

## Capitalism, Complexity, and Inequality

*Geoffrey M. Hodgson*

Under capitalism there is a potential for increasing socioeconomic complexity and greater specialization of skills.<sup>1</sup> One implication is that there is a potential for increasing inequalities of wealth, income, and power on both a national and international scale. What follows is an updated, broad-brush account of possible future developments in a knowledge-intensive capitalist economy. They can themselves be manifest in different ways, in a number of quite different institutional frameworks (Hodgson 2001).

### *Drivers of Capitalist Change*

Capitalism is a social formation in which markets and commodity production are pervasive, including capital markets and labor markets. Capitalism is the most dynamic economic system in human history. Its driving logic involves the expansion and diversification of multiple markets. As it expands, corporations seek ever-new opportunities for trade and gain. As competition intensifies within particular markets, profit-seeking corporations innovate and diversify their products in unceasing creation of new market niches (Chamberlin 1933; Rueschemeyer 1986). The competitive pursuit of profit pressures firms to invest in new technology or new skills. In this quest for innovation, the frontiers of science and technology are advanced, leading to new fields of knowledge and enquiry. Services are generally more diverse than manufactured goods; hence, diversity also increases with the increasing relative size of the service sector. New and varied organizational forms are devised to increase productivity and to manage an exponentially expanding number of products and processes.

Accordingly, there is a long-run tendency in capitalist economic systems toward greater complexity, driven by powerful economic forces and leading to the widening of

---

*The author is a Research Professor at The Business School, University of Hertfordshire, U.K. This paper was presented at the Association for Evolutionary Economics annual meeting, Washington, D.C., January 2003.*

markets and greater product diversification (Warsh 1985). There are several meanings of complexity and the definition of complexity is problematic (Pryor 1996; Rosser 1999), but we can make an outline attempt. Complexity is not the same as variety (Saviotti 1996). Variety refers to a diversity of types. Complexity exists only when such variety exists within a structured system. In short, complexity in the sense used here is *systemically interconnected and interactive variety*. By this definition, increasing economic complexity means a growing diversity of interactions between human beings and between people and their technology.<sup>2</sup>

Improved global communications and increasing mobility can help to increase complexity and give a further impetus to product diversification. However, increasing complexity is not inevitable. It can be interrupted by political, economic, or environmental catastrophes. Joseph Tainter (1988) argued that the weight of complexity itself has helped to bring the collapse of civilizations. Nevertheless, it is reasonable to explore a scenario of increasing complexity, with its possible implications.

Can the growth of modern systems of communication and the development of new techniques of analysis help us to overcome the challenges of an increasingly complex world? Technology cannot make the problems of complexity go away. Innovation and change mean that there will always be new problems of analysis and the potential for cognitive and computational overload. Furthermore, the nature and dispersion of knowledge means that there will always be difficulties in dealing with tacit, idiosyncratic, and context-specific knowledge. The new information technology can help us deal with some but not all aspects of growing complexity, and it cannot neutralize its underlying forces.

Hence it is appropriate to consider possible scenarios involving increasing socioeconomic complexity. The central supposition is that in core sectors of the economy, the processes of production and their products are becoming more complex and sophisticated.

### ***Changing Levels of Knowledge and Skill***

We now consider the impact of growing complexity on the level, diversity, and distribution of skills within the economy. The growth of socioeconomic complexity does not automatically imply increasing levels of skill or knowledge on behalf of workers or consumers. It is possible that automation and artificial intelligence might facilitate a growing diversity of products and processes without comparable increases in average levels of skill.

Karl Marx (1976, 549, 788) and Harry Braverman (1974) argued that the growth of machine production, with increasingly sophisticated machines, would lead to a deskilling of the workforce. Consider a technologically sophisticated economy of the future in which human innovation and learning have stagnated. In the place of humans, largely artificially intelligent machines would administer the varied processes

of production. Technology would be used extensively, not to enhance human creative powers but to replace them as much as possible. Economic growth would occur, but it would not result from substantial human learning or innovation. It would emanate largely from a growing output of physical goods and automated services.

This brave new world of menial jobs, unemployment, and robots is consistent with the supposition of increasing complexity, but it does not entail any general increases in knowledge and skill. This scenario of general deskilling is possible but not inevitable. There is no reason why workers will *necessarily* be moved to jobs involving lower levels of skill. After all, the simpler and more mechanical types of skill are often the ones more readily replaced by machines. Contrary to Marx and Braverman, the evidence indicates that levels of workplace skill have increased rather than decreased in the twentieth century, at least in the developed countries (Ashton and Green 1996). Historical evidence also suggests that machines can enhance skills rather than reduce them (Goldin and Katz 1996). As Frederic Pryor (1996, 55) argued on the basis of his review of the evidence for the U.S. economy:

Although deskilling in terms of substantive skills has occurred in certain industries, the notion of a general deskilling process for the economy as a whole represents a triumph of ideology over common sense. The fears about a fall in levels of substantive skills arising from the shift into services also are groundless. On the contrary, the evidence shows clearly that the entire job structure is shifting toward work requiring more data analysis, more general education, and also more specific vocational preparation. The occupations increasing in relative importance also involve a higher level of interaction with people.

However, while the march of complexity within capitalism does not always lead to deskilling, it does not inexorably lead to upskilling, either. Diverse outcomes are possible. Within several developed countries, including the United States and Britain, the last two decades of the twentieth century saw a pattern of development in which skill levels for a substantial proportion of the population increased while at the same time there was the growth of an equally significant underclass of relatively unskilled workers, who were unemployed or in insecure and low-paid jobs.

In several institutional contexts, the outcome of increasing complexity within capitalism is likely to be an increasing inequality of skill levels, with an elite of highly trained and qualified skilled workers at one extreme and a substantial, unqualified, and excluded underclass at the other. The precarious position of the underclass is further undermined by the development of the global division of labor and by competition from firms in developing countries who are mass producing goods and services at much lower costs.

The result of this dispersion of skills within developed countries could be a growing inequality in income, wealth, and influence within society. However, the outcomes are unlikely to be uniform. While some countries—notably the United States and Britain—have witnessed a significant increase in inequality of income since the 1970s, other

countries—notably Germany—have resisted this trend. The explanation for the German exception lies probably in a greater emphasis on intermediate training and apprenticeships and in mechanisms to train and relocate workers of relatively lower skill (Nickell and Bell 1996). Capitalism does not have a singular and universally overriding logic. Different institutional frameworks can yield significantly different outcomes.

With this important caveat, it is possible to focus on the processes that can lead to upskilling among a substantial segment of the population. As complexity increases, still higher levels of skill and adaptability are required of many, especially for those coping with innovations, those dealing with new and unpredictable phenomena, or those making judgments with respect to complex relationships or large amounts of varied information.

This increase in skill levels has two main dimensions. There is first the level of each particular skill or set of skills and second the degree of specialization between skills. The level of each skill can be measured roughly in various ways, including by an estimation of the amount of time it takes to train, on the average, to reach that skill (Hodgson 1999, chap. 10).<sup>3</sup> The degree of specialization is a reflection of the number of distinct professions or occupations, according to some appropriate definition of those terms.

It is reasonable to consider a scenario involving not only increasing complexity but also increasing skill levels and an increasing degree of specialization for a substantial segment of the population. Of course, this does not rule out the possibility that there is also a substantial underclass of unskilled and unemployed.

The combination of increasing complexity and enhanced skill levels for a segment of the population can result in a number of key challenges for economic analysts and policy makers. Among these, for some knowledge-intensive workers, is the impairment of the employers' right of interference in the process of work, which is central to the traditional employment contract. This is because for highly skilled and specialist work the employer is less likely to have access to the relevant supervisory expertise. A further implication is the need to replace authority by internal commitment, so that the knowledge worker devotes the required care and attention to complex details. This in turn raises potential problems of overcommitment and overwork and the undermining of social and family life. Furthermore, complexity and information overload raise personal, corporate, and political problems of accreditation, information screening, and democratic accountability. These issues are discussed elsewhere (Zuboff 1988; Zolo 1992; Drucker 1993; Hodgson 1999, 2002). Here I focus on the potential problem of growing inequality.

### ***The Forces of Inequality***

The increasing diversity of products and tasks, along with the growing sophistication of knowledge, is likely to be paralleled with an increasing variety of skills and occupations. As complexity grows within the economic system, it is likely that there will be

demands for higher and higher levels of skill in particular specialisms. New specialisms emerge to deal with the multiplying facets of the increasingly complex capitalist system. Workers with advanced and transferable skills, and with enhanced capacities to rapidly learn and adapt, are more and more at a premium. We have a scenario of enhanced skills and growing knowledge intensity.

Some skills and professions will become obsolete. At the same time, for each individual worker, it becomes more difficult and costly to transfer readily from one specialism to another. A skills escalator can emerge, where frequent retraining is required to relocate in the more skilled and more highly remunerative jobs. Retraining is easier and less risky for those that already have acquired high skill levels. Without remedial policies and subsidies, some may never get onto the skills escalator. A further widening of inequality can result. This makes the issue of widening of access to education a policy priority for governments.

Pryor (1996, 54) made a distinction between several types of skills. First, there are *substantive skills*, consisting of transferable and nontransferable elements and highly correlated with vocational and general education. Second, there are *interaction skills*, or “people skills,” such as mentoring, negotiating, persuading, supervising, or instructing. Third, there are *motor skills* related to manual dexterity and the manipulation of tools and materials. Pryor cited evidence that in the U.S. economy substantive skills have increased steadily and are significantly correlated with both education and remuneration; interaction skills are also increasing but are modestly correlated with substantive skill levels and considerably less correlated with income; and motor skills show no long-term increase and have no discernable correlation with substantive or interaction skills, or with education or wages. Increasing complexity in the United States seems to be associated primarily with an increase in substantive and interaction skills and skills depending on education and training.

In most developed countries, unemployment is concentrated among those with low or obsolete skills. Furthermore, as Pryor (1996, 281) concluded from his study of the U.S. labor market, “in so far as many jobs require several different but highly specific skills, it becomes increasingly difficult for employers to fill such positions without increasing wages.” Of course, the level of skill, even if it could be readily measured, is not the only factor determining wage levels. Institutionalized and discriminatory factors also come into the determination of wages. Nevertheless, there is substantial evidence that rising relative wages for skilled workers are a major force behind growing inequality (Gottschalk 1997; Johnson 1997; Pryor and Schafer 1999; Topel 1997; Wood 1994).

Increasing business competition from developing countries, such as India and China, further compounds these problems. Businesses in the developing world can now take on, at much lower wage costs, much of the manufacturing or service work formerly confined to the developed countries. The existence of cheaper skilled capabilities abroad, with cost-cutting revolutions in transport and communications technology, has meant the relocation of some manufacturing and service production from developed to

developing countries. The developed world now imports cheap but sophisticated manufactured goods and computer software or hardware from India or East Asia. In India in particular, the existence of a number of skilled, English-speaking workers has led to the development of an indigenous software industry and the relocation of company call centers and accountancy departments. Accordingly, in the West there has been a significant loss in employment opportunities for workers with the more routine jobs in manufacturing or services. In addition, there has been relatively more migration of skilled workers from developing to developed countries, further increasing the inequalities of skill and income both within and between countries.

With the march of complexity in modern capitalism, workers with high levels of transferable or specialist skills, particularly substantive and interaction skills, are at a premium. They are likely to command increasing relative and absolute levels of remuneration. In contrast, those lacking such skills seem at an increasing relative and absolute disadvantage. Skill is important, alongside other factors that affect wages. Unless remedial policies are implemented, increasing complexity can be associated with increasing inequality of income.

### ***Concluding Remarks***

Education-centered economic policies are vital to sustain economic growth and to diminish inequality and unemployment. It is not possible for developed countries to compete with the newly industrialized countries in terms of lower costs. The low wage levels required are politically and economically infeasible. Instead, the strategy must be to concentrate on knowledge-intensive, high quality goods and services. In pursuit of this approach the developed West has no acceptable alternative but to invest massively and continuously in education and training. Redistributive taxation also has a role, but it is more likely to be accepted in the context of growing real incomes.

The increasing relative importance of the knowledge worker has important implications for the distribution of income. Income inequality has widened in many countries since the 1970s, including in Britain and the United States. While institutional, political, and other changes have clearly affected the distribution of income, there is strong evidence that rising skill differentials, and rising relative wages for skilled and experienced workers, are a major force behind the change.

A problem is to break the link between growing knowledge intensity on one hand and growing pecuniary and social inequality on the other. The remedy must involve heavy investment in education and training, to widen access to knowledge and to increase the relative and absolute supply of skilled and educated workers. Countries that have traveled more than others down this road, particularly Germany, have witnessed a lower increase in income inequality since the 1970s and have been more able to train and relocate workers of relatively lower skill (OECD 1993). We can learn many les-

sons from international comparisons of this type. One of them is that the logic of globalization and the learning economy implies no single model for national success.

It is not simply the “amount” of education and learning that is important but also its quality, access, and distribution. Knowledge and learning work at different levels, combining both the general and the specific, and the tacit and the codifiable. The recent German experience emphasizes the importance of widening the distribution among the population of detailed, technical skills. Many of these skills are tacit and require on-site training. In addition it is necessary to enhance flexible and transferable skills. Many of these involve capabilities of a more abstract and conceptual nature. There is little value, for instance, in educating a workforce simply in the use of one particular technology, when any such technology is increasingly likely to become obsolete in a short time. To face the challenges of the future, people do not simply need to learn. They need to learn how to adapt and to learn anew.

The purpose of education is not simply to enhance workplace skills. In an increasingly complex society, knowledge is required to act effectively as a consumer and a citizen. If democracy is to survive in the face of growing complexity, then education must play a major part.

### Notes

1. The author is very grateful for participants at the January 2003 AFEE session for their comments on this paper.
2. If we represent interactions in an economy in matrix form, with the cells of this matrix showing the intensity of interaction between relevant agents, then growing complexity means an increasingly dense matrix of interactions. A measure of economic complexity becomes possible, related inversely to the degree to which the matrix can become triangulated. Frederic Pryor (1996, 11–12) claimed that complexity in the postwar U.S. economy has increased by this measure.
3. The problem of measurement of skills is discussed in more detail in OECD 1996, Pryor 1996, Stasz 2001, and Elias and McKnight 2001.

### References

- Ashton, David, and Francis Green. *Education, Training, and the Global Economy*. Cheltenham, U.K.: Edward Elgar, 1996.
- Braverman, Harry. *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review Press, 1974.
- Chamberlin, Edward H. *The Theory of Monopolistic Competition*. Cambridge, Mass.: Harvard University Press, 1933.
- Drucker, Peter F. *Post-Capitalist Society*. Oxford: Butterworth-Heinemann, 1993.
- Elias, Peter, and Abigail McKnight. “Skill Measurement in Official Statistics: Recent Developments in the UK and the Rest of Europe.” *Oxford Economic Papers* 53, no. 3 (July 2001): 508–540.
- Goldin, Claudia, and Lawrence F. Katz. “Technology, Skill, and the Wage Structure: Insights from the Past.” *American Economic Review (Papers and Proceedings)* 86, no. 2 (May 1996): 252–257.

- Gottschalk, Peter. "Inequality, Income Growth, and Mobility: The Basic Facts." *Journal of Economic Perspectives* 11, no. 2 (spring 1997): 21–40.
- Hodgson, Geoffrey M. *Economics and Utopia: Why the Learning Economy Is not the End of History*. London and New York: Routledge, 1999.
- . *How Economics Forgot History: The Problem of Historical Specificity in Social Science*. London and New York: Routledge, 2001.
- . "Capitalism, Employment, and Complexity: With Further Critical Comments on Another Hodgson." *Journal of Economic Issues* 36, no. 1 (March 2002): 190–196.
- Johnson, George E. "Changes in Earnings Inequality: The Role of Demand Shifts." *Journal of Economic Perspectives* 11, no. 2 (spring 1997): 41–54.
- Marx, Karl. *Capital*. Vol. 1. Translated by Ben Fowkes from the 4th German ed. of 1890. Harmondsworth, U.K.: Pelican, 1976.
- Nickell, Stephen, and Brian Bell. "Changes in the Distribution of Wages and Unemployment in OECD Countries." *American Economic Review (Papers and Proceedings)* 86, no. 2 (May 1996): 302–308.
- Organization for Economic Cooperation and Development (OECD). *Employment Outlook*. Paris: OECD, 1993.
- . *Measuring What People Know: Human Capital Accounting for the Knowledge Economy*. Paris: OECD, 1996.
- Pryor, Frederic L. *Economic Evolution and Structure: The Impact of Complexity on the U.S. Economic System*. Cambridge and New York: Cambridge University Press, 1996.
- Pryor, Frederic L., and David L. Schafer. *Who's Not Working and Why*. Cambridge: Cambridge University Press, 1999.
- Rosser, J. Barkley, Jr. "On the Complexities of Complex Economic Dynamics." *Journal of Economic Perspectives* 13, no. 4 (fall 1999): 169–192.
- Rueschemeyer, Dietrich. *Power and the Division of Labor*. Stanford, Calif.: Stanford University Press, 1986.
- Saviotti, Pier Paolo. *Technological Evolution, Variety, and the Economy*. Aldershot, U.K.: Edward Elgar, 1996.
- Stasz, Cathleen. "Assessing Skills for Work: Two Perspectives." *Oxford Economic Papers* 53, no. 3 (July 2001): 385–405.
- Tainter, Joseph A. *The Collapse of Complex Societies*. Cambridge and New York: Cambridge University Press, 1988.
- Topel, Robert H. "Factor Proportions and Relative Wages: The Supply-Side Determinants of Wage Inequality." *Journal of Economic Perspectives* 11, no. 2 (spring 1997): 55–74.
- Warsh, David. *The Idea of Economic Complexity*. New York: Viking, 1985.
- Wood, Adrian. *North-South Trade, Employment, and Inequality: Changing Fortunes in a Skill-Driven World*. Oxford: Clarendon Press, 1994.
- Zolo, Danilo. *Democracy and Complexity: A Realist Approach*. Cambridge: Polity Press, 1992.
- Zuboff, Shoshana. *In the Age of the Smart Machine: The Future of Work and Power*. Oxford: Heinemann, 1988.