Health economics and applications in developing countries

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Abstract

The concept of health human capital guides the statistical study of (1) health production functions, (2) derived demands for medical and behavioral health inputs, and (3) determinants of health and productivity outcomes. Health inputs are generally endogenous to health outcomes, and prices of health inputs are the most common instrumental variable for identifying estimates of the causal effects of health inputs. But when health input prices are modified by individual regional migration, the regional prices no longer satisfy the requirement of being independent of preferences and omitted variables. Then the difficulty of evaluating health program effects reinforces the need to design randomized regional treatments, in order to be able to evaluate without bias the consequences of critical health interventions, such as are needed today to deal with the HIV/AIDS epidemic.
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Michael Grossman's (1972) paper on health human capital contains a variety of insights which have influenced fundamentally the field of health economics. First, the demand for medical care is a *derived* demand due to the presumed connection between medical care and health. Therefore, the economist, seeking to estimate the demand for medical care must understand the underlying process producing health and how the consumer of health learns about this complex long-term health production process. Health itself is viewed as a current service derived from a depreciating stock of health human capital, formed by investments in medical care, and also impacted by health-related behaviors, such as smoking, which interact with the individual's initial health stock. As a conceptualization of health human

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capital, Grossman's framework is widely used and adapted to shed light on at least three types of relationships: (1) the health production technological function, (2) the individual demand for medical and behavioral health inputs, and both of these functions are implicitly submerged when estimating reduced form equations, (3) for the determinants of individual health status or health outcomes in terms of exogenous variables describing resources, prices, opportunity sets, and technological possibilities.

As empirical research on health economics has studied more questions, and data has been collected specifically to close the gaps in our knowledge of health technology and health related demand behavior, it has become clear that estimation of the "health production function" from data on inputs and outputs is quite complicated. The "initial stock of health", in Grossman's terms, cannot be conditioned away in estimation of the levels in health production functions or health care demand equations, for at least two reasons. First, because health status is a complicated, multifaceted phenomenon that is measured with substantial error, especially, but not exclusively, when health status is derived from subjective responses by individuals to a sample survey. Second, because this initial stock of health or the individual's *health endowment* exerts a persistent endogenous effect on realized health. A common solution for dealing with the endogeneity of the initial health stock is to borrow from aggregate time series simultaneous-equation methods and treat lagged values of the stock as exogenous, or to estimate the model in first differences from an individual panel or from repeated cross-sections where the fixed effect represents birth cohorts over time. But these estimation strategies are not entirely satisfactory in this case, because the health endowments of individuals differ substantially, persists over the life cycle, and are dynamically reacting to the realization of new health shocks and health investments. A growing body of evidence has accumulated from clinical studies suggesting, for example, conditions of the fetus in the uterus (and the mother) account for many chronic health problems experienced by the individual many years hence, even when contemporaneous and lagged control variables are included in the estimation of adult health outcomes (Barker, 1998). If current health inputs respond to current health stocks or health status, such as being sick, as well as to the (unobserved) initial health endowment of the individual, the econometrician faces a difficult task—how to measure sources of health input variation that are arguably uncorrelated with the initial health stock, preferences, and health shocks (Rosenzweig and Schultz, 1983).

One choice of instrumental variable (IV) for explaining the independent variations in input demands is the market determined price of the health inputs in the area in which the individual resides and thereby has access to health goods and services. This specification of an instrumental variable representing the monetary and time price of health inputs may seem a "natural" instrument for an economist, but this choice requires that migration among residential regions is not affected by variation in health input prices. Identification by this exclusion restriction, namely that health input prices are exogenous to the health production and demand equations, might be more acceptable if these variations in health input prices exerted only a minimal effect on lifetime utility and hence could be neglected as a determinant of migration, or if the realization of these price variations is unanticipated and hence could not affect the decision whether and where to migrate.

For example, if HIV/AIDS is known to be endemic in one area of a country and not in another, migration into and out of these regions may be correlated with the regional