International free-riding in healthcare innovation

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The U.S. faces a crisis of bloated healthcare costs—15 percent of GDP, compared to 11 percent in France and Germany, 10 percent in Canada, and 8 percent in the United Kingdom and Japan in 2006 (OECD, 2008). Yet, Americans do not appear to enjoy superior health outcomes relative to their Canadian and European cousins (Schoen et al., 2007). Scholars have argued that cost differences between the US and other developed countries stem from differences in national healthcare systems and market incentives rather than underlying disease profiles (Garber and Skinner 2008).

We propose to examine the linkages among disease incidence, local economic factors and policy on global spillovers on healthcare innovation and welfare. We start with the premise that treatments developed for patients in one developed country can readily be exported to another. As a result, changes in profits expected from the treatment of the ailing in one country have externalities on welfare owing to the rate of health-related innovation experienced in other countries.

The notion that the some countries subsidize medical breakthroughs for the rest of the world is not new—Commissioner of the Food and Drugs Administration (FDA), Mark McClellan, created a media stir by arguing that pharmaceutical companies shift the costs of drug development disproportionately to US consumers to recover the lower profits from European and Canadian markets which are subject to strong price controls (McClellan 2003).Relatedly, academics have discussed the long-term trade-offs in innovation that developing countries like India face by sidestepping IP protection for the short-run benefit of cheaper access to drugs (Lanjouw 2003). However, to our knowledge, the importance of differing disease profile correlations between specific countries, and in particular, among developed countries (which differ from each other not so much in the willingness to pay of consumers but in their institutions that regulate pharmaceutical prices) and their effects on pharmaceutical innovation has not been studied.

Theoretical Framework

We propose to study the spillover effects of medical innovation with a focus on the correlated patterns of disease between countries. We begin by developing a formal model to capture the game between profit motivated innovators, who react to global incentives, and regulators, who have the incentive to shift surplus from foreign pharmaceutical firms to local consumers. A preliminary sketch of the model delivers the following hypotheses.

1. Changes in R&D investment by pharmaceutical innovators in specific diseases are positively related to changes in the incidence of those diseases. The sensitivity of this responsiveness varies with the average profit margins in country *i* (although not articulated to account for the geography of markets, this is the main message in Acemoglu and Linn 2004).

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2. Countries where pharmaceutical industries are a more important part of the national economy will allow higher profit margins (because producer surplus accruing to innovators counts as welfare to same-country policy makers); however, conditional on profit margins, innovators are no more responsive to national disease incidence changes than they are to foreign ones.

3. Health care systems are endogenously determined with disease incidence. All else equal, countries whose disease profiles are less correlated to the diseases of high profit countries have less ability to free-ride and thus will allow innovators higher profit margins.

Empirical Approach and Data

In the second phase of the project, we propose to empirically test the above propositions. The key variables required for the tests are: (i) disease incidence by disease-country-year, (ii) measure of expected profit margins by country-year, and (iii) R&D investments by pharma firms by disease-year. For (i), we use the number of people dying from a disease by country-year. This data is available from the World Health Organization, and is as recorded by national civil registration systems annually. For (ii), we use a proprietary database developed by his, Pharma Online International, that provides data on ex-factory price, wholesale price, retail price, and daily cost of treatment for various drugs and diseases across over 40 international markets. Finally, we proxy for R&D investments by the number of new clinical trials initiated by pharma firms in a year for a specific disease. The source is IMS' R&D Focus which provides a history of all projects in development from the mid-1980s. As in Kyle and McGahan (2013), we focus on the first stage of human clinical testing, to capture early R&D efforts.

The basic empirical specifications estimate the effect of R&D investments by firms of each country ‘i’ for disease ‘j’ in year ‘t’ as a function of disease-incidence and expected profit margins across a vector of countries for which we have data on incidence and margins. We also control for several other country-level variables that may drive pharmaceutical investments such as IP protection and income levels. If the first two of our propositions are correct, they should yield a positive estimate of the relationship between incidence and R&D investments and profit-margins and incidence. However, the coefficient estimate of responsiveness of innovators should not be different for national disease incidence changes than for foreign ones.

Policy Implications

We plan to use the estimates of sensitivity to profit margins to calibrate the effect of policy changes in any given country (that affect profit margins) on innovation both in that country and other countries as a function of the correlations among disease-incidence for any given pair of nations. As incidence correlations between nations evolve, they may change the direction of innovation spillovers in the future. And as medicine begins targeting disease at its genetic source, the interaction of differing immigration flows into Europe and North America, may begin to drive a wedge between the continents' incentives to free-ride on each other. Our study, when complete, can thus shed light on how factors such as changes in country-specific economic factors, incidence, and policy have global spillovers and endogenously influence healthcare innovation.

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