

## Economic History and the “New Economy”

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I suppose I am in a somewhat unique position to speak about the new economy for two reasons. One is that I am an economic historian who has written a bit about the Industrial Revolution and a lot of economists are asking me, well, are we in another Industrial Revolution? The other is that one of the leading new-economy skeptics, Robert J. Gordon, is my Northwestern colleague and close friend, and everything I say about the topic will have to withstand his scrutiny.

Are we really in a “new economy?” I am always tempted to give the classic answer given by the Chinese Communist leader and revolutionary Zhou-en Lai who was once asked on a visit to Paris whether he thought the *French* Revolution had been a success. His response was “it’s too soon to tell.” Now, of course, economic and technological revolutions are not like political revolutions. There are no Bastilles to be stormed, no Petrograd Soviets to grab power. In economic history much of the change that matters is quiet, underneath the surface, and the effects don’t show up until a generation later. The classic British Industrial Revolution for instance, was barely noted for decades by contemporaries. Even those who noticed the innovations around them did not suspect that continuous innovation and productivity growth were there to stay and turn from rare

events into a sustained and normal condition. Most of the macroeconomic effects do not show up in the aggregative statistics, such as they are, until many decades after the great inventions.

It has been customary among economists to judge technological changes by measures of productivity and growth. This is natural and normal, and I would be the last person to deny that if change is real, it will eventually show up in productivity changes if *properly* measured. Therein, however, lies the rub. Productivity is a ratio of output to input, and the way we measure aggregate output was set in stone by national income accounting conventions agreed upon many decades ago, to measure an economy that produced wheat and steel and services that were more or less unchanging in nature. The measurement rules that go into the numerator did not concern themselves much with such issues of the boundaries of intermediary and final goods (always a tricky issue) and the consumption of leisure (widely acknowledged by economists to be an economic good in every respect yet not counted in the GDP statistics). Product quality and variety are dealt with very poorly or not at all.

Beyond that, technology affects economic welfare in ways that are not even designed to show up in the statistics. Thus, if someone invents a pain reliever that can alleviate suffering at a cost close to zero and no side effects, even if there are no substitutes, this would not count for much. That is because GDP figures are designed to measure output at market prices, not consumer surplus. Hence the invention of aspirin in 1898, arguably one of the most welfare-enhancing events in modern history, made little impact on national income statistics.

What I want to talk about today is a similar topic that affected people as much as any increase in productivity over the past 250 years with rather ambiguous effects on the income statistics, namely the rise and fall of the Factory System. Karl Marx was the most notable but not the first observer to realize the enormity of the change that the Industrial Revolution implied for the labor force. Before 1750 the vast majority of workers in Western Europe worked at home, or perhaps better put, lived at the place at which they worked. Millers lived in little attic rooms in the windmill. Artisans and blacksmiths and shopkeepers lived above or adjacent to the place of business. The household and the plant were, with few exceptions, one and the same. With the Industrial Revolution, this began to change: the large factories or “mills” as they were known at the time began to become more and more common. The process took more than a century to complete, but by 1914, the large majority of people working in the industrialized west had left their homes and were working at a different place, often miles away. By that time factories as we know them today had expanded to services: large department stores were competing with Mom-and-Pop cornerstores, huge law offices, schools, and hospitals with hundreds of professionals had become quite common, to say nothing of railroads and public utilities.

This process has deep and complex economic causes. The benefits of concentrating workers in one place were manifold. Some plants, such as large chemical works, shipyards, and steelmills were obviously too large to be carried out in a home. Others simply had to be done at the site such as collieries and railroads. But more often the causes were informational: it was too costly to monitor quality on the output side, and firms needed to

observe and supervise workers in the plant itself. Firms also discovered that it was more efficient to employ workers on a salary base rather than pay them a piece wage. The reason was a growing interdependence of different units of production in finely divided labor processes and continuous flow production lines, which made it difficult to identify separate marginal contributions of labor. It thus became more efficient to pay workers per hour or day, and create a separate set of incentives to make sure they put in the effort. In a classic paper published in the 1972 *AER*, Alchian and Demsetz analyze the problems that such “jointness” triggers. They view this as the fundamental cause of the rise of modern firms, although I would note that “firm” and “plant” should be kept separate here.

Perhaps not as widely discussed in the literature but equally important is the fact that the modern plant served as a conduit for technical and economic knowledge necessary to produce in a world that increasingly relied on the insights and understanding of technically trained employees familiar with the science and engineering required for best practice. In 1750, a single blacksmith could know all there was to know about his trade. After the Industrial Revolution, production engineering became more and more science-based and complex, and the need for the “division of knowledge” deepened. In 1900, metallurgical firms needed to know a great deal of state-of-the-art metallurgy, chemistry, chemical engineering, and required specialists who could maintain and repair steam engines, electrical motors, transport vehicles, complex transmission mechanisms, and on and on. Some of this expertise could conceivably have

been purchased on the open market from consulting engineers and chemists, but the day-to-day operation of production was too specialized and too “local,” and therefore required in-house technical knowledge. This knowledge was transmitted and shared by people through direct contact -- there was no other way.

After 1870 the trend toward factories accelerated. Industries and services in which home production was impractical or impossible, such as railroads and mass-produced cookie-cutter assembly line manufacturing, became increasingly common. Furthermore, it became cheaper to move people relative to information. The period 1880-1914 witnessed the emergence of mass transit through streetcars, commuter trains, and bicycles. The telephone and telegraph, to be sure, also reduced the absolute costs of moving *information* around, but it is hard to argue that their *proportional* decline was in the same ballpark.

The welfare effects of the rise of the Factory are quite striking. We might think today that it was not such a bad thing for workers to get a bit out of the house. The economic and psychic costs of the transition were quite substantial. Two obvious economic costs were the costs of commuting and the reduction of leisure-work choice set. Commuting is a deadweight burden to an economy in that, much like any other kind of friction, it creates a wedge between input and output, but not one captured by our traditional input measures. It comes at the expense of leisure and in equilibrium probably also at the expense of labor time. An increase in commuting time may show up in the statistics, but only insofar as it reduces real work. Insofar that it replaces leisure, our national income

measurement simply ignore it. Furthermore, a worker at home earning a piece wage could fine-tune her allocation of time between leisure and income-producing activities to the point of optimum, as introductory labor economics teaches us. But factories reduced this trade-off to a single point, an “all-or-nothing” kind of choice. In the end, workers might have had higher incomes but worked longer hours than they would have chosen if they had been at liberty to set their own hours.

There were other costs to the new system. Factories were often noisy, dangerous, dirty places. Workers were subjected to harsh discipline to which they were unaccustomed, spent their time with strangers, and often, as Marx called it, felt “alienated.” As economics suggests, these “disamenities” would in equilibrium be compensated for in terms of higher wages, and there is some evidence that this was indeed the case. Coal miners, who worked in the most dangerous and unpleasant circumstances, were paid substantially more than other workers. But this suggests that if we look to higher wages in search of higher productivity, from a social welfare point of view this may have been a wash since there were social costs associated with the higher output. An often overlooked cost of moving workers, especially women, from the home to the factory is the *jointness* of homework in which work that generates income can often be combined with simultaneous domestic activities such as childcare and cooking. As women joined the factories, this option was lost and housework suffered. Since, again, these services are not counted in national accounts, *measured* output grew faster than actual production.

Arguably, then, the Factories imposed a substantial cost on the

population. To be sure, there were some offsetting factors. Some mill-owners were humane, provided their workers with housing, organized company picnics and even offered some measure of social benefits and insurance. Many of them provided schooling, in large part as an investment: the children were taught above all docility, punctuality, sobriety, thrift, moderation, and such bourgeois Victorian values that would enhance productivity.

Now what does all this have to do with the new economy? I submit that what we are observing the late twentieth and early twenty-first century is not history repeating itself but history reversing itself. The new economy is causing the pendulum to swing back. Gradually, more and more workers are working at home, either as telecommuters employed by large firms who let them work from home, or as telecottagers who start small independent businesses operated from home. The dividing line between these two, by the way, seems to get murkier by the day. Many contracts involve “just-in-time” labor, people hired for a particular project. The factory notion of cradle-to-grave employment is slowly coming to an end everywhere if not at the same rate. Exact numbers are hard to come by, as yet. It is hoped that the 2000 census will provide more detail on the matter. But the little information that comes out of survey data leaves no doubt that the pendulum is swinging back. According to Cyber Dialogue there were 4.0 million people working at home during normal business hours in 1990, and 19.6 in 1999, a five fold increase. These do not include another 21.4 million self-employed home-workers, of whom a third report using internet for business. It would not surprise me if some future historian would consider

this trend at least as important as any increases in productivity, diversity, and product quality.

The cause for this goes, of course, straight to the new economy, but not just for what it does but for what it does *not* do. We all know how much easier it has become to transmit and access information, to search, filter, sort, store, and manipulate knowledge. On the other hand, in the past quarter century little progress has been made in the technology of moving people to and from work. The length of the average daily commute by car has changed little since the 1970s, most of our casual empiricism that things have grown worse notwithstanding. But average practice mass-transit has certainly not experienced much technological advance, and -- as Bob Gordon keeps reminding me -- despite electronic ticketing and bar-coded luggage, a flight from Chicago to London is not any shorter and not much more comfortable than 25 years ago. To be sure, technological progress has not entirely skipped the transport sector: our cars are more reliable and comfortable, and mobile phones have made our commuting time somewhat more productive, but these changes are but crumbs compared to the huge advances in information technology. Hence it has become easier to share and pool knowledge with people who are far away than to bring them near. Soon it will be just as easy or easier to monitor workers in their living rooms by electronic means than it was in the past to monitor them through foremen. Some workers, of course, may object to this: these workers may not have much choice.

Indeed, we may soon reach asymptotically a world in which -- to use Frances Cairncross's catching phrase -- distance for all practical purposes



is dead. A growing number of workers, whether they are college professors, bank tellers, or quality control engineers, sit in front of computer terminals. With rapidly improving connectivity, it will soon matter little *where* these terminals are located. In manufacturing, the increasingly tight marriage between robotization and high-powered computers keeps reducing the number of human beings who have to be present on the shopfloor. To be sure, distance is not quite irrelevant, and we still need to go in person for a dental hygiene or a brake job. Some meetings, including the present one, require a physical presence of the kind electronics cannot -- yet -- supply. Distance will not die, I think, as much as that it will just become gradually less tyrannical and eventually fade into insignificance.

The beneficial effects of these developments are in most part not reflected in the national income statistics, and thus will be missed by the searchers for the holy grail of productivity growth. The new economy will bring about a decline in commute time, an increase in the flexibility of working hours, an improvement in satisfaction due to the worker finding herself in a physical environment of her own choosing and design rather than some soulless cubicle or greasy shopfloor. Most of this, to be sure, is still in the future. Specialists are skeptic if the information highway will reduce congestion on the real one. But in 1820, in the middle of Industrial Revolution, factory workers were still an exception even in Britain, and nobody could foresee the far-reaching changes in the century ahead.

Moreover, pilot studies show uniformly that for those workers who telecommute now, productivity increases. Together with the savings in space, such gains will eventually show up in the standard measures of

output. Economists will point out that this is a biased sample, since the workers most suitable for working at home would be the first to take it up. At the same time, however, the technology supporting home work is just getting started: fast DSL lines are still rather rare, the much-touted Internet II is still a while off, and wireless communications through handheld devices are still in their diapers. In any case, even without *any* changes in productivity, this effect of the ICT has enormous economic consequences.

To be sure, the transformation is inevitably going to be gradual. A substantial – if shrinking – proportion of the labor force is still not quite comfortable enough with computers and the internet to make the switch. Human capital formation, as will surprise nobody, is contingent on the life cycle. Younger people have an easier time, on average, to make radical changes in the way they work. For the generation that grew up surfing on the internet, the transition will be smoother than for set-in-their-ways middle-aged baby boomers. New economy skeptics argue that “the vast majority of jobs require direct contact with people or objects.” What we need to ask is if the generation that has never seen a punchcard or a manual typewriter and whose interpersonal communications rely increasingly on email and cellular phones will define “direct contact” in the same way. In this sense, too, history provides a parallel in reverse: those domestic workers in the early nineteenth century who had fiercely defended their status as independent craftsmen found it very difficult to look for work in factories. The next generation, however, saw the writing on the wall and made the transition.

One issue that will come up is whether a society in which the labor force consists mostly of lonely workers isolated at their homes will not pay a terrible price in social terms. A lot of people, sociologists tell me, are working away from home because work provides them with companionship and a sense of a social belonging. The factory or office provides what one might call a “tavern effect.” The medieval tavern and the modern pub provided the social context in which people who worked apart got together and interacted. Maybe the last thing an economy in which loneliness is already a national affliction, and in which people, in Robert Putnam’s term are “bowling alone” is to get rid of the workplace.

I have three answers to that. The simple one is that people in need of social interaction can still arrange to meet for lunches or conversations at places of their choice, in which *they* control the timing and place. Community life has not done well in America, but perhaps the reason is in part that community life and the workplace are substitutes, competing for the same time and serving similar needs. If the workplace and the commute were to claim less time and effort, people might re-invent the social institutions we associate with life before the Industrial Revolution, only with better food. Information technology has already done things to our society to give future sociologists decades worth of research in creating “virtual communities” of email pals and chat room chums.

A second argument against the social dangers of a decline in the Factory system is the implications for the family: no more latchkey children, no more difficult locational bargaining between couples working in very different places or the need to live apart and set up conjugal

meetings for the weekend. For a society so obsessed with “family values” but which has never seriously considered the effect of commuting and long absences of working parents on their children, this is something worth reflecting upon.

Third, preferences are heterogeneous. Some people like watercooler conversation, others don't. A sorting phenomenon is likely to take place in which we might expect that those most in need of personal contact will continue to go to the office and meet like-minded colleagues there. This sorting principle also holds, *mutatis mutandis*, for e-tailing. Some people like shopping, and I suppose there are enough of them to keep some of the large malls in existence. But for those for whom shopping constitutes a cost rather than a desirable service, there is now an alternative. This means, therefore, an unequivocal welfare increase. The new economy gives us more options, we have more choices, and this makes us better off as long as we don't toss out the old system.

In the short and even medium run, this seems unlikely. Just as the Factory system did not arise overnight but for decades was a hybrid of the old and the new with slowly changing weights, the factory will not collapse overnight. I can envisage workers going into the office one or two days a week, and taking more and more work home with them without giving up the centralized workplace altogether. If there is one thing we learned from past experience that seems to hold over the ages, it is that economic organizations stubbornly cling to existence even after their useful life seems to have come to an end. The Industrial Revolution did not toss out domestic industry in a few decades or even a century. In some industries

such as apparel making and leather products, domestic craftsmen remained in the majority until this century. Similarly, the transformation back to a world of home-based offices and teleworkers will not be complete nor very swift. The rise of the new economy is a gradual change of weights, not a dramatic revolution. It will evolve continuously and the transformation will be one of degree. But, Ladies and Gentlemen, the first lesson of economic history is that “degree” is everything.

Thank you very much