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Economic geography and international inequality

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Abstract

This paper estimates a structural model of economic geography using cross-country data on per capita income, bilateral trade, and the relative price of manufacturing goods. We provide evidence that the geography of access to markets and sources of supply is statistically significant and quantitatively important in explaining cross-country variation in per capita income. This finding is robust to controlling for a wide range of considerations, including other economic, geographical, social, and institutional characteristics. Geography is found to matter through the mechanisms emphasized by the theory, and the estimated coefficients are consistent with plausible values for the model's structural parameters.

Keywords: Economic development; Economic geography; International trade

JEL classification: F12; F14; O10

1. Introduction

In 1996, manufacturing wages at the 90th percentile of the cross-country distribution were more than 50 times higher than those at the 10th percentile. Despite increasing international economic integration, these vast disparities in wages have not been bid away by the mobility of manufacturing firms and plants. There are many potential reasons for the reluctance of firms to move production to low wage countries, including endowments, technology, institutional quality, and geographical location. This paper focuses on the role of geographical location. We estimate its effects using a fully specified model of economic

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geography (that of Fujita et al., 1999) and cross-country data including per capita income, bilateral trade, and the relative price of manufacturing goods.

Geographical location may affect per capita income in a number of ways, through its influence on flows of goods, factors of production, and ideas. In this paper, we concentrate on two mechanisms. One is the distance of countries from the markets in which they sell output, and the other is distance from countries that supply manufactures and provide the capital equipment and intermediate goods required for production. Transport costs or other barriers to trade mean that more distant countries suffer a market access penalty on their sales and also face additional costs on imported inputs. As a consequence, firms in these countries can only afford to pay relatively low wages—even if, for example, their technologies are the same as those elsewhere.

The potential impact of these effects is easily illustrated. Suppose that the prices of output and intermediate goods are set on world markets, transport costs are borne by the producing country, and intermediates account for 50% of costs. Ad valorem transport costs of 10% on both final output and intermediate goods have the effect of reducing domestic value added by 30% (compared to a country facing zero transport costs), the reduction in value added rising to 60% for transport costs of 20%, and to 90% for transport costs of 30%.[2] Transport costs of this magnitude are consistent with recent empirical evidence. For example, using customs data, Hummels (1999) finds that average expenditure on freight and insurance as a proportion of the value of manufacturing imports is 10.3% in US, 15.5% in Argentina, and 17.7% in Brazil. Limao and Venables (2001) relate transport costs to features of economic geography finding, for example, that the median land-locked country's shipping costs are more than 50% higher than those of the median coastal country. Each of these papers focuses on transport costs narrowly defined (pure costs of freight and insurance) and may understate the true magnitude of barriers to trade if there are other costs to transacting at a distance, such as costs of information acquisition and of time in transit.

Our model formalizes the role of economic geography in determining equilibrium factor prices, and the exact specifications suggested by theory are used to estimate the magnitude of these effects. When included by itself, the geography of access to markets and sources of supply can explain much of the cross-country variation in per capita income. After controlling for a variety of other determinants of per capita income, we continue to find highly statistically significant and quantitatively important effects of economic geography.

The methodology we employ is as follows. We develop a theoretical trade and geography model to derive three relationships for empirical study. The first of these is a gravity-like relationship for bilateral trade flows between countries. Estimation of this enables us to derive economically meaningful estimates of each country's proximity to markets and suppliers—measures that we call market access and supplier access, respectively. Market access is essentially a measure of market potential, measuring the export demand each country faces given its geographical position and that of its trading partners; 'supplier access' is the analogous measure on the import side, so is an

[2] See also Radelet and Sachs (1998).