Technical Change and Wages

A useful tool for analyzing technical change is based on a slightly different approach than the Edgeworth Box. Here we draw an isoquant that represents $1 worth of output of a good (a unit value isoquant). We show that good #2 uses skilled labor more intensively than good #1.

If we know the country’s endowment of skilled and unskilled labor is given by E, we can determine the output of goods #1 and #2 that will result in full employment at this relative wage rate for skilled and unskilled labor – just use the two rays OA and OB, based on the 2 ratios of skilled to unskilled labor that will be chosen at this relative wage rate, and complete a parallelogram with a vertex at O and one at E. We have just found one point along the contract curve of the Edgeworth Box.

Although this approach may seem more complicated, we will find it is easier to represent technical change. Suppose it becomes possible to produce the same amount of good #2 with less skilled labor and less unskilled labor. The isoquant showing this same quantity of output will shift in toward O. It now costs less to produce X2. For this new isoquant to represent $1 worth of output, the wage of skilled labor must rise. At this new relative wage rate, we find the new factor proportions chosen and new output levels. Can we relate this framework to the class debate over the divergence of skilled v. unskilled wages? An alternative explanation is given by the Stolper-Samuelson theorem: if the U.S. reduces its protection of unskilled-labor-intensive goods, the economy will produce fewer of them and import more, while it produces more skilled-labor-intensive goods and exports more of them. This shift in production results in a fall in the SL/UL ratio in each good, and a rise in the relative wages of skilled labor, Ws/Wu.

If we instead observe that there has been an increase in the SL/UL ratio in both sectors, but there has been an increase in Ws/Wu, too, what sort of technical change could explain that outcome? Consider especially technical progress that reduces the demand for unskilled labor. The solution shown here does give an increase in SL/UL in each sector. Yet, what must be happening to output in each sector at unchanged output prices? For this scenario to explain events in the United States, allow for an unskilled-labor intensive sector that produces non-traded goods (McDonalds?).