

Wage inequality and long-term unemployment: is education and training the answer?

Lisa Lynch*

Summary

■ Despite similar exposure to the disruptive forces of increased trade and technological change, most European nations have not experienced the same increase in income inequality as found in the U.S. This suggests that there are other institutions or factors at play that ameliorate the effect these factors have had on the distribution of wages. This paper argues that differences in the investment patterns in education and training across countries have helped reduce the disruptive effects for certain groups of workers. In particular, the Swedish welfare state appears to have produced a work force with both higher average skill levels and lower variance than the U.S. Extensive government training programs and a highly unionized work force in Sweden seem to have reduced some of the potential market failures that can occur especially for post-school training investments. The paper reviews possible policy solutions for rising income inequality in the U.S. that would include increasing the amount of investment in human capital. It also examines lessons from the U.S. experience for current Swedish labor market policies. ■

* *The William L. Clayton Professor of International Economic Affairs at the Fletcher School of Law and Diplomacy at Tufts University. During 1995-1997, she served as the Chief Economist in the U.S. Department of Labor. She is also a research associate at the National Bureau of Economic Research and co-editor of the Journal of Labor Economics.*

Wage inequality and long-term unemployment: is education and training the answer?

Lisa Lynch

During the past decade, economists and policy-makers in the U.S. and Europe have become increasingly focused on the labor market impacts of investments in education and training. Investments in human capital are an important component of the *goods* historically produced by a welfare state. So a better understanding of the *true* payoffs to human-capital investments is especially important for current policy discussions on appropriate responses to widening inequality, programs to speed up the transition from welfare to work, design of assistance for workers displaced due to trade or technological change, solutions for the growing problem of long-term unemployment, and more generally the role of human capital in economic growth.

Many European countries have experienced trade and technological changes similar to those in the U.S., without a corresponding increase in inequality. This suggests that there are other institutions or factors at play that ameliorate the effect these factors have on the distribution of wages.

I argue in this paper that differences in the investment patterns in education and training across countries have helped reduce the disruptive effects (for certain groups of workers) of changes in the pattern of trade and the introduction of new technologies.

Section 1 reviews the current state of the U.S. labor market and identifies certain similarities between the U.S. and Europe in the nature of current labor market problems, despite much higher job growth and lower unemployment in the U.S. Because many economists have argued that part of the explanation for wider income inequality in the U.S. is due to a rapid increase in the demand for skilled labor, Section 2 examines possible explanations of why the relative supply of skilled labor in Europe in general, and Sweden in particular, seem to have increased much faster than in the U.S. Section 3 re-

views the returns to investment in skills in the U.S. and Europe, and Section 4 presents some explanations of why there may be more under investment in skills in the U.S. than in Sweden. Section 5 then discusses some policy options for the U.S. that may improve the relative supply of skilled labor. Section 6 briefly remarks on lessons from the U.S. experience for Sweden, and Section 7 presents some final conclusions.

1. The current state of the U.S. labor market

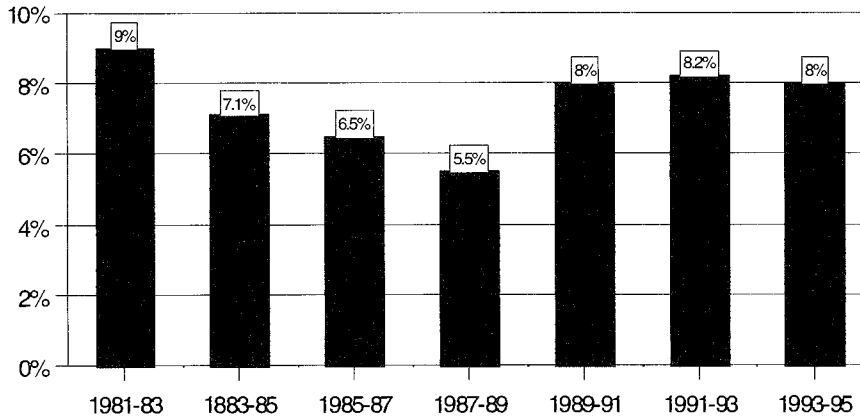
Despite achieving the lowest unemployment rate in nearly a quarter of a century in the U.S., and more than 13 million net new jobs added to the economy since 1993, there are signs that some of the problems of long-term and structural unemployment in Europe exist even in the dynamic and flexible labor market of the U.S.

The percentage of job losers in the U.S., not on temporary layoff, has become a much larger share of the unemployed (relative to the unemployment rate) since the mid 1980s. Many of these job losers include those who have permanently lost their jobs due to a plant shutdown or an abolished position. Data from the *BLS Displaced Workers Survey* shown in Figure 1 indicate that the percentage of all workers who were permanently displaced¹ in the 1993-1995 period remains relatively high when compared to similar points in the business cycle in the 1980s.

The costs of job loss are large and enduring. For workers who lost their jobs between January 1993 and December 1994, almost one-quarter were either still unemployed or out of the labor force by February 1996. For the remaining three-quarters, who were successful in finding a new job, slightly more than half were in jobs that pay less than their previous employment. Recent work by Ann Huff Stevens (1997) found that even six years after job displacement, earnings and wages remain reduced by about 9%; experience adjusted.

¹ Displaced workers are persons 20 years and older who lost or left jobs because their plant or company was closed or moved, there was insufficient work for them to do, or their position or shift was abolished.

**Figure 1. Permanent job losses.
Displacement rates of workers 1981-1995.**

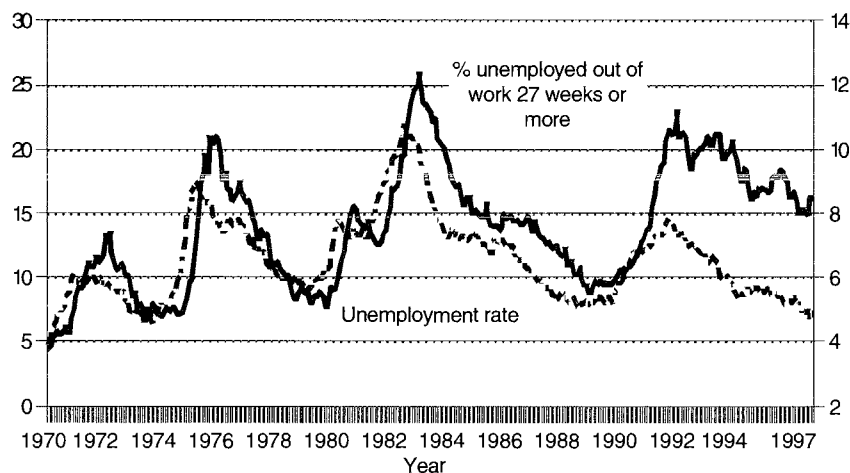


Source: U.S. Bureau of Labor Statistics, *1996 Displaced Workers Survey*, revised.

In addition, if one compares trends in the unemployment rate with the unemployed who are out of work for 27 or more weeks (see Figure 2), we see that there has been a widening gap since the recession in the early 1990s that has not narrowed during the current recovery.

The percent of the unemployed who are out of work for more than six months² is still considerably lower than in many European countries, but it is worrisome that this gap has emerged in the U.S. during the third-longest recovery since WWII. These changes in the nature of unemployment in the U.S. suggest that investments in education and training may be a crucial part of any policy targeted at the growing problem of long-term job loss of experienced workers.

² Given the low current unemployment rate, workers who are unemployed for more than six months are not eligible to receive unemployment insurance.

Figure 2. Unemployment rate and the long-term unemployed.

Notes: The left scale shows the percent of unemployed workers. The right scale shows the unemployment rate.

Source: U.S. Bureau of Labor Statistics, monthly reports 1970-1997.

2. Cross-country differences in the relative supply of skilled workers

One explanation of the variance in the degree of inequality across countries, despite similar technological and trade shocks, is that the relative supply of skilled workers in some of these countries has been better able to keep up with the changes in the relative demand for skilled workers than in the U.S. As Nickell and Bell (1996) discuss, countries that have an education and training system, which produces a much more compressed distribution of human capital, are also more likely to have experienced less increase in income inequality in the last 20 years. For example, the variation in mathematics ability for workers is much smaller in Sweden than in the U.S. Math literacy has been shown in the U.S. to have an important impact on the labor market experience of young workers. Levine and Zimmerman (1995) find that additional mathematics training (a six-month math course) can raise wages of youth as much as 5.5%. As Table 1 shows, there are almost four times as many U.S. workers with minimal mathemat-

ics skills, compared to Sweden. A much higher proportion of Swedish workers (78%) has mathematics ability at medium or above levels compared to just under 60% of U.S. workers. This striking difference in the skill-competencies distribution across workers in the U.S. and Sweden is also true for document and prose literacy levels. If we look in more detail at the workers' ability levels by age, there are even more disturbing data. Figure 3 shows that there are five times as many young workers with zero or minimal math skills in the U.S. as there are in Sweden. While the gap between the U.S. and Sweden narrows somewhat with age, there remains a substantial difference in this dimension of skill across these two countries.

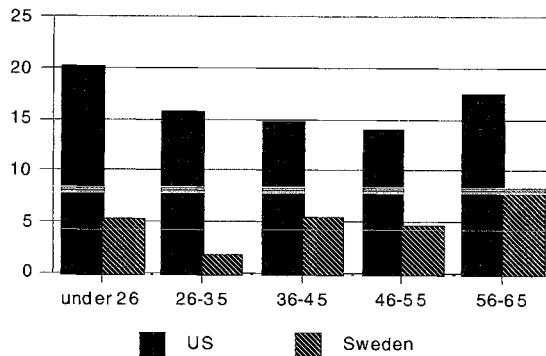
Table 1. Percent of employees at various literacy levels by changes in male inequality 1979-1990.

	Very high 4/5	Medium 3	Low 2	Minimal 1	Δ Inequality (males)
Math level					
U.S.	27.1%	32.5%	24.5%	15.9%	+28
Sweden	38.1	39.8	17.4	4.7	.00
Prose level					
U.S.	24.7	34.0	26.2	15.0	
Sweden	33.9	41.0	19.5	5.5	
Document level					
U.S.	22.7	34.0	25.5	17.8	
Sweden	37.9	40.6	16.7	4.8	

Source: OECD, *Literacy, Economy and Society: Results from the International Adult Literacy Survey*, 1995 (revised data) and Freeman and Katz (1995).

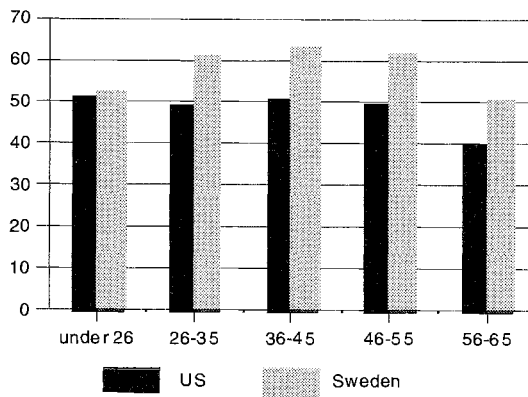
Part of this difference may be related to standards of performance set by the school systems in the two countries for those in the bottom half of the ability distribution. Part of it may also reflect differences in post-school, human-capital investments made by employers. Figure 4 shows that despite having higher skills, Swedish workers are more likely to acquire additional training and education after completing their formal schooling than U.S. workers. The Swedish education and training system seems to have produced a work force in which those in the bottom half of the ability range have relatively higher skills than their U.S. counterparts. This may have helped minimize many of the negative consequences of a relative demand shift away from the unskilled.

Figure 3. Minimal math skills by age.



Source: OECD, 1994, *Adult Literacy Survey, Employed Individuals*, minimal quantitative score.

Figure 4. Any training or education in the past year?



Source: OECD, 1994, *International Adult Literacy Survey*.

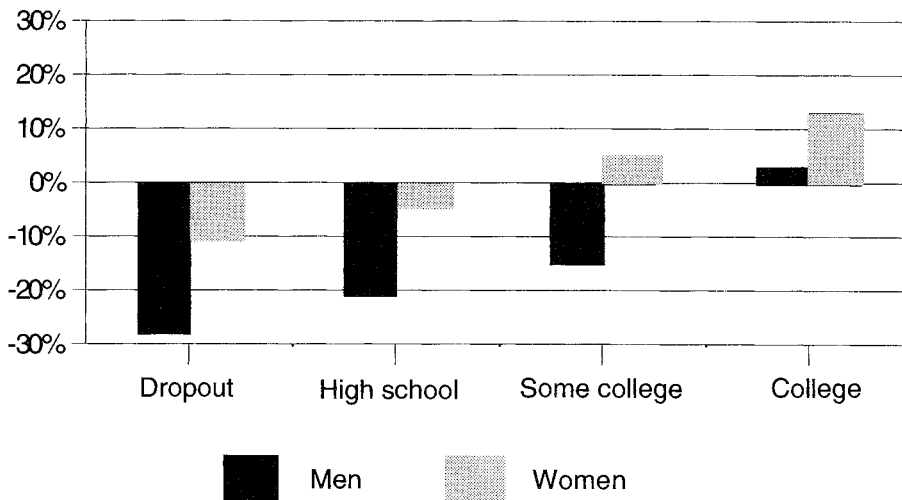
3. Returns to human-capital investment

The question arises then, why hasn't the relative supply of skilled workers risen faster in the U.S.? Could it be that the wage premium and productivity gains associated with education and training in the U.S. are too low to make them a reasonable investment for workers

and firms, whereas in other countries they are much higher? The answer is a resounding no. More educated workers earn more in the U.S. and the gap is increasing. In 1979, the average full-time male (female) worker with a college degree earned 49 (44)% more than the average full-time male (female) worker with only a high school degree. By 1995, the gap had widened to 89 (73)%. While the size of the earnings advantage varies across country, as shown in the OECD 1996 *Education at a Glance*, it remains true that university education offers a substantial boost to earnings compared to just having a secondary degree to virtually all of the countries in the OECD.

Figure 5 shows that real median income for full-time male (female) workers, with less than a high school degree in the U.S., fell by 28 (10)% during the 1979-1995 period. At the same time, real median income for full-time male (female) workers with a college degree or more increased by 3 (13)% during this same period.

Figure 5. Growth in median income by educational attainment 1979-1995.



Note: The right scale indicates the percent of change.

Source: Bureau of Labor Statistics, median annual earnings of full-time, year-round workers ages 25-64, wage data were inflation adjusted and are in 1995 dollars.

Figure 6 shows that the probability of experiencing unemployment declines sharply with educational attainment with high school

dropouts four times as likely to be unemployed as those with a college degree in the 1990s. Recent evidence indicates that the returns to schooling occur because higher-educated students are more productive as employees and not because higher education screens out low-ability individuals. Kane and Rouse (1993) find that a year of post-high school education increases earnings by 5-10% after controlling for family background and test scores in high school. And Ashenfelter and Rouse (1997), using data on identical twins, find returns on the order of 9%. Interestingly, Ashenfelter and Rouse find that higher-ability individuals acquire slightly more schooling but this is due mainly to lower costs of funds. They conclude that their findings "stand in sharp contrast to recent claims that genetic factors predetermine education and income, and that such differences are not amenable to alteration by public or private choices."

While the returns to education seem to be quite high in the U.S., are the returns to education in economies that have much more centralized collective bargaining and less inequality different? Work by Edin, Fredriksson, and Holmlund (1994) on Swedish data that covers the 1960s-1980s suggests that the *after-tax* return to university studies fell from about 12% in the 1960s to 1-3% in the early 1980s. But the *after-tax* return on higher education appears to have risen again to 5% by the 1990s. Belzil and Hansen (1997) find returns to education for prime-age workers, allowing for dependence between labor market ability and ability at school, lower than U.S. estimates at around 4%. But they find the returns for younger workers (18-25) in Sweden to be almost twice as large at 7%. So even in countries with quite different wage-determination processes, returns to schooling for most recent entrants into the labor market are large and similar. In addition, micro-level studies of firms and establishments show significant gains in productivity associated with human-capital investments. For example, recent research by Black and Lynch (1996) on U.S. establishments finds that increasing the average educational level of workers in a firm by one year raises productivity as much as 8% in manufacturing and 13% in non-manufacturing.

Table 2 summarizes evidence on the significant impact that private-sector training has on wages and productivity of firms. Lynch (1992) found that a year of formal on-the-job training raises wages for non-college youths as much as a year of college. Bartel (1992) and Bishop (1994) also suggests that increased company-provided training can raise productivity of a business by 16% or more. Wage gains as-

sociated with apprenticeship or on-the-job training in Denmark, Australia, the Netherlands, and the UK are remarkably similar. Productivity gains associated with company-provided training look as high in the Netherlands as in the U.S.

Figure 6a. Unemployment rate by education. Men 25-64.

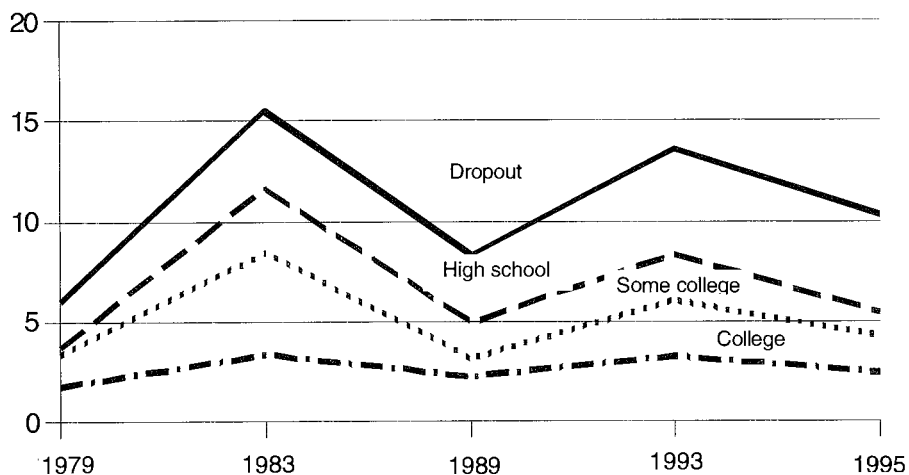
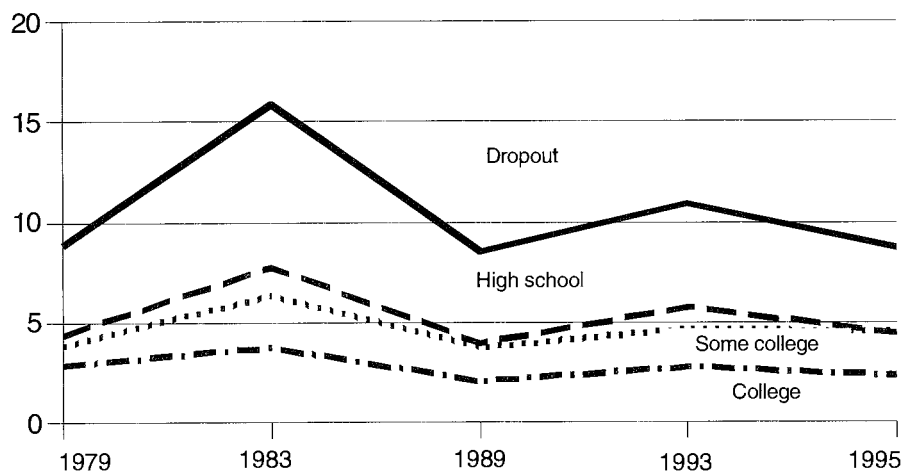


Figure 6b. Unemployment rate by education. Women 25-64.



Source: U.S. Bureau of Labor Statistics, March (not seasonally adjusted).

Table 2. The impact of private-sector training

Study	Impact
<i>Outcome measure—wages</i>	
Lynch (1992) U.S. Non-college bound	A year of formal on-the-job training raises wages as much as one year of college
Mincer (1991) U.S.	Rates of return associated with an additional year of training 4.4-11%
Blanchflower and Lynch (1994) UK	Apprenticeship training increased earnings 9-12%
Tan et al. (1993) Australia	Apprenticeships increased earnings by 8%
Groot et al. (1994) Netherlands	OJT increases wages 4-16%
Westergard-Nielsen and Rasmussen (1997) Denmark	Apprenticeships raise earnings 10%
<i>Outcome measure—productivity</i>	
Bartel (1992) U.S. all industries	Productivity +19% average 3 years in firms that train
Bartel (1989) U.S. all industries	Training investment increases productivity by 16%
Bishop (1994) U.S. all industries	Formal training increases an index of performance by 10-16%
Holzer et al. (1993) Michigan manufacturing	Double-training investments and decrease scrap rate by 7%
Black and Lynch (1996) U.S. non-manufacturing	Computer training increases labor productivity by more than 20%
Black and Lynch (1996) U.S. manufacturing	Providing a higher proportion of workers who train off-the job increases productivity
Ichniowski, Shaw and Prennushi (1994) U.S. Steel	Where training is linked with progressive systems of HRM practices uptime is 7% higher
Groot (1993) Netherlands	Company rates of return to training of 11-20%

4. Barriers to human-capital investment

All of these studies suggest that the gains to both workers and firms with investments in human capital are substantial. But if training and education are so good, why isn't everyone doing more of it, especially in the U.S. where, as a nation, we seem to have less firm-provided training than many of our counterparts in Europe and Japan? Part of the answer lies in the costs of further education in the U.S.

Ashenfelter and Rouse (1997) show how rising education costs can have an adverse effect on college completion in the U.S., especially for lower-ability individuals. In addition, a recent study by the U.S. General Accounting Office (1996) shows how tuition at four-year public colleges and universities has risen three times faster than the median household income between 1980 and 1995. Student aid in the U.S. has not kept pace with tuition levels, so students and their families are relying more heavily on loans and personal finances to go to college. Given these rising costs, some are forced to abandon college, delay entry, or drop out of school, despite the wage premium associated with acquiring more education.

An alternative source of human-capital formation is employer-provided training. But even if there are large returns to employer-provided training, there may still be a problem of under-investment. A firm's decision to invest in training, especially more general training, may be influenced in part by the characteristics of the workers they employ. Employees who are perceived to have higher turnover rates are less likely to receive employer-provided training. In addition, training itself may contribute to employee turnover: if new skills are of value to other employers then firms risk having their trained employee hired away (the poaching or *cherry-picking* problem). So investments in non-portable, firm-specific training are more attractive to firms than are investments in general training, unless employers can find some ways to *capture* their investment in general training. If firms invest in general skills of workers and workers then leave a firm, employers may end up investing in a sub-optimal level of training.

Smaller firms may have higher training costs per employee than larger firms because they cannot spread fixed costs of training over a large group of employees. The loss in production from having one additional worker in off-site training is probably much higher for a small firm than for a larger one. Smaller firms are also less likely to have developed extensive internal labor markets that allow them to better retain and promote employees within a firm.

Other factors besides size may also influence the amount of training provided by an employer and who actually receives it. As human-capital theory argues, employees who have already shown an aptitude to learn new skills by having completed more years of schooling are more likely to receive additional human-capital investments provided by an employer. Studies by Lynch (1992), Mincer

(1988), Brown (1989), Lillard and Tan (1986), Bishop (1994), and Barron et al. (1987) show that firm-provided training is much more likely to be obtained by more educated employees. This results in the creation of both *virtuous* and *vicious* circles of human-capital accumulation. Individuals who acquire more schooling are also more likely to receive post-school, employer-provided training, while those with minimal education find it extremely difficult to make up this deficiency in human capital once they enter the labor market.

None of these issues would necessarily result in under-investment in training as long as capital markets were perfect so that workers could borrow to finance more general training, if the government subsidized general training, or workers accepted lower wages during training spells. But capital markets are far from perfect, and workers differ from employers in their attitudes toward risk and time horizons. As a result, there may be a market failure in the provision of general training and the proportion of workers trained in more general skills (see Booth and Snower 1996 for a more detailed review of the issues associated with market failures in skill acquisition).

Recent work by Stevens (1994) and Acemoglu and Pischke (1996a, 1996b) re-examines this issue of market failure in the context of imperfect competition. In particular, these papers try to develop the theoretical basis for understanding investments in general training by relaxing the assumption that the labor market is characterized by perfect competition. More specifically, Acemoglu and Pischke show how a firm can exhibit *ex-post* monopsony power and as a result, workers decide not to invest in general training because they realize that part of the return will be appropriated by the firm. So workers could end up not investing in general training even if they were not credit constrained. Acemoglu and Pischke (1996a) argue that there may be multiple-training equilibriums—low training and high quit rates or low quit rates and high training with the U.S. representing a high quit rate and low-training equilibrium and Germany and Japan representing a low quit rate and high-training equilibrium. They also argue that their findings suggest that OLS estimates of the returns to training may actually underestimate the true rate of return to training.

Finally, Booth and Chatterji (1997) present a model, which shows that in the absence of a social planner, the firm has *ex-post* monopolistic power that drives trained workers' wages below the socially optimal level. But the emergence of a trade union bargaining at the firm level can increase the amount of training provided and social welfare

by *enforcing* employer commitments of future wage increases for trained workers. As a result, the number of workers trained within a firm is nearer the socially optimal number. This may explain why, in a highly unionized country, such as Sweden, there is more employer-provided training than in the U.S., despite what appears to be far greater *need* for this training in the U.S., given the skill levels of workers.

5. What to do in the U.S.?

Although the returns to investment in education and training seem to be quite high in the U.S., there is evidence that there may be an under-provision of training or market failure that would warrant some type of government intervention. At first blush it does not seem to be too difficult to design some policy solutions to stimulate additional investments in education and training. But the challenge of designing effective policies to ensure that investments in education and training show results means that policy-makers must have a better understanding of where the *problem* lies. Does it lie within the quality of education in the U.S., which has declined so much that skill levels of many young workers (especially those who do not complete a college degree) are actually lower today than they were in the past? Or does the *problem* lie within technological changes, where the skill requirements of incumbent workers have shifted? Moreover, is there a market failure in the provision of training for many of these workers? Or is the *problem* related to the dramatic increase in the cost of higher education, which creates extra financial burdens for those still in school and those returning to school? More generally, one could fix inequality by a variety of methods in the short term, *but* these may not be the same policies one would keep in place in the long term to keep the inequality under control. For example, one could use a combination of wage subsidies and tax credits to redistribute the gains of the *haves* to the *have nots*. But this will not contribute to overall economic growth in the same way investments in education and training can.

Another policy solution is to expand financial assistance to encourage young adults to stay in school. Establishing and raising national norms for standards in school, especially for those in the bottom half of the ability distribution, may go a long way to improving the high variance in basic literacy and numeracy skills found in the U.S. in international comparisons of literacy (see Table 1).

But changing the skill level of new entrants into the labor market will take a long time to notice in workers' average earnings because most workers have long since left school. Also, it does not help welfare recipients who are now entering the labor force, long-term unemployed, and the newly displaced, experienced, skilled workers who now find that the market does not place much premium on their now-obsolete skill set. So what might be the role of education and training and other strategies to improve the skills of incumbent workers? Even if trade has not, until now, had a large effect on the overall rise in inequality in the U.S., workers and businesses in certain sectors seem to be affected by trade (for example, textiles, apparel, auto, metals). In sectors of the economy that are more trade sensitive, enhancing skills would greatly assist workers and employers to compete successfully by choosing high, value-added and more versatile production processes rather than trying to compete just on cost with low-wage labor from other countries. We have seen success in this area in the auto sector, for example, Saturn, with leaner production systems and in steel, with more companies pursuing a market-niche strategy, for example, mini mills. The change in production strategy in these and other industries has increased the demand for extensive cross-training of workers in combination with enhanced communication and problem-solving skills. A higher *skilled* worker is not just someone who has advanced specialist knowledge but can also include those with a broader range of somewhat less technical training, who is more capable of moving from job to job. This means that firms may be more reluctant to invest in this type of training because it is more portable across employers.

What role might government-training programs play in supplementing the educational investments individuals already make before they enter the labor market and training investments employers make once workers have entered the workplace? Some have argued that current expenditures for government training should be cut in the U.S. because either they fail or they have a negative impact on the wages and earnings of displaced or disadvantaged youths and adults. But a recent review of the evidence on the effectiveness of government-training programs (see U.S. Dept. of Labor 1995) suggests that at least some types of government-funded training and employment programs have been successful for every population examined. Government-training programs, such as the U.S. Job Training Partnership Act (JTPA) for disadvantaged adults, residential programs for at-risk

youths, the San Jose Center for Employment and Training, some welfare-to-work programs, and job-search assistance for displaced workers have shown returns to society of \$1.40 or more for each dollar invested. But, as noted by Heckman (1996), while conventional employment and training programs are often cost effective, especially for disadvantaged women, the amounts spent on these programs tend to be quite modest and, as a result, they are unlikely to be sufficient to lift most participants out of poverty.

Recent experimental evaluations of the US/JTPA program for disadvantaged male youth found negative effects of training on their earnings and no effect on the earnings of disadvantaged female youth. This empirical analysis weighted greatly with policy-makers due to its apparently more *scientific* basis, having been an experiment using controls and treatments rather than a statistical analysis that only a handful of economists could understand. It was cited as the justification for cutting funding of training programs for youth by 80%. New work by Heckman and Smith (1997) argues, however, that these experimental impact estimates are quite sensitive to the construction of the experiment and, as a result, are quite fragile. In particular, after taking into account that many “controls” undertook training and some of the “treatments” dropped out of the experiment before the training began altered the findings substantially. The returns to classroom training for treatments switch from lowering earnings (relative to controls) 12 months after completing training to increasing it substantially to more than \$2114.79.³ They also find large differences in the outcomes of treatment and controls by location of the training program and by the data used to measure earnings. This suggests that government-training programs may be much more effective than previously thought. In addition, it should dampen some of the enthusiasm to fund experimental evaluations of training programs because of their ease in interpretation. This is especially true given that the costs of running a large experimental evaluation such as the JTPA study were more than \$30 million. Finally, the findings by Heckman and Smith (1997) suggest there is still much we do not understand about what really makes one training program more successful than another.

³ The difference between earnings following completion of the first spell of training among all those receiving classroom training and earnings in the year following random assignment for those who did not receive training.

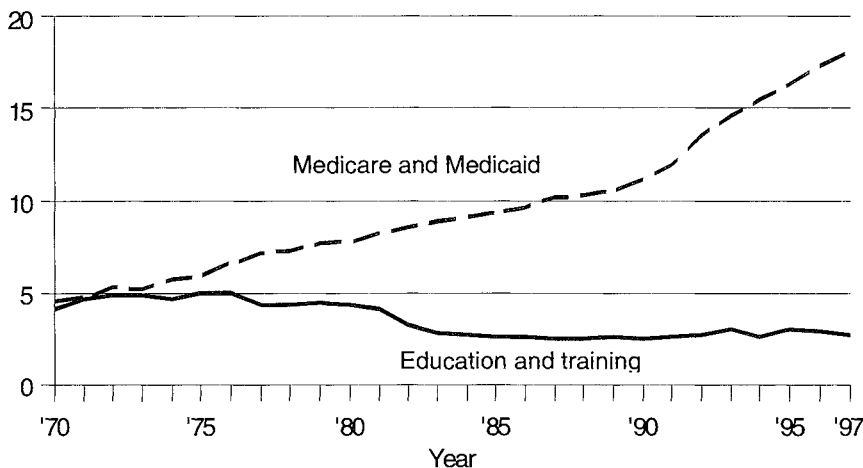
Some have argued against relying too heavily on government to address the human-capital needs of those at the bottom of the income distribution to get them back to the relative wages of the late 1970s because it would be prohibitively expensive. This conclusion is based in part on some calculations done by Heckman (1996). Assuming a 10% rate of return to investing in human capital, Heckman calculates that it would cost \$426 billion to restore earnings of male high school dropouts and graduates to their 1979 real earnings level. At first blush this sounds like an extraordinarily large sum of money. But to put this sum in some context, the U.S. government (federal, state, and local) currently spends well over \$500 billion a year on education—\$211 billion in higher education alone. New estimates by the American Society of Training and Development (and author's calculations), using data from the recent BLS survey of employer-training practices, suggest that U.S. employers are spending \$55-80 billion on formal training per year. This figure would more than double that if one included informal training. Firms in 1995 spent \$534 billion on durable equipment. Certainly \$426 billion is a lot of money, but relative to the other investments in physical and human capital we are currently making every year in the U.S. economy, this is not so extraordinary.

Figure 7 highlights a key issue in the U.S. government federal financing of education and training programs. The percentage of the federal budget spent on education and training has fallen during the past 20 years from a peak of 5% to around 2.8% in 1997. This pattern is similar even when we look at federal outlays in education and training as a percent of GDP. Per capita spending on education and training has fallen, and real annual spending as a percentage of the population ages 5-24 has fallen from more than \$4700 in the 1970s to less than \$3500 in the 1990s. At the same time, expenditures on Medicare and Medicaid have accelerated rapidly, especially since the 1990s. It is increasingly difficult to allocate resources to education and training in the *zero sum* world of government-budget processes. Just as many companies cut expenditures in research and development and training when they encounter weakness in profits, the federal government in the U.S. appears to have decided that investments in education and training are a lower priority as it seeks to balance the budget.

One solution might be to look to the private sector to help make up the skills gap. But as discussed earlier, employers are understanda-

bly reluctant to make general skills investments in their workers that might end up being poached away. In addition, small firms may face higher per-employee training costs than larger firms. As a result, we have a market failure in the provision of general training for incumbent workers.

Figure 7. Outlay categories as a percent of the federal budget, 1970-1997.



Note: The left scale indicates the percent of the federal budget.

Source: Author's calculations.

A possible response to this problem is to give employers, especially small and medium-sized employers who hire many low-wage workers, additional tax credits for formal-training expenditures. Another way is to reward suppliers of training to businesses, for example, community colleges, with additional resources for creating training programs for employees with less education. A third strategy is to impose a training tax, which would set a standard minimum (maybe 1.5%) spent by employers on training or else pay a tax into a general training fund. This is similar to the employer-training tax in France. This has the benefit of creating a level playing field across employers and potentially solves the poaching problem. But the experience of countries, such as Australia, which recently adopted and abandoned such a tax, suggests that in practice the training levy can be relatively easy to game.

6. Lessons from the U.S. experience for Sweden

As shown in Figures 3 and 4, the Swedish welfare state's commitment to investments in education and training has helped produce a work force that is highly skilled. Not only is the average skill level high, but the variance is quite low. As the relative demand for skilled workers increased sharply in developed economies during the past 20 years, the relative supply of skilled workers in Sweden increased faster than in the U.S. This has played an important role in explaining the differences across these two countries regarding changes in the amount of income inequality. In addition, the Swedish system seems to have addressed some of the potential market failures in the provision of training through extensive government-training programs and a highly unionized work force.

While investments in education and training in the U.S. have not kept pace with demand, the Swedish system, at the moment, is expanding its commitment to human-capital investments for the unemployed. The question, however, in both countries is given increasingly tight budget constraints; where are public monies best spent? I would argue that in the U.S., given the low level of skill proficiency in the bottom half of the ability distribution and the potential market failures in the delivery of post-school training (especially for basic skills like numeracy and literacy), we should learn from the example of the Swedish system and increase our investments in human capital. For Sweden, there seems to be some room to refocus some of the current public policies to assist the expansion of jobs available for its already highly skilled work force. The U.S., in its current recovery, has produced an extraordinary net of new jobs to its economy. Many of these have been in managerial positions in smaller and medium-sized firms in the service sector. Tax and other incentives to help stimulate the establishment of similar firms in Sweden may be ways of addressing some of its currently high unemployment.

7. Conclusions

It has been more than 30 years since Gary Becker first wrote on human capital and outlined how investments in education and training would affect wages and productivity. But while I would argue that based on a great deal of empirical work on the returns to education and training of which human-capital investments play a critical role

(reducing inequality and long-term unemployment), there is still much that we need to learn about the impact of human capital on the labor market experience of workers. For example, there is still much that we do not understand about the depreciation of human capital, especially post-school training investments. Do different types of investment (schooling versus employer training versus government training) depreciate at different rates? Does the depreciation rate vary for different types of workers? More generally, what is the relative effectiveness of alternative types of human-capital investments for different groups of workers—youth, long-term unemployed, recently displaced workers, welfare entrants, female re-entrants, immigrants, incumbent workers? Knowing the answers to questions such as these can help prioritize public spending to get the most successful economic results.

The nature of the depreciation of human capital also highlights the importance of understanding the different types of education and training that workers receive. Not all university majors would be expected to generate the same return in a wage equation, and likewise, not all types of employer-provided training spells would be expected to have the same impact on productivity or wages. While there has been some empirical work on the different returns to education conditional on the major, degree, or course followed, we usually treat all types of training spells as homogenous. If we differentiate across training spells, it is usually done solely on the basis of the duration of training and not content. Not having more specific information on program content makes it difficult for policy-makers to determine what works when they are trying to redesign their training programs.

Nevertheless, understanding the content of existing education and training programs is not sufficient information for a policy-maker who is trying to understand the most effective way of *heating up* the stock of human capital. If incentives are going to be put in place to stimulate additional training, most policy-makers will not want to pay for investments in human capital that would have happened anyway. So we must understand more about the nature of the market failure in the provision of general training. For example, do employer concerns about *poaching* of trained workers influence their decisions to invest in the skill development of workers? Do small firms face higher costs of training due to large fixed costs of introducing formal training programs? Are there certain types of skills that are more

likely to be affected by a market failure than others, for example, computer skills versus more firm-specific technical skills?

Some policy-makers will also want to identify, on tax equity grounds, certain workers who systematically end up with lower human capital due to the nature of the current tax system or the nature of capital markets. In particular, do imperfections in the capital market result in the under-investment in human capital by lower income/wealth individuals conditional on ability? If the tax structure provides more generous breaks for wealthier individuals who continue on in higher education, and we see that more educated workers are more likely to receive company-provided training that is financed in part by tax breaks, is there a tax equity issue?

Training and education matter, but they are not magic elixirs that will solve all of the problems associated with rising wage inequality and long-term unemployment. In Sweden, training unemployed workers will not be a sufficient condition to guarantee jobs in the current economy. In the U.S., significant investment in the human capital of incumbent workers will be necessary to begin to permanently narrow wage inequality and address the problem of long-term unemployment. But as we look forward to what the next century will bring, one thing is certain in both the U.S. and Sweden, even if we are successful in raising the skill levels of workers and reducing the wage gap in the U.S. to its pre-1980s level and we lower the number unemployed in Sweden, the need for increased training and education investments in both countries will not stop.

References

- Acemoglu, D. and S. Pischke (1996a), *The Structure of Wages and Investment in General Training*, mimeo, MIT, November.
- Acemoglu, D. and S. Pischke (1996b), *Why Do Firms Train? Theory and Evidence*, National Bureau of Economic Research, Working Paper No. 5605.
- Ashenfelter, O. and C. Rouse (1997), *Income, Schooling, and Ability: Evidence from a new sample of identical twins*, National Bureau of Economic Research, Working Paper No. 6106.
- Barron, J., D. Black, and M. Loewenstein (1987), *Employer Size: The implications for search, training, capital investment, starting wages and wage growth*, *Journal of Labor Economics*, 5 (January), 76-89.
- Bartel, A. (1989), *Formal Employee Training Programs and Their Impact on Labor Productivity: Evidence from a Human Resource Survey*, National Bureau of Economic Research, Working Paper No. 3026.

- Bartel, A. (1992), Productivity Gains from the Implementation of Employee Training Programs, National Bureau of Economic Research, Working Paper No. 3893.
- Belzil, C. and J. Hansen (1997), Estimating the Returns to Education from a Non-Stationary Dynamic Programming Model, University of Aarhus Centre for Labor Market Research, Working Paper No. 97-06.
- Bishop, J. (1994), The Impact of Previous Training on Productivity and Wages, in: L. Lynch ed., *Training and the Private Sector: International Comparisons*, (University of Chicago Press, Chicago).
- Black, S. and L. Lynch (1996), Human Capital Investments and Productivity, *American Economic Review*, May, 263-268.
- Blanchflower, D. and L. Lynch (1994), Training at Work: A Comparison of U.S. and British Youths, in L. Lynch ed., *Training and the Private Sector: International Comparisons*, (University of Chicago Press, Chicago).
- Booth, A. and M. Chatterji, Unions and Efficient Training, *Economic Journal*, forthcoming.
- Booth, A. and D. Snower eds. (1996), *Acquiring Skills: Market Failures, Their Symptoms and Policy Responses*, (Cambridge University Press, Cambridge).
- Buechtemann, C., J. Schupp, and D. Soloff (1993), Roads to Work: School-to-Work Transition Patterns in Germany and the U.S., *Industrial Relations Journal*, 24(1), 97-111.
- Bureau of Labor Statistics, U.S. Department of Labor (1996), *Worker Displacement During the Mid-1990s (Based on Revised Estimates)*, USDL release No. 96-446.
- Burtless, G. (1990), *A Future of Lousy Jobs? The Changing Structure of U.S. Wages*, (Brookings Institution, Washington, DC).
- Edin, P-A., P. Fredriksson, and B. Holmlund (1994), Utbildningsnivå och Utbildningsavkastning i Sverige, in *Ekonomiska Rådets Årsbok 1993*, (Stockholm: Konjunkturinstitutet).
- Freeman, R. and L. Katz eds. (1995), *Differences and Changes in Wage Structures*, (University of Chicago Press: Chicago).
- Groot, W. (1993), *Company Schooling and Productivity*, mimeo, Leiden University.
- Groot, W., J. Hartog, and H. Oosterbeek (1994), Returns to within Company Schooling of Employees: The case of the Netherlands, in: L. Lynch ed., *Training and the Private Sector: International Comparisons*, (University of Chicago Press, Chicago).
- Heckman, J. J. (1996), What Should our Human Capital Investment Policy Be?, *Jobs and Capital*, Milken Institute for Job and Capital Formation, Spring, 3-10.

- Heckman, J. J. and J. A. Smith, (1997), The Sensitivity of Experimental Impact Estimates: Evidence from the National JTPA Study, National Bureau of Economic Research, Working Paper No. 6105.
- Holzer, H. et. al., (1993), Are Training Subsidies for Firms Effective?: The Michigan Experience, *Industrial and Labor Relations Review*, November.
- Ichniowski, C., K. Shaw, and G. Prennushi (1995), The Effects of Human Resource Management Practices on Productivity, National Bureau of Economic Research, Working Paper No. 5333.
- Kane, T. and C. Rouse (1993), Labor Market Returns to Two and Four-Year College: Is a Credit a Credit and Do Degrees Matter?, *Industrial Relations Section*, Princeton University, Working Paper No. 311.
- Levine, P. and D. J. Zimmerman (1995), The Benefit of Additional High-School Math and Science Courses for Young Men and Women, *Journal of Business and Economic Statistics*, 13:2, 137-149.
- Levy, F. and R. Murnane (1992), U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations, *Journal of Economic Literature*, 1333-1381.
- Lillard, L. and H. Tan (1986), Private Sector Training: Who gets it and what are its effects? Rand monograph R-3331-Dol/RC, (Rand Corporation, Santa Monica, CA).
- Lynch, L. M. (1992), Private Sector Training and the Earnings of Young Workers, *American Economic Review*, March, 299-312.
- Mincer, J. (1991), Job Training: Costs, returns and wage profiles, in *Market Failure in Job Training?*, in: J.H.H. Ritzen and D. Stern eds., (Springer Verlag, Amsterdam).
- Nickell, S. and L. Bell (1996), Changes in the Distribution of Wages and Unemployment in OECD Countries, *American Economic Review*, May, 302-308.
- Stevens, A. (1997), Persistent Effects of Job Displacement: The importance of multiple job losses, *Journal of Labor Economics*, 15 (1), 165-188.
- Stevens, M. (1994), A Theoretical Model of On-the-Job Training with Imperfect Competition, *Oxford Economic Papers*, 46, 537-562.
- Westergaard-Nielsen, N. and A. Rasmussen (1997), Apprenticeship Training in Denmark: the impact of subsidies, University of Aarhus Centre for Labor Market Research, Working Paper No. 97-07.
- U.S. Department of Labor, Office of the Chief Economist (1995), What's Working (and what's not): A Summary of Research on the Economic Impact of Employment and Training Programs, January.
- U.S. General Accounting Office (1996), Higher Education: Tuition Increasing Faster than Household Income and Public Colleges Costs, August.