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Robots and Looms: If today's robots are just the automated looms of the 21st century, then expect a couple decades of wage stagnation, declining living standards, and civil unrest

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In the very long run, industrialization has raised living standards immensely. Over the past 230 or so years since the first industrial revolution began in England, real per capita income in the West has grown by a factor of twenty. We are vastly richer than our ancestors were in 1780. However, while 21st century economists celebrate the first industrial revolution as the crucial breakthrough to modern economic growth, the majority of workers living at the time saw it as a painful and disruptive process. And for the thousands of workers who lost their jobs to new machines or who were crowded into the slums of Manchester and other English industrial cities, the effects were catastrophic. Those who lightly dismiss the technological revolution of today as "just another industrial revolution" do not understand the extent to which the process of an industrial/technological revolution is wrenching to society.

As Marx and Schumpeter (1950) stressed, capitalism is an evolutionary process driven by "creative destruction." One does not need to be a Marxist to appreciate the effects of the initial wave of creative destruction as described in Part I of the *Communist Manifesto*:

> The bourgeoisie cannot exist without constantly revolutionizing the instruments of production, and thereby the relations of production, and with them the whole relations of society. . . . Constant revolutionizing of production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation distinguish the bourgeois epoch from all earlier ones. . . . All that is solid melts into air (Marx and Engels 2002: 222-3).

Since the first industrial revolution of 1780-1850 there have been periodic other industrial/technological revolutions, associated with the internal combustion engine, the computer, etc. All of these technological revolutions were associated with waves of creative destruction that created "winners" and "losers." Once society recognizes this fact, it may be able to take actions to mitigate the negative effects

of technological change, and thus to ameliorate the plight of the losers. Toward that end, the remainder of this essay will examine the historical lessons to be learned from the British industrial revolution.

The process of industrialization did not bring immediate prosperity to the working class through the creation of new higher-productivity jobs. During the first four decades of the industrial revolution, from roughly 1780 to 1820, manual workers' full-employment real earnings increased by slightly more than 10%; when unemployment is taken into account, earnings growth was even slower. Charles Feinstein (1998: 652) concluded that "for the majority of the working class the historical reality was that they had to endure almost a century of hard toil with little or no advance from a low base before they really began to share in any of the benefits of the economic transformation they had helped to create." Ricardo and Malthus's notion that even in a growing economy workers' long run equilibrium wage was subsistence (the so-called iron law of wages) was based on empirical observation.

While workers' real earnings finally began to increase slowly after 1830, "biological" measures of well-being suggest that living standards continued to deteriorate in the 1830s and 1840s. After increasing from 1801 to 1826, life expectancy at birth stagnated until the early 1850s, and probably declined slightly for the working class. The jobs created by the industrial revolution were in cities, and workers who migrated from rural areas to industrial cities to take advantage of the new jobs paid a steep price for their increase in purchasing power. Early nineteenth century industrial cities were death traps—workers were crowded into slums lacking clean water and adequate sewers. As late as 1851, life expectancy at birth in large cities was 34, largely due to the appalling levels of infant and child mortality in urban slums. Another indicator of health is height by age, which is a function of net nutritional status, the amount of food taken in by children and adolescents net of demands make on their bodies by labor and disease. Military recruits born in the 1820s were taller on average than recruits born in the 1780s, but heights declined from 1830 to 1850, so that recruits born in 1850 were shorter than those born at the beginning of the industrial revolution. The decline in heights was a result of the disease environment

which came with rapid urbanization, and also of the increase in child labor associated with the industrial revolution.

While the average manual worker benefited little from technological change during the first industrial revolution, some groups of workers were definite losers. Chief among the losers were the handloom weavers. In the late 18th century technological improvements in spinning had led to a sharp increase in the demand for handloom weavers. By the early 1820s there were approximately 200,000 handloom weavers living in Lancashire and Cheshire, equal to about a quarter of the adult male labor force in those counties. However, the widespread adoption of the power loom caused the wages of handloom weavers to decline by 60% or more from 1820 to 1840. By the 1830s weavers had become "among the most poverty-stricken workers" in England, many just managing to survive with the help of local welfare. Taking both factory workers and handloom weavers into account, John Brown (1990: 612-13) concluded that "there was virtually no improvement in living standards in cotton textiles," the "leading sector" of the first industrial revolution, until "at least the 1840s." One of the reasons why textile workers' wages did not increase more rapidly was that the newly adopted machinery enabled employers to replace adult male workers with women and children, who were employed at far lower wages. In the 1820s and early 1830s, before the first child labor laws, more than 10% of English children aged 5-9 and 75% of children aged 10-14 were working (Horrell and Humphries 1995).

The economic dislocations resulting from the "creative destruction" of the industrial revolution led to much industrial unrest, including waves of textile machine breaking in 1811-13 by the Luddites, agricultural machine breaking in 1830-1 by the followers of the mythical Captain Swing, and major strikes in the cotton industry in 1808, 1810, 1818, 1829-30, and 1842. The effects of industrialization also led to political unrest—a mass meeting of cotton workers from Manchester and surrounding towns resulted in the "Peterloo Massacre" of August 1819, in which eleven workers were killed and about 400 injured. The textile cities also were the center of Chartism, the working-class reform movement which

demanded of Parliament, among other things, universal manhood suffrage, equal electoral constituencies, and the abolition of the requirement that members of Parliament be property owners.

After decades of inaction, Parliament finally responded to the social and economic disruptions caused by industrialization in the 1830s and 1840s. The Factory Act of 1833 eliminated the employment of children under age 9 in cotton and woolen mills, and set maximum hours of work for children and youths aged 9-17. The 1842 Mines Act, the Ten Hours Act of 1847, and later acts further restricted the employment of children and young persons and regulated the employment of adult women. The problems of urban squalor were addressed by the Public Health Act of 1848 and the Artisans' and Labourers' Dwellings Acts of 1868 and 1875. The Trade Unions Act of 1871 gave unions legal recognition, and an act of 1875 legalized peaceful picketing. Perhaps most significant, the 1867 Reform Act extended the franchise to the better-paid members of the working class, thereby doubling the urban electorate.

What can we learn from the first industrial revolution and from the other technological revolutions of the past two centuries? First, that capitalism is an evolutionary process, and that the creative destruction which is a necessary part of capitalist growth creates large numbers of "losers" as well as "winners." Second, that the workers displaced by job destruction often do not have the skills necessary for the new jobs that have been created. Third, that the private sector largely is uninterested and unwilling to help the "losers;" if their pain is going to be mitigated, it must be by government policy. In *The End of Laissez-Faire*, Lord Keynes wrote: "I think that capitalism, wisely managed, can probably be made more efficient for attaining economic ends than any alternative system yet in sight, but that in itself it is in many ways extremely objectionable. Our problem is to work out a social organisation which shall be as efficient as possible without offending our notions of a satisfactory way of life." Nearly 90 years later, this remains "our problem," and it is a problem that we must figure out how to solve.

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