Macroeconomic Implications of Shifts in the Relative Demand for Skills

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My assignment for this conference on U.S. wage trends was, as an outsider, to draw the macroeconomic implications of widening wage inequality. I shall do so in six points.

The Race between Relative Demand and Relative Supply

The first point is not specifically about macroeconomic implications. It emerges from my reading of the body of research. What has happened is usually described as having come from an increase in relative demand for skills. It is in fact better described as a race, over the last twenty years, between increases in relative demand for skills and increases in relative supply. In the 1970s, relative supply won; in the 1980s, relative demand won. But in both decades, the race has been fast on both sides.

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To make the point more precisely, let me rely on the work of Larry Katz and Kevin Murphy. In Katz and Murphy (1992), they aggregate labor in two groups, high school (H) and college (C), and estimate the following relative demand relation, in inverse form, using data from 1963 to 1987:

$$(1.1) \quad (W_C/W_H) = -0.709 \log C/H + \text{constant} + .033\ \text{time}$$

The relative wage depends on the relative supply of C and H—the coefficient implies a fairly high elasticity between the two, $\sigma = 1/.709 = 1.4$—and a time trend, which captures the shift in relative demand. The coefficient on time is the same throughout: contrary to common perceptions, Katz and Murphy find little evidence that the relative demand shift is accelerating.

Now do the following computation. Suppose that there had been no change in relative supply, so that $\log(C/H)$ had remained constant. Then over those twenty-four years, the relative wage of college workers would have increased by .033 times (24) = 79 percent! The actual

increase was only 10 percent. The difference is accounted for by the increase in relative supply. Table 1 builds on Katz and Murphy to show the contribution of shifts in demand and supply to the evolution of the wage.

What is striking is how large the numbers in the first two lines of the table are, how large the shifts in relative demand and supply have consistently been. If one is an optimist, one can read this table as suggesting that it would not take much change in either the rate of change of supply or demand to reestablish balance. If one is a pessimist, one can read it as suggesting that things could easily get much worse, that wage inequality may easily deteriorate faster. But in any case, the message of the table—that both demand and supply have changed rapidly—strikes me as important.

UNEMPLOYMENT

Let me now turn to macro implications. The main macro implication of the increase in net relative demand for skills is likely to be higher aggregate unemployment, or more generally, nonemployment.

The reason is obvious. The labor supply of the unskilled is much more elastic than that of the skilled workers. Thus, the increase in the wage of skilled workers does not increase their labor supply very much, if at all. But the decrease in the wage of unskilled workers can lead to a large decrease in their labor supply.

How large has the effect been so far? The question has been looked at carefully by Chinhui Juhn, Kevin Murphy, and Robert Topel in Juhn et al. (1991). Estimating labor supply elasticities of workers with different levels of wages, they found that they could explain all of the increase in nonemployment of 2.3 percent for prime age males from the early 1970s to the late 1980s (of which 0.7 percent took the form of higher unemployment).

Table 1
RELATIVE DEMAND AND SUPPLY SHIFTS

	1963-71	1971-79	1979-87
Change in (W_C/W_H)			
Due to increase in demand (estimated)	26.4	26.4	26.4
Due to increase in supply (estimated)	-22.2	-28.9	-18.0
Net (estimated)	4.2	-2.5	8.4
Net (actual)	7.7	-10.4	12.8

As for what happens in the future, the elasticities at the low end of the wage scale are critical. The elasticities estimated at the low end of the wage scale by Juhn et al. are large by the standards of the labor literature, on the order of .3. These may, however, be quite optimistic. Labor supply depends not only on the real wage, but on the real wage relative to what is provided by the safety net. When the real wage gets close to the safety net, attachment to work is likely to be weak, the elasticity of labor supply likely to be large. My sense is that in the United States at this point, minimum wage or no minimum wage, labor supply is likely to be very elastic at $4 to $5 an hour.

What does this imply? One can use the estimates from Katz and Murphy to do a rough computation. Assume that relative demand is given by (1.1). Now assume that the elasticity of high school labor is given by:

$$(2.1) \qquad \log (H/\bar{H}) = \alpha \log (W_H / W_C) ,$$

where H is the number of H workers and α is the elasticity with respect to the relative wage. Assume that the labor supply of C workers is inelastic, so that all C workers are employed, and $C = \bar{C}$. Finally assume that the number of H workers relative to C workers continues to decrease at the same rate as in the last eight years, so that:

$$(2.2) \qquad \Delta (\bar{H}/\bar{C}) = \text{-2.4 percent.}$$

Then a few simple steps give:

$$(2.3) \qquad \Delta p (H/\bar{H}) = \text{-1.6\%} \frac{\alpha}{1 + 0.709\alpha}.$$

If, for example, the elasticity of supply of H workers is equal to 1—rather than the .3 number used by Juhn et al.—then the annual decrease in the employment rate of H workers is equal to 0.9 percent. Since H workers account for roughly 60 percent of the labor force, this represents a decrease in the employment rate of about 0.5 percent a year, a large number indeed. I believe the basic message of this computation to be right. At the current wages, the labor elasticity of low-skill workers may be quite high. If there is no change in demand and supply trends and no change in policy, we could well see a large decrease in employment rates in the future.

THE UNITED STATES VERSUS EUROPE

The effects of the relative demand shift on nonemployment will obviously be worse if there is a binding minimum wage. But in the United States, the wage at which labor supply becomes extremely elastic cannot be very far from the minimum wage. So, it is not clear that this makes a large macro difference.

The same is not true of Europe, where the minimum wage is a substantially higher percentage of the median wage. But here I want to debunk a theme that is popular in the press and has been endorsed by Paul Krugman (1994). The theme is that the difference between unemployment rates in Europe and the United States comes from different responses to a similar relative demand shift. The United States, the argument goes, has chosen larger wage inequality, avoiding most of the increase in unemployment. Europe instead has limited the increase in wage dispersion, thereby pricing a large number of workers out of the market; the result has been high unemployment.

It is not hard to see why this idea might be popular. The increase in unemployment in Europe has indeed been much larger among the low-skill than among the high-skill workers. Table 2 below, borrowed from Stephen Nickell and Brian Bell (1994, Table 2), shows the basic evolution of unemployment rates in four European countries.

So why doubt the Krugman explanation? I have no doubt that a higher relative minimum wage, combined with the shift of relative demand, has led to more unemployment of the unskilled in Europe. Even that proposition, however, is surprisingly hard to establish from a look at the cross section of European experiences.

Table 2
EVOLUTION OF UNEMPLOYMENT RATES
For High- and Low-Education Workers in Four European Countries

		1979-82	1993			1979-82	1991
France	Overall	5.2	9.4	U.K.	Overall	7.7	10.0
	High ed	2.1	5.9		High ed	3.9	5.7
	Low ed	6.5	13.6		Low ed	12.2	17.4
		1979-82	1991			1979-82	1993
Germany	Overall	3.8	5.4	Spain	Overall	11.7	17.9
	High ed	1.6	2.4		High ed	7.9	10.7
	Low ed	4.5	6.2		Low ed	13.5	24.0

Note: Educational levels are defined differently in each country. In France, high ed=two years of university or more; low ed=primary school certificate or less. In Germany, high ed=professional, technical and related, and administrative workers; low ed=production and related workers, transport equipment operators, and laborers. In the United Kingdom, high ed=passed A levels or more; low ed=no qualifications. In Spain, high ed=university; low ed=primary education or less.

But the change in the distribution of unemployment rates in Table 2 is also exactly what we would expect to happen in response to a shift in aggregate rather than relative demand for labor. It is well understood that in response to a neutral adverse shift in demand, various effects—"ladder" effects, "ranking" effects, the labor supply elasticities we discussed earlier—lead the unemployment rate of low-skill workers to increase much more than the unemployment rate for high-skill workers. Back-of-the-envelope computations I have done for a few countries suggest that the evolution of the distribution of rates is roughly what one would expect had the only shock been an aggregate shock and had the elasticities of skill-specific unemployment rates remained the same as in the past. A more careful computation by Nickell and Bell leads them to conclude that only about one-fifth of the increase in unemployment in the United Kingdom is due to the relative demand shift.

Thus, there is a trade-off between unemployment and wage dispersion. But it is not the one shown by a simple comparison of the United States and Europe.

THE SHAPE AND SIZE OF TRANSFERS

If one believes—either on income distribution grounds or on grounds of externalities—that something should be done to avoid either the increase in wage dispersion or the increase in unemployment rates for the unskilled, what measures should one advocate?

No economist is likely to be in favor of a substantial increase in the minimum wage as a solution to the shift in relative demand. Most proposals on this and the other side of the Atlantic have focused on employment subsidies for the unskilled. Edmond Malinvaud and Jacques Dreze have argued for the elimination of payroll taxes for low-wage workers. Phelps (1994) has argued for the introduction of a graduated subsidy, phased out at pre-subsidy hourly wages of $10.

How large might these subsidies be? This clearly

depends on the goal, both in terms of wage inequality and of unemployment rates. A simple computation, once again based on the Katz and Murphy relation above, is instructive.

Suppose we wanted to reestablish the wage differential between H and C workers at its level of about ten years ago. Data in Table 1 suggest that this would require an increase of about 15 percent in the wages of H workers. How large a subsidy it would require depends in turn on the elasticities of demand and supply. Take the elasticity of demand from the Katz and Murphy equation earlier. Assume that the supply of C workers is inelastic. Assume that the supply of H workers is a function of the wage differential, with elasticity .2—a number that appears roughly consistent with the average of the Juhn et al. estimates over the relevant range of wages. Then, the subsidy to firms should be equal to 15 percent (1 + .2 x .7) = 17 percent.

How large a subsidy does this represent in terms of the wage bill? From Bound and Johnson, we know that H workers account for roughly 60 percent of employment. Their wage is about 65 percent of the wage of C workers. Thus, a subsidy equal to 15 percent of their wage implies an increase in the wage bill of (.6 x .65 x 1.17 + .4 x 1)/(.6 x .65 + .4 x 1) -1 = 8.3 percent of the wage bill, or about 4 to 5 percent of GDP.

This is a very large sum indeed. But it is not very different from other estimates. James Heckman has asked a closely related question: How much would have to be spent on training to go back to the 1979 differential? He estimates the cost to be about $160 billion on an annual basis, about 3 percent of GDP. Ned Phelps estimates the cost of his scheme (under the assumption of zero labor supply elasticity) to be around $180 billion. And it only takes care of the widening to date. Under the assumption that the shifts are the same in the future, the cost of maintaining the wage differential increases at a rate of about 0.4/0.5 percent of GDP per year.

Is it likely that anything like this will be put in place? The answer must be no. The political mood is surely not propitious to the creation of new large transfer programs. The main insight from the theory of political economy here is that the earlier such a system is put in place, the more likely it is to have political support. The earlier it is put in place, the more it looks like a social insurance program, the less like a transfer program. But it may already be too late: the winners and the losers are already fairly well identified.

Supply Responses

The increase in net relative demand for skills leads to an increase in the returns to acquiring those skills. Can we expect the effect to be strong enough that increases in relative supply will catch up again with increases in relative demand, leading to little or no further wage dispersion?

The answer from current forecasts, as explained in the paper by Frank Levy for this conference, is indeed for some supply response. The longer run outcome depends on two factors. On the one hand, the return to education has increased; this should certainly lead to a positive supply response. On the other hand, the income of the currently unskilled has decreased. If credit markets are imperfect, so that borrowing against future earnings is difficult, or if primary and secondary education are largely locally financed, this makes it harder for the unskilled, or their children, to acquire education.

Which effect dominates has implications that go far beyond the sign of the supply response: if the sign is negative, wage and skill inequality are likely to be magnified over time. The issues here have been clarified in particular by the work of Roland Benabou (1992). But as far as I know, there is little evidence on the relative strengths of the effects. Whether an increase in wage inequality is likely to lead to more or less education in the United States today is still to be empirically settled.

Even if we do not have the answer, the analysis still has a clear implication. Reducing credit market imperfections to allow people to borrow against future earnings is more desirable than before. There are good theoretical reasons to believe that the government can play a role here, and some good empirical reasons to believe that it can play more of a role than it has played in the past. Moreover, if a transfer program is put in place to reduce wage dispersion, there is an additional argument for avoid-

ing the distortion between unskilled work and education, and thus for subsidizing the college education of poor students.

Technological Progress

I see two interesting issues about technological progress in this context. The first is whether, assuming that a good part of the shift in relative demand has come from skill-biased technological progress, this bias will continue in the future. One can think of scenarios in which the future is different from the past. In the paper I mentioned earlier, Paul Krugman indicates that the next step for computers may be to replace skilled workers. He mentions lawyers and accountants. Or, computers may become so user-friendly that workers no longer require computer skills to operate them. The problem here is that, as far as I know, these speculations fairly summarize the state of our knowledge: in short, we do not know.

A slightly more solid reason for believing that the future will be different from the past is based on the fact that technological progress is not exogenous. The shift in relative wages in the last decade has increased the return to developing techniques of production that use relatively more unskilled workers. Here again, we do not know much, if anything. But at least the argument relies on a basic economic mechanism, a response to relative prices.

The second issue of interest is whether the increase in the relative supply of skilled workers—if it indeed happens—will allow firms to adopt new and more sophisticated technologies faster and more effectively, leading them to sustain higher productivity growth. If this were the case, I could end on a rather optimistic note. I could argue that skill-biased technological change may not only lead to an increase in the education of the U.S. labor force, but may also hold the key to higher technological growth in the future.

Unfortunately, there is little evidence to sustain this claim. In this case, we actually have the beginning of an answer from a recent paper by James Kahn and Jon-Soo Lim (1994). Kahn and Lim look at the relation between multifactor productivity (tfp) growth and the share of skilled labor, measured as the proportion of workers with twelve years or more of education. At first glance, their results look quite impressive. Their results imply the following relation across sectors:

$$(6.1) \quad \text{tfp growth} = -6.22\% + 11.25\% \beta,$$

where β is the share of skilled labor. The average share is 0.62, so that average tfp growth is .75 percent per year. If the results are seen as implying a causal relation between the share and productivity growth—rather than common factors, or omitted variables—they are quite impressive. They imply, for example, that if the share of skilled labor in the United States was increased from 0.62 to 0.70, tfp growth would increase to 1.65 percent. Unfortunately, however, the results are largely driven by two sectors, tobacco and petroleum, which have low shares of skilled labor and low productivity. Both sectors suffer from notorious measurement problems. Thus, one cannot see the evidence as very conclusive.

Summary

What are the macro implications of the increase in the relative demand for skills? Here are the conclusions of a neophyte:

If the trend increase in the net relative demand for skills continues, it has the potential to lead to substantially higher overall unemployment.

If the trend continues, the size of the transfers needed to offset the increase in wage inequality is much too large to be politically feasible. Subsidies such as cuts in payroll taxes for the unskilled are desirable but will have limited effects.

A positive supply response sufficient to eventually offset the trend in demand cannot be taken for granted. Measures avoiding local finance effects of increased income inequality on primary and secondary education and allowing for easier borrowing by poor students for higher education seem essential.

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