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Power and Progress: Our Thousand-Year Struggle Over Technology and Prosperity

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Abstracts of Chapters 4-7, by Ed Steffes

The main purpose of the historical chapters is to show that technological progress and general prosperity have not always gone hand in hand. Who benefits from new technologies depends on such factors as how much they enhance—not just replace—human labor, whose vision of the future prevails, and whether workers have the power to share the benefits of rising productivity.

Chapter 4. Cultivating Misery

Although the European Middle Ages have often been seen as a time of technological and economic stagnation, many technological innovations did occur, such as better crop rotation, the heavy wheeled plow, and the spinning wheel. “Perhaps the most defining technology of the Middle Ages” was the water- or wind-driven mill for grinding grain. Agricultural productivity did rise, but the benefits went mainly to the landowners, who often operated the only mill in a local area. Peasants had to work very hard just to live at a near-subsistence level. The elites included the clerical elite, who owned one-third of the agricultural land of England. Much of the surplus wealth went to build cathedrals and monasteries. A combination of physical coercion and religious persuasion sustained the hierarchical feudal order.

The authors do not accept Thomas Malthus’s explanation for persistent peasant poverty, that technological innovations were offset by population growth. Populations did grow—except in times of plague—but agricultural output often grew faster. The problem for peasants was more the distribution of surplus wealth than the lack of surplus wealth. Population size did play a role, however; for example, the Black Death created a labor shortage that strengthened the hand of the peasants in demanding better wages or larger shares of agricultural product.

The authors put the European Middle Ages in global perspective by considering agricultural economies in general. Although early farming societies differed in many ways, a dominant pattern emerged after the transition to settled, permanent agriculture. Economies relied mainly on an agricultural base of cereal grains. Productivity was high enough to support “dense settlements, cities, and then ultimately larger states... But under the auspices of early centralized states, most people engaged in full-time grain cultivation seem to have been decidedly worse off than their foraging ancestors.” They worked longer hours, had

worse diets, and died younger. They were kept in their place not just by physical coercion, but by religious beliefs promulgated by the ruling elites.

Focusing again on Europe—and England in particular—the authors observe that even the post-feudal modernization of agriculture benefitted landowners at the expense of the rural poor. On the one hand, the decline of feudalism increased the number of small landholders who could benefit from their own increased productivity. But on the other hand, larger landholders wanted to terminate the traditional rights commoners had to use common lands for hunting and grazing. With democracy still very limited—less than 10 percent of adult men could vote—landowning elites had little difficulty gaining the legal right to enclose those lands and turn them into profitable commercial enterprises, all in the name of national progress. The authors doubt that this was the only possible route to progress. The displaced peasants became a source of cheap labor for commercial enterprises of many kinds, perpetuating extreme inequality into modern times.

The chapter provides two other examples of how “technological reorganization of production, even when proclaimed in the interest of progress and the common good, has a way of further pushing down the already disempowered.” In America, Whitney’s improved cotton gin made it much easier to process upland cotton by removing its sticky green seeds. But that also increased the demand for slave labor in the interior regions of the South. Between 1790 and 1860, the enslaved portion of South Carolina’s population went from 18.4 percent to 61.1 percent. In Russia after the Bolshevik Revolution, the collectivization and mechanization of agriculture was a disaster for small farmers. In both cases, the system relied not only on coercion but on ideological propaganda, whether racist propaganda in the American South or communist propaganda in Russia.

The lesson from this history is that “we should always carefully examine ideas about what is or is not progress, particularly when powerful people are keen to sell us on a specific vision.” The authors end the chapter with a sobering warning, that digital technology and artificial intelligence could make our future something like our agricultural past.

Chapter 5. A Middling Sort of Revolution

This chapter describes the acceleration of technological innovation and economic growth in Western Europe in the eighteenth and nineteenth centuries, especially after 1820. The focus is on Britain, which played a leading role.

Technical and economic progress required a dramatic expansion of useful knowledge, which depended partly on advances in science. But the authors attribute the surge in innovation mainly to the rise of a “new class of entrepreneurs and inventors” who shared a

new *vision* of progress. A good example is George Stephenson (1781-1848), who designed and built the first modern railway line. He was no member of the elite, but the self-taught child of poor and illiterate parents. “Practical men, born to scant resources, were able to propose, fund, and implement useful innovations.” This became possible after the decline of rigid medieval hierarchies increased the possibilities for upward social mobility.

Science played a role, but not an all-determining one. When the Liverpool and Manchester Railway organized a competition among makers of locomotives, “no members of the scientific establishment played any role in the design of the engines.” Science had been advancing throughout Europe, and before that in China. What was more unique to Britain, however, was a class of practical entrepreneurs like Stephenson. Science would play a larger part in innovation after 1850, with advances in areas like electromagnetism and electricity.

The authors consider a number of historical theories intended to explain why Britain was first in technical innovation during this period. Maybe the country had some kind of geographical advantage, although the Mediterranean area was traditionally more prosperous. Maybe the shift from Catholicism to Protestantism had something to do with it, but other European countries experienced that too. Maybe the availability of coal was a factor, but early textile factories were water-powered. Maybe British workers were more skilled, but a comparison of literacy rates across countries does not support this. Maybe it was something government did, like protect property rights, build an overseas empire, or consciously support industrialization, but Britain did not stand out in these respects either.

The authors argue instead, “What set apart Britain from its peers was the outcome of a long process of social change that had created a nation of upstarts... Nowhere else in the world at that time do we see so many middle-class people trying to pierce through the existing social hierarchy.” Challenges to the old feudal order were more successful there. As early as the late sixteenth century, Britain saw the rise of merchants, yeoman farmers and skilled artisans. In the next century, these groups resisted when the Stuart kings James I and Charles I claimed to rule by divine right. The English Civil War and the Glorious Revolution set limits on monarchy and shifted power toward the middle classes.

This “middling sort of revolution” was not an attack on private property or a campaign for universal rights like the one promoted by the Levellers. It was a “revolution within the system” by people who wanted to “imitate their betters” by *acquiring* property. The upwardly-mobile middle class usually shared the aristocracy’s low opinion of the rural and urban poor. Their vision of economic progress did not translate into higher living standards for the majority of workers, at least not right away. At the dawn of the Industrial Revolution, “industrial entrepreneurs’ choices of technology, organization, growth strategy, and wage

policies enriched themselves while denying their workers the benefits of productivity increases—until the workers themselves had enough political and social power to change things.”

Chapter 6. Casualties of Progress

This chapter elaborates on the failure of early industrial technology to benefit the majority of British workers, although some improvement occurred later in the nineteenth century. By the 1840s, works like Friedrich Engels *The Condition of the Working Class in England* and the *Report from the Royal Commission of Inquiry into Children’s Employment* were documenting the dismal working and living conditions experienced by the British working class. “[M]ost workers lived shorter, less healthy, and more brutal lives than had been the case before industry began to develop.” From the mid-eighteenth to the mid-nineteenth century, work hours increased from about 53 to 65 hours per week, but “longer hours did not mean higher incomes for most of the population.”

One reason for the plight of the working class was that early industrial technology tended to eliminate skilled jobs. In the textile industry, once spinning and weaving were mechanized, they “could be done more cheaply in the large mills employing mostly unskilled workers.” Those workers included many children, girls as well as boys. Work that had been done at home with flexible hours and working conditions was brought under the discipline of the factory, whose regimentation was inspired by military organization. Employers decreed how long workers would work and exactly what they would do.

Since the workers lacked their own power and organization—they could not legally vote or form unions until later in the century—they were largely at the mercy of the powerful factory owners. They lived close to the factories, suffering the worst effects of overcrowding, air and water pollution, and poor sanitation. “In the new manufacturing towns, half of all children died before reaching age five.” Meanwhile, writers who appealed to the rising middle class, like Jeremy Bentham, preached a philosophy of general progress, where the system that was enriching some was good for all. Such a view was the forerunner of the “self-acting productivity bandwagon” that still dominates many economic and political discussions today.

The second half of the nineteenth century was somewhat better for workers. Wages increased along with productivity; the work day was shorter; and child labor laws took many children out of the factories and mines. Key technologies of this era augmented human labor rather than just replacing it. The railroad industry did not just replace existing modes of travel, since people still needed transportation within towns and cities, not just

between them. The railroads increased the demand for inputs like iron rails and locomotives, and helped bring many other products to new markets. Similarly, innovations like the telegraph and telephone created more good jobs than they destroyed.

Innovations from America also gave new direction to technological change. In the United States, land and capital were more abundant than labor, especially skilled labor. That encouraged entrepreneurs to use technology differently—not just to replace skilled labor, but to improve the productivity of labor in general. When, for example, the emerging machine-tool industry began to supply precisely-manufactured interchangeable parts, workers with modest skills could assemble them quickly into sewing machines, or bicycles, or mechanical reapers, or guns. Improvements in long-distance transportation and communication, like the steamship and telegraph, spread the “American System of Manufacturing” to other countries, raising worker productivity and—*potentially*—wages.

In the authors’ view, technologies that enhanced worker productivity were necessary but not sufficient to improve wages and living standards. That also required a new vision, including some consternation about widespread poverty and support for labor organization to exercise “countervailing power” against factory owners. In Britain, extension of voting rights to more men in 1867 and 1884 helped empower workers, and so did the legalization of union activities in 1871. The idea that free markets were enough to improve social conditions gave way to a greater commitment to public action, such as efforts to improve urban sanitation. That in turn influenced the choice of what technologies to develop and apply.

Technological progress in Britain and the United States, even the kind that raised living standards, did not have the same effects in other countries, especially those subject to colonization. The massive export of British textiles to India was so devastating to local production that many skilled workers had to leave the industry for rural farm jobs. India deindustrialized and deurbanized, becoming mainly an agricultural exporter. (Its biggest export became opium, “sold mostly by the British to China.”) The main effect of railroad construction in India was not economic modernization, but more efficient British control. Similarly, many African colonies had to focus their economies on supplying raw materials for British industry, a direction of development that kept most people poor.

Chapter 7. The Contested Path

The late nineteenth century's modest progress toward higher productivity and higher wages was not easy to sustain. It was interrupted in the first half of the twentieth century by two world wars and the Great Depression. The wars unleashed the technologies of destruction, destroying lives and property on a grand scale. Although it was less obvious at the time, however, the early decades of the century were also laying a foundation for broader-based economic growth in the future. That foundation would include two building blocks, "a direction of technology that created new tasks and jobs for workers of all skill levels and an institutional framework enabling workers to share productivity increases with employers and managers."

One of the remarkable accomplishments of the US economy at this time was to create urban jobs fast enough to compensate for the loss of rural jobs due to the mechanization of agriculture. The percentage of workers in farm jobs declined from 53 percent to 31 percent between 1860 and 1910, and continued falling from there. Fortunately, the demand for labor in urban industries was rising. Those industries continued to build on the American tradition of striving "to raise productivity to make better use of labor that was relatively in short supply." Now that took the form of mass production to produce a high volume of standardized products at low cost. It also involved a "systems approach" that brought more planning, design, engineering and organization to machine-enhanced work. That created millions of job opportunities in white-collar work requiring more education.

Perhaps the most important technological innovation was electricity. It not only enabled new products like electric appliances, but transformed production. The electrified assembly line dispersed power throughout the factory and enabled workers, tools and machines to be located wherever they needed to be for maximum efficiency. The telephone facilitated communication among managers and other workers, contributing to planning and organization.

The wildly successful mass-produced automobile illustrates how a new technology could create more jobs than it destroyed. Because Henry Ford could produce cars so efficiently, he could make them more affordable. The resulting mass market created a high demand not only for auto workers, but for workers in related industries. Cars needed inputs like steel, gasoline and rubber tires, and they supported consumer activities like tourism and drive-in restaurants. Ford also raised wages, both to motivate his workers and to give them the purchasing power to support the mass-production economy.

The economist John R. Commons promoted "welfare capitalism," an economy where high productivity and good wages would go hand in hand. But in the early decades of the

century, most employers still had the power to resist wage demands. Workers would not make significant gains until institutional changes enabled them to organize and exercise countervailing power.

The Great Depression had varying effects on the politics of different countries, some turning to the right and some to the left. In Sweden, the Social Democratic Workers' Party succeeded in forming a coalition between business and labor "ensuring that profits and output increases were shared with workers." In the US, FDR's New Deal pursued similar aims through government regulation of business and support for organized labor.

The "Glorious Years" from the mid-1940s to the early 1970s were a time of spectacular productivity growth and broad-based real-wage gains. Economic inequality declined, both between the rich and the middle class, and also between workers at different educational levels. Some workers, like telephone switchboard operators, did lose their jobs to automation during this period. But new jobs in both blue-collar and white-collar occupations kept the demand for labor high. Rapid expansion of education helped qualify workers for better-paid positions. Union contracts had training provisions to help their members work with new machinery instead of being replaced by it.

The authors conclude that "there has never been, as far as anyone knows, another epoch of such rapid and shared prosperity." They note, however, that even then, several groups were excluded from political power and many economic benefits—women, Blacks and immigrants. Globally, many former colonies achieved formal independence during those years, but they were left with serious problems of poverty and authoritarianism. And to make matters worse, what shared prosperity there was in the wealthy countries "started unraveling soon thereafter."