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Chapter Title: Discussion of "When Does Improving Health Raise GDP?"

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Discussion

Ashley Lester initiated the discussion by responding to some of the issues raised by the two discussants. He first reiterated that the paper does not embark on either a welfare analysis (which would dwarf any economic considerations) or a cost-benefit evaluation (which would require estimates of the costs of implementing various policies). Responding to Hoyt Bleakley's concern about the use of a single index for health, Lester defended its use on the basis that it has been proven useful both here and in other contexts, when one looks at human capital or even capital itself. Nonetheless, he agreed that nuanced interventions that are geared to specific diseases will have different effects that should be considered when making policy decisions. As an example, he pointed out that tuberculosis and malaria have very different effects on the path of income per capita. Lester then reiterated the main sets of policies in education, fertility, and capital mobility, which are important complements to health initiatives, due to the interaction effects uncovered in the paper.

David Weil agreed with Bleakley that improvements in health do not just run through education, and, in fact, there is no presupposition that an improvement in health would actually raise education. He pointed out that the paper allows for a direct effect of health improvements on adult productivity, separate from the education channel. Applying the paper's procedure to malaria incidence in Zambia would yield a 2.5% steady-state effect on GDP per capita. Weil pointed out that, although this number is smaller than what he estimated would be a 13% steady-state effect using Bleakley's (2007) numbers, the difference is not as big as had been suggested by the discussant. Weil later provided the numbers for the effect of malaria eradication on education: the improvement in life expectancy from eradicating malaria is only roughly 1.6 years but results in 0.18 additional year of schooling. Conversely, a 20-year improvement

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in general health generates only 0.38 extra year of schooling. So malaria eradication results in almost half the schooling effect with a much smaller change in life expectancy.

Weil also responded to Simon Johnson's questions about using other data sources that measure population before and after a major health improvement. He argued that looking at the raw data in that way would amount to doing ordinary least squares without an instrument, because it would not control for other developments that happen concurrently. Therefore, one can compare the structural estimates from this paper only to instrumental variable results, which is why the authors compare their results to those of Acemoglu and Johnson (2007).

Michael Woodford suggested that one could determine the rate of return on the initial investment implied by the paper's simulations. If one seeks to assess whether or not such policies would pay for themselves, then one should ask by how much GDP would be increased relative to the cost of the policies. Weil agreed with the idea but said that the paper's starting point was the often-cited argument that improvements in health would make everyone richer.

The discussion then turned to the question of how to boost long-run estimates, to perhaps begin to approach the estimates cited by policy makers. Andrew Atkeson returned to the question of fertility as being crucial to the results and argued instead that land is key. However, the evidence did not point to land as being a strong constraint on GDP, so he did not see how the model could generate large long-run effects. His comments were later echoed by Robert Shimer, who proposed human capital, rather than land, as being key to the estimates. Shimer wondered what type of dynamics might be missing from the model that could, if incorporated, generate a stronger response of human capital to increased longevity. Weil agreed that even after eliminating all Malthusian effects and adding the positive effects of all channels, one could not even begin to approach the large effects often touted in policy debates.

Valerie Ramey nicely rounded out the discussion by pointing out that this paper was very useful in showing how far one can go with standard features, which is "not very far." She then argued for moving beyond the issues of land or human capital because "we have to think about something more besides growing rutabagas on the land." She suggested incorporating increasing returns and the fact that a healthier population would be able to accomplish bigger things that generate spillover effects. She offered the construction of the Panama Canal as an example of how knowledge about malaria and yellow fever enabled American soldiers to build the canal when the French had failed. Lester agreed that

rather than looking at factors that are innately subject to diminishing returns, one might need to investigate the effects of longevity that come directly through technology. Weil added that one of the often-cited benefits of disease eradication is the ability to cultivate land that had previously been uninhabitable. He cited Enrico Spolaore's example of various areas near Rome and in southern Tuscany that were uninhabitable until DDT pesticide came along. However, he also added that so far this benefit has not been quantified.

Harald Uhlig shifted the discussion to the broader point of the paper. He wondered if, by focusing on GDP per capita, we were not somehow forgetting the big picture of how important the welfare gains are from health improvements. Lester agreed with Uhlig's point that the welfare gains easily swamp any economic considerations. Nonetheless, he stressed the importance of understanding the consequences of any health initiatives. He reiterated the importance of complementary interventions that should accompany any health intervention.

Daron Acemoglu thought that the paper highlights the point that we know very little about the adjustment process itself, rather than long-run effects, which had thus far dominated the discussion. He argued that it is unreasonable to expect that people will immediately adjust to big changes since their expectations will adjust only at a moderate speed. However, there are currently no models that can address this adjustment process. Acemoglu also tied the paper's findings to broader political and social issues. He referenced an idea that he and Simon Johnson are investigating, which is that big increases in population have a big effect on civil wars.

John Cochrane added that he found the paper's finding on the importance of capital flows very interesting and offered the example of the Black Death in 1350, which eradicated 40% of Europe's population. As a result, wages doubled, since capital had been unaffected. He further suggested that environmental costs should also be considered, especially when thinking about the effects of cultivating previously uninhabitable land.

Robert Hall concluded the discussion by referencing William Nordhaus's new book on global warming, which has a similar structure. He suggested that beyond looking at general equilibrium effects, the authors should also follow Nordhaus's exercise of forming a welfare measure, discounting this measure to the present, and finding the Ramsey optimal policy for this setting. As he concluded, "there's a lot to do on this project."