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Comment

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Comin and Hobijn’s paper looks at the role of technology diffusion and postwar growth in the OECD countries. The key idea is that differences in the barriers to technology diffusion may be behind the differential growth rates after the war. Conceptually, the model turns technology into another form of capital that can be accumulated. When technology is thought of in this manner, then frictions to technology adoption will have an effect on output per worker in the same way that a higher cost of capital lowers capital intensity and thus output per worker.

Let me illustrate this idea with a stripped-down version of the model in the paper. Suppose that output is given by

\[ Y = Z_{\bar{t}} X, \]

where \( X = AK^{\alpha}L^{1-\alpha} \) and \( Z_{\bar{t}} \) is an index of the country’s technology vintage. The cost of having technology of this vintage is given by

\[ C(Z_{\bar{t}}, Z_t) = \frac{b}{1 + \chi} \frac{Z_{\bar{t}}^{1+\chi}}{Z_t^{\chi}}, \]

where \( Z_t \) is the world technology frontier and \( \chi > 0 \) parameterizes the convex cost of technology adoption. The marginal cost of moving up the technology frontier is given by

\[ C'(Z_{\bar{t}}, Z_t) = b \left( \frac{Z_{\bar{t}}}{Z_t} \right)^{\chi}. \]

The marginal cost is a function of \( b \), which can be interpreted as the “friction” and the country’s distance from the world technology frontier. Equating the marginal cost to the marginal benefit, we get the following expression for the country’s technology gap relative to the world frontier:

\[ \frac{Z_{\bar{t}}}{Z_t} = \left( \frac{X}{b} \right)^{1/\chi}. \]
In turn, aggregate output is
\[ Y = Z_t \left( \frac{1}{b} \right)^{1/x} X^{(1+\chi)/\chi}. \]

Aggregate output is a function of the cost of technology adoption \( b \) with an elasticity of \( 1/\chi \). The diminishing returns to accumulating technology capital comes from the convex cost of technology capital. Thus, the importance of the differences in \( b \) will depend on the convexity of the technology cost adoption parameter \( \chi \). In effect, what the model does is to convert technology into another factor that can be accumulated.

What this paper does is to empirically measure \( b \) and to argue that differences in this parameter can explain the different growth performances after the war in the OECD countries. Specifically, the paper shows that output growth is associated with the adoption of “new” technologies such as airplanes, cars, electricity, radios, phones, and trucks and decreased use of “old” technologies such as railways, steamships, and telegrams. In terms of the model, the claim is that use of new technologies proxies for \( Z_{vt}/Z_t \). The issue is that most of the “technologies” that are measured are consumption items, and not inputs into the production process. For example, why are expenditures on cars a measure of a country’s technology gap? Why isn’t it reasonable to think that expenditures shift toward cars and away from railroads (and horses) when incomes rise, regardless of the technology used in production?

The second claim is that the differences in technologies are driven in large part by differences in the cost of technology adoption (the parameter I have called \( b \) here). Conceptually, the technology gap is a function of \( b \) and a function of \( X \), and what the paper is after is to isolate the role of \( b \) in explaining the technology gap. What the authors do is to use a postwar technical assistance program by the United States as a measure of “exogenous” variation in \( b \). This program provided some money but mostly technical assistance to many countries after the war. As the paper shows, the amounts involved were quantitatively small. In Japan, for example, the program provided $12 million of technical assistance aid and provided 165 engineers in the United States.

However, it is hard to believe that the exclusion restrictions necessary for this program to be used as an instrument for variation in technology adoption are satisfied. For example, the paper shows that the point estimate from a reduced-form regression of \( \log(Y/L) \) on U.S. aid suggests that $1 million in U.S. aid increases \( \log(Y/L) \) by 0.018. If we take Japan again, \( Y/L \) in Japan in 1950 was about $3,000 and population was
83 million. The point estimate thus suggests that $1 million in U.S. aid was responsible for increasing Japan’s GDP by $4.5 billion. This rate of return seems wildly implausible and suggests that variation in the intensity of the U.S. technical assistance program was probably correlated with other factors that had an independent effect on output.

The paper suggests that we can solve the problem by regressing adoption lags on U.S. technical assistance as the first stage and then using the fitted adoption lags in the second stage of a regression of output on technology adoption. I do not see, however, how this solves the identification problem. The first-stage regression of adoption lags on U.S. technical assistance is unbiased only if U.S. technical assistance is uncorrelated with other variables that might have an independent effect on income. However, one would need to know more about the sources of variation in this program to know whether the exclusion restrictions hold. As it stands, the large point estimates of the reduced-form regression of output on the program indicate that the exclusion restrictions are not likely to be met.

In sum, the paper is ambitious and on a very important topic. The data the authors use are very interesting. The mechanism they have in mind is plausible. However, much more needs to be done to provide reliable estimates of the magnitude of the importance of technology adoption on growth and on the effect of barriers to technology adoption.