

Reply to Skillman

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Gil Skillman's comments fall into two groups: specific comments on the model and broader questions concerning the fruitfulness and power of our approach in comparison to other approaches. We briefly address the specific points before turning to the some of the interesting and more general issues raised by Skillman.

Skillman suggests that our account of the movements in relative wages implies that both high- and low-skill workers should have experienced decreasing wages (p.3). We fail to understand this comment. Our argument in section 5 of the paper relates the rise in unemployment to slow adjustments in wage aspirations, following the observed decline in the *growth* rates of labor productivity and average real wages. This argument is compatible with rising or falling real wage rates. What matters in our account is the ratio Am/B , and this ratio may clearly decline even if A has increased. Our model predicts widening wage inequality in the US but the average growth rate of wages depends on the pace of technical progress, that is, on the growth rate of A .¹

It is correct, secondly, that not all countries experienced the pronounced increase in wage inequality that characterized the United States or the United Kingdom. Germany, as pointed out by Skillman, had "declining income inequality along with increased unemployment" (p.3). Our numerical examples, however, included Germany. Moreover, using plausible parameter values the simple model in section 4 was consistent with the patterns of employment and wages in both the US and Germany. Thus, it is unclear how the German example can indicate a failure of our model to predict "the empirical connection between unemployment and wage trends in OECD countries" (p. 3).

The rise in unemployment for high-skill workers in the US also casts doubt on our account, Skillman suggests (p. 3). But again, our numerical example in section 4 is based on US data that incorporates this trend increase.

¹A similar dependence of average wage growth on the rate of technical progress will characterize extensions of Acemoglu's (1999) theory that allow for technical change.

Turning to the concepts of over- and undereducation, Skillman comments on our neglect of undereducation in the formal model. If a worker is doing a particular job it is hard to see how - in a strict sense - the worker can have less education than required to do this job (although of course the worker may have less education than would currently be required to *get* the job). Thus, the category of undereducation indicates the presence of a combination of "credentialism" and unmeasured heterogeneity in skills. Either of these possibilities, in turn, imply that measured overeducation may fail to reflect true overeducation.

Despite conceptual and empirical difficulties, the evidence that overeducation represents a real phenomenon seems compelling: some workers would like but fail to find jobs that utilize their skills. Moreover, despite its shortcomings, the evidence suggests that this kind of mismatch is widespread. The interesting question in relation to our model is whether in fact widening wage inequality from 1970 to the mid 1990s in the US was associated with an increase in the degree of overeducation. Citing Acemoglu (1999), Skillman suggests that this may not have been the case.

Acemoglu claims that overeducation declined between 1976 and 1985. Using the same data set, Daly et al (2000) reached the same conclusion, a result which we cited in the paper. These studies, according to Skillman, show an inverse relation between unemployment and overeducation, an inverse relation which is consistent with Acemoglu's theory but runs counter to the relation posited in our model.

The figures do not support Skillman's claim. Acemoglu's overeducation figures are 40%, 38% and 39% in 1976, 1978 and 1985, respectively, while the unemployment rates for male workers (16 years and older) are 7.1%, 5.2% and 7.0% in those three years. Thus, contrary to Skillman's claim, the figures would seem to support a positive rather than an inverse relation between overeducation and unemployment. Acemoglu's results are also consistent with the presence of credentialism: undereducation is higher (19%) in 1978, which had low unemployment, than in 1976 or 1985 (18% and 15%, respectively).

Although consistent with our model, this evidence is very weak. For the reasons discussed in our paper, short-run movements in overeducation are subject to a variety of cyclical influences that are unrelated to our account (as well as to Acemoglu's theory). A comparison between three years that are less than 10 years apart and located at different points of the business cycle therefore cannot settle the issue.² But since induced changes in overeducation are central to our story, the trend in overeducation is critical for an evaluation of the empirical relevance of the model. It may be of interest, therefore, to consider Wolff's (2000) approach to the measurement of overeducation which allows one to estimate these trends.³

²The effects of unemployment and overeducation on relative wages, moreover, are not instantaneous so that the increase in wage inequality between 1976 and 1985 says little about the relevance of either Acemoglu's theory or our account.

³Unlike Wolff, most other studies (including those by Sicherman (1991), Acemoglu (1999) and

The *Dictionary of Occupational Titles* gives detailed skill requirements for about 12,000 job titles. Using this data set, Wolff calculates overall changes in the requirements of different types of skills in the economy. The calculations are based on the assumption that the skill levels of individual occupations remain largely unchanged. This assumption, Wolff argues, is justified since "evidence from studies that have looked across all occupations suggests that there are changes in both directions, and the net effect is small" (p. 31). Moreover, "if the skill requirements of a job change substantially, then the US Bureau of the census classifies this as a new occupation" (p. 31).

Wolff's analysis "suggests that the bias in technological change toward workers with cognitive skills was strongest in the 1960s but fell rather sharply in the 1970s and again in the 1980s" (p. 52). His results "emphasize the lack of correspondence between the growth in the demand for cognitive skills (as reflected in direct skill measures) and the supply of such skills, as reflected in the educational attainment of the population. Indeed, they suggest that in both the 1970s and 1980s, the educational system in the US was producing far more educated workers than the workplace could absorb" (p. 52).

These results may not be conclusive; the assumption of largely unchanged skill requirements within each job category may be false, for instance.⁴ But unlike the survey data for 1976, 1978 and 1985, Wolff's analysis addresses the relevant medium and long term trends in the mismatch between the skills of the workforce and the skill requirements of the jobs.

The real test of competing theoretical accounts is "the ability to explain the complex empirical record regarding the dynamic patterns in unemployment and wage dispersion" (Skillman p. 3-4). Skillman compares our story to two alternative accounts: skill biased technical change and Acemoglu's theory of endogenously determined skill requirements.

Acemoglu (1999) explains the rise in unemployment and wage inequality as the result of a shift from a pooling equilibrium to a separating equilibrium. This shift in turn is caused by a rising supply of high-skill workers and/or skill-biased technical progress. This theory certainly is interesting, but many of the features that can be accounted for by Acemoglu's theory fit our account equally well. Contrary to Skillman's claim, this applies to the opposite wage trends for high and low skill workers, the possibility of proportional increases in the unemployment *rates* for high and low skill workers (but much larger absolute increases in low-skill

Daly et al. (2000)) use interview data on "required" and actual education to measure the extent of overeducation, and in the absence of comparable surveys covering a span of years it becomes hard to evaluate trends in overeducation.

⁴From the perspective of Acemoglu's theory it might also be interesting to examine whether these average changes in the skill requirements mask a polarization of skill requirements across jobs.

unemployment), and a slightly falling US college wage premium until the mid 1970s; undereducation in a strict sense finds no place in either theory.

Our model is less ambitious than Acemoglu's theory. The mechanism of induced overeducation does not require any particular explanation of unemployment. We do suggest in section 5 that falling productivity growth may have played a role in raising unemployment, but the central argument in section 4 does not depend on this explanation. Unlike Acemoglu, we do not claim that an increase in the proportion of high-skill workers must raise both unemployment and wage inequality.

Our agnosticism on this issue can be seen as a weakness. But in light of the evidence, it may also be a strength. US unemployment rates in the 1990s were significantly below those of the 1980s. From the perspective of Acemoglu's model with its clear prediction of increased unemployment, this evidence is troublesome. Of course, one could always amend his model. There may have been a shift in the direction of technical progress, for instance. Or one could argue that since his paper describes steady-state solutions, the decline in unemployment in the 1990s can be seen as a cyclical deviation from the new, high unemployment rate. But these explanations of the empirical record would seem to rob the theory of much of its appeal and explanatory power. If low unemployment in the 1990s does not cast doubt on the theory, why should we see high unemployment in the late 1970s and the 1980s as evidence in favour of the theory? Acemoglu's theory claims that unemployment and inequality have to go up because of a shift from a pooling to a separating equilibrium. Our account, on the other hand, merely says that induced overeducation may lead to seemingly paradoxical movements in wage inequality and the composition of employment. This is a more modest claim but one, we believe, which merits further investigation.

The mainstream explanation of increasing wage inequality has focused mainly on the effects of skill-biased change. Skillman proposes that key pieces of the empirical record are well explained by skill biases in frameworks other than the one put forth by us. Our approach, he suggests, should have "the capacity to account for an at least equally broad range of empirical regularities" (p. 5).

At a methodological level, we fail to understand this requirement.⁵ Should one exclude from consideration all hypotheses with a narrow set of implications? The important questions, it would seem, are whether a theory has a well-defined domain of applicability and whether it makes a contribution to an understanding of the problem which it addresses.⁶ If in fact induced overeducation is an important real-life phenomenon, our model would deserve attention even if it fails to explain

⁵We also have reservations with respect to Skillman's suggestion that, following Acemoglu, deunionization in the US and the UK may be explained "in terms of the effects of SBTC on the incentives of skilled workers to form bargaining coalitions with their less-skilled counterparts" (p. 5). A discussion of this issue, however, is beyond the scope of this short reply.

⁶See Auerbach (1979).

other aspects of the labour market. Moreover, the fact that other models with skill-biased technical may generate movements in relative wages that match the observed movements would seem irrelevant if it were known that real-world wage movements had been generated by induced overeducation.

In our paper we take an agnostic attitude to the question of skill biases in technical change. The mechanism of induced overeducation does not depend on any particular form of technical progress (although, for simplicity, we assumed that technical change was Hicks neutral). Are explanations based on skill-biased technical change compelling? Wolff's (2000) study, which we referred to above, clearly "casts doubt on recent analyses which posit a particularly strong technological bias in favor of educated workers during the 1980s" (Wolff, p. 52). His data suggest that the skill bias was stronger on the 1960s than in the 1970s and 1980s.

The real strength of the skill-bias hypothesis may have been that within a standard neoclassical setup it is hard to find other explanations for the rise in both the relative employment and the relative wage of high-skill workers. Thus, supporters of skill-biased technical change have argued that the absence of other convincing explanations "implicates technology by default" (Berman et al. 1994, p 391). The literature on skill biases in technical change is enormous but we would like to draw attention to the David Howell's work. His careful study of the existing evidence leads him to the conclusion that

the skill-biased technological change story should predict accelerating increases in skill composition and wage inequality, peaking at the end of the 1990s boom. In fact, standard measures of skill exhibit rapid growth only in the early 1980s recession. And wage inequality shows spectacular growth in the 1980s, stability through the mid-1990s, and a decline at the end of the decade, just the reverse of what the demand shift account would expect. (Howell 2002, p. 35)

According to Howell, satisfactory explanations of increasing inequality must move beyond the conventional supply-demand model and include the effects of ideological shifts and institutional changes (e.g. minimum wages and union power). We agree with this view. Extensions of our story to allow for these institutional and ideological aspects seem much more promising than extensions relating to the direction of technical progress.⁷

⁷As a simple first step, Skott (2004) includes the effects on wage in equality of both endogenous changes in wage norms and autonomous ideological shifts.

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