

Man and Machine

**THE NEW DIVISION OF LABOR:
HOW COMPUTERS ARE CREATING THE NEXT JOB MARKET**

BY FRANK LEVY AND RICHARD J. MURNANE
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REVIEWED BY JOHN A. WEINBERG

Among the many famous maxims that have come down to us from the work of Adam Smith is: “The division of labor is determined by the extent of the market.” This statement captures an evolution frequently observed in the nature of businesses and jobs as economies and markets grow. In a small market, particularly in a preindustrial economy, goods were produced and sold in small shops. All stages of production were carried out by the same artisans, the most senior of whom may also have been the shop’s owner.

The growth associated with industrialization brought production on a much larger scale. And with that growth in scale came processes that allowed production to be broken into distinct pieces performed by distinct workers. So one effect of industrialization was the shift in the distribution of work away from artisans who were skilled at and performed an array of related tasks, to workers who specialized in performing one, often relatively simple part of the production process.

These changes originated with the introduction of technology that allowed large-scale production to take place. That is, there has long been an interdependency between the size of demand for goods (the extent of the market) and technology in determining the evolving nature of work.

In *The New Division of Labor*, Frank Levy and Richard Murnane, economists at the Massachusetts Institute of Technology and Harvard University, respectively, direct their attention to the contemporary version of this interdependence. Their particular focus is on the ways in which computers have changed the workplace. Since the dawn of the computer age, many observers have predicted widespread replacement of machines for human work.

Levy and Murnane assess the extent to which such predictions have come true and, more importantly, attempt to

dig deeper into the relationship between information technology and human work. On the first score, it seems clear that some early fears about massive displacement of workers by computers were widely off the mark. Still, it also seems clear that the effect of technology on work has differed widely for workers of varying skill levels and occupations. It is this variation that claims the authors’ attention.

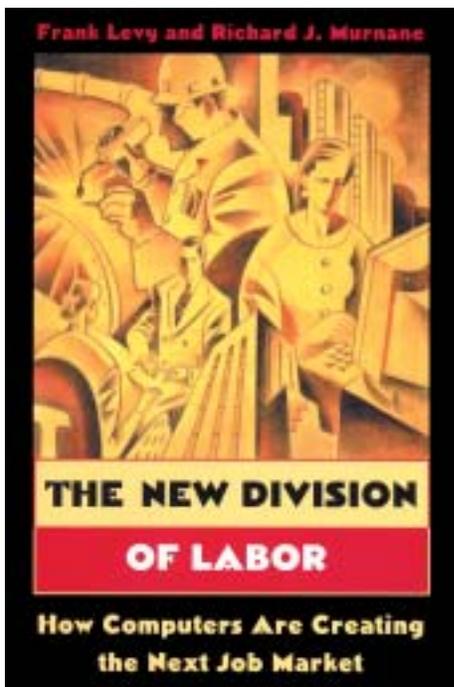
The (Limited) Power of Computers

The authors emphasize jobs in two broad categories — blue collar and clerical — which accounted for over half the U.S. workforce in 1970 but for less than 40 percent today. The increased mechanization of manufacturing and the resulting declines in blue-collar jobs are by now old stories. But the decline in the clerical category also has been striking. Many clerical jobs involve the organization, storing, and retrieving of information. These are tasks that computers handle particularly well, and so the demand for clerical labor has fallen.

The authors give a number of examples of other jobs in which computers’ comparative advantage has reduced the relative demand for human input. And not all of these are clerical or mid-level jobs. Some, like the job of a trader in the pits at the London International Financial Futures and Option Exchange, were quite highly paid. The exchange replaced its trading pits with an electronic trade execution network in 1999. While the information processing tasks

associated with trading were perhaps more complex than traditional clerical work, it was still the case that computers could do that processing — searching for matches between buyers and sellers — more efficiently.

All decisionmaking, and therefore most jobs, involves information processing of some kind. But computers are not better than humans at every kind of information processing. Levy and Murnane draw some useful distinctions. They single out decisions that require “rules-based logic” as those that can be easily delegated to machines. Of course, rules-based logic is simply the raw material of computer programming. A problem is broken down into a sequence of statements, the truth or falsehood of which can be unambiguously assessed. Many decisions involve



using data provided as inputs to perform such a sequence of tests, culminating in a final decision. The authors give mortgage underwriting as an example of a problem that, at first blush, seems quite complex but that is still well suited to automation.

The power of computers to solve even complex problems has at times led people to hold out high hopes for “artificially intelligent” computers that could perform any decisionmaking task more efficiently than mere humans. In such a vision, there is no limit to the ability of machines to replace work done by people. Levy and Murnane take a distinctly different view. They identify an array of decisionmaking problems where rules-based logic is not the basic building block. A key component of this other category of problems is what they call “pattern recognition,” by which they mean the ability to assess a situation and determine if it fits a previously encountered pattern. Through examples, they show that “situations” can be very complex things. Consider a driver assessing and reacting to traffic conditions, or a prison guard surveying interaction among prisoners and watching for signs of trouble.

Building on pattern recognition, the authors describe skills and jobs that computers cannot easily replace. “Expert thinking” involves a body of knowledge and experience necessary for specialized pattern recognition. In the work of automobile mechanics, computer diagnostics can identify many problems encountered by car owners, but this technological tool doesn’t always provide the answer to the customer’s problem. When it doesn’t, the expert mechanic needs to draw on his experience of similar cases to efficiently search for a solution. Many jobs also require “complex communication” — the ability to convey and understand nuances and subtle differences in meaning between statements that may sound very similar. In face-to-face or telephone communication, this skill may involve reading meaning into voice tone or body language. In many businesses, a human customer-service function remains superior to menu-driven, automated alternatives.

New Skills for a New Age

Ultimately, Levy and Murnane are most interested in how businesses train and how schools teach in a world where rules-based logic allows machines to perform many tasks and where expert thinking and complex communication are the uniquely human skills that keep people employed. On the training side, they describe cases of large businesses, like IBM, that make substantial investments in training their workers. They argue, however, that profit-seeking businesses will in general not provide enough in the development of expert thinking and complex communication skills. These are general skills that make workers equally valuable to competitors as to the firm that provides the skills. So, naturally, firms are reluctant to invest in the acquisition of such skills because workers can easily take them to a new company. Instead the authors look to the education system, and in particular to standards-based

educational reforms, as a source of improved skill-building for the U.S. workforce.

Standards-based educational reforms mean different things to different people, and Levy and Murnane argue that not all standards are created equal. They are much less interested in standards related to particular content areas than in standards that assess a student’s success in developing the types of thinking and communication skills necessary to do the jobs at which humans still have a comparative advantage. And these types of skills don’t lend themselves as easily to simple, multiple-choice testing. They describe a program undertaken by a Boston public elementary school that has had some considerable success. This example makes clear that the kinds of reforms the authors have in mind are not simple or cheap. They involve a great deal of direct student-teacher interaction, as well as guided interaction among students.

In the end, the picture Levy and Murnane paint of the future of the U.S. labor market is not too promising. They foresee a continuation of recent trends, involving replacement of low-skilled work by technology and a widening gap in earnings between the skilled and unskilled. Given the divisive politics of public education, it’s hard to imagine sweeping changes in primary and secondary education taking place very rapidly.

But many of the authors’ examples show that not all jobs involving expert thinking and complex communication require a college degree. That is, not all such jobs are “high-skilled” in the conventional sense of the term. Indeed, general economic trends could ultimately lead to increases in the demand for jobs that do not require higher education but do involve the types of skills the authors emphasize — for instance, jobs that involve face-to-face (or voice-to-voice) customer contact.

The New Division of Labor gives a concise description of just what it means, in the computer age, to say that jobs are being lost to machines. Computer technology is different in this regard from earlier technological advances. Since computers are likely to continue to be a source of new innovations, it may be natural to assume that the labor market trends brought about by the information revolution are likely to continue. But innovations are just that — they’re new developments that aren’t anticipated before they appear. This makes projection of trends into the future a risky business. Rather than hoping for a change in the direction of technology, the authors prefer to argue for adapting our approach to education to the currently prevailing technological trends. That’s a hard preference with which to argue. **RF**

EDITOR’S NOTE

Our review of Too Big to Fail: The Hazards of Bank Bailouts by Gary Stern and Ron Feldman, which appeared in the Fall 2004 issue of Region Focus, stated that the book’s authors failed to address the problems a coinsurance program may face if the Federal Reserve lends liberally from the Discount Window. Actually, Stern and Feldman discuss that issue on pp. 157-158 of their book.