in the KBE. When knowledge capital and knowledge labor are put as factors of production, the production function can be described as follow:

$$y=f(KC, PC, KL, SL)$$

where KC is knowledge capital, PC is physical capital, KL is knowledge labor, and SL is simple labor.

The important indicators in analyzing the characteristics of productivity regime are knowledge intensity of capital (α) and knowledge intensity of labor (β). The former can be defined as $\alpha=KC/(PC+KC)$, the latter as $\beta=KL/(KL+SL)$. If, in the economy as a whole, knowledge intensity of capital is greater than knowledge intensity of labor ($\alpha>\beta$), knowledge capital-intensive productivity regime will prevail. Conversely, if knowledge intensity of labor is greater than knowledge intensity of capital ($\alpha<\beta$), knowledge labor-intensive productivity regime will prevail.

Knowledge capital and knowledge labor are formed by knowledge investment. Knowledge investment (KI) is comprised of R&D investment (Ird) and HRD investment (Ihrd)⁵. So, $KI=Ird+Ihrd$. R&D investment could bear fruit in knowledge capital, that is, patent, copyright, and software. HRD investment (investment in education and training) might be realized in knowledge labor, that is, skills, ability, and creativity. If, in the economy as a whole, the proportion of R&D investment (Ird/KI) is higher than the proportion of HRD investment ($Ihrd/KI$) or $\alpha>\beta$, there will be a R&D-intensive productivity regime. If the proportion of HRD investment ($Ihrd/KI$) is higher than the proportion of R&D investment (Ird/KI) or $\alpha<\beta$, there will be a HRD-intensive productivity regime.

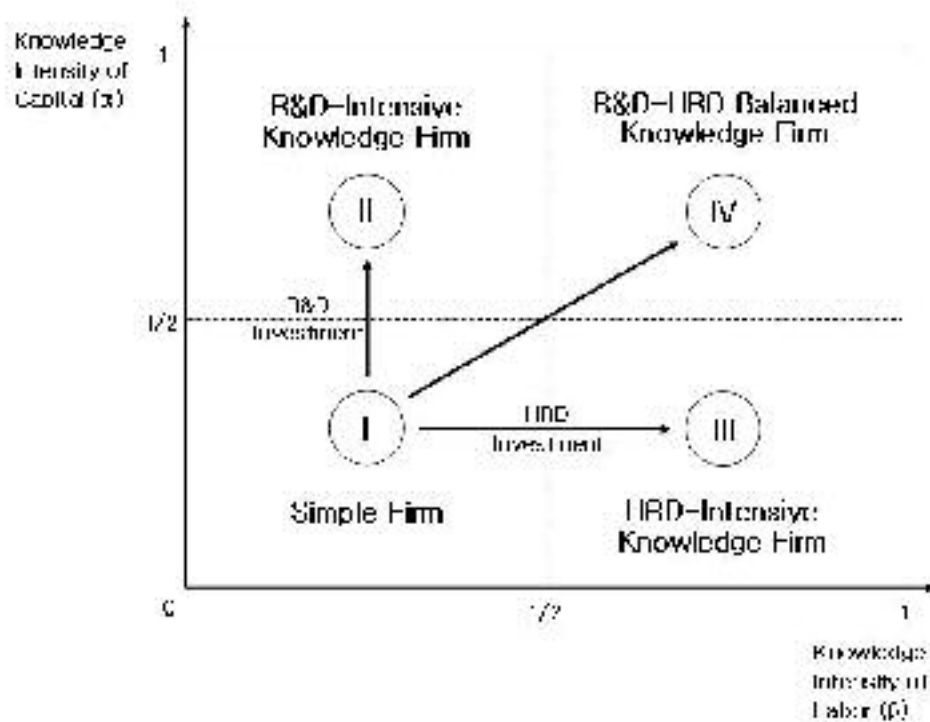
Now, we can classify types of the firm into simple firm and knowledge firm. Simple firm is one with low knowledge intensity of capital and low knowledge intensity of labor. Knowledge firm is one with high knowledge intensity of capital and/or high knowledge intensity of labor. Again, knowledge firm is divided into R&D-intensive knowledge firm with high knowledge intensity of capital and low knowledge intensity of labor, and HRD-intensive knowledge firm with high knowledge intensity of labor and low knowledge intensity of capital. Therefore, we have four types of firm as shown in Figure 1: simple firm (Type I) if $\alpha<1/2$, $\beta<1/2$, R&D-intensive knowledge firm (Type II) if $\alpha>1/2$, $\beta<1/2$, HRD-intensive knowledge firm (Type III) if $\alpha<1/2$, $\beta>1/2$, and 'R&D-HRD balanced knowledge firm' (Type IV) if $\alpha>1/2$, $\beta>1/2$. Type IV knowledge firm is a firm with both high knowledge intensity of capital and high knowledge intensity of labor. It can be named as 'perfect knowledge firm'.

In R&D-intensive knowledge firm, there is asymmetrical distribution of knowledge biased toward knowledge capital. In HRD-intensive knowledge firm, there is another asymmetrical distribution of knowledge biased toward knowledge labor. In a R&D-HRD balanced knowledge firm or perfect knowledge firm, there might be a symmetrical distribution of knowledge between capital and labor and almost all workers might become knowledge workers. Knowledge worker is one who on the base of his or her knowledge of production system can perform conception function in the labor process⁶.

⁵ According to OECD definition, knowledge investment includes R&D investment, software investment, and education investment. Here I regarded that software can be included into either R&D investment or education investment, since most soft ware investment overlap with R&D or education investment.

⁶ Knowledge workers belong to the group of scientists, engineers, ICT specialists, technicians that generate knowledge (OECD 2001).

Figure 1. Types of Knowledge Firm



Distribution of knowledge determines distribution of income. Other things being equal, labor's share will become larger in a firm where knowledge intensity of labor (β) is greater than knowledge intensity of capital (α) and the proportion of HRD investment (I_{hrd}/KI) is higher than the proportion of R&D investment (I_{rd}/KI), and thus a HRD-intensive productivity regime exceeds R&D-intensive productivity regime. If α is greater than β , then capital's share will become larger. This income distribution pattern will shape the demand regime in KLAR. Since knowledge is typically put to use under conditions of increasing returns, so-called 'winner-takes-all' situation arises. This is reinforced by the cumulativeness that learning, which is a process of knowledge acquisition, typically entails. Dynamic increasing returns tend to yield path-dependency. In systems characterized by non-linearities and positive feedbacks, history matters (Dosi 2000: 32). Therefore, if knowledge is distributed unequally, income inequality in the KBE tends to be aggravated.

In a perfect knowledge firm, employer and knowledge workers can enter into partnership in knowledge creation or skill formation. As the knowledge intensity of capital and labor become higher, the antagonism inherent in capital-labor relations could

be mitigated, since there might be a cooperation game between knowledge capital and knowledge labor. Thus, cooperative industrial relationships may prevail in the perfect knowledge firm. While the antagonism of capital-labor relations within the perfect knowledge firms will be reduced, a new type of antagonism between knowledge 'haves' and 'have nots' on a societal level will be formed.

Behaviors of Firms and Workers in Knowledge-Based Economy

The most important factors in the dynamics of an accumulation regime are the behaviors of firms and workers. Here, I will analyze how firms demand knowledge labor and how the workers respond to firm's behavior. And what are the effects of such behaviors of firms and workers on labor market, labor process, and business organization.

The fundamental difference between the mass production economy and the KBE is that in the latter firms demand more knowledge labor and less simple labor than in the former. New technologies such as information technology, biotechnology, and nanotechnology adopted in knowledge firms demand more high-skilled workers and less low-skilled or unskilled workers. Skill-biased technical change is occurring. For example, there has been a steady rise in the share of jobs requiring knowledge such as problem-solving abilities and interactive (communication) skills, especially during the 1980s and 1990s in the U.S. (Karoly and Panis 2004, 109-110). In the knowledge firms, complementarities between high technology and high skills exist. Especially, in the HRD-intensive knowledge firms, the proportion of knowledge workers will be great.

According to the knowledge-based theory of the firm, the primary role of the firm is to protect and integrate specialized knowledge. As Burton-Jones (1999) points out, knowledge-based theory of the firm predicts that economic activities with high level tacit firm-specific knowledge will remain in the firm. Conversely, those with high level explicit non-firm-specific knowledge will move into the market. The former is internalization processes of knowledge, while the latter is externalization processes of knowledge. Dual processes of internalization for a tacit firm-specific knowledge and externalization for explicit general knowledge will proceed. These processes of externalization and internalization are products of firm's response to a techno-economic paradigm. Increasing knowledge codification made possible by information technology contributed to externalization of knowledge (Caroli 2007). So we can give a following proposition.

Proposition 1: In order to protect and integrate knowledge, knowledge firm will internalize firm-specific, tacit, and core knowledge, while it will externalize general, explicit, and non-core knowledge. In short, ‘internalization-externalization’ process of knowledge will exist in the KBE.

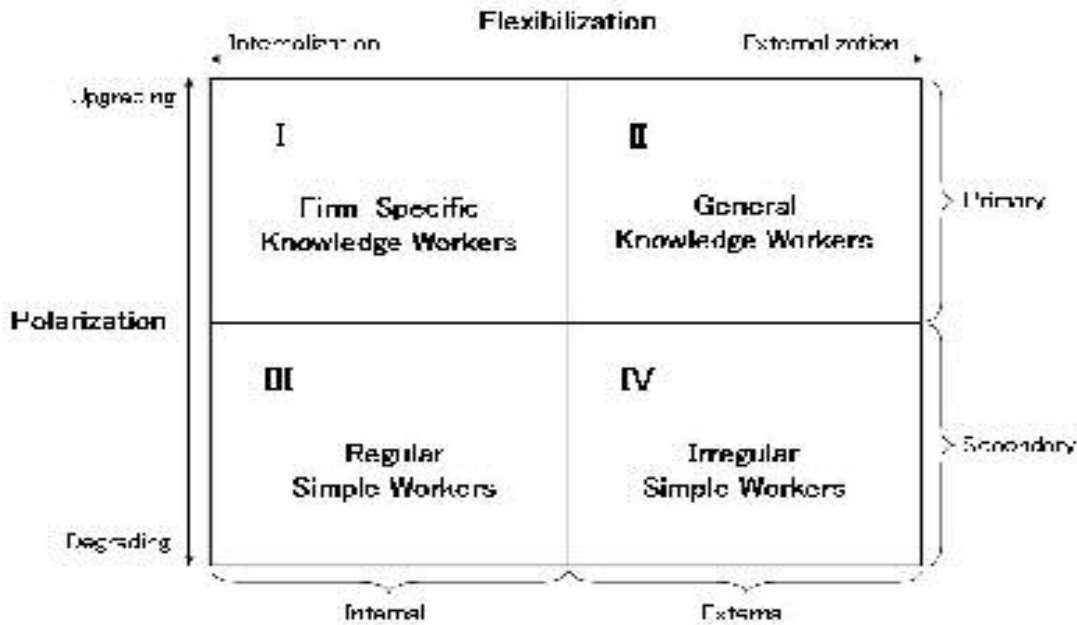
Corresponding to the dual processes of internalization and externalization of knowledge, labor market for knowledge workers will be divided into internal labor market for workers with firm-specific knowledge and external labor market for the workers with general knowledge. Internal and external labor markets are divided into primary market for knowledge workers and secondary market for simple workers. Features of internal labor market including long-term employment and internal promotion tend to disappear for most workers except core firm-specific knowledge workers. There will be flexibilization of labor market by which contraction in the internal labor market and expansion in the external labor market proceeds. The shift from regular full-time employment to non-standard employment will occur. Knowledge workers might benefit from high employability, high wage, and job stability (in the case of firm-specific knowledge workers) or labor mobility (in the case of general knowledge workers). Simple workers, who have no specific or general knowledge for which production system requires, will suffer from low employability, job instability, and low wage. This discussion leads us to the following proposition.

Proposition 2: In the knowledge-based economy, ‘flexibilization-polarization’ of labor market will emerge. Flexibilization process of labor market for knowledge workers will come along between internal labor market for firm-specific knowledge workers and external labor market for general knowledge workers. Polarization process of labor market will proceed between primary market for knowledge workers and secondary market for simple workers.

Proposition 2 is derived from proposition 1. The ‘flexibilization-polarization’ of labor market is the result of ‘internalization-externalization’ of knowledge and skill-biased technical change. This trend is consequence of employers’ response to the growing importance of knowledge in value creation, whether or not firms pursue neoliberal strategies in order to achieve greater flexibility of labor market. It is important to recognize that the knowledge-based economy will accompany flexible labor market irrespective of neoliberalism. Needless to say, if this trend is coupled with the neoliberal strategy, polarization of the labor market will proceed further. Actually, neoliberalism

can have complementary relation with KBE. In this respect FLAR can merge with KLAR. The former could be a conservative response to the demand of labor market flexibility in the latter.

Figure 2. Labor Market Structure in the Knowledge-Based Economy



From Proposition 2, we can infer that labor market in the KBE will be divided into four submarkets as shown in Figure 2: primary internal market for firm-specific knowledge workers (I), primary external market for general knowledge workers (II), secondary internal market for regular non-knowledge workers (III), secondary external market for irregular non-knowledge workers (IV). There are two processes in this labor market structure in the KBE. One is flexibilization process of labor market in which externalization and internalization of knowledge coexist. The other is polarization process in which upgrading and degrading of knowledge coexist.

This labor market structure in the KBE is rather different from the labor market segmentation in mass production economy. In mass production economy of the 1960s and 1970s in developed countries, the proportion of knowledge workers was small and primary external labor market for general knowledge workers did not exist. There was relatively high job stability in internal labor markets for the semi-skilled majority workers protected by collective bargaining power of the labor unions and/or labor laws

(Gordon, Edwards, Reich 1982). So, it can be said that ‘stabilization-segmentation’ process emerged between primary internal labor market and secondary external labor market. Since larger part of workers employed in primary market, even though there was segmentation, no significant polarization in labor market could be found. As the mass production economy shifted to the KBE, labor market structure transformed from ‘stabilization-segmentation’ process to ‘flexibilization-polarization’ process.

Let’s see labor process in the knowledge firm. Unlike the Fordist labor process where workers deprived from knowledge have rigidly-defined repetitive jobs, workers can perform the conception function through knowledge labor with greater autonomy in the labor process in the knowledge firm (Kim 2001, 501-502). Core knowledge workers whose functions are internalized in the firm not only can perform conception function but also can have substantial autonomy. This tendency might be more prominent in the HRD-intensive knowledge firm rather than R&D-intensive knowledge firm. From this argument, the following proposition can be described.

Proposition 3: In the knowledge firm, unity of conception and execution is realized in the labor process of knowledge workers. Anti-Taylorist labor process could prevail especially in the HRD-intensive knowledge firm or perfect knowledge firm.

As the knowledge intensity of labor in the firm increases and individuals in the firm are much more easily informed of business management through information technology, vertical disintegration in the firm organization is fostered (Karoly and Panis 2004: 186-191). IT reduced the necessity of hierarchical control. Thus, as a new technological paradigm, information technology has an affinity with a new organizational paradigm represented by the network model (Schienstock 2004). Work organizations are restructured into the ensemble of autonomous work teams of knowledge workers. Mode of coordination within the firm shifts from hierarchical control to network coordination. Worker ownership and participation tend to be positively associated with knowledge intensity of labor. In the knowledge firms, many of the distinctions between owners as employers and knowledge workers as employees lose their relevance (Alan Burton-Jones 1999: 56). From this transformation in organizational structures of the knowledge firm, we can get the following proposition.

Proposition 4: The greater the knowledge intensity of labor is, the less hierarchical the business organization will be and the higher level of autonomy of workers will be. High

knowledge intensity of labor will facilitate a shift in organizational paradigm from hierarchical model to network model.

Proposition 4 is derived from proposition 3. Codetermination by labor and management will have real foundation in a perfect knowledge firm. High skill, high autonomy, high participation, and high productivity' of workers are combined in a perfect knowledge firm. Therefore a perfect knowledge firm can have a high performance work organization or post-Fordist labor process beyond Fordist labor process in which conception is separated from execution and workers deprived of knowledge are excluded from participation in workplace and strategic decision-making.

How would knowledge workers respond to the internalization and externalization behaviors of the firms? In externalization circumstances, knowledge workers will have orientation to accumulate general knowledge transferable to other firms rather than to increase firm-specific knowledge. In short, knowledge workers tend to have a career orientation instead of a job orientation (Burton-Jones, 1999: 20). Workers' propensity to turnover will be high. Workers who have general knowledge and are highly mobile become 'e-lancers', that is, electronically connected free-lancers (Karoly and Panis 2004). Conversely, in internalization circumstances, workers will have interest in accumulating firm-specific knowledge with long-term commitment to the firm. In this case, knowledge workers tend to have a job orientation rather than career orientation.

In the KBE, firms have to innovate more frequently as new knowledge replaces old knowledge at an ever-increasing rate. In the IT industry in which the speed of technological changes is relatively high, radical innovation is necessary. In R&D-intensive knowledge firms in which radical innovation is occurring and most functions are externalized, knowledge workers tend to have a career orientation rather than a job orientation. In HRD-intensive knowledge firms where incremental innovation is occurring and the proportion of internalization of functions is high, knowledge workers will have a job orientation rather than a career orientation. Therefore, the following proposition can be posited.

Proposition 5: Whether knowledge workers have a job orientation or a career orientation in response to the internalization and externalization behaviors of the firms depends on firm-specificity of knowledge and pattern of innovation. Knowledge workers tend to have a career orientation rather than job orientation when firm-specificity of knowledge is low and radical innovation prevails.

What would be the effects of these changes on the behavior of labor unions? Since knowledge level of workers becomes the decisive factor of employment and wage level, traditional wage struggles of labor unions without improving the knowledge level or skill level of workers will be less effective and unsustainable. The confrontational tactics of labor union for simple wage increases will lose effectiveness and legitimacy. Centralized wage bargaining also will be less effective. If the major aim of labor unions is enhancing the quality of life of workers, labor unions will be needed to focus on supporting their members to become more highly skilled and to have higher level of knowledge. In response to the externalization behaviors of firms, labor unions could have a career-related rather than job-related education and training strategy, as shown in such labor unions as FNV in Netherlands⁷ and a branch of AFL-CIO in Silicon Valley⁸. So, we get the following proposition.

Proposition 6: In the KBE, labor unions will face the need to follow solidaristic knowledge policy to equalize the skill or knowledge level of workers beyond the existing solidaristic wage policy to reduce wage differentials among the workers. Upgrading the knowledge level of the less educated or trained workers not only within firm but also beyond firm might become a new egalitarian policy of labor unions.

Knowledge creation in the firm is a holistic process, since knowledge is developed not only in the individual brain but also through social interactions. Knowledge cannot be separated from the context. It is embedded in the workplace (Nonaka and Konno 1998). And learning is a socio-cognitive process as well as an individual cognitive experience (Harrison and Kessels 2004). Therefore, in the production function described above, complementarities between inputs, that is, complementarities between knowledge capital (KC) and knowledge labor (KL) and complementarities between knowledge labor (KL) and simple labor (SL) are important for value creation in the knowledge firm. And there are complementarities between R&D investment and HRD investment

⁷ The training strategy of FNV (Trade Union for Workers in the Industry) was the idea of ‘investments contracts’ regarding job security and training. The idea of investment contracts recommended by the Foundation of labor was to create a well-trained and flexible workforce (Wilthagen 1998).

⁸ In Silicon Valley, Amy Dean, head of the South Bay Central Labor Council, has initiated training programs with a local junior college for a mobile, educated workforce. She called for regional training partnerships that can develop “move-up” programs for employees to increase their skills and income levels. This innovative organizer attracted extraordinary attention since she created a strategic role for unions in the KBE and contributed to reinvent labor movement in the age of the KBE, when workers are often freelance agents rather than attached to one firm for life (“Back to the Future: Labor in Silicon Valley”, By interview by Kerry Tremain, Blueprint, June 1, 2000)

because R&D investment demands R&D personnel (Fuente and Ciccone 2002). In a learning organization of knowledge firm, cooperation between knowledge workers and simple workers is essential in value creation. Sharing tacit knowledge in a learning organization is also required. These mean that social capital such as trust and cooperation between individuals that builds and sustains knowledge-productive relationships in the workplace is indispensable. So we can have the following proposition.

Proposition 7: Knowledge creation for value creation in the knowledge firm requires social capital which encourages interactive learning in the workplace. Complementarities among knowledge capital, knowledge labor, and simple labor are the sufficient condition for knowledge creation in the knowledge firm.

Macroeconomic Circuit of Knowledge-Led Accumulation Regime

An accumulation regime consists of productivity regime and demand regime. As described above, the way to gain productivities determines the characteristics of the productivity regime. And the way to distribute the productivity gains determines the contents of demand regime. When the productivity regime matches the demand regime, a macro-economic circuit is accomplished⁹. To achieve a continuous and stable macro-economic circuit, it is necessary to build a package of institutions by which the behaviors of economic agents are compatible with the overall logic of an accumulation regime.

If we use this analytical framework, we can describe the macroeconomic circuit of the KLAR as shown in Figure 3. In KLAR, flexible quality production system is the foundation of productivity regime and diversified consumption of high-tech commodities (high-tech durables, education- and culture-related services) is the core of demand regime. In KLAR, virtuous circle is achieved through matching flexible quality production to diversified consumption.

High value-added is created through innovation and the economies of variety (Storper and Salais 1997: 31-32) and anti-Taylorist labor process with information technology. Innovation in products and process brings about high productivity and thus creates high value-added. Economies of variety, which is realized in flexible quality production, can

⁹ As for Fordist accumulation regime, mass production system in simple firm was the base of the productivity regime and the pattern of mass consumption was the core of the demand regime. In the mass production economy, macroeconomic circuit was completed through matching mass production to mass consumption.

be secured by knowledge investment including R&D investment and HRD investment. As we have discussed above, IT or flexible technology tends to bring about 'skill-biased technical change' and knowledge firms demand knowledge workers. Thus, in the anti-Taylorist labor process in which conception is united with execution, creation of high value-added from multi-skilling or high skills of workers is expected to result. High value-added is secured by high value-creating power of the knowledge labor with job autonomy.

High value-added makes high wages possible. Institutional forms like collective or individual bargaining system and skill pay or knowledge pay as wage system can really transform high value-added into high wages. With high wages, knowledge workers can purchase diverse high-tech goods, information goods, and education/culture services. Rather than mass consumption of durables with less variety, diversified consumption of high quality goods and services make flexible quality production possible. High value-added is shared out into high wages, high profits, and free time. High profits can finance high level of knowledge investment including R&D investment and HRD investment. And knowledge investment contributes to knowledge formation and innovation indispensable for a flexible quality production system. High wages coupled with the growth of free time through reduction in working time gives workers opportunities for self-development through learning. Learning, a new way of life in the KBE, transforms simple labor into knowledge labor, simple workers into knowledge workers, and reproduces knowledge labor and knowledge workers. In this way, a macroeconomic circuit of KLAR is sustained in an innovation-driven development¹⁰.

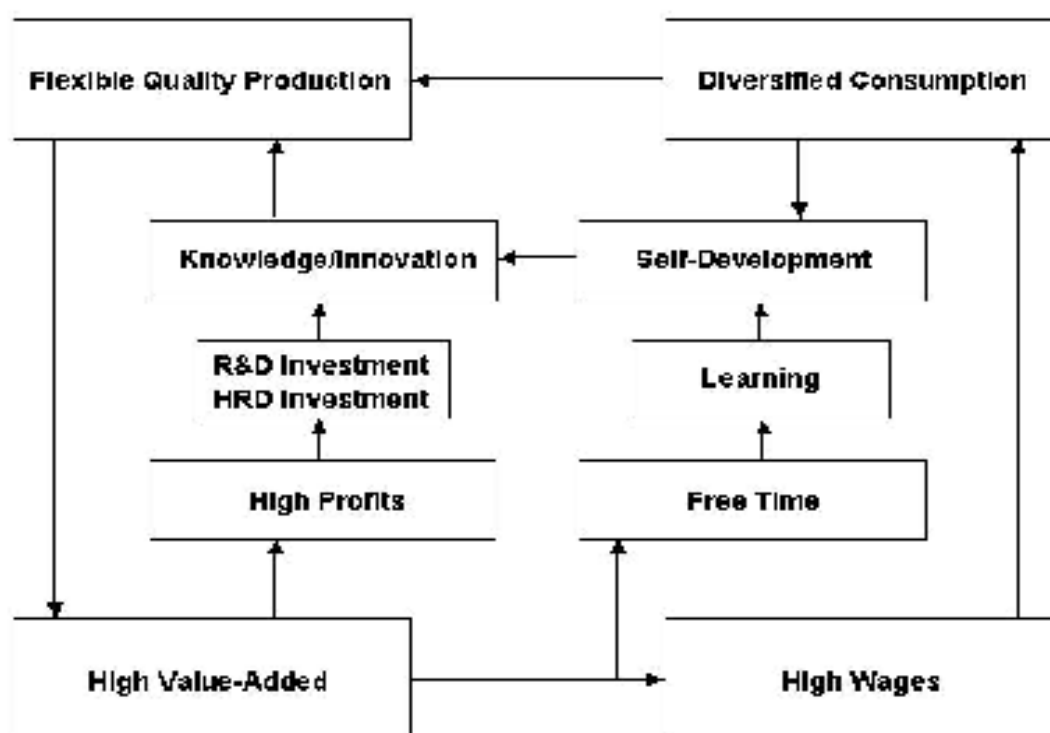
There is positive feedback mechanism in knowledge creation which brings about polarization within macroeconomic circuit of KLAR. From the proposition 1 and proposition 2 described above, we can expect internalization and externalization of knowledge by firms and subsequent polarization of labor market in KLAR. In this situation a positive feedback mechanism between knowledge formation and income distribution will exist.

With protection of intellectual property rights and increasing returns to knowledge, an individual or a firm with higher level knowledge capital, that is, intellectual property

¹⁰ In a real KBE, there must be economic sectors that exist on the periphery or outside of the macroeconomic circuit of KLAR. KLAR needs the sectors in which simple firms produce low value-added products on a subcontract basis, without significant R&D and/or HRD investment and with non-knowledge workers paid low wages. These low value-added and low wages sectors complement the KLAR through supplying simple assembly or manufacturing processes to the latter. Thus a real KBE is comprised of KLAR as a core sector and its peripheral sectors and regions. This hierarchical division of labor in a KLAR might be deployed nationally and globally. Actually, global knowledge firms seek for global sourcing and outsourcing.

such as patent and software, will earn more. Higher income or profits accrued to the owners of knowledge capital make it possible for them to create higher level of knowledge capital. With knowledge gap within workers, segmentation of labor market, and skill-biased technical change, knowledge workers with higher quality knowledge labor is paid higher wage than others. Higher wages of knowledge workers make them to attain more knowledge than simple workers.

Figure 3. Macroeconomic Circuit of Knowledge-Led Accumulation Regime



In this positive feedback mechanism, a core loop is a new wealth effect. In conventional macroeconomics wealth effect is that wealth increases consumption. A new wealth effect in the KBE is that through more consumption of information goods and education and culture goods, wealth makes it possible for individual economic agent to attain more and higher knowledge which accrues higher income and thus more consumption. If the rich consumes more information goods and education services than the poor, knowledge gap between the rich and the poor becomes wider through the new wealth effect. Unlike the wealth effect in Fordist accumulation in which more consumption does not bring more wealth, a new wealth effect in KLAR is cumulative in

that more consumption results in more wealth. The consequence is that the rich becomes richer while the poor gets poorer. Thus there might be a tendency of polarization in KLAR.

Institution Building for a Sustainable Knowledge-Led Accumulation Regime

Endogenous growth theory, which is elaborated by Romer (1986) and Romer (1990), argues that since innovation is endogenous and the dynamic driver of economic growth mediated by cumulative nature of knowledge, permanent growth is feasible without any recurrent exogenous productivity shocks. Romer proposed a model where economic growth is driven by the accumulation of knowledge, that is, human capital and technology¹¹. He suggested a kind of knowledge-led or innovation-led growth model.

However, his model has a deficiency. Since innovation is a creative destruction process and entails dynamic increasing returns, it can bring about instability and inequality which might threaten sustainable growth. Therefore, even though innovation is endogenous by cumulative nature of knowledge, endogenous growth driven by innovation or knowledge is not sustainable without the mediation of relevant institutions that can not only remedy deficient demand but also reduce polarization and volatility. It is necessary to realize the institutional embeddedness of economic growth (Hollingsworth and Boyer 1997, Coriat and Dosi 1998). Endogenous growth theory missed this point. In analyzing dynamic process of accumulation regime we should consider not only endogeneity but also embeddedness of economic growth. For a sustainable KLAR, institution building is indispensable.

First of all, institution building for a sustainable innovation that makes flexible quality production possible is necessary. The science system that contributes to the key functions of knowledge production, knowledge transmission, and knowledge transfer should be built (OECD 1996). In knowledge production, government should implement institutions that ensure and subsidize the creation of science as a public goods. In knowledge transmission, it is required to provide intensive vocational training system to a larger number of workers and life-long learning system to citizens while giving high-level education and training to scientist and engineers. In knowledge transfer, knowledge networks or innovation networks, which link knowledge from different scientific and technological fields, should be constructed (Schienstock 2004). These networks should be consolidated into national and regional innovation system in which university/research institute/industry collaborations occur.

¹¹ In our terminology, equivalent of human capital is knowledge labor, and that of technology is knowledge capital.

Optimum protection of intellectual property rights (IPRs) is required sustainable innovation and social welfare. From the perspective of efficiency, IPRs protection might have dual effects to innovation. On the one hand, IPRs provide incentives to investors to develop new knowledge thus encourage innovation. On the other hand, IPRs might suppress innovation since the market exclusivity conferred by IPRs reduces competition (Fink and Markus 2005: 3). From the perspective of equity, since strong protection of IPRs bring about excessive privatization and monopoly of knowledge, it might not only aggravate inequality between knowledge haves and have-nots but also could increase welfare costs by limiting the diffusion of innovation. This could be a barrier to sustainable innovation. Thus, optimal protection of IPRs, especially optimal patent must be created. From the perspective of both innovation and social welfare, optimal IPR regime that can create balance between encouragement of innovation and its diffusion should be established. Patent protection which covers not only living substances and genes but also upstream basic scientific research will be a serious threat to the progress of basic research and social welfare such as health system. Therefore, principle of free access to the results of basic research should be realized. And proper limitations should be imposed on patents on living matters and genes (Orsi and Coriat 2005).

In the longer term, tacit knowledge rather than codified knowledge can give a firm a sustainable competitive advantage. Since tacit knowledge is always associated with people, people-centered management might be fundamental to KBE. Moreover tacit knowledge is a necessary factor for successful implementation of regional innovation system. Sharing tacit knowledge, which can not be easily codified, among the more economic actors in the regional economy is a key factor in the diffusion of innovation throughout the region (Lundvall 1992). Trust building among people is important for networking the economic actors who will share the tacit knowledge. Trust as social capital can contribute to the reduction in transaction costs and creation of partnership among actors for knowledge creation

Solidaristic knowledge policy, which not only reduces the knowledge gap between individuals/regions but also enhances knowledge level of individuals/regions equally, should be implemented for a sustainable KLAR. This policy must be designed as following directions: to strike balance between knowledge capital and knowledge labor, that is, between R&D investment and HRD investment, to increase investment in education and training for the low wage workers/low income regions and the poor/backward regions, to enlarge the knowledge network through which more people can share tacit knowledge, and to focus on knowledge bargaining initiated by labor unions. The core of solidaristic knowledge policy is to transform more simple workers

into knowledge workers and upgrade knowledge level of workers. In this respect, it is important to establish 'science-technology-skill' linkage system in which knowledge promotion ladder from skill to science and knowledge transmission route from science skill are interfacing.

Collective wage bargaining system of annual wages in the form of skill pay or knowledge pay is necessary for high value-added to be shared out into high wages. Given the large knowledge gap between workers, individual bargaining system with weak labor unions or no unions will result in great wage inequality. Therefore, in an individual bargaining system that can best be shown in Silicon Valley, there might be a polarization process in KLAR. Collective bargaining system with strong labor unions could curb polarization in KLAR. In order for high value-added to be shared out into HRD investment, skill bargaining or knowledge bargaining, through which labor unions ask for skill or knowledge upgrading of workers, is necessary. This means that the focus of collective bargaining might shift from wage bargaining to skill bargaining and further to knowledge bargaining in the KBE. Skill bargaining or knowledge bargaining, if it has meaningful effects, will push the firms towards HRD-intensive knowledge firms or R&D-HRD balanced knowledge firms. Therefore, intensive skill bargaining or knowledge bargaining prevailed throughout the leading sectors of the economy will contribute to the formation of the virtuous circle of KLAR.

Flexicurity of labor market is required for a sustainable KLAR. As mentioned above, the KBE, in which rapid technological changes occur, demand high flexibility of labor market. Especially in the industries in which radical innovation emerges, labor market flexibility is indispensable. In this case, to sustain static stability of employment is really impossible. Therefore an alternative policy might be 'dynamic stability of employment' (Lipietz 1992) which can be realized by flexicurity of labor market. As for the labor market in KBE, flexibility without security as well as security without flexibility is not sustainable since the former intensifies polarization and the latter brings about 'high cost-low efficiency'. Only flexicurity (flexibility with security) of labor market might be sustainable. Here security is about building and preserving worker's ability to remain and move up in the labor market. Thus, flexicurity can be achieved by a policy mix that includes low employment protection, high unemployment protection with a generous welfare system, and active labor market policy (Wilthagen 1998). A new welfare regime, is indispensable for flexicurity of labor market

Learnfare regime as a new welfare regime is necessary for a sustainable KLAR. As described before, in Schumpeterian workfare regime which is common ground in any type of KLAR, there is a tendency of labor market polarization due to knowledge gap

and digital divide among workers. Knowledge gap among workers gives rise to difference in employability and wage differentials. In other words, knowledge gap accompany difference in job opportunity and quality and thus difference in welfare. Therefore, in order to realize social cohesion, workfare regime should be complemented by a learnfare regime in which more workers have opportunity to enhance their skill and knowledge level through intensive education and training. A higher proportion of HRD-intensive and R&D-HRD balanced knowledge firms with active labor marker policy and solidaristic knowledge policy will contribute to realize the new welfare regime.

Reduction in working time is necessary to receive increased education and training required in a labor-process model based on conscious involvement (Lipietz 1992). Especially in KBE, the growth of free time by reduction in working time is a necessary condition for enhancing innovation abilities and creativity of workers. However, increased free time is only a necessary condition not a sufficient condition. Learning is a sufficient condition for simple workers to become knowledge workers. In the circumstances of rapid technological change in the KBE, implementing lifelong learning system for workers is required.

A financial system to support innovative knowledge firms is crucial. The development of venture capital for start-up and growth of knowledge firm is necessary either in market-based financial system or in bank-based financial system. Financial capital's commitment to knowledge capital and knowledge labor is important to sustain a virtuous circle. We need a stable capital market that channels funds to innovators and a perfect credit market that lends money for education and training to students and workers.

Perhaps the most important thing in KLAR is reconstructing the demand regime that corresponds to the productivity regime. Beyond the existing demand for consumer durables, a new demand for services such as education, culture, and information useful for knowledge formation and innovation should constitute major parts of the aggregate demand. This new demand regime will contribute to boosting the aggregate demand as well as to enhancing innovation capability of workers.

Unlike in the Fordist accumulation regime in which mass production is matched with mass consumption in a relatively autonomous way, KLAR does not have a structure of demand increase which can correspond to the ever-expanding supply capacity that innovation-driven productivity regime provides. Moreover, since skill-biased technical change occurs in KBE, polarization between high-skilled knowledge workers and low-skilled workers will be intensified. Only knowledge workers, who are small segment of

the working class, are paid high wages. So, there is a possibility of a serious deficiency in demand.

From the sustainability perspective, two major problems with KLAR might be deficient demand regime and polarization tendency. Therefore in order to sustain the virtuous circle of the KLAR, macroeconomic policies to address a deficient demand regime and socio-economic policies to reduce polarization should be implemented. In addition to the Schumpeterian intervention in the supply side for enhancing innovation capabilities of firms and workers and supporting human resources development, Keynesian intervention in the demand side for boosting the aggregate demand is necessary. For sustainable growth, KLAR needs not only Schumpeter but also Keynes

III. Institutional Diversity and Alternative Knowledge-led Accumulation Regimes

Schumpeterian Workfare Regime: A Common Ground

In any KBE in which innovation-driven development is realized, a basic common ground might be the Schumpeterian workfare regime which has some variants according to the different institutional forms of a given country. As Jessop (2002) argued, in advanced countries after Fordism, there was a great transformation in the form of state from the Keynesian Welfare State (KWS) to the Schumpeterian Workfare Regime (SWR)¹² corresponding to the shift from the mass production economy to the KBE.

According to Jessop, the distinctive features of the KWS can be summarized as follows. KWS was Keynesian in that it aimed to secure full employment through demand-side management adjusted to the Fordist mass production. KWS was welfare-oriented in that it tried to make all full national citizens to share the fruits of economic growth through collective bargaining and state intervention. KWS was statist in that state is expected to compensate for market failures and also had a dominant role in the institutions of civil society (Jessop 2002: 58-73). In short, in KWS, there was a maximalist state or big government that actively intervened in the mass production economy in order to increase aggregate demand and enhance welfare of the poor. This was a common ground of Fordism in the developed countries.

¹² In his book, Jessop used the terminologies ‘Keynesian Welfare National State’ and ‘Schumpeterian Workfare Postnational Regime’, instead of the terminologies ‘Keynesian Welfare State’ and ‘Schumpeterian Workfare Regime’ that I used here briefly.

As Fordism fell into crisis and the age of globalization and knowledge-based economy arose, KWS was gradually transformed into SWR. In this process, there were two major transitions. One was the shift from 'Keynesian' to 'Schumpeterian'. The other was the shift from 'welfare' to 'workfare'. SWR is Schumpeterian insofar as it tries to facilitate innovation, flexibility, and competitiveness in response to global competition by intervening on the supply-side in the KBE. And SWR is workfare-oriented insofar as it subordinates social policy to the demands of economic policy and thus it promotes labor market flexibility and employability. Moreover, in SWR, central government transfers some of economic and social policy-making functions of the national state upwards to the international agencies and downwards to the local governments. In most OECD countries, we can see now extensive decentralization policies that aim to implement regional innovation systems and regional human resources development (RHRD) systems. In SWR, the statism of the KWS tends to be reduced in that it put increased importance to the self-organizing governance in compensating for market and government failures (Jessop 2002: 250-254).

The shift from the KWS to the SWR can be observed sooner or later in the most advanced capitalist states regardless of diversity of the development model. In the countries with societal corporatism such as Denmark, Netherlands, Germany, and Austria, there was a transition from Keynesian 'demand-side corporatism' to Schumpeterian 'supply-side corporatism' (Traxler 1995, Falkner 1997, Heinisch 2001). Supply-side corporatism aims to enhance international competitiveness through investment in HRD and R&D.¹³ 'Social investment state' toward which the Tony Blair's government in the UK oriented is similar to SWR (Lister 2004). In the OECD countries since the 1990s, one of the most important policy agenda is innovation management by government and firms as shown in Lisbon Strategy. The goal of Lisbon Strategy is to reform the European social model by focusing on knowledge and innovation and social cohesion (Rodrigues 2006). The Lisbon Strategy pointed to a knowledge-led accumulation regime with social cohesion, that is, a sustainable KLAR.

A common aspect of welfare state reform in EU is to implement workfare policy that tries to realize welfare through enhancing employability of workers. While the existing KWS was the state form corresponding to the mass production economy and the Fordist

¹³ According to Heinisch(2001), under supply-side corporatism, a high level of macro-level coordination and concerted effort among corporatist actors is necessary to channel infrastructure development, investment in human capital, skill formation, and public investments into strategic industries, while achieving organized flexibilization and decentralization. If corporatist actors cooperate in these supply-side policy rather than demand-side policy, supply-side corporatism will be prevailed. Austria, which has been a typical country of demand-side corporatism, has had successful supply-side corporatism in the 1990s.

accumulation regime, SWR is a new regime corresponding to the knowledge-based economy and KLAR. As KWS shifted to SWR, the main route of government intervention changed from Keynesian demand-side intervention to boost up aggregate demand to Schumpeterian supply-side intervention to enhance innovation abilities of individuals, firms, and regions. In short, SWR is a common ground of diverse KLARs

Liberal Market Economies vs. Coordinated Market Economies vs. Regulated Market Economies

However, there can be various strategies to establish SWR. Jessop himself posited four ideal-typical strategies: neoliberalism, neocorporatism, neostatism, and neocommunitarianism (Jessop 2002: 259-264). In reality, of course, strategy mix is possible. Which strategy or strategy mix will be chosen in individual countries will depend on the factors such as institutional forms, the balance of political forces and the economic and political conjunctures.

Among these factors, institutional forms shaping the structures and regulating dynamics of accumulation regimes would be more important. According to the Regulation approach, different institutional forms shape different development model. In addition to this approach, the varieties of capitalism approach (Hall and Soskice 2001, Amable 2003) and the institutional complementarities approach (Aoki 1996) might be useful for analyzing different model of capitalism. These two approaches stress the pivotal role of institutions in shaping different capitalism. From these approaches, we can explain different KLARs in terms of the institutional diversity of each country.

Hall and Soskice (2001) draw a distinction between two types of market economies, liberal market economies (LMEs) and coordinated market economies (CMEs) by reference to the way in which firms resolve the coordination problems. In LMEs, firms coordinate their activities primarily via hierarchies and competitive market arrangements. In CMEs, firms depend more heavily on non-market relationships to coordinate their endeavors (Hall and Soskice 2001: 8).

Unlike the market mode of coordination including transactional contracting and competitive relationships among actors in LMEs, the non-market modes of coordination in CMEs entail more extensive relational contracting and more reliance on collaborative relationships to build the competencies of the firm. In contrast to LMEs where the equilibria are largely given by market competition among individual economic agents, the equilibria in CMEs are more often the result of strategic interaction among firms and other individual or collective actors. In short, in CMEs strategic coordination

overwhelms market coordination. While LMEs have competition approach to KBE, CMEs have cooperation approach to the KBE.

CMEs provide more institutional support for the strategic interactions required to realize the value of co-specific assets in the form of industry-specific or firm-specific training, collaborative research and development, while LMEs encourage economic actors to acquire switchable assets, such as general skills or multi-purpose technologies (Hall and Soskice 2001:17). This means that, in the case of knowledge formation, economic actors in CMEs are willing to invest in firm-specific knowledge, while those in LMEs are willing to invest in general knowledge. HRD-intensive knowledge firms in CMEs have a tendency of internalization of knowledge rather than externalization of knowledge, while R&D-intensive knowledge firms in LMEs have a tendency of externalization of knowledge rather than internalization of knowledge. Thus, more workers in CMEs might have a job orientation rather than a career orientation.

The dominant pattern of innovation activities of the firm will be different in the LMEs and CMEs, because the two different modes of coordination condition the efficiency with which firms can perform certain production activities. That is, the national institutional forms provide nations with comparative advantages in particular activities. What would be the impact of institutional forms on innovation that is the most dynamic factor in the knowledge-based economy?

Radical innovation is especially important in rapidly changing technology sectors, such as IT and BT. Incremental innovation is more important for enhancing competitiveness in the production of capital goods, consumer durables. Institutional forms of LMEs are highly supportive of radical innovation, since flexible labor market facilitating employment adjustment and extensive equity markets facilitating mergers and acquisitions allow firms prompt restructuring needed for radical innovation. These institutional forms of LMEs provide favorable conditions for general knowledge formation rather than firm-specific knowledge formation. CMEs provide superior conditions for incremental innovation because high levels of industry-specific or firm-specific skills, highly coordinated industrial relations, stable labor market, and close inter-firm collaboration promote incremental improvements in products or production processes. These institutional forms of CMEs give favorable conditions for firm-specific knowledge formation.

This means that each type of market economy has its own comparative institutional advantage¹⁴. In other words, the national institutional forms provide nations with comparative advantages in particular activities. The concept of comparative institutional advantage tells us the importance of institutional forms in shaping the pattern of innovation, international specialization, and thus an accumulation regime in particular country. From this viewpoint, we can say that different institutional forms of LMEs and CMEs in the KBE will shape different KLARs.

When Hall and Soskice (2001) classified two types of market economy, their scope of analysis is confined to European and North American capitalism including Japanese capitalism. And their analysis is focused on mode of coordination among the firms rather than the pattern of state intervention. When we consider the factor of state intervention and expand the scope of analysis to Asian capitalism, we can identify three types of market economy rather than two: liberal market economies, coordinated market economies, and regulated market economies (RMEs).

RMEs are the market economies in which state coordination by laws and administrative regulations overwhelms market coordination or strategic coordination (Kim 2007). The distinctive characteristics of RMEs vis-a-vis CMEs is that while in the former market is controlled by strong state intervention, in the latter market is coordinated by strategic interaction among employers and labor unions and government. Direct state intervention is the primary factor in resources allocation in RMEs. RMEs prevail in several Asian countries adopting developmental dictatorship model or developmental state model. Korea before the 1997-1998 financial crisis, Singapore, Malaysia, and even China can be included in the category of RMEs.

In the RMEs, in order to facilitate the transition from the mass production economy to the KBE, the state played an important role in knowledge investment such as R&D investment and HRD investment. For example, now in Korea, the state has an initiative to construct regional innovation system and regional HRD systems (Kim 2004). In the RMEs, the state plays an active role in knowledge formation including skill formation. Such a state can be named 'knowledge state'. There is interventionist approach to the KBE in RMEs rather than competition approach in LMEs and cooperation approach in CMEs.

¹⁴ The basic idea of comparative institutional advantage is that the institutional structures of a particular economy provides firms with advantages for engaging in specific types of activities there (Hall and Soskice 2001, 37)

Three Alternative Knowledge-Led Accumulation Regimes

The conceptualization and classification of growth regime in the KBE can be found in Regulation approach. Boyer (2004) suggests the coexistence of three successful institutional configurations for the "New Economy" or IT-led growth: deregulated economy, social-democratic model, and accelerated catch-up model. The deregulated economy seeks a science-pushed innovation, labor market flexibility, private appropriation of advances in knowledge through protection of intellectual property rights. The social-democratic model is based on a high level of general education, intensive vocational training, close cooperation between universities and business sector, and widespread socialization of knowledge. An accelerated catch-up model can be viewed as a configuration capable of triggering a virtuous circle by leapfrogging the Fordist phase.

The implication of Boyer' analysis is that there is no 'one best way' to the knowledge-based economy. And there can be diverse labor market institutions governing the "New Economy" or knowledge-based economy. He argues that even though the deregulation of the product markets is desirable, labor market flexibility is not a necessity for the knowledge-based economy. In short, alternative KLARs can be constructed in different institutional frameworks if a high level of knowledge investment is achieved.

Based on an extensive empirical study, Amable (2002) classified five types of capitalism, each characterized by specific institutional forms and particular institutional complementarities: the market-based model, the social-democratic model, the Continental European model, the Mediterranean model, and the Asian model. Since the Continental European model and the Mediterranean model might be regarded as a kind of hybrid model between the market-based model and the social-democratic model, these five types could be reduced to three types: the market-based model, the social-democratic model, and the Asian model.

The market-based model is also called as the Anglo-saxon model, social-democratic model as Nordic model. Thus, finally, we can classify three types of capitalism: Anglo-saxon model, Nordic model, and Asian model. By developing Hall and Soskice's analysis, I have already classified three types of market economy: LMEs, CMEs, RMEs. We can say that there is an one-to-one relationship between Anglo-saxon model and LMEs, between Nordic model and CMEs, between Asian model and RMEs.

And we can distinguish three approaches to the knowledge-based economy by extending Boyer's analysis: competition approach, cooperation approach, and interventionist approach. Market approach to the KBE is found in LMEs or Anglo-

saxon model, cooperation model in CMEs or Nordic model, and interventionist approach in RMEs or Asian model.

As Jessop (2002) suggested, in the major OECD countries accepting the common ground of Schumpeterian Workfare Regime, three major strategies to promote the SWR are being sought: Neoliberalism, Neocorporatism, and Neostatism¹⁵. In neoliberalist strategy, innovation is expected to follow spontaneously from individual entrepreneurs and from the more general government promotion of an enterprise culture. Thus the government is required to facilitate innovation by the policies of liberalization, deregulation, and privatization. Especially the flexible labor market is regarded as a prerequisite climate for innovation.

Neocorporatist strategy is more directly promotes innovation and active labor market policy through social consensus between economic actors. In order to promote innovation, government tries to balance competition and cooperation rather than to encourage competition among economic actors. The strategy seeks to realize regulated decentralization and to expand the role of public-private partnerships in facilitating innovation. Neocorporatism might be regarded as a more flexible and decentralized version of the existing corporatism in the Fordist era.

Neostatist strategy seek an active structural policy in which the state sets strategic targets related to new technologies, innovation systems, infrastructure and other factors affecting the structural competitiveness of the knowledge-based economy. And it tries to promote an active regional policy to support learning regions, regional innovation systems, industrial clusters, entrepreneurial cities, etc. There is a shift from state control to regulated competition in the mode of regulation (Jessop 2002: 259-263).

Now, we can posit three alternative KLARs by synthesizing the above discussion: KLAR I, KLAR II, and KLAR III, as Table 1 shows. The characteristics of KLAR I are as follows: knowledge capital-led accumulation, R&D-intensive productivity regime, market approach to the KBE, Neoliberalist strategies to SWR, LMEs-type mode of regulation, Anglo-saxon model of capitalism. The characteristics of KLAR II are as follows: knowledge labor-led accumulation, HRD-intensive productivity regime, cooperation approach to the KBE, Neocorporatist strategies to SWR, CMEs-type mode of regulation, and Nordic model of capitalism. The characteristics of KLAR III are as follows: knowledge state-led accumulation, interventionist approach to KBE, Neostatist strategies to SWR, RMEs-type mode of regulation, and Asian model of capitalism. In

¹⁵ Another one strategy, Neocommunitarianism, is also being promoted. However, as now, it is a local attempt or minor policy attached to the three major strategies. Therefore, it was removed in the discussion.

KLAR I, institutional forms are supportive of radical innovation. In KLAR II, institutional forms facilitate incremental innovation. In KLAR III, institution forms encourage regional innovation. Representative country of KLAR I would be the U.S., of KLAR II is Sweden, and of KLAR III, Korea.¹⁶ In total, we can identify three types of KLAR: Neoliberalist, Neocorporatist, and Neostatist KLAR.

In the US, FLAR merged into KLAR. The merge of FLAR and KLAR resulted in KLAR I. There were two main ways by which FLAR played a role in shaping KLAR I. One is that financial deregulation in FLAR encouraged start-ups and easy funding of high-tech sector innovative knowledge firms through providing abundant venture capitals and creating the new financial markets such as NASDAQ. The other is that FLAR, in which the interests of shareholders are central, provides short-term flexibility including labor market flexibility favorable to radical innovation. So, KLAR I, in which the fusion of the FLAR and the KLAR occurs, accelerates radical innovation and tends to maximize short-run efficiencies. However, it might be weak in long-term efficiencies that require stable employment relationships and relation-specific knowledge investments.

Table 1. Three Alternative Knowledge –Led Accumulation Regime

Type of KLAR	KLAR I	KLAR II	KLAR III
Key Factor of Accumulation	Knowledge Capital	Knowledge Labor	Knowledge State
Approach to KBE	Competition Approach	Cooperation Approach	Interventionist approach
Strategy for SWR	Neoliberalism	Neocorporatism	Neostatism
Mode of Regulation	LMEs	CMEs	RMEs
Development Model	Anglo-saxons	Nordics	Asians
Representative Country	US	Sweden	Korea

¹⁶ Knowledge investment as a percentage of GDP might be a most important aggregate indicator that shows the extent of development of KLAR. In 2002, top five countries in the world in terms of that indicator are Sweden (6.8%), United States (6.6%), Finland (6.1%), Korea (5.9%), and Denmark (5.5%). As for the strategy for SWR, the U.S. has a typical neoliberalist strategy, while Sweden has a typical neocorporatist strategy and Korea has a typical neostatist strategy.

KLAR II, in which the interests of the principal stakeholder are central, encourages stable labor-management relationships which are favorable to enhancing long-term efficiencies and thus facilitate incremental innovation. There are highly efficient institutions that enhance innovation abilities of the countries: high level of general education, intensive vocation training, close cooperation between universities, research centers, and corporate sector. A socialization of knowledge is realized by collective investments (Boyer 2004: 71). However, it tends to induce rigidities in the short run and lock-in path dependencies in the long run, impeding radical innovation. Flexicurity of labor market that implemented successfully in Denmark and Netherlands may encourage radical innovation even in KLAR II.

In the KLAR III, the state has an initiative to construct national and regional innovation systems through the strategic budgets allocation. It has a strong point in developing the large-scale strategic industries such as information technology, biotechnology, nanotechnology industries for which private firms have difficulties in financing. However it might experience serious inefficiencies from the government failure in innovation policies due to the rigidities of bureaucratic intervention and the moral hazard of state-sponsored innovators (firms, research institutes, universities). It is confronted with challenges of globalization and liberalization that weaken the ability to intervene in the economy.

What would be the effects of each KLAR on equity? Generally speaking, as mentioned above, KLAR has a tendency to increase income inequality from the monopoly of intellectual property rights, the 'winner-takes-all' game, and the digital divide. Under KLAR, there is also a tendency of labor market polarization due to knowledge gap among workers and 'skill-biased technological change'.

Since FLAR has an inherent tendency to aggravate income inequality and polarization due to unequal distribution of financial assets among economic actors and firm's behavior of maximizing shareholder value, when the KLAR is coupled with the FLAR as in KLAR I, the inequality and polarization will be much more deepened by positive feedback mechanism. In the US, where finance- and knowledge-led liberal market economy prevails, such a bad coupling occurs. When the KLAR is combined with the social democratic coordinated market economy as in KLAR II, the inequality and polarization might be reduced. Sweden shows the best practices of KLAR in which strong social cohesion is realized in the highly efficient KBE. In KLAR III, inequality and polarization could be reduced through the state intervention in knowledge formation and income distribution.

So far, we have identified three different KLARs. Each KLAR shares the Schumpeterian Workfare Regime as a common ground. However, there is no single 'one best way' to the KLAR. The KLAR can be molded to the diverse development model with different institutional forms and culture. It could correspond closely with the Anglo-saxon model which stresses the importance of stakeholder interests and labor market flexibility. The KLAR can also be adjusted to the social-democratic model or Nordic model which emphasizes the importance of stakeholder interests and stable labor market. And it might be combined with Asian model or RMEs.

IV. Conclusion

The theory of KLAR that I proposed in this paper is built on three interrelated approaches: relational approach to knowledge, and micro-macro nexus analysis of the economy, and Regulation theory of accumulation regime. With the relational approach to knowledge, we could get new concepts: knowledge capital and knowledge labor. One of the my core arguments is that whether knowledge is embodied in knowledge capital or in knowledge labor is very important, since it plays a decisive role in shaping the type of knowledge firm, characteristics of productivity regime, pattern of income distribution, and ultimately structures and dynamics of KLAR.

Therefore, knowledge intensity of capital and knowledge intensity of labor are key variables in analyzing KLAR. Either R&D-intensive productivity regime or HRD-intensive productivity regime is one of the core micro-foundations of KLAR. So, not only 'R&D intensity' but also 'HRD intensity' should be used as important indicators in analyzing KLAR. With micro-macro nexus analysis between knowledge firm and KLAR, we can predict that different type of KLAR will emerge from different type of knowledge firms. KLAR I might emerge from R&D-intensive productivity regime while KLAR II might emerge from HRD-intensive productivity regime.

I highlighted seven propositions about the behaviors of the firms and workers in KBE. Based on 'internalization and externalization of knowledge' thesis, we could derive 'flexibilization-polarization of labor market' thesis. Beyond the 'stabilization-segmentation of labor market' thesis of existing segmented labor market theory in era of mass production economy, 'flexibilization-polarization of labor market' thesis could be a backbone of a new theory of labor market structures in the age of KBE. I proposed a configuration of labor market structures in the KBE, in which four submarkets were identified. The structural transformation of labor market from stabilization-

segmentation to flexibilization-polarization would be one of the distinctive features in the KBE.

The policy implication of the analysis of macroeconomic circuit KLAR is that since KLAR may have problems of deficient demand and polarization, it needs not only Schumpeterian supply-side intervention but also Keynesian demand-side intervention. It should be noted that a new wealth effect exerts on macroeconomic circuit of KLAR. Because a new wealth effect has a positive feedback mechanism between wealth and knowledge and widen the knowledge gap between knowledge-haves and knowledge have-nots, it will intensify polarization. Therefore, assets redistribution rather than income redistribution to the simple workers and the poor is recommendable to reduce polarization. A perfect credit market accessible to the poor and intensive HRD investment to the simple workers must be complements to the assets redistribution policy.

In the discussion of institution building for a sustainable KLAR, I highlighted a package of complimentary institutions: science system for a sustainable innovation, optimum protection of IPRs for sustainable innovation and social welfare, people-centered management and trust building for sharing tacit knowledge, solidaristic knowledge policy for enhancing knowledge level of workers equally, knowledge bargaining system as a new collective bargaining system, flexicurity of labor market for dynamic stability of employment, learnfare regime for innovation and social cohesion, reduction in working time for workers' self-development by learning, and financial system supporting innovative knowledge firms and workers' knowledge formation.

From the comparative analysis of three alternative KLARs, I argued that institutional diversity of each country shapes different KLAR even though a common ground of any KLAR is Schumpeterian workfare regime. KLAR can be matched to social-democratic model as well as neoliberalist model. This gives an implication that there is no 'one best way' to establish KLAR. Neither the position that 'there is no alternative' but neoliberalism in the age of the KBE nor the position that 'there is no third way' between social democracy and neoliberalism might be right. This paper tried to show that it is feasible to establish a sustainable KLAR that is democratic and solidaristic.

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