A Quantitative Theory of the HIV Epidemic: Education, Risky Sex and Asymmetric Learning*

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Abstract

We show empirically that the relationship between education and the probability of HIV infection is U-shaped (positive-zero-positive) over the course of the epidemic. In contrast, the relationship between education and knowledge about the process of HIV infection follows an inverted U-shaped pattern. We develop a non-stationary quantitative macroeconomic theory with heterogeneous agents that is consistent with these facts. Our theory endogeneizes the entire course of the HIV epidemic across its different stages: a pre-HIV epidemic stage; a myopic HIV stage in which agents are not aware of the process of HIV infection; a learning stage in which agents heterogeneously—across education groups—learn about the process of infection; and an anti-retroviral (ARV) stage that modifies the effects of HIV infection on individuals. We show that asymmetric learning is key to reproduce both the micro patterns that we document and the aggregate evolution of the HIV epidemic. In further counterfactual experiments, we assess the effects of an early understanding of the virus and its mode of infection, improvements in the composition of education, the earlier (and universal) adoption of ARVs and the use of PrEP to prevent further spread.

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