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Earnings Inequality and the Quality of Jobs:
The Status of Current Research, and
Proposals for an Expanded Research Agenda

by

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I was fortunate to have very constructive comments on an earlier draft from Kathy Bradbury, Michael Handel, William Lazonick, Mary O'Sullivan, and Chris Tilly. I also benefited from on-going conversations about the content of this paper with Kathy Bradbury, Robert Forrant, Michael Handel, William Lazonick, William Mass, Harold Salzman, and Chris Tilly.

I. Introduction

Aside from recessions in 1980, 1981-82 and 1991-92, the number of jobs in the United States has grown respectably during the 1980s and 1990s. The 1997 Economic Report of the President trumpeted 11.2 million new jobs since January 1993, bringing the unemployment rate to 5.4 percent, quite low by recent standards, and the rate has declined since that report was issued. Nonetheless, there are many indicators of serious concern. Real average hourly earnings have declined from 1978 to the early 1990s, and have stagnated since at the level achieved in 1965. Inequality of earnings and income have risen over the same time period, and the rise in earnings inequality is pervasive, within occupations and industries, within age groups, within education groups, and markedly across education groups. Several measures of the quality of jobs other than their wage rate, for example stability and security, upward mobility, percent of the workforce working under a contingent contract, and growth of benefits signal stagnation or deterioration.

Both the level and the rise of earnings inequality is significantly greater in the United States than in other advanced countries. Only Great Britain has had an increase in inequality in the neighborhood of what has occurred in the United States. Workers in the United States have less job security, less representation at work, and lower benefits than is the case in Japan and the industrialized countries of Europe.

There is a long list of suspects to explain the worsening distribution of earnings and job quality. Most economists have concentrated on changes in market forces, implicitly assuming that firms have been forced to respond to these market forces by moving up or down labor demand curves, or shifting or twisting their demand curves in favor of persons with more skill. Market changes such as increases in the supply of low skilled workers, primarily immigrants; a rise in the demand for more skilled workers and a fall in the demand for low skilled workers, caused by increased use of computers and other advanced technologies, or by increased international trade are the explanations most frequently put forward by economists. Other economists have analyzed the weakening of particular institutional restraints on the forces of the market including the drop in the density of union coverage of the workforce and the descent in the real value of the minimum wage.

A few economists and industrial relations specialists have emphasized a set of factors that have worsened the bargaining position for labor, and reduced job availability and job security in mainline U.S. industries.¹ These analysts are the exception, however. There is not a great deal in the literature that connects heightening wage inequality in the U.S. to U.S. firms' competitive strategies, and how those strategies have changed for the worse or not changed for the better in the 70s, 80s, and 90s. This is true despite the evidence that important changes have taken place--in wage setting and job security norms

¹ See, for example, Kochan, Katz, and McKersie 1984, Bluestone and Harrison, 1982 and 1988, Harrison 1994, Gordon 1996, Howell 1997, and Cappelli, Bassi, Katz, Knoke, Osterman, and Useem 1997.

generally; cost and job cutting strategies, even in growing and profitable industries; job restructuring; outsourcing; relocation of jobs within the country and abroad; lowered training investments; and a shift in orientation towards short term financial performance over other firm goals. Indications of divergent strategies being adopted by U.S. firms--some taking a "high road" strategy of greater skill investment, employee participation, and better wages, and many more taking the "low road" of squeezing labor costs through lowered wages and job security and increased task demands--also suggests that exogenous market forces can be only part of the story.

In the next section of this paper, we detail the stylized facts of the worsening distribution of earnings and job quality in the United States. The section following is the heart of the paper--an assessment of the empirical literature that seeks to explain these facts. This paper is one contribution to a larger project, funded by the Jerome Levy Economics Institute, that explores the dynamic interaction of the investment and competition strategies of important U.S. industries and enterprises, and the institutional structures that characterize different nations in generating sustainable prosperity. Sustainable prosperity, in the framework of this project, is the ability to distribute the benefits of economic growth to more and more people over a prolonged period of time.²

This perspective opens new possibilities for research, and, if valid, offers important insights on possible remedies for the deteriorating distribution of earnings and job opportunities at the middle and lower rungs of the ladder. If changes in the distribution of earnings are primarily the result of "inexorable" market and technology forces, there is little room for improving the distribution except by trading off economic growth. If the changes in the earnings distribution are not due primarily to market forces, as the sustainable prosperity perspective developed in this project argues, then it may be possible to restructure social institutions to influence corporate investment strategies so that increasing equality of earnings and economic growth go hand in hand.

The more modest objective for this paper is to appraise the usefulness of existing research on the causes of changes in the earnings distribution to the sustainable prosperity perspective. The next to last section of the paper provides a synthesis of problems in the existing literature and an alternative framework, focusing on the strategic behavior of enterprises, consistent with the sustainable prosperity approach. Finally we offer a concluding section with proposals for future research.

As a disclaimer, this paper provides neither an exhaustive review of the empirical literature on changes in earnings inequality or a major elaboration of the skill base hypothesis and its bearing on the distribution of earnings. There have been several very good and detailed reviews of the literature on earnings inequality (Levy and Murnane 1992, Danziger and Gottschalk 1995, Kodrzycki 1996, Michel, Bernstein, and Schmitt 1997). The sustainable prosperity perspective is presented in detail by its authors, Lazonick and O'Sullivan (1996, 1997).

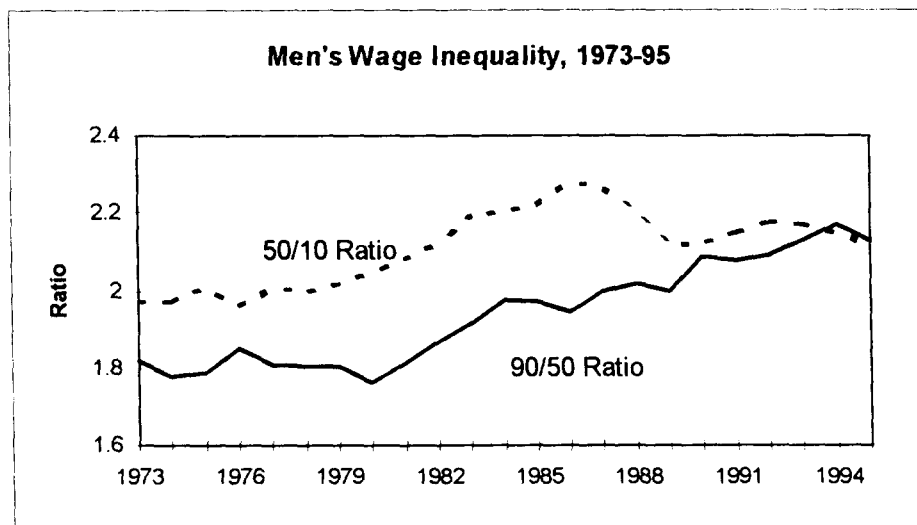
² The theoretical framework underlying the concept of sustainable prosperity is elaborated in Lazonick and O'Sullivan 1996.

II. What needs to be explained: The stylized facts of earnings and job quality

Inequality

That earnings in the United States have become significantly more unequal is now well accepted. Earnings of the top decile have risen, those of the bottom deciles have plummeted, and those in the middle deciles have stagnated or declined. Workers in the bottom groups have faced not only a relative decline, but a significant fall in absolute terms as well. The rise in inequality occurred both for men and for women, but there were differences as well. For men, during the 1980s the very top of the distribution gained relative to the middle, and the middle gained relative to the bottom. The ratio of the calculated hourly wage of the 90th percentile worker to that of the 50th worker rose from about 1.7 in 1980 to about 2.1 in 1990. The ratio of the calculated wage of the 50th to the 10th rose from about 2 in 1980 to a peak of about 2.3 in 1986-87 and declined to about 2.15 by 1990. In the 1990s, inequality for men continued to increase, but it was the top percentile that pulled away from everyone else—the 90/50 ratio continued to climb to almost 2.2 by 1994, and the 50/10 ratio wiggled up and down somewhat during the 90s but by 1994 it was essentially unchanged from its level in 1990 (Mishel et al. 1997).³ Figure 1 shows the pattern in inequality of men's earnings.

Figure 1



Source: Mishel et al. 1997 Figure 3.11

For women, the trend in the 90/50 ratio was steadily upward throughout the 1980s and the 1990s from about 1.8 in 1980 to a little less than 2 in 1990 to about 2.2 in 1994.

³ The Economic Report of the President, 1997 calculates these ratios with the earnings of full time full year workers and reports similar results.

The 50/10 ratio grew sharply in the 1980s, from about 1.5 in 1980 to over 1.9 by 1989. It declined slightly until 1992 where it has been stuck at a little over 1.8.

Wage levels

The trend in the level of wages is also very disheartening. Real wages have fallen for every decile group of men below the 90th. The rise in the 50/10 ratio, noted above, results from a much faster decline among the bottom groups. The real wage (in 1995 dollars) of the median male worker slipped from \$13.66 in 1979 to \$12.41 in 1989 to \$11.62 by 1995, a 14.9% descent over the period. Male workers in the bottom two deciles watched their wages plunge by over 18%.

Wages for women at the median grew modestly in the 1980s and then fell modestly in the 1990s, leaving the median wage in 1990 4% above its level in 1979. Wages of women in the bottom decile fell precipitously in the 1980s (over 18%) but reversed very slightly in the 1990s (1.6% by 1995) (Mishel et al. 1997). The result of the wage trends for men and women was to lessen the gap between what men and women are paid.

Timing and the changed pattern of cyclical response

The time path of inequality and wage level measures indicate that the major loss of ground occurred in the early 1980s and secondarily in the early 1990s. The indicators of inequality had their sharpest rise from 1980 to 1982. While rising through the 1980s, the rise turned more steep again from 1990 to 1992. Measures such as inequality, real wages, and poverty levels have for the most part been countercyclical. Both the early 1980s and the early 1990s were periods of recession, so a rise in inequality and stagnation of wages was not unexpected. The sustained growth in inequality and continued slide in real wages through the recoveries of the 1980s and the 1990s is a break from historical patterns and calls out for explanation. The particularly steep descent in the real wages of workers in the bottom deciles reversed the historical inverse relation between growth in GNP and employment and the rate of poverty. (Blank and Card 1993, Blank 1997a)

A number of factors made the recessions of the early 1980s distinct. The 1981-82 recession followed quickly on the recession of 1980, and was especially harsh, the worst since the 1930s. The value of the U.S. dollar was very high during the early and mid 1980s which handicapped the U.S. competitive position in international trade. The election of Ronald Reagan and his stance towards the PATCO strike signaled a change in public policy towards labor. There is no firm consensus on the degree to which these factors, or other changes in the economy, discussed below, altered the structure of the U.S. economy, and hence altered the alleged historical relationship between growth, and in inequality and wages.

The 1991-92 recession was milder, but marked a change from past patterns as well. Unemployment, and long duration unemployment spread into the white collar ranks to a much greater degree. Although the increased rate of job loss of managers and

professionals attracted a lot of attention, lower paid white collar workers in technical, clerical, sales, and administrative jobs suffered much more seriously than in the past as well. Their unemployment rates were higher and their unemployment was more permanent than in previous downturns. It should be noted that blue collar workers, while losing jobs at a significantly lower rate than in earlier recessions, still suffered greater rates of job loss in 1991-92 than any other occupational category.

Job quality

Along a number of dimensions, in addition to the tumble in wages, the quality of jobs has worsened.⁴ Some analysts have tried to soften the blow of declines in real wages by noting that total compensation, the sum of wages plus fringe benefits, did not fall, but rather grew very slightly from 1979 to 1994. However, the rate of growth in the 1980s and 90s slowed significantly from its rate in the previous decades, reflecting a decline in the growth of benefits. Benefits grew by 6.4% in the 60s, 2.3% in the 70s, 1.3% in 80s, and a paltry .6% in the 1990s. Benefits, in fact, went down, on average, from 1994 to 1995 (Mishel et al. 1997). The distribution of benefits, in particular, employer provided health care, are distributed more unequally than the distribution of wages. Further, the distribution of benefits worsened as the fraction of employees with health care coverage and pension coverage declined. The loss in coverage was felt relatively more in the bottom quintile of earners (although the next quintile up from the bottom was also hit hard), compounding the sharp decline in wages felt in this quintile. The distribution of total compensation, as a result, is *more unequal* than that of wages (Little 1995).

The decline in union coverage plus inconsistent application of state laws barring “wrongful discharge,” has reduced the access of U.S. workers to due process. Job flexibility has increased, but mainly for employers, not employees. Families are supplying more work hours, chiefly from increased hours of women, and multiple job holding has increased (Mishel and Bernstein 1994, cited by Tilly 1996). Although there is a lot of movement up and down over the business cycle, the fraction of the workforce employed part-time has trended upward since the 1950s. Since the 1970s, the increase has been fueled primarily by persons working involuntarily part-time. The contingent workforce has grown substantially and companies now report use of temporary workers throughout the occupational distribution (Carré, duRivage, and Tilly 1995, Mishel et al. 1997).

Job security has declined. Jobs tenure decreased for men as did industry and occupational attachment. Women’s job tenure lengthened, counterbalancing to a degree the circumstances of men (Farber 1995, Rose, 1995, 1996, quoted in Tilly 1996). The rate of displacement from jobs increased in the 80s and 90s. The workforce experienced a greater rate of job loss 1991-93 than in 1982-3. Recall 1982 was the trough of a severe recession, and 1993 was the beginning of recovery from a milder recession.

⁴ This section draws significantly from Chris Tilly 1996.

The earnings loss associated with losing a job was higher at the end of the 1980s than at the beginning (Farber 1996, cited by Tilly 1996 and Mishel et al. 1997). The rate of job loss increased for white collar and service workers during the 1980s, and in the 1991-92 recession, managers experienced the greatest percentage rise in the rate of job loss, but professional, technical, administrative, and sales workers' rate of job loss jumped as well (Mishel et al. 1997 using work of Farber 1996).

Downward mobility became more likely and the prospect of upward mobility lessened. A greater fraction of workers experienced a downward skid in earnings during the 1980s. Men's probability of an earnings loss increased while women's declined. However, both groups experienced an heightened chance of a drop in hourly wage (factoring out the effect of changes in hours per week and weeks per year) (Rose 1996, cited in Tilly 1996, and Mishel et al. 1997). In general, the variability of earnings went up during the 1980s (Danziger and Gottschalk 1995).

Disputing the idea that job quality has been declining, the Council of Economic Advisors issued a report claiming that the jobs generated in the economy in the last few years have been good quality jobs because two-thirds of them have been in occupation/industry categories whose average wage is above the overall median wage (Council of Economic Advisors 1996). The Council's 1997 Economic Report of the President repeated this claim. The assertion has been criticized by several analysts. The major point, however, appears to be that if job quality and wages paid are equated, then creating more good quality jobs should appear as rising average wages, which has not occurred.⁵ The council implicitly assumes that wages within occupation/industry cells are constant, and then shows that higher wage cells are expanding employment. The catch is wages are falling within these and most other cells.

International Comparisons

The level and trend in inequality among industrialized nations shows that the United States began the 1980s with a level of earnings and income inequality above that for other countries. Canada and the United Kingdom were also higher than the rest of the others, but both trailed the U.S.. The growth in income inequality was greater in the United States than any other of the industrialized countries, and again, the countries whose rise in inequality was closest to the U.S. were the United Kingdom and Canada. Most countries had very modest rises in earnings inequality or no rise at all (Atkinson, Rainwater, and Smeeding OECD 1995, and Freeman and Katz, 1994).

The sharp decline in wages that U.S. workers on the bottom rungs of the ladder experienced was not observed elsewhere, even in the countries that experienced increases in wage inequality. In the UK, wages rose for low wage workers, as they did in Japan

⁵ This point was made to me by Michael Handel and developed in conversation with Chris Tilly.

(Freeman and Katz, 1994). Most industrialized countries experienced a substantial rise in unemployment during the 1980s and early 1990s, however.⁶

A number of indicators of job quality other than inequality also leave the United States trailing other advanced nations. Productivity growth and wage growth were slower in the United States in the 1980s than in other countries. Job security in the other countries, except Great Britain, did not lessen anywhere near the degree as it did in the U.S.. Union coverage declined in most countries, except Canada, to some degree, but not by nearly as much as in the United States. Further, in Europe, mandated works councils assumed a greater role in maintaining worker representation as union influence diminished. In Europe, the social safety net, already stronger than that in the U.S, was questioned and weakened to a modest degree in some countries in the 80s and 90s, but was not assaulted and lacerated to anywhere near the same extent as it was in the U.S. (Freeman 1994).

III. How current empirical research explains the facts

The most frequently given and most widely accepted explanations given for the worsening labor market outcomes can be characterized as falling into three groups: those on the supply side; those on the demand side; and certain institutional changes, in particular the decline in unionization and the falling real value of the minimum wage. Explanations based upon changes on the demand or on the supply side of the labor market assume fairly competitive conditions in the labor market, so that wages paid by skill level are determined by a market for skill levels. And changes in the wage paid by skill represent shifts or a “twist” in either the demand for different levels of skill, or the supply of different levels of skill. Within the supply demand framework, institutions represent restraints on competitive market forces. The institutional explanations analyze changes in the level or strength of these restraints.

The perspective of sustainable prosperity suggests a fourth category of explanations. These explanations look at enterprises and changes in their strategy with respect to pay structures, skill formation, and implementation of technology. Parts of the statistical literature that is analyzing a supply or demand side explanation are consistent with the sustainable prosperity perspective. Our discussion of research relating to this perspective, or promising research that can be done to further it comes in the next section.

The remarkable pervasiveness of the rise in earnings inequality weakens the case of any individual supply or demand factor used to explain it. Inequality has risen substantially within essentially every relevant subset of the labor market—within industries, within occupations, within education groups, within experience level groups,

⁶ Many analysts explain the difference between the experience in the U.S. and that in Europe or Japan as different countries have “picked” a different point along a continuum of choices that tradeoff employment against the level of wages. That is, in the face of market changes, the U.S. experienced more employment growth, but at a price of stagnant wages, while other countries’ wages did not fall, but at a price of low job growth and rising unemployment.

within age groups, within gender groups, within racial groups, within regions. Groups, or industries, or regions that did not feel the force one of these explanatory factors experienced an upswing in inequality nonetheless. In fairness, one can't expect to explain everything with a single factor, taken by itself. Nor should the failure of any one factor to be consistent with all or a majority of the observed changes in inequality invalidate it as part of a more complicated explanation.

Supply side

Three supply side developments have been linked to increased inequality. The first is a slowdown in the growth rate of more educated workers in the 1980s compared to the 1970s (Katz and Murphy 1992). Katz and Murphy estimate that the supply of college educated workers relative to high school educated workers increased by 5 percent per year from 1971 to 1979. The annual rate of increase slowed to 2.5 percent from 1979 to 1987 (cited in Freeman and Katz 1994). Reaction to the falling college wage premium in the 1970s, and the smaller cohorts of high school graduates as a result of the "baby bust" appear to be the main causes of the diminished growth of the relative supply of college graduates in the 1980s. This slowdown in the growth of relative supply, and a purported increased demand for more educated workers (elaborated below), is asserted to be an important cause of the rise in the wage premium for a college degree, and hence, a cause of the widening divide in wages. It should be noted that the growth of the relative supply of college graduates picked up again in the late 1980s and into the 1990s. That this development did not moderate the widening of the distribution of earnings has been explained by a purportedly greater rise in the demand for higher skilled workers (proxied by college educated) that has outpaced the increased relative supply. There are many problems with this explanation which will be discussed below with the demand side explanations.

Increased immigration of low skilled workers, legal and illegal, is also alleged to have stretched the wage distribution. Borjas (1994, cited in Mishel et al. 1997) shows that the flow of legal immigration increased sharply in the 1980s, and that legal immigrants are less likely than native born U.S. residents to have a high school education. Briggs (1993) indicates that the rate of illegal immigration shot up in the 1980s as well. Case studies (Moss and Tilly 1996, Waldinger 1992, for example) provide additional evidence of increasing employer preference for immigrants over native workers for low end jobs, and the transition of the occupants of certain occupations from native born, typically black, to immigrant groups). Case study appears to a very fruitful way to understand how particular kinds of immigration can affect particular groups of workers in particular strata of jobs. It also helps understand the persistence of low pay and low skill development strategies of particular industries.

The statistical literature on the effects of immigration on wages is very mixed (Borjas, Freeman and Katz 1992). The case for immigration having an effect on inequality is bolstered by research that shows that inequality increased relatively more in the West, where there was a relatively higher flow of low wage immigrants (Topel 1994), but, again

there are important counter examples. Although labor economists claim to have found some national level effect of immigration on earnings inequality, immigration cannot explain the widening inequality in the some regions and cities that did not experience significant immigration. And no pronounced effect appears for Los Angeles or Miami, two cities that experienced significant immigration.

The effects of immigration requires further study. An overall statistical estimate of the national effect of immigration on wages and inequality, that policy makers might have confidence in, will continue to be very hard to produce. For particular types of policy, (*example) it is important to understand how immigration has affected particular industries. As mentioned above, case studies have been effective in generating an understanding of the role immigration has played in maintaining low paying industries. It would also be very useful to understand the role of immigration of college degree seekers and highly educated and skilled individuals in maintaining the competitive position of several high technology industries in the United States that generate relatively high pay and job security.⁷

Third, a negative demand shift at the middle and lower strata of the wage distribution may have affected supplies at lower levels. One would expect the increased amount of middle and lower middle level earners who lost jobs in the 1980s would swell the number of people looking for lower paying jobs. (Howell 1997). Job losers have suffered earnings losses of larger and larger amounts during the 1980s and 90s. Average earnings losses were 9.2% in 81-83, 10.5% in 89-91, 11.2% in 91-93, and 14% in 93-96 (19% for factory workers).

Demand Side

The general story about demand and its effect on wage inequality is that demand for labor has twisted—raising demand for more skilled workers and reducing demand for lower skilled workers. Evidence from a variety of sources has been amassed in support of this argument. Because skill itself is so difficult to measure in large scale survey data, and hence rarely is, most of the statistical analysis rests on the assumption that level of education is reasonably synonymous with skill—more educated people are on average more skilled, and increased use of more educated people means (supply controlled for) increased demand for skill on the job.

The wage premium to more education--college to high school--has soared. Men with college degrees earned about 22% more than high school educated men in 1979 (having fallen from about 32% over the 70s). The bonus rose to about 45% by 1994. For women the trend was from a little over 40% in the early 1970s to about 30% in 1979 to approximately 53% by 1994. This has occurred not so much because college educated workers have seen large rises in pay. In fact they have not. College educated workers wages tumbled during the 1970s as the relative supply of them increased, and advanced

⁷ This point was suggested by William Lazonick.

modestly during the 1980s and 90s back to the level achieved in the early 1970s. The reason for the continued widening of the education premium is that the wages of high school and less than high school educated workers have nose-dived over from 1979 to 1995 (-12% over the period for high school, -23% for less than high school (Mishel et al. 1997)).

At the same time, the relative employment of more educated workers has increased within occupations and within industries. In a supply/demand framework, that both relative price and relative quantity have gone up indicates an increase in demand. Industries that employ more educated workers have grown relative to those that do not. The decline in goods producing industries that use, on average, relatively less educated workers, and the rise of service producing industries that use, on average, relatively more educated workers is now well known.

Recent studies decomposing the effect of within industry increases in the use of more educated labor and the across industry compositional shift are pretty uniform in arguing that the within industry rise is the more important explanation for overall increase in the use of more educated labor (Berman, Bound, and Griliches 1994, Murphy and Welch 1993, reviewed in Kodrzycki 1996). Berman, Bound, and Griliches also chart the non-production worker share in total employment in manufacturing. They interpret the observed rise in this share during the 1980s to be a further indication that demand is twisting towards higher skilled workers, presumably exacerbating the spread in earnings between skilled and less skilled. Gordon (1996) gives an alternative explanation. He argues that upper management “fattened” the ranks of managers and supervisors to extract more effort from line workers.

Howell (1997) notes, however, that within manufacturing, the non-production share shot up in the 1980-82 period of recession, but remained stable after that. This weakens the case for either of the two causal stories for the rest of the 1980s and 90s, when the earnings distribution continued to widen. Nonetheless, the simultaneous rise in the 1980s of the wage premium to education, the relative employment of more educated workers, and earnings inequality, has proven to be a very potent association in economists’ and policy makers’ minds.

The explanations given for the rise in demand for more skilled (educated) labor and the fall in demand for less educated labor center on technological change, increased international trade in goods and services, and globalization of production. Technological change, as captured by greater use of computers and computer driven processes, has accelerated in the 1980s and 1990s. Krueger (1993), in a very frequently cited paper, used Current Population data and found that people working with computers were paid more, on average, than those who did not. He also found that the likelihood that a person used a computer rose with education and the payoff to the use of computer rose with education as well. The fractions of workers using computers rose between 1984 and 1989 even as the premium paid to workers who use them did not diminish, leading Krueger to infer that the technology of computer use was driving demand for workers with computer

skills faster than the supply was increasing. It is interesting that Krueger found the particular computer skill associated with the highest wage premium to be use of electronic mail. Krueger explains this by saying that “high-ranking executives often use electronic mail.” Anyone who uses electronic mail knows that it does not involve a lot of skill or require more than very minimal training. Secondly, it is pretty far fetched to believe that a “high-ranking” executive becomes yet more high-ranking once he masters the skills of electronic mail. It is much more likely that high ranking executives have experienced a surge in pay for quite other reasons, discussed below, and that they also have tended to be more likely to use electronic mail because U.S. firms have tended to concentrate new skill training at the managerial ranks.

The evidence from employer data is less robust on the wage premium for computer use. Cappelli (1996) using a large scale national survey of employers found that among manufacturing firms the percent of nonmanagerial workers using computers was associated with higher pay for production workers, although the effect was very small. There was a similar association between the percent of managerial workers using computers and production workers’ pay. Cappelli also found a positive association between the fraction of workers using computers and the probability that a firm reports that skill needs are rising, but the measured effect is, again, very small.

Berman, Bound and Griliches (1994) discovered that the use of more educated labor was correlated with greater investment in computer technology. This, combined with the swell in investments in computer technology occurring in the 1980s and 1990s, has led Berman et al., and almost all other analysts to conclude that computer related technological change has caused an upsurge in demand for more skilled labor, and a sag in demand for low skilled workers. The demand twist has overwhelmed any supply changes, according to the argument, and has thus resulted in a worsening of the earnings distribution. As discussed in the next section, one problem, among others with this line of reasoning is that the timing of the major wave of investment in computers and the timing of the major change in skill mix of employment and stretch in the earnings distribution don’t match (Howell 1997, in which he reviews his earlier work on this topic). This notwithstanding, increased technological change--primarily the use of computers--has emerged, among economists, as the leading causal culprit for the skill demand twist, which, in turn, is the favored explanation for widening earnings inequality.⁸

The increased level of international trade of the last two decades, and the emergence and increased size of the trade deficit for the U.S. are also alleged to have twisted the demand for skill. Trade deficits shift labor demand toward foreign lower skill labor (or implicitly increase the effective supply of lower skill labor) in the U.S. (Borjas,

⁸ A poll was conducted of the attendees at a colloquium on U.S. wage trends in the 1980s held in November 1994 at the Federal Reserve Bank of New York, which included, along with several Chief Executives, an all-star roster of economists working in this field. The attendees were asked to rate relative importance of the various explanations for worsening earnings inequality. Technological change garnered 3 times the support of the next explanation. *Economic Policy Review*, Federal Reserve Bank of New York, January 1995.

Freeman, and Katz 1992). The heightened international competition and loss of domestic and world market share has caused job losses among U.S. manufacturing workers in a number of well known industries that have supplied jobs with relatively good pay, but have demanded relatively modest skill (education). There is controversy over the size of the impact of greater trade flows on earnings distributions and in the econometric research, analysts have admitted great difficulty in separating the estimated effects of trade and the estimated effects of technological change (see Freeman 1995 for a good review of the theory and empirical evidence).⁹ Increased international competition has had two further effects. It has weakened the bargaining position of the workers remaining in the industries faced with this competition. Closely related, it has also encouraged firms to look for cost savings by trimming their workforce, becoming more strident in wage negotiations, and seeking lower cost, typically non-union, facilities and locations in which to operate or from which to purchase intermediate products.

Globalization of production both by outsourcing segments of the value chain to foreign suppliers and by locating production to lower wage facilities abroad also reduced the demand in the U.S. for lower skilled labor. It is also likely that higher level earners such as those that produce financial, managerial, legal services and those working in the portions of high technology industries that maintained or increased their international market share experienced a rise in the demand for their labor with increased globalization of production. Most of the analyses of the effects of trade and globalization on the distribution of earnings have also used education levels in order to assess changes in relative demand for skill.

If skill is measured by education, as most of the research on technological change, trade, and globalization does, then the substantial rise in earnings inequality that has occurred *within* education groups is a puzzle necessitating new or amended arguments about skill and inequality. The thrust of the modified argument is that within occupations there is an increased need and premium paid for skill beyond what is measured simply by education. This has been researched indirectly using the standard large household data sets that have no measure of skill other than education, essentially equating skill with wage (Juhn, Murphy, and Pierce 1993, for example), or by trying to measure necessary job skills directly. The first method is not satisfying because the assumption that wage level equates with skill level assumes a lot of what needs to be researched and relies on unobserved heterogeneity among individuals as the key explanatory variable. The second approach is very hard with representative data sets because longitudinal data on necessary job skills is so scarce. There is some interesting evidence, however from case studies and studies that involve survey data gathered from employers.

Michael Handel (1994) and Peter Cappelli (1996) have surveyed the literature on the extent of skill upgrading in within job categories (as opposed to compositional shifts) in the U.S. Both Handel and Cappelli show how varied this literature is, the significant problems with the data sets that are used, for example the Dictionary of Occupational

⁹ See also the other papers in this volume of the *Journal of Economic Perspectives*.

Titles (DOT), and the conflicting results that have emerged. A good deal of the literature measuring the change in skill in large data sets, such as the DOT, indicates that the degree of skill upgrading has been modest and uneven. The popular vision of wide spread and sharp increases in skill demands driven by an exogenous surge of high technology certainly does not fit the evidence. Howell and Wolff (1991, 1992), analyzing Census occupational data, argue that the overall rate of skill increase in jobs, while positive, slowed in the 1980s, from the pace set in the 1960s. Cappelli's research with data from Hay Associates (a firm that rates the task content of jobs to help client firms set compensation) shows that in most production worker jobs experienced rising skill demands from the late 70s to the later half of the 80s. The results for clerical workers was quite mixed, however, with as many jobs showing less skill need as the reverse (Cappelli 1993).

Data drawn from employers themselves report fairly consistently an some increased need for skills (for example, see Osterman 1995, Holzer 1995, Moss and Tilly, 1996, Cappelli 1996, Murnane and Levy 1996). Most of the studies report modest increases in skill demands, and none reports dramatically increased demand for computer or other other technological skills. Holzer, for example, in a survey of roughly 3200 firms, in four major metropolitan areas, and representative of all sectors, finds only 40% of the firms reporting an increase in skill needs. His sample is of firms whose entry level jobs require only a high school education. Each of these studies offers some insight into the nature of changing skill demands—soft versus hard, whether related to use of computers or other technological changes, organizational changes, or more basic reading and writing skills, etc. The weight of the evidence points to increased demands at the level of quite basic skills—reading and writing, and soft skills such as motivation and communication, and to some degree team and group problem solving skills.

Murnane and Levy show that controlling for a person's mathematics or reading skill when they were high school seniors eliminates a substantial portion of the growth in the college to high school wage premium in a later period (for women essentially all, and for men about one-third). This indicates to them that it is basic high school level skills that are in demand, and employers are increasingly using college completion as a screen to get the people who are more likely to have them.

Taking these studies together, again, there is no evidence of a roaring technological locomotive leaving those lacking advanced computer skills behind. In fact, in Holzer's survey data, and these are firms requiring no more than a high school degree for the entry job, over half of the firms report that workers in these jobs use computers. This suggests that computers, at least in many occupations, complement the skills in jobs that less educated people hold. In Krueger's study, he presents evidence from the CPS, a survey of placement firms and a survey of secretaries employed by Kelly Services, all showing that secretaries with knowledge of computers receive a higher wage. This should raise the earnings of lower educated and lower paid workers, compressing the earnings distribution, not the reverse.

Several recent studies, including Osterman (1995), Cappelli (1996), Bassi (1992), Lawler, Mohrman, and Ledford (1992), Educational Quality of the Workforce (1995), Gittleman, Horrigan, and Joyce (1995) indicate that some significant fraction of firms (ranging from 20% to over 50% of all firms, and higher for manufacturing firms) report some type of activity (teams, cross-training, job rotation, quality circles, employee participation etc.) associated with high performance work (the latter three studies are cited and reviewed in Cappelli 1996). There is evidence in some of these studies that firms that engage in these activities are more likely to invest in training, and pay relatively more to their employees than firms who have not initiated one or more high performance work activities. Cappelli, as well as others, makes the inference that use of these forms of organization are likely to be associated with more skill needs, and therefore, because these organizational developments are relatively new, skill needs must be rising. He notes that other studies have shown that such workplace changes do not always involve skill increases. These inferences are not directly tested, however. These data are all one shot cross sections, and while they ask a question about change over time --whether skills are rising--they do not track pay over time. Therefore it is not possible to connect changed skill demand with changes in pay, or inequality of pay. Further, the introduction of high performance work activities is relatively recent and probably cannot be a consequential factor explaining either skill change or earnings changes that occurred as far back as the early 1980s. Finally, Appelbaum and Batt (1994), having analyzed the existing case study evidence report that experiments in high performance work often wither and often result in little real change or new skill development.¹⁰ The national survey data from firms, nevertheless, do indicate some association between these initiatives and wage levels, although the causality cannot be determined in the cross sectional data. It is possible that such initiatives result in workers learning more skill that then, through market competition, results in higher wages. It is more plausible, however, that many firms that launch high performance work changes are doing so as part of an investment strategy to improve productivity and quality that also includes skill development and better pay levels, which may in turn have an "efficiency wage" effect of inducing more cooperation and effort from workers.

Taken as a whole, the studies that attempt to look directly at skill changes, indicate that skill demands appear to be increasing, but not at the pace suggested by the statistical literature that infers skill changes, not at a pace commensurate with the importance placed upon it by economists explaining the worsening earning distribution, and not in a way that is so concentrated on computer use as the technological change argument would require.

Institutional Changes

A good deal of research has been done on two changes in the institutional context of wage setting in the 1980s, the decline in the fraction of the workforce covered by collective bargaining, and the decline in the real value of the minimum wage. These two

¹⁰ Appelbaum and Batt's work extend previous studies by Kochan, Katz and McKersie (1984) and Walton (1985). These studies and the historical context of the antecedents in the 1970s to the high performance work efforts in the late 1980s and 1990s are discussed in Lazonick 1990.

institutions are seen as restraints that prevent market forces from pushing the wage to a lower level. Weakening these restraints, therefore, should be expected to push down wages and middle and lower levels of the wage distribution where union coverage has been important and where the minimum wage is relevant. The research on these two developments has attempted to disjoin them and estimate the separate impact of each. Not only does this strain the explanatory power of the time series data (Howell 1997 also makes this point), it misses the connections between these two changes and a set of other factors influencing the structure of wage setting and firm strategy. Only a few analysts, have considered declining coverage of workers by unions and a declining real minimum wage as related pieces of a shift in the climate of public policy towards labor, and reflecting a more active strategy by management to lower labor costs, to achieve more flexible control of labor deployment, and to steer the course of public policy (See, for example, Howell 1997, Kochan, Katz, and McKersie 1984, and Cappelli, Bassi, Katz, Knoke, Osterman, and Useem 1997).

The impact of dwindling union and/or collective bargaining coverage of U.S. workers on earnings inequality estimated using several techniques (See Richard Freeman 1996 for a very accessible review of his and others work in this area). Among them are statistical comparisons of the U.S. levels of coverage and earnings inequality with those of other industrial countries; time series estimates using, U.S. data, of the impact of changes in coverage on inequality; regression estimates of the union/non-union wage differential that are then used in shift-share simulations, essentially apply this differential to the percentage drop in union/collective bargaining coverage of workers; more complex simulations that refine the estimation of the hypothetical earnings distribution that would be in place had union/collective bargaining coverage not waned. All of the studies find an important impact of reduced union/collective bargaining coverage on earnings inequality—in the neighborhood of 20% of the explanation of the overall change. DiNardo, Fortin, and Lemieux (1996) adopt an different econometric procedure and find an even stronger effects of changes in unionization on wage dispersion. Theirs is the most recent and probably the most refined statistical work on this issue. The research assumes that the effect of unions on firms in which they are present does not spillover to non-unionized firms. If non-union firms tend to imitate union firms, or if some fraction of non-union firms take the decline in union coverage as a harbinger of more latitude to reduce labor costs, the estimate of 20% underestimates the true effect. Further, to the degree combating union presence is part of a larger strategy by firms to reduce labor costs and increase flexibility to hire, fire and deploy labor, estimating the individual effect of reduced union coverage is missing the dynamic causal mechanism behind the results.

The impact of the decline in the real minimum wage has been estimated through similar type simulations, or regressions using variation among states in the change in the number of workers covered by the minimum wage and the change in inequality. The estimates across studies vary much more widely across studies than do the estimates of falling union coverage. Almost all studies find a significant impact, varying in size (responsible for 10% to 50% of the total change in earnings inequality for adult men, and 30% to 60% for adult women. The impact on earnings inequality is estimated to be

greater for women because more women work at or near the minimum wage. Although the variation in estimates is large, the evidence suggests to Richard Freeman (1996) “that maintaining the minimum wage at historically plausible levels relative to the average would have helped limit the near free-fall in wages at the bottom of the earnings distribution that characterized the U.S. job market in this period.”

The importance of changes in institutions to wage movements in the United States is underscored by a comparison across industrialized countries. Other countries have been subject to many if not all the factors alleged to have shifted labor demand and supply (in particular availability and use of computers, and increased international trade with less developed countries). While some countries experienced modest increases in inequality, their experience was not at all commensurate with what befell the U.S.. have hit other industrialized countries. These countries have not experienced the same surge in inequality, or plunge in the wages of lower wage workers. There is evidence, however, as one would expect, in many European countries of changes in earnings consistent in direction with supply and demand changes, if not nearly as large as the changes in earnings in the United States (Gottschalk 1996)

DiNardo and Lemieux (1997) compare U.S. and Canadian wage distributions and argue that the much larger decline in unionization felt in the United States explains a large portion of the difference in inequality experienced in the two countries. Many have argued that the European countries have adjusted to these factors through higher unemployment because their wage setting mechanisms are more rigid than those in the U.S. The evidence does not support a simple tradeoff between unemployment and wage inequality, however. The attempts to disassemble social protections and labor market restraints in the United Kingdom, and several countries, including Germany and France has not affected employment growth. Further, the fairly constant composition of the unemployed by skill in Europe does not is not consistent with declining demand for low skill and increasing demand for higher skill (Blank (1997b) discusses these issues).

The statistical work on institutional changes, particularly the work on changes in unionization, appears to be more robust across studies than the work on supply or demand changes. The work, however, does highlight the limitation of looking at individual phenomena piece meal, especially when many other political, policy, and management strategy changes were transpiring in the United States. In-depth, and/or comparative case study work will be particularly useful for understanding these changes within the context they have been happening.

IV. Evaluating, Reinterpreting, and Extending Current Research

Each of the explanations for widening earnings inequality, taken one at a time has difficulties. There are statistical problems and limitations, as well as conceptual problems and troublesome counter examples and exceptions. Changes in the supply and demand for

labor is plausibly a part of the explanation for worsening inequality. But the case for the particular factors alleged to have shifted demand, is certainly weakened by all the difficulties with the evidence. Given the problems, its hegemonic hold on thinking about inequality is all the more surprising.

Taken as a whole, the body of research has not sufficiently explored a set of promising factors or explanations for the loss of good jobs, and widening inequality. In addition, other methods of research, in particular, historical, comparative, and case study methods highlight further problems with the existing body of research and suggest encouraging areas for research.

We mentioned several difficulties in the previous section as the different factors were discussed. In this section we try to integrate them to a degree and bring them into sharper focus, so that a productive research agenda might be developed. We first concentrate on the causal argument related to computers, technological change, and demand for skill because it is so central to existing research and policy thinking.

Technology and Skill

It very interesting that faith in the advance in technology (computer use) → twist in demand away from lower skills to higher skills → wage inequality argument appears unlimited. This argument persists as the dominant explanation, not only among economists, but among politicians and policy makers, and in the popular press. For example, the noted academic and policy economist, Paul Krugman wrote in 1994,

“It seems undeniable that the increase in the skill premium in the advanced world is primarily the result of skill-biased technological change.”¹¹

Yet, problems abound with this thesis, several of which were mentioned in the previous section. There are questions about the robustness of the statistical evidence, and a set of problems that arise when in-depth, historical, and comparative studies of technological change are juxtaposed with the inferences drawn from the statistical literature.

A fundamental problem with the existing body of statistical evidence, as Michel et al. (1997) point out, is that the argument about the nexus of technological change, skill, and wages is based on *inferences* from data that measure neither the nature nor magnitude of technological change, nor skill, nor the relation of technological change to skill change. The key causal and mediating variables are *unobserved*. The results, mentioned above, on training needs and training investment, although not without problems of measurement and interpretation, indicate that there has not been substantial change in the need for skills, at least those for which training would be required. The belief, in spite of the lack of direct confirmatory measurement, appears to rest on the simultaneous increase in the

¹¹ This quotation was noted by DiNardo and Pischke (1996).

supply of more educated workers and in their *relative* (not absolute) wage—a prima facie case for non-supply (presumably demand) forces to be at work, as noted earlier. The absence of direct measurement in existing surveys points up the need for case study research both as a basis for understanding the nature of recent technological change and its relation to skill, wages, jobs, and as a basis for informing productive measures of these phenomena that could be used in future specialized surveys.¹²

That timing of the major investment surge in computer technology and the timing of major changes in the skill mix of employment (measured by education, or by occupations) and in earnings inequality don't line up is a pretty serious strike against the technology/skill demand/wage argument. According to Howell's calculations (1997), the early 1980s—1980-82 saw the greatest degree of skill change, as measured by education and composition of high and low skill occupational categories, and sharpest the rise in earnings inequality. Computer investment did not surge until the latter half of the 1980s. This difficulty with timing is also mentioned and further explored by Mishel et al. (1997), and DiNardo and Pischke (1996).

Mishel et al. look at trends in several indicators of implementation of new technology, including equipment per worker, R&D expenditures, computer equipment per worker, and multifactor and labor productivity. Their results further damage the basic argument. The time patterns in these indicators, and results one might expect in multifactor and labor productivity, do not show an acceleration of technological change in the 1980s over their trends from the 1960s and 1970s (Howell 1997 corroborates this view). Further, when these indicators are related to the change in employment shares of higher and lower educated workers, or higher and lower wage workers, the 1970s show a stronger impact than the 1980s. The measures of technological change are associated with a larger increase in high education/wage workers and decrease in lower education/wage workers in the 1970s than in the 1980s. Note, that while productivity has not accelerated off its trend line from the 70s, as the technology story suggests it should, there has been productivity growth. What is different is that the gains from productivity growth have not been shared with production workers in the form of wage increases as they have been in the past. This suggest that whether or not the pace of technological change has altered, the norms of wage setting have changed, as we elaborate below.

Michel et al. reveal another problem—the location of the changes in the earnings distribution is, for the most part, not consistent with technology story. The nose-dive in the wages at the bottom of the distribution is consistent with the story to a degree (but remember that retail clerks, cashiers, and other low wage service workers who are working with new computer technology saw a sharp drop in their wages). College educated workers, well above the median wage, presumably those whose wages should

¹² Levy and Murnane (1992), conclude their careful and widely cited review with a call for case studies to understand inter firm earnings differences because, "Finding a way to get 'inside the black box of firms' may be critical to learning more about the factors that influence firms' choices of technology and their consequent demands for different types of skills. The decisions firms make are difficult to understand, but they will play a large role in determining the distribution of earned income in the years ahead."

have been bid up (in fact, practically all men below the 90th percentile) saw their wages languish, however. While top managers (those above the 90th percentile) are involved in its implementation, they are not the ones who must use the computer driven technologies (other than electronic mail). The connection between technological change and the bidding up of top managers, or other top professionals wages—the top few percent of the earnings distribution—seems pretty attenuated. The supply demand framework and its technology/demand twist variant has no theory as to why the very top group in the earnings distribution has pulled away from almost everybody else. Nor has it a convincing explanation as to why top executive salaries are so much higher as a ratio of median worker wages in the United States than in other countries and why this ratio skyrocketed in the 1980s.

Mishel et al. punch one more hole in the technology story by pointing out that the *within* industry rise in earnings inequality was no higher in industries where technology use grew the most than in industries where technology use did not grow as rapidly. A further blow is dealt by the fact that among the lower skilled occupations that suffered particularly sharp declines in earnings, were truck drivers and construction workers where there is essentially no use of computers, and retail clerks and cashiers, where implementation of computers has been extensive (Howell 1997). Introduction of computers among low paid occupations such as retail clerks and cashiers, which are low paid occupations, may have resulted in productivity increases that reduced demand for numbers of workers, but the productivity increases should have also raised the earnings of the workers who remain.

Di Nardo and Pischke's quite careful econometric work point up several other problems with the statistical evidence. Comparing German data with the United States data, they find that use of computers on the job is associated with a similar wage premium in both countries. The big surprise is that in the German data, use of other tools, such as pencils, calculators, telephones, as well as working while sitting are associated with similar size wage differentials! They, and presumably most others, do not believe that the use of pencils or sitting while working would produce an increase in productivity to merit this wage premium. They caution, therefore, that the widespread belief that computers have generated a productivity increase that, in turn, has generated a wage increase is not justified. Further, DiNardo and Pischke show that when longitudinal data are used, or a time series of CPS cross-sections are used to look at the *change* in computer use and wage *growth*, the effect on the coefficient of computer use becomes unstable. This method of differencing (using a fixed effects model), is a way to control for *unobserved* differences in skill levels. They conclude, therefore, that the cross-sectional relation between wages and computers does not represent a causal relation between computer use and productivity. The relation, they claim, is due to heterogeneity among individuals in their unobserved levels of skill associated with computer use, and/or to the possibility that computers have been introduced more quickly into more highly skilled occupations or where wages have grown more rapidly, that is, unobserved heterogeneity among jobs. Given the nature of the data, these propositions concerning heterogeneity cannot be directly tested. Nor can the skill level of occupations be directly measured, but must be inferred from education levels or wage levels. Unfortunately, therefore, the implications of

these interesting findings must rest on unobserved variables whose validity is hard to establish or disprove.

In fact, the unobserved heterogeneity in skills and jobs that DiNardo and Pischke propose may not be all the relevant heterogeneity to consider.¹³ First, the heterogeneity may well be in job rank or status, not simply skill. Sitting down while working, in itself, probably has little to do with productivity, but it is likely to be related to the rank of one's job. Rank, or status, does have something to do with pay and with the likelihood one uses computers. Second, even if the heterogeneity is indeed about skill, it may well be that it reflects heterogeneity among organizations in the degree to which they have invested in organizational skill and organizational learning which is shared among the individuals within the organization. Organizations, as case study evidence on high performance work, and on skill development and implementation of technology has shown, differ in their strategies for employee involvement in learning and participation in design and implementation of technology. This is true of organizations in the implementation and use of computer technology, and some organizations may have paid their workers a premium as part of a strategy of developing and maintaining these organizational skills.

Different strategies about shopfloor and organizational level skill development may also help to explain Di Nardo and Pischke's findings about the different statistical association between years of education, computer use and wages in the United States and Germany. For the United States data, when they interact years of education with use of computers, the positive coefficient, although somewhat unstable across studies, suggests that the return to computer use is greater for more educated (presumed, by the authors, to be more skilled) workers. This interaction term is negative when the data for Germany is used, suggesting the reverse pattern. The authors are stymied by the result. In-depth comparative study of how the introduction of computer technology has been different in the two countries, particularly in relation to investment in shop floor skill development to utilize the technology, and the different relation of education, and level of (particularly post-secondary) education to shop floor skill might help understand and greatly extend the authors' findings.¹⁴

Evidence from two of the industry case studies contained in this report further perforate the simple argument that technological advance and increased computer caused a skill twist that in turn exacerbated wage inequality. Machine tools and aircraft engines are industries that employ high skilled workers, both in production and in engineering. New technology has been introduced either in products or processes in both in the last two decades. One thread that seems to run through these case studies is that instead of shifting demand away from less skilled toward more skilled or educated workers, and having to pay higher wages to secure the them, as the standard story suggests they should have, most of the firms, for a variety of reasons of history and in response to a new set of competitive challenges, reduced engineering and skilled labor and attempted to hold down wages and other costs through downsizing, relocating production, and outsourcing.

¹³ The points in this paragraph were suggested to me by Chris Tilly.

¹⁴ See Farrant (1997) for work that takes a historical, comparative approach along these lines.

These findings put in high relief the usefulness of case study research to understand how technology is actually implemented.

Other case studies (reviewed in Handel 1994, Cappelli 1996), as well as these two, show that the implementation of technology in the United States results in wide variation in the degree of upskilling, and deskilling or simply skill transforming without increase or decrease being obvious. Case studies have also shown quite different strategies across firms within the same industries for combining technology, training, and workplace organizational changes. Small numbers of firms have taken the high road of greater skill investment and greater responsibility for shop floor workers along with the introduction of technological changes, while others have pursued a wage and effort squeeze of their workforce as their competitive strategy (Lazonick and O'Sullivan 1997, Appelbaum and Batt 1994, and Cappelli, Bassi, Katz, Knoke, Osterman, and Useem 1997).

Finally, the case study evidence indicates that the implementation of technology, including computers and computer driven production technology has been very different in different countries. Robots, and computer assisted design-computer assisted manufacturing are two recent examples. These technologies have been implemented very differently in different countries, with very different implications for the skill content of the jobs, earnings levels, and the success of the use of the technology (Farrant, 1997, Lazonick and O'Sullivan 1997). There has been a pattern of long standing in many U.S. industries to implement technology to reduce skilled labor input, while in other countries, notably Germany and Japan, the introduction of these and other technologies has involved substantial investment in shop floor skills (Lazonick 1990, 1991).

While not explicitly stated, the statistical literature that advances the technology→skill demand twist→earnings dispersion thesis treats technology deterministically--as the exogenous driver of the process. What the case study literature on the implementation of technology emphasizes is that there are strategic choices about how technology can be introduced and integrated with a firms broader competitive strategy. Like much economic research, the statistical literature is very weak on what firms actually do (as opposed to just responding mechanistically to changed market forces).

Considering the range of problems and criticisms, the central thesis of the technology story seems a badly bruised reed on which to base so much of the diagnosis of and policy strategy to moderate the rise in earnings inequality. A reading of the statistical literature leaves the reader with a host of concerns about the existing explanations as to why inequality continued to rise after the economy recovered from the severe 1981-82 recession. With the technology story pretty battered, one needs to look elsewhere to understand why the structure of or strategy towards wage setting, employment, and job quality altered in ways to sustain the damage begun in the recession. Within the statistical literature, work on the decline of unionization and the real value of the minimum wage appears to be the most robust across studies, and to have suffered the least damaging criticism by other analysts. However, the decline in institutional restraints on wages and

job protections must, in turn, be explained. A more comprehensive theoretical framework is needed.

Expanding the research agenda

Aside from specific empirical problems, the focus on market responses to exogenous supply and demand forces has also neglected other factors that may be equally or more important. In particular, changes (or lack of changes) in the strategy, behavior, and organization *inside of firms*, changes in norms, and power relations between employees and management, and changes, other than increased international trade, that have affected the competitive environment facing firms in most sectors, have not gotten the research attention they likely deserve. Although we discuss them separately below, the most fertile way to look at these factors, in all probability, will be an integrated approach, most understandable with case study and comparative research across time and across countries. The treatment here of these various developments is very brief, as they are dealt with in much greater detail by Lazonick and O'Sullivan (1996, 1997).

The recession of the early 1980s coincided with a major change in national politics ushered in by the election of Ronald Reagan. The recession was caused, in part, the federal government's new willingness to endure a high level of unemployment to wring inflationary pressure out of the economy. The government's new stance towards labor was made manifest by President Reagan's decision to break the strike by PATCO. This stance fostered a much tougher posture by management, according to Daniel Mitchell. He has presented research that the wage concessions of the post PATCO recessionary, high value of the dollar days of the early 1980s persisted through the decade, long after economic conditions had reversed (Mitchell 1985, 1989, and Kochan, Katz, and McKersie 1984 for further analysis).

Expanded international trade and more intense international competition are not the only changes that have affected the competitive environment for U.S. firms. Key sectors such as transportation, banking, financial services, insurance, and telecommunications have been deregulated resulting in sharply increased competitive pressures among firms in those sectors. The emergence of large discount retail firms with new methods of distribution, and "just-in-time" relations with vendors has placed strong new competitive and cost pressures horizontally through the retail industry and vertically down the entire retail value chain. Taxpayer unrest and mistrust of government has roiled, putting pressure on traditionally secure public sector employment and pay. Some firms in these sectors appear to have learned from the experiences and tactics of large manufacturing firms that were hit by international competition.¹⁵ Certainly the same

¹⁵ Through in-depth interviews with firms in manufacturing in manufacturing, insurance, retail, and the public sector. Moss and Tilly found that most firms outside of manufacturing reported some version of the increased competition and cost pressure story. Further, they were demanding more skills and more effort from their employees and trying organizational models to improve employee performance that paralleled models underway in manufacturing firms (Moss and Tilly 1995)

language of harsh new competition, and its use to justify a strategy of downsizing, outsourcing, and relocating operations were spread throughout the economy.

Financial demands placed on firms in the 1980s and 1990s from takeover bids and from investor pressure sent top management in many firms on a hunt for rapid increases in share prices. This, in turn, legitimized a very tough stance towards labor. The focus on the financial pressure caused many firms to seek short term profits through cost reductions that had a toll on wages and employment.¹⁶

These three factors and the challenge from foreign competition stiffened the back of many U.S. firms towards costs and labor costs in particular. The impact of a very severe recession, and a new climate of national politics with its celebration of market competition and disparaging of government interference in the market and business decision making allowed much greater latitude for firms to cut wages, jobs, and squeeze the remaining employees. The strategy of response by firms proceeded way beyond the conditions that spawned them. This is a broader and more integrated change in the institutional structure than the literature on the effect of institutional change, reviewed in the previous section, acknowledges. As Lazonick and O'Sullivan (1996, 1997) point out, the strategy of response of many U.S. firms had long antecedents. They further argue that it was not the only type of response possible, nor was it uniformly adopted by all U.S. firms. As we suggest below, finding out why some firms squeezed their labor force and other took a higher road is important to place on the research agenda about sustainable prosperity.

The supply side explanations for changes in earnings and the earnings distribution, discussed in the previous section, are based primarily on a body count of persons at different education levels or occupational levels. But, the supply of labor by skill, is composed of numbers of people and their productive capacities. Productive capacity is certainly not well measured in the existing surveys, and where productive capacity comes from certainly cannot be understood from the existing research.

We need a closer look at skill, and the means by which skill is developed.¹⁷ At a first cut, we need to understand how much training is provided by firms. In 1983 and 1991, the Current Population Survey included questions on whether an individual needed specific skills or training to obtain his or her job, and whether the individual obtained training to improve skills once on the job. Michael Handel has prepared tabulations from these surveys and his tabulations indicate a *decrease* in the proportion of workers who report having needed specific skills or training to obtain their current job, and a *decrease* in the proportion receiving training once on the job. His sample is all workers. The BLS, using the same data, (Amirault 1992) reports a tiny increase in the first proportion and a slightly larger increase in the second proportion. Constantine and Neumark (1994), again using the same data, have findings corroborating the BLS, although with smaller changes.

¹⁶ This is analyzed in detail by Lazonick and O'Sullivan 1996. See also Useem *need citation

¹⁷ Lynch (1994 and in other work) has done extensive research on training in the United States and in other advanced countries.

There is no evidence of any really noticeable increase in skills or training needs to get a job, and no evidence of any sizeable increase in training obtained while on the job. The survey also indicates that the proportion of individuals needing or receiving training is highest for the highest occupations (executives, managers, and administrators) and the highest educated. Given this concentration, one might argue that, on average, less training was provided to most workers. Why this lack of any significant increased training or reported skills need to obtain a job is very surprising given the alleged increase in technology and skill demands. It must be understood if anything serious is to be done about increasing productive capacity to achieve more sustainable good jobs.

There is certainly more that can be learned from careful econometric work on existing data sets. But, as this paper has tried to show, there are considerable limits on that work, and many of the questions addressed by that literature, as well as other significant issues can only be investigated with more in-depth case studies, and comparative and historical methods. The implicit framework of most of the mainstream research on inequality, like much work in economics, sidesteps what goes on inside firms. The behavior of firms is modeled as being determined by the exogenous forces of the market and of technology. The role of policy, in this light, is to offset, in part (and in smaller part all the time, it seems), the income, unemployment, or skill gap consequences of these largely “unavoidable” forces. This framework deflects attention from the endogenous nature of technology and investment in skill. It also limits the scope of thinking about policy. Most discussion of policy concerning earnings inequality centers on education, and training provided, in large part, outside of firms. As Lazonick and O’Sullivan (1997) emphasize, skill development takes place to a very large extent within organizations. Who gets what skills and how the skills are utilized depends on organizational strategy and organizational integration. Without a better understanding of these relationships, and their connection to the quality and pay of jobs, policies relying purely on more education and training will be less effective in promoting the growth of good jobs and incomes¹⁸.

Technology, technological change and skill, as we have stressed, are key concepts in the mainstream story about the divergence of pay levels. The case study literature, as argued above, points up the limitation of using survey data that does not measure technology nor, for the most part, skill. Careful historical and case study research on technology show that technology and skill, to a large extent, is embodied in organizations (Lazonick 1991). It is not surprising that it is hard to measure technology or skill external to their implementation is an organizational setting. Neither is it surprising that the relation of technology to skill, pay, and job quality varies greatly across organizational design and organizational strategy—that is across firms within the same industry, across countries, and across time.

Only with further in-depth case studies will researchers understand technological change sufficiently well to design satisfactory measures that might be used in surveys. The

¹⁸ Murnane and Levy (1996) are an exception. They try to connect educational reform to what they have learned from companies about the skill that are really useful in the workplace.

same is true with skill and the process of skill development. And the connection between technology and skills, given the range of choice in how technology can be implemented and how skills can be developed, requires analysis over time, and comparative work on different firms within the same industries and of the same industries in different countries. The case study of diagnostic imaging equipment included as part of this report shows that firms in the same industry in the U.S. and in different countries have different strategies about skill development and the integration of workers, suppliers, or customers into the design of the technology with likely different implications for the quality, security and pay of jobs (Tilly 1997). The case study of machine tools also illustrates how the decisions to invest in skill in the major U.S. firms have changed over time, and how new technologies have been implemented very differently in the U.S. and Japan, again with divergent implications for the quality, security, and pay of jobs (Forrant 1997).

Case study research can not only uncover the firm strategies and consequences of those strategies to understand how the current situation has come about, it is particularly helpful in finding the contradictions in current strategies and likely future turning points in behavior. For example, some case studies in progress by the author and other researchers at several leading firms in medical diagnostic imaging equipment and insurance and financial services, are generating insights into the limits of the cost cutting approach, and the emergence of new strategies.¹⁹ Respondents have spoken of the limits of outsourcing, and the need to invest in the skills and organization of suppliers to whom they had turned to save on labor costs.²⁰ This is likely to have some implications for wages and job quality. Other respondents have spoken of the stress limits of higher and higher production goals--a consequence of downsizing that expands the tasks assigned to the remaining employees.²¹ High ranking managers within the interviewed firms in both diagnostic imaging equipment and insurance and financial services are recognizing a need for new organizational models and job designs to foster innovation in product development and market penetration. Several interesting models are being designed. It remains to be seen whether the legacy of the cost cutting, efficiency and speed up strategy can be overcome, whether the jobs will have significant investment in skill, and whether better pay and security will be attached to the jobs.

¹⁹ The project, entitled "Corporate Restructuring, Skill Formation, and Earnings Inequality," is funded by the Alfred P. Sloan Foundation. It is managed by Harold Salzman of Jobs for the Future, and includes Chris Tilly and Philip Moss of the University of Massachusetts Lowell.

²⁰ See the report of some of these interviews in Chris Tilly's paper, included in this report (Tilly 1997).

²¹ According to Harold Salzman, the push to reduce costs and promote operational efficiency is the second wave of corporate restructuring, following a first wave of determining and focusing on "core competencies" (itself a reaction to the mergers and acquisitions that preceded it). The third wave is the emergence of strategies for growth--a search for organizational forms and job designs that promote innovation and expansion of market share (Salzman 1997).

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