

Geography and Economic Theory*

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THOSE who are interested in geography as a subject to be expounded educationally must welcome every approach to it which may add to its effective rationalization and bond it into the main structure of knowledge. This is not a mere teaching device, for it may make teaching more difficult, if it is to make it more effective. It makes teaching more difficult if we have to go beyond the immediate neighbour in causation, to reach basic causation and fundamental reasons. To explain a geographical condition by an economic condition is immediate, but not fundamental. Some theory of economic action is implied, though it may be conveniently left unexamined and unexpressed—taken for granted. All such single economic-geographic couplets of facts taken together must ultimately conform to some theoretic principle, and have some common thread. If they do *not*, then there is no uniformity of causation, and no economic, still less geographical science. An economic explanation of a geographic fact is then no 'explanation' at all. The kind of theory which geography may involve, or which may aid geographic understanding, and help to make geography, already culturally basic to so many mental disciplines, a fully rounded science, is therefore the subject of this address.

Geography in recent decades has multiplied its descriptive classification or titles in a rather opportunist manner. No one bothers much about keeping or making the boundaries—they seem to be sufficiently well understood. Yet at the outset I find some uncertainty as to the true scope and purpose of 'economic geography'. Economic history is certainly not the history of economics, but quite clearly the selection of those facts in history which are of economic importance, or which can be accounted for only by economic tendencies and principles. But I am not sure whether economic geography is confined to describing the geographical aspects of physical and spatial facts which are of interest to the economist, providing him, so to speak, the bricks to build with, but quite indifferent to the use he makes of them. If so, how far does the economist really use them? To what extent in constructing an edifice of economic principle does he rely on geographical material? To what extent does he overhaul and recast principles to cover the wealth

of material, with differences and similarities, which the economic geographer continually presents to him? How far does he merely use this material by selection, to illustrate his point, or does he feel a responsibility for subsuming and accounting for the whole of it? Is a geographical fact *ever* the awkward fact that kills the happy economic theory? But perhaps the economic geographer thinks it is his own task to account for facts, for the presence or absence of features, for similarities and differences, by applying economic principles and tests. Perhaps he learns what facts to register and elaborate, by economic theories and differentials. Or am I again an idealist? What, in fact, is the functional relationship between the two disciplines? Whose task is it to do the work of establishing causation, in either direction?

Economic geography must *begin* with physical environment, because these natural controls are dominant. So its first contributor is pure geography. But this is only the first of three classes. Variations of labour and capital are also important and these are covered by economic history and economics proper, not by geography. Thus complementary productions, in seasons or in female labour, are not factors derived from geography. The persistence of a factor through an early start comes from economic history. The data provided by Nature have to be handled by man, and therefore human motives are involved; so the balance of marginal cost to himself of the effort and of marginal utility to himself of the product, or its market equivalent, must be made. Utility and value and psychic considerations have entered.

Geographers have been as active in adopting the term 'economic' without doing much distinctive with it, as economists have been inactive in using the term 'geography' for their basic data. In the composite volume, "The Trend of Economics", Prof. Weld has a section on "Regional Comparison and Economic Progress", in which he refers to the three trends now becoming clear: first, realistic studies as opposed to abstract analysis; secondly, statistical presentation; and thirdly, regional comparison. In elaborating the last, he details Mill's five canons of method applied to inter-regional data. "The economist of today finds himself face to face with the problem of the inequalities of standards of living in different regions. For example, India and China have not

* Abstract of the presidential address to the Geographical Association, delivered at the London School of Economics on January 6.

participated in the economic progress which has become conspicuous in some of the Western countries. Many explanations have been offered for the economic backwardness of regions in Asia, Africa and South America. Which explanation is nearest the truth? We do not know. It is time we were finding out. Scientific comparison seems the most obvious method. What is required is a thoroughgoing search for the *causes* of the differences in the separate regions." Surely this is economic geography in the truest sense, yet he never once uses the term 'geography'. The word geography does not appear in the indexes to the first forty years of the *Economic Journal*. The "Encyclopædia Britannica", 14th edition, has no mention of economic geography in its index. Palgrave's "Dictionary of Political Economy" (1896) includes an article on "Commercial Geography", which is for a large part economic history, but contains no reference to *causal* geography in the economic sense, except the conventional reference to England's natural advantages. It is very much the same story when we look in geography literature for economic theory. The index to the *Geographical Review* over a long period of years contains scarcely any reference to economics in its analytical or theoretical sense. Probably the nearest that it gets to it is in an article by Chisholm on "World Unity", where he postulates the tendency towards the equalization of economic development throughout the world in capital, in population density and in skill—an important economic generalization akin to the second law of thermodynamics and fraught with vital consequences in the field of foreign trade and also in the extent to which natural resources will be fully developed. But it is a generalization of his own which does not base itself on any recognized economic field. Modern works on realistic economics contain much geographical matter, and those on commercial geography, important summaries of economic factors. Thus a chapter in Seligman's "Principles of Economics" and one in Dr. Dudley Stamp's "Commercial Geography", dealing with the localization of industry, might even be changed over, without doing any real violence to the balance or trend of either work.

We may classify geographical explanations of economic facts, which are thus also quite often reversible as economic explanations of geographic facts, first as the simple static; second, as the simple dynamic; third, as the inductive static and fourth, as the inductive dynamic; and fifth, beings the most rare, as theory inductive and illustrative. The first, the simple or direct static, is the type best known to us, filling our commercial geographies and our realistic economic text-books. Its method is to account for one fact or set of

facts by another set, not indeed in a connexion obvious until it is pointed out, but when stated, requiring or securing no supporting argument, no discrimination from other possible causes or connexions, and certainly involving no analytic and theoretic body of economic principles either to verify it or in itself to form an illustration. These often involve a certain element of history. In general, this class includes such statements as that a given port owes its prosperity to the fact that it lies on the trade routes between two wealthy or populous areas. "The completion of the Erie Canal in 1815 gave to New York, then a city of secondary importance, a position of undisputed pre-eminence" (Chisholm).

The second, or simple dynamic, class accounts for a *changing* set of facts by another set *changing* with it. Accounting for an important part of the grain trade of St. Louis, Chisholm says: "Here reside the merchants who handle a large part of the grain grown in the region to the west, including eastern Kansas and Nebraska. The nearest ports for that grain are Galveston and Houston. If the railways to these ports become congested, and are consequently disposed to charge too high rates, the merchants can apply for rates by rail or river to New Orleans, by rail to Baltimore or some other eastern port, or partly by water by the route here spoken of to New York" (p. 631). This is economic geography, but not economic theory. To provide economics with a problem for analysis, details of the change in traffic passing in different directions at different levels of freight rates and their fluctuations would be necessary. Or perhaps lessons in equilibrium between two types of transport, with different ratios of working costs to total costs, might be obtained therefrom. Chisholm provides a factual dwelling, but the economist is not yet dwelling therein.

The third, or inductive static class, draws lessons from a *number* of instances of the first class—for example, cases in which transport is involved. "With the increase of facilities and lowering of costs, geographical situation is yielding to the facts of artificially created location" (Seligman, p. 45). Similarly, population densities provide material for comparable generalizations.

The fourth, or inductive dynamic class, draws lessons from a number of instances of *changing* facts in sets or pairs with their correlations. This obviously is getting nearer to help for economic theory than any of the foregoing.

The fifth class goes further than the fourth if it brings the general principle that emerges into relation with analytic work, and perhaps produces generalizations which will 'work' as prophecies or further explanations. But I cannot find many clear examples in recent work. J. E. Orchard advanced

along this line when he claimed that the geographic study of minerals is certain to involve economic theory and to make contributions to it. He illustrated by a geographic explanation of the agitation for the nationalization of mineral resources. Pressure comes through a demand for higher wages or lower prices. The emergence of a period of abundance in particular countries has the basis of different economic conceptions of property rights, and the threat of future scarcity in particular places has a like differential in the property concept. The period of abundance lay behind the *laissez faire* theory, and the current concept of property right is differentially distributed with scarce or abundant minerals.

Now, in the present state of economic geography, it seems to me that most progress is naturally being made in the third class. The photographs, so to speak, being taken in the first class, are being brought together for induction under the third. But as time goes on, new photographs will be taken of the same physical locations under the first class, and the endeavour to relate the old and the new will call for measurement and explanation of the change, and bring them under the second class. The accumulation of instances under the second class will then provide masses of material for induction under the fourth class. Here economic theory fully emerges, but not before. The economic theory is not based on static conditions—it is essentially related to incremental changes of cause and effect, or related effects; and only as geography registers changes over time can it be of full advantage to economic theory.

Turning to the geographical ideas of well-known economists, Adam Smith's "Wealth of Nations" was not so much a piece of abstract reasoning, as a systematic induction from history and geography, in what was really a piece of political propaganda of high wisdom. It was a great protest against nationalism, and therefore it was cosmopolitanism. But no man can be a cosmopolitan without being a geographer. It has more geographical references in proportion to its bulk than any later important work.

A famous example of the inductive method is John Stuart Mill's discussion of peasant proprietors. He does not elaborate from first principles the economic results of the whole produce of land going to the owner worker without a tripartite division into rent, profits and wages, for he calls it one of the most disputed questions in the range of political economy. But instead he examines conditions in Ireland, Switzerland, Norway, the Palatinate, Saxony, Prussia, Holland, Flanders, Channel Islands, France and Lorraine, takes the common factors and then makes generalizations. He declares, first, there is no necessary connexion

between the form of landed property and an imperfect state of the arts of production; secondly, that the most effective use of the soil is not endangered; thirdly, that it is supreme in developing industry, intelligence, and frugality; and last, that it raises the standard of life, and does not unduly increase the numbers of the population.

We find no such rich geographic texture in the abstract reasoning of Ricardo, which was "unfavourable to any regional treatment". The German historical school introduced again ideas of relativity in time and space, but as we get down to modern times the text-books of "principles" are rather bare of geographic illustration. Seligman's "Principles" is well based on such facts, but even so objective a writer as Taussig in his "Principles" provokes the criticism of a geographic reviewer that he has very little geography. The latest highly analytical works of Pigou and Keynes are nearly bare of *geographic* facts.

Let us now lay out the field of economic theory on broad lines, and indicate in which quarters there lies most opportunity for geographic illustration or induction. It will be obvious at once that geography has no lot or part in a considerable range of it. Material objects need to have an appeal to human psychology before they are wealth. At least one half of the theory of value is psychological. A good part of invested capital is not geographical. Political and social institutions are of this order and, therefore, in the fields where these matters predominate geographic generalization is at a minimum. Where, however we come to land, we should expect to find that if the theory, for example, of no rent land, and marginal land of various types, has any validity we ought to be able to see these things objectively, and it is in relation to land and minerals, that induction from geographic facts should be most productive of theory or illustrative of it.

All questions of location and their effect upon production are capable of geographic illustration. Here is a generalization which is capable of economic analysis and certainly of illustration: "The geographic location of a manufacturing plant assumes an importance now that did not obtain when competition was less keen and almost any site would do. All the geographic factors have to be considered and a mistake in only one of them may offset good judgment in all the rest." Again, the geographer finds various methods of land utilization and describes them. The economist asks the question, why and wherefore—the causes. He finds certain uses bring misfortune; he seeks to impose conditions and so considers values.

When we get to the theory of demand and value, geography is quiescent. It is not, however, out of the question to see some possibilities. Anyone

illustrating the principles of inelastic and elastic demand respectively, and taking salt and margarine as examples, might extend the study into the relative stability of employment in geographical areas supplying one as compared with those dependent on the other, to account for their differences. This would be an excellent geographic verification or illustration of the theory. The principle of substitution might well be illustrated by the rise to popularity of particular commodities supplanting others the costs of which had become dearer, relatively, if not absolutely. This change means a change in the economic statistics of geographical areas, which can be examined and stated.

International trade proceeds on the theory of comparative costs (with certain important modifications) and it shows that it is quite possible for *a* to export to *b* commodities in which *b* has the greater natural advantage, provided that *b*'s natural advantages in another commodity are even greater. This ought to be susceptible of verification by reference to geographic facts.

Geography has little concern with money, banks or the technique of trade, and productive methods, but I would not conclude that the economist can make no use of geography at all in these fields. Atkinson says: "But if the metric system gives Germany an advantage over Great Britain in South American markets, it becomes to that extent a factor in the Geographic division of labour—that is, it tends to locate the economic complement of the wheat fields, and cattle ranches of Argentina in Germany rather than England."

Then again, banking systems may affect geographic facts: if the bank reserve system in America draws money from country to cities and

gives them a lower interest rate, then it becomes a factor in concentrating industries, and determining the geographic division of labour.

Technical production is not economic geography. But if the Bessemer process causes migration of the steel industry to areas where the ores are free from certain impurities, it is part of economic geography.

A few years ago the American Economic Association had a round table discussion on the various relations between economics and geography¹. It covered the geographic basis of agricultural production, land economics, economic concept of property in minerals, the study of pioneer belts, and geography in foreign trade prospects.

This probably expresses fairly the field of geography which actually lies within the field of economic theory, but the range of the latter is extensive and may—to reverse the metaphor—throw valuable side-lights at unexpected points of geography. But economics, though now highly specialized, is really one and indivisible. The geographer who aims at strengthening his grasp of causality, especially for expository purposes, by learning economics, would do well to cover the whole field first, in a preliminary way, and then specialize on the particular applications to which our analysis has led us. The economist who would keep his feet on the ground, even if his head is in the clouds, by realistic treatment, will get no such mitigations of his task from the geographer—like John Wesley, he will take the whole world for his parish.

¹ *Proceedings of the American Economic Association*, March, 1926, p. 112.

Constitution of the Earth*

By J. H. Reynolds

THE behaviour of materials such as granite and basalt can be tested in the laboratory up to a pressure of 30,000 atmospheres, or, as engineers would say, about 200 tons to the square inch. This corresponds to a depth of 120 km. in the earth's crust, but what are the conditions of matter at pressures of 10,000 tons to the square inch or thereabouts, which presumably must obtain near the centre of the earth? Then with regard to temperature, we know that near the surface of the earth in Europe this increases generally with depth by about 30° C. per km. The rate of increase

differs considerably from one point of the earth's surface to another. In North America it is three quarters of this amount, and in South Africa only about one half. In regions where volcanic activity has taken place in recent geological times, the rates of increase are abnormally high. In a boring almost a kilometre deep at Budapest a temperature of 69° C. was reached at the bottom. In Tuscany and other places in Italy a similar rate of increase has been found. If we take an average and extrapolate from this, we find that at a depth of something like 50 km. we reach a temperature of 1,400° C.—enough to fuse all but the most refractory substances.

* Extract from the presidential address to the Royal Astronomical Society delivered on the presentation of the Gold Medal to Dr. Harold Jeffreys on February 12.