THE EMERGENCE OF GEOGRAPHICAL ECONOMICS:
AT THE CONTESTED BOUNDARIES OF ECONOMICS, GEOGRAPHY AND
REGIONAL SCIENCE

BY JASMEEN RAHMAN AND ROBERT W. DIMAND*

Abstract

We explore disciplinary boundary-making in geographical economics or “the new economic geography” with attention to the approaches taken by, and attempts at communication between, scholars with primary affiliations in economics, geography and regional science. The Dixit-Stiglitz general equilibrium approach to monopolistic competition and increasing returns was applied to agglomeration and location by Paul Krugman, who had previously pioneered the “new trade theory” building on the Dixit-Stiglitz model, and, independently and slightly earlier, by Masahisa Fujita and his student Heshem Abdel-Rahman starting from regional science, a tradition with its own departments, doctorates, conferences and journals distinct from economics and geography. Economic geography, as studied by geographers, had already taken a quantitative and theoretical turn in the 1960s, reviving an earlier tradition of German location theory overshadowed within geography after World War II by areal differentiation. Another strand of economic geography pursued by geographers was influenced by economic theory, but by non-neoclassical Marxian and Sraffian economics. Debates between these scholars raised questions whether these analyses were multidisciplinary, drawing on distinct disciplines, or crossed disciplinary boundaries (as when geographical economics in the style of economists is undertaken in geography departments) or transcends disciplinary boundaries, or involved the emergence of a new discipline.

* Department of Economics, Brock University, Ontario, Canada.

Contact: jasmeen_rahman@yahoo.com and rdimand@brocku.ca

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Introduction

The “new economic geography” (NEG) or geographical economics gained widespread attention with Paul Krugman (1991a, 1991b). As indicated by the alternative names¹, the disciplinary status of these developments is contested, as a subfield of geography or of economics, or as the new discipline of regional science, transcending disciplinary boundaries or bringing distinct disciplines into communication or interaction, through the overlap of regional science with the subfield of urban economics and with the quantitative turn in geography. In particular, the origins of the new economic geography can be located either within economic theory (specifically international trade theory) or, in a parallel development by other researchers, within regional science. The editors of the *Journal of Economic Geography*, established to appeal to “a younger generation of scholars who were first attracted to economic geography through the development of the ‘New Economic Geography’,” recalled that a review of their journal in the *Times Higher Education Supplement* had suggested that the gulf between economic geographers in economics and in geography was “too deeply embedded in different conceptions as to what constitutes appropriate evidence, methodology and theory” to be bridged (Puga and Wrigley 2004, p. 104). The subtitle of an article in *The Economist* (March 13, 1999, p. 92) was “Economists say they have rediscovered geography. Geographers are interested to hear it. They didn’t know they had been away.” The claims made for the novelty and importance of NEG were such that J. Peter Neary (2001, p. 536), in a review article about Fujita, Krugman and

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¹ As with “new economic history” (NEH), historical economics, cliometrics. The term geographical economics (like historical economics) has been used by some economists to claim the research area as part of the discipline of economics, implicitly applying economic principles and analytic categories rather than drawing on the intellectual traditions of multiple disciplines, in keeping with George Stigler’s concept of economics as the imperial science, invading and attempting to dominate the territory of other social sciences, teaching economics to the other social sciences without learning anything fundamental from them. See Stigler (1984) and, regarding geographical economics and economic geography, Uskali Mäki (2004), Caterina Marchionni (2004) and Mäki and Marchionni (2011).

Venables (1999), found it necessary to “argue that, despite the hype, there is interesting work here which deserves to be better known” and that Henry Overman (2004) felt daring and controversial in making the case for an affirmative answer to the question “Can We Learn Anything from Economic Geography Proper?”² When Paul Krugman won the 2008 Royal Bank of Sweden Prize in Economic Science in Memory of Alfred Nobel for contributions to the new trade theory and new economic geography, the subtitle of Behrens and Robert-Nicoud (2009) was “The 100 dollar bill on the sidewalk is gone and the 2008 Nobel Prize well-deserved” (see also Brakman and Garretsen 2009, Fujita and Thisse 2009, and Isserman 1996, “‘It’s Obvious, It’s Wrong, and Anyway They Said It Years Ago’: Paul Krugman on Large Cities”).

We examine the emergence of the “New Economic Geography” or geographical economics at the contested boundaries of economics, geography and regional science, and suggest that Harry Johnson’s critical dissection of the Keynesian revolution (“New Economics”) and monetarist counterrevolution offers a useful way of thinking about the rhetoric of creating self-consciously “new” theoretical approaches, whether “new growth theory,” “new trade theory” or “new economic geography” (Johnson 1961). Johnson, who spent half of each year teaching economics at the University of Chicago and half at the London School of Economics, provoked British Keynesians by insisting on the value of Milton Friedman’s revival of the quantity theory of money but, while in Chicago, acted as a Keynesian gadfly to Friedman and Chicago monetarism. Johnson’s Ely Lecture was an “as if” exercise on how one might fabricate a revolution (or counterrevolution) in economics, without claiming that the revolutionaries were doing so consciously, an approach David Laidler’s *Fabricating the Keynesian Revolution* (1999)

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² While Overman (2004) responded to the tendency for economists to dismiss economic geography by geographers as non-economists writing on economics, the historian of geography Geoffrey Martin (2005, pp. 441-42) uses the economist Jeffrey Sachs and economic historian David Landes as examples when lamenting “that a good deal of ‘big-issue’ geography is being written today by nongeographers, some of it less than well-informed.”

has followed up for the Keynesian revolution (but not the monetarist counterrevolution). Many approaches to understanding how scholarly disciplines develop, from Adam Smith's essay on the history of astronomy to Popper and Kuhn, have started from examination of the (simplified and stylized) history of physics (and, in the case of Lakatos, mathematics) (see Chalmers 1999). In contrast, Johnson started from a (simplified and stylized) history of economics, and so recognized the crucial role of claims to policy relevance by new approaches, which would not be a feature of developments in physics, astronomy or mathematics.

The Origins of Geographical Economics

There was a long tradition, primarily in Germany from von Thünen in 1826 through Launhardt (1885) and Georg Pick's mathematical appendix to Alfred Weber (1909) to Predöhl (1928) and Lösch (1940) but also in Sweden with Palander (1935), of using economic theory and formal modelling to find the equilibrium location of economic activities, although using partial equilibrium analysis rather than general equilibrium (Ponsard [1958] 1983, Blaug 1979). This tradition had indeed received little attention in more general economic theory before World War II, and even less in geography, where search for general explanatory theories was overshadowed by an emphasis on description and areal differentiation associated with Hartshorne ([1939] 1961). But from the 1940s onward Walter Isard, originally an economist³ (with a Harvard PhD in economics and early publications in the *Quarterly Journal of Economics*), took the lead in establishing "regional science" as a new discipline between economics and geography, emphasizing neoclassical economic theory of constrained optimization together with formal mathematical and statistical techniques such as interregional input-output models, linear

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³ Before joining the University of Pennsylvania, Isard was an associate professor of regional economics at MIT, but in the Department of City and Regional Planning, not the Department of Economics.

programming and gravity models, culminating in *Location and Space-Economy* (Isard 1956)⁴. Isard (1956, pp. 15, 3031n, 87n, 93n, 107n, 120-22, 125, 128n, 132, 225n) made frequent reference to an earlier, “highly valuable” Harvard dissertation on *The Theory of Geographical Location of Economic Activity* by William H. Dean, Jr. (1938), one of the first African-Americans to receive a PhD in economics⁵.

Geography itself took a “quantitative turn” in the 1960s, exemplified by Hägerstrand (1953, translated from Swedish 1967), Garrison’s “Spatial Structure of the Economy” (1959-60), Bunge’s *Theoretical Geography* (1962), Haggett’s *Locational Analysis in Human Geography* (1965), Chorley and Haggett’s *Models in Geography* (1967) and Harvey’s *Explanation in Geography* (1969), with a notable forerunner in Edward Ullman (1941), little-noticed when first published (two years before Ullman completed his PhD) but the only pre-1958 article reprinted in Leahy, McKee and Dean (1970). Ian Burton (1963) wrote of a “quantitative revolution” in geography that was over because its core ideas had been accepted throughout the discipline (see also Bunge 1979, Johnston 1979, chapter 3, Billinge, Gregory and Martin, eds., 1984, Johnston 2010). The central place theorist Brian Berry (1978, pp. vii, ix) held that “by the mid-1960s ... [t]he Hartshornian mainstream had withered under theoretical-quantitative attack. To a new

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⁴ Embrace of mathematical modelling need not imply systematic adoption of neoclassical economics. With “intent here to be provocative,” Marcus Berliani (2006, pp. 106-107) complains that “Regional science seemed to be focused on technique rather than on attacking interesting problems. It borrowed such techniques from fads in applied mathematics, and used them without giving serious consideration to whether the models are consistent with any sort of individual optimizing behavior or whether prices matter at all to agents ... as a reviewer, I continue to receive many papers that simply *assume* that land prices and wage rates are irrelevant to agents.”

⁵ Because of his race Dean was denied a tutorship at Harvard and, in 1939, appointment at City College or Queens College despite strong support from Frank Taussig, A. P. Usher and Mayor Fiorello LaGuardia. He taught economics and business administration at Atlanta University, an historically black institution, until 1942, then worked for the wartime Office of Price Administration in the Virgin Islands and committed suicide in 1952 after returning from directing a United Nations mission in Somaliland (see *American National Biography*). Lösch (1940, p. 29n) cited Dean (1938). Isard came to Harvard as a graduate student in 1939, a year after Dean graduated; both studied with the economic historian Abbott Payson Usher, author of an unpublished “Dynamic Analysis of the Location of Economic Activity” (cited by Isard 1956, pp. 15, 30-31n).

generation of young geographers, progress in geography meant theory-building, theory-testing, and theory-refining in an accumulative and unidirectional sequence, and the theory was location theory – von Thünen, Weber, Christaller, and Lösch,” ending the days when “Proponents of alternative paths [were] dismissed as malcontents, kooks, or worse – witness Richard Hartshorne’s dismissal of competing views in *The Nature of Geography* [1939, 1961] and *Perspective on the Nature of Geography* [1959].” Several leading figures in the quantitative turn in geography published in *Papers and Proceedings in Regional Science* (e.g. Berry and Garrison 1958, Ullman 1962) and held office in the Regional Science Association (Edward Ullman as president in 1960-61, William Garrison in 1962-63 and Torsten Hägerstrand in 1968-69, and Brian Berry as one of two vice-presidents in 1966-67), while the election of Walter Christaller as a vice-president for 1961-62 provided a symbolic link to the earlier German tradition of location theory. The titles of Bertil Ohlin’s *International and Interregional Trade* (1933) and Isard’s “Location Theory and Trade Theory” (1954) show international trade theorists and regional scientists before Krugman recognizing the analogy between international trade and the location of economic activities, with countries as just one kind of region. However, the perfect competition and constant returns assumption then prevalent in economic theory did not suffice for general equilibrium analysis of location decisions, so location theory remained at the periphery of mainstream economics, taught, if at all, in field courses on urban and regional economics. What was missing, both in international trade theory and in location theory in regional science and geography, was a tractable general equilibrium analysis incorporating increasing returns to scale.

The idea of increasing returns to scale goes back to Adam Smith’s dictum that “the division of labour is limited by the extent of the market” (Smith 1776, Book I, Chapter 3) and to Alfred

Marshall's external economies in the 1890s, but long resisted tractable formalization. Avinash Dixit and Joseph Stiglitz's "Monopolistic Competition and Optimum Product Diversity" (1977) combined monopolistic competition (pioneered by Edward Chamberlin 1933) with increasing returns to scale to create a tractable⁶ model of what products will be produced, a model in which increasing returns produced clustering in a general equilibrium framework without going to an equilibrium of complete monopoly. Paul Krugman's Nobel Prize-winning contribution to international trade theory (Krugman 1980, 1990) transferred this model from product space to actual space, the location of economic activities, with agglomeration resulting from economies in transport costs⁷. Krugman (1991a, 1991b) then extended the Dixit-Stiglitz model from international trade to economic geography and combined with the assumption made by Paul Samuelson (1952) that transport cost can be viewed as the transported good melting like an iceberg at a steady rate over time, presenting this mathematical modelling of general equilibrium in space as a formal, rigorous replacement for the supposedly descriptive, untheoretical work of geographers. As Baldwin et al. (2003, pp. 227-28, 230) emphasize, the resulting "models have a number of properties that make policy analysis very different to standard neoclassical models ... because of the non-linearity of the models, which produce multiple equilibria, hysteresis and bifurcations", with such consequences as making "small policy interventions ineffective when it comes to location" until a threshold is passed and "a massive dislocation of industry" occurs and

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⁶ The attraction of economists to tractable or solvable models, yielding definite (and publishable) results, is not innocuous. For example, single-agent (representative agent) models are convenient to work with in macroeconomics but exclude consideration of inequality and can only incorporate coordination failure by arbitrarily assuming frictions. See two posts on Beatrice Cherrier's "The Undercover Historian" blog on April 20, 2018: "What is the cost of 'tractable' economic models?" and "How 'tractability' has shaped economic knowledge: A few conjectures" (<https://beatrice.cherrier.wordpress.com>).

⁷ The spatial competition literature within industrial organization, following with a lag from Hotelling (1929), also considered why firms selling similar products agglomerate even when consumers are dispersed, and there were a few papers in urban economics on why cities exist. See Fujita (1989) and Proost and Thisse (2019) for references and for discussion of the interrelatedness of these literatures regarding agglomeration economies.

that, because of hysteresis, “Bad policies, even when they are temporary, may have long-lasting bad effects.” In the new models, “many policies have very non-linear and even non-monotonic effects on prices, trade flows, industrial location, and the like. Moreover, the impacts of policies often interact with trade openness, sometimes in unexpected ways” (Baldwin et al. 2003, p. 472).

Even the crucial modelling strategy of Krugman (1991a, 1991b), the adaptation of the Dixit-Stiglitz general equilibrium model of increasing returns and monopolistic competition to the explanation of agglomeration in economic geography, had, unknown to Krugman⁸, been undertaken by regional scientists publishing in *Regional Science and Urban Economics* (a journal that bridged the separated discipline of regional science and a subfield of economics, urban economics, but was unlikely to be read by an international trade theorist), Masahisa Fujita (1988) and his doctoral student Hesham Abdel-Rahman (1988) (see also Fujita 1989, Abdel-Rahman and Fujita 1990, Abdel-Rahman and Wing 1995, Abdel-Rahman 1996). Fujita took an undergraduate degree in urban planning from Kyoto University before doing a PhD with Walter Isard in the Department of Regional Science that Isard had founded at the University of Pennsylvania, then became a professor in that department where he supervised Abdel-Rahman’s 1987 dissertation. The University of Pennsylvania eventually abolished its Department of Regional Science after thirty-five years in 1993⁹ (see Isserman 1993, Barnes 2003, 2004a), and Fujita returned to Kyoto as a professor of economics.

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⁸ Krugman’s earlier work bringing the Dixit-Stiglitz model into international trade theory was known to Fujita and Abdel-Rahman, cited for instance in Abdel-Rahman (1988).

⁹ Even though the dean who made the decision wrote, in a response to a letter urging that the department be continued, that she was “well aware that our Department of Regional Science ... has been the flagship department for the discipline” (quoted in Barnes 2003, p. 20). In his history of regional science, Isard (2003, pp. 114-17) reprinted the syllabus for the PhD in Regional Science at the University of Pennsylvania, including eligible courses in other departments, without acknowledging that his program and department had been abolished ten years before.

The much greater attention paid to Krugman than to Fujita and Abdel-Rahman was not due to any difference in policy relevance, which all three authors stressed, or to Krugman addressing questions rather than just formal modelling, since all three did so (see, e.g., the title of Abdel-Rahman 1996). All three asked policy-relevant questions about how agglomeration economies cause economic activities to be concentrated in some places rather than others. Krugman (1991b, pp. 2-3) gave the explanation when, after regretting that “nobody is ... busy exploiting the facts and insights that can come from looking at localization and trade within countries,” he qualified this “unfair statement” by noting that “There are excellent economic geographers out there, as well as urban and regional economists who worry about geographical issues ... however, these people are almost uniformly peripheral to the economics profession” whereas “International economics is a flagship field.” Economic geographers and urban and regional economists “may do excellent work, but it does not inform or influence the economics profession” unless and until independently reinvented by people in a flagship field. The circularity of the argument, that international trade theorists need not heed the work of economic geographers or urban and regional economists (“nobody”) because their work is not heeded by international trade theorists, does not diminish its force as a description of how economics is conducted (Krugman 1991b, p. 3, remarked that “There are good reasons why this has happened and equally good reasons why it should change”).

Priority issues were quietly settled by some joint publications starting with Fujita and Krugman (1995 in *Regional Science and Urban Economics*, see also Fujita and Krugman 2004) and co-authorship of a major treatise and textbook on *The Spatial Economy* (Fujita, Krugman and Venables 1999) but, although *The Spatial Economy* was widely cited, Krugman remained very sparing in mention of Fujita’s earlier work (and Abdel-Rahman’s name is unmentioned in

The Spatial Economy or Krugman 1995)¹⁰. The only mention of Fujita in Krugman's Ohlin Lectures *Development, Geography, and Economic Theory* (1995, p. 90) is a passing remark in the appendix that "a variant of [Vernon Henderson's 1974] approach, represented for example by Fujita (1988), in which external economies are not assumed but instead derived from increasing returns in a monopolistically competitive industry producing non-traded inputs. This leaves the basic approach unchanged, and still leaves the spatial relationship of cities to each other undetermined." Fujita (1988) appears in the bibliography of Fujita, Krugman and Venables (1995) but no index entry leads the reader to any mention of that article, let alone a statement that it made use of Dixit and Stiglitz (1977). Fujita was mentioned in Krugman (1998a) only for works co-authored with Krugman (see Rosser 2011).

The most notable treatment by an historian of economic thought¹¹, Meardon (2000), of the emergence of geographical economics gives a good account of the relationship of the "New Economic Geography" to the pre-World War II tradition of German location theory but did not mention Fujita, even as a coauthor of Krugman. Meardon (2000, p. 346) drew attention to Henderson's comment on Krugman (1996), where "Henderson [1996] reminded Krugman that neoclassical urban systems models incorporated imperfect competition, in some cases the very same Dixit-Stiglitz variety, even before Krugman (1991[a]) launched the new economic geography." Meardon (2000, pp. 355-56) quoted the condescending evaluation by Krugman (1995, p. 87) that "One cannot fault the geographers for their failure to develop full

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¹⁰ Marcus Berliant (2006, p. 107), reviewing the fourth volume of the *Handbook of Regional and Urban Economics*, remarked that "Volume 4 cites Masahisa Fujita more than the one time he was cited in Volume 1 ... It should be noted that the various authors [who included Fujita and Abdel-Rahman] are reluctant to cite the early, original work of Fujita (1988), Abdel-Rahman (1988, 1990), and Abdel-Rahman and Fujita (1990) is this area that pre-dates Paul Krugman's entry into the field."

¹¹ See Maki (2004), Marchionni (2004) and Maki and Marchionni (2011) for discussions from the standpoint of methodology rather than history of thought.

maximization and equilibrium models although one can perhaps complain about their failure to understand how short of that ideal they were falling” but added that geographers such as Ron Martin (1999) disputed Krugman’s narrative.

Apart from Meardon (2000), the relevant history of thought literature is thin, with the promising exception of a bibliometric study by Anthony Rebours (2018) of the interactions between geography and economics in recent decades. Thisse (2011, 2016) provides a practitioner’s history of the emergence of geographical economics, discussing von Thünen (1826-63) and Harold Hotelling (1929) as a backdrop to celebrating Krugman (on spatial competition models since Hotelling see Eaton and Lipsey 1997, collecting their earlier articles). Although himself a coauthor of Fujita since 1986, Thisse (2016) is reticent about Fujita’s early work, citing his book on *Urban Economic Theory* (Fujita 1989) but not Fujita (1988) or anything by Abdel-Rahman. In his successful textbook on the history of geographic ideas, Geoffrey Martin (2005, p. 509) offers only a puzzling remark about Krugman “embracing the notion that comparative cost advantages may be ignored given specialization and trade that secure increased profit” (an interpretation that he attributes to Trevor Barnes) and the horrified (but undeniable) observation that “Krugman plans to make economic geography a branch of economics (Krugman 1995).” Sixty years after his doctorate, and more sixty years after he began publishing in journals, Walter Isard published his *History of Regional Science and the Regional Science Association International* (2003) but this book, padded with the programs of conferences and lists of council members, lacked the force of his earlier works. Of thirty-five items in the bibliography, sixteen were by Isard and the others included Ohlin (1933), Samuelson’s introductory textbook, Arrow and Debreu on the existence of general equilibrium, Keynes, Rostow and Tinbergen. Trevor Barnes (2004b, p. 222-23) dismissed Isard (2003) as “really a

scrapbook of the history of regional science, with almost no interpretation other than an underlying triumphalism ... Missing from this volume ... is an explanation of [regional science's] success, or any recognition of its more recent failure.”

Two Approaches to Economic Geography

The geographical economics presented in the *Journal of Economic Geography*, the *Oxford Handbook of Economic Geography* (Clark, Gertler and Friedmann, eds., 2000), Fujita, Krugman and Venables (1999) or the treatise and textbook *Economic Geography and Public Policy* by Baldwin et al. (2003) (notwithstanding some notable attempts at communication “from the other shore” by Scott 2000, Sheppard 2000, 2001, Barnes 2004a, and notwithstanding that the *Oxford Handbook* has mirror chapters by an economist and a geographer and that the editorial board of the *Journal of Economic Geography* is balanced between economists and geographers) can be sharply distinguished by inspection from the economic geography typical of geography departments, exemplified by the journal *Economic Geography*, *A Companion to Economic Geography* (Sheppard and Barnes, eds., 2000) or Allen Scott’s Clarendon Lectures, *Geography and the Economy* (2006) or his *Regions and the World Economy* (1998). This contrast may seem paradoxical, given that the radical geographers Barnes, Scott and Sheppard served on the editorial boards of both journals and contributed to the *Oxford Handbook* while, in the case of Sheppard and Barnes, editing the Blackwell *Companion*. But the difference is clear: contributions by economists (and some geographers) in the *Oxford Handbook* or the *Journal of Economic Geography* are unmistakably mainstream neoclassical economics, and the engagement and dialogue promoted there between geography and economics is between geography and neoclassical economics (geographical economics), leaving Ricardo, Marx and Sraffa outside

modern economics but perhaps in geography (all three are in the subtitle of Sheppard and Barnes 1990). In contrast, in the Blackwell *Companion* neoclassical economics, far from being accepted as the imperial social science, was covered by a single chapter (by a geography lecturer) on “The Modeling Tradition” on an equal footing with chapters on Marxian, feminist, institutionalist and poststructuralist approaches¹², while readers of *Economic Geography* might find a six-paper symposium on the engagement between geography and a variety of heterodox economics, evolutionary political economy (in the April 2009 issue).

The difference between the two approaches to economic geography is shown by what Fujita, Krugman and Venables (1999, p. 45) write about their “workhorse model”: “Dixit-Stiglitz monopolistic competition is grossly unrealistic, but it is tractable and flexible; as we will see, it leads to a very special but very suggestive set of results ... This spatial Dixit-Stiglitz model is a crucial ingredient in almost everything that follows.” This core-periphery model, described by Baldwin et al. (2003, p. 2), as having “the unfortunate feature of being astoundingly difficult to work with analytically,” often requiring approximating the multiple equilibria numerically with a search algorithm rather than finding them by an analytical solution, was made more tractable by Baldwin et al. (2003) and Forslid and Ottaviano (“An Analytically Solvable Core-Periphery Model,” 2003)¹³. The point is not the specific model, or the use of formal quantitative methods or explicit theorizing, but the willingness to commit to a “grossly unrealistic,” “astoundingly

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¹² In their introduction, Sheppard and Barnes (eds., 2003, p. 3) remark dismissively that “While much of economic geography’s recent appeal has been to sociologists and political scientists, some economists have also discovered geography. Perhaps the best-known example is the MIT economist Paul Krugman ... Admittedly, some economic geographers still wonder if he is doing economic geography (Martin, 1999), but at least it is a start.” Apart from a political scientist all their contributors taught geography.

¹³ Berliant (2006, p. 108) remarks that “Only the quasi-linear utility form of the model can be solved analytically ... the other forms require computation. Of course, use of the quasi-linear form prohibits income effects.”

difficult,” highly mathematical modelling strategy provided only that it yields “very suggestive results” within the general equilibrium framework standard among economists.

Another striking difference is that, after its “quantitative turn” in the 1960s, a substantial part of human geography took a different turn from the 1970s onwards, indicated by the title question of Amin and Thrift (2000), “What Kind of Economic Theory for What Kind of Economic Geography?”, by the title of *New Models in Geography* (Peet and Thrift, eds., 1978), named to challenge *Models in Geography* (Chorley and Haggett, eds., 1967), and by the subtitle of Shephard and Barnes (1990), “Geographical Analysis After Ricardo, Marx and Sraffa.” Allen Scott, once a faculty member in regional science at the University of Pennsylvania (later Distinguished Professor of Public Policy and Geography at UCLA) and joint secretary with David Harvey of the British Section of Isard’s Regional Science Association, also discovered Marx and Sraffa (Barnes 2004a, p. 124). David Harvey, once the author of *Explanation in Geography* (1969) and later Halford Mackinder Professor of Geography at Oxford, wrote a companion to each of the three volumes of Karl Marx’s *Capital*, as well as *Seventeen Contradictions and the End of Capitalism* (Harvey 2014),¹⁴ the dust jacket of which reports that “He is among the twenty most-cited authors in the social sciences and humanities and is the world’s most cited academic geographer” (although by then he had crossed disciplinary lines as Distinguished Professor of Anthropology at the Graduate Center of the City University of New York). Barnes, Harvey, Scott, Sheppard and other defectors from Isard’s regional science did not reject economic theory, but the Marxist or Sraffian economic theory that they embraced was not at all the neoclassical, general equilibrium economic theory of Krugman and Fujita. This sharp

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¹⁴ Also compare Bunge, *Theoretical Geography* (1962), with Bunge ([1971] 2011) on the inner-city Detroit neighborhood of Fitzgerald, research that led to Bunge being fired by Wayne State University, holding limited-term positions at Western Ontario and York, and then driving a taxi in Toronto.

contrast in economic methodology does not of course contradict the position of Krugman (or for that matter Stiglitz) on the more left end of the US political spectrum, as is evident to any reader of Krugman's op-ed column in the *New York Times*.

What the radical geographers, whether Marxist or Sraffian (neo-Ricardian), took from David Ricardo's *Principles* (1817) was not what Krugman or other trade theorists or classical and neoclassical location theorists took from Ricardo. Krugman (1990, p. 4) wrote that "The long dominance of Ricardo over Smith – of comparative advantage over increasing returns – was largely due to the belief that the alternative was necessarily a mess" until Dixit and Stiglitz (1977) managed to formalize increasing returns in a tractable model. While trade theorists emphasized the numerical example of comparative advantage in Ricardo's Chapter 7 "On Foreign Trade," with Portugal specializing in wine and England in cloth even though Portugal has an absolute advantage in both goods, location theorists looked to the classical theory of rent, which von Thünen extended to differences in location of land from Ricardo's margin of cultivation among plots of land differing in fertility. The radical geographers followed Marx and Sraffa in looking to Ricardo's theory of value, not his analysis of gains from trade or of the margin of cultivation. This variety of messages to take from Ricardo has made Piero Sraffa and Maurice Dobb, the editors of his works, the only Communists reprinted by the Liberty Fund (Ricardo 1817).

Five Loops of the "New Economic Geography": An Interpretation after Johnson (1971)

Harry Johnson held in his Ely Lecture on "The Keynesian Revolution and the Monetarist Counter-Revolution" (1971) that the success of a revolutionary approach to economics depends on five core characteristics. First, the new idea must confront the principal hypothesis of the

conservative orthodoxy and reverse that main hypothesis in an academically acceptable way. Second, it must give the impression that it is a new theory yet retain, under new names, the effective factors or unquestionable elements of the prevailing orthodoxy. Third, the new theory must also be sufficiently difficult to understand so that established senior academic individuals will not master its technical aspects, providing opportunity for younger academics to advance their careers by doing so. It must be difficult enough to test the talent of the younger scholars but easy enough so that they can successfully understand it. Fourth, the new theory had to provide scholars with a new attractive methodology as compared to the pre-existing ones which will consist of extensive mathematical approach. This new methodology will require the scholars to have a broad empirical knowledge base to understand it. Lastly, empirical relationships are introduced for the econometricians to estimate the relationship between components.

These five factors made the Keynesian Revolution successful, displacing the pre-existing orthodoxy to become an orthodoxy itself. However, the Keynesian revolution was a victim of two characteristics: inability to cope with a major social problem (inflation) and dependence on the authority and prestige of senior scholars whose position barred the advancement of younger academics. Thus, the Keynesian revolution was as vulnerable to revolution as the previous orthodoxy. The monetarist counter-revolution became successful as it provided the explanation to a policy-relevant problem which the Keynesians could not explain and therefore was received as the new “New Economics” in place of the Keynesian “New Economics.” Thus, according to Johnson (1961), first Keynesianism and then monetarism revolutionized macroeconomics by giving new confusing names to parts of the existing orthodoxy, changing its methodology by adding mathematics and empirical relationships, and providing opportunity for a new generation of scholars to advance their careers.

First, the new idea will have to confront the principal hypothesis of the conservative orthodoxy and it must be academically acceptable which can reverse the main hypothesis. It means that the new idea will have to be similar with an existing orthodoxy but will have to offer liberation from the established primary orthodoxy. Contrary to the established belief in economics and geography that increasing returns to scale could not explain cities because increasing returns models would imply a single huge city, Krugman (1991a, b) and, independently of him, Fujita (1988) and Abdel-Rahman (1988) showed that the Dixit-Stiglitz combination of monopolistic competition with increasing returns could yield an equilibrium distribution of agglomeration within a general equilibrium framework. These theoretical developments were presented as having policy relevance, like the changes in macroeconomics considered by Johnson. Abdel-Rahman (1988) linked his use of the Dixit-Stiglitz model for characterizing equilibrium and optimum city size to a subsidize scheme to achieve the first-best optimum city size. Abdel-Rahman and Fujita (1990, p. 165) invoked “normative or policy questions” as the motivation to “develop an alternative framework which models agglomeration economies endogenously, explicitly showing their origins.”

Second, the new theory must give the impression that it is a new theory but still consist of the effective factors or at least not readily disputable components of the prevailing orthodoxy. Like the “Regional Science” founded by Walter Isard (1949, 1956) but without much awareness of regional science or of the quantitative turn in geography, Krugman’s “New Economic Geography” provided, as an alternative to economic geography (as it was before the quantitative turn) a rigorous analytical framework derived from mathematical models. What made Krugman’s “New Economic Geography” new was the use of the Dixit-Stiglitz model of monopolistic competition and increasing returns, an innovation that was also introduced by the

regional scientists Fujita (1988) and Abdel-Rahman (1988), trained in Isard's Department of Regional Science and steeped in the long tradition of location theory, as indicated by Fujita's writings on Thünen, Hotelling and Isard.

Third, the new theory must also incorporate a high, but not too high, level of difficulty to apprehend. It will have to be so difficult that senior academic authors will not be willing to master the theory and be difficult enough to test the talent of the younger students but also easy enough so that the younger scholars can understand it with sufficient intellectual effort. The NEG is modelled using rigorous mathematical causal models which are used to evaluate empirical analysis. The first generation of NEG models relied heavily on rather specific modelling assumptions or tricks (for example Krugman and Fujita were both inspired by the Dixit-Stiglitz model of monopolistic competition which relied heavily on numerical models as well). This shows that NEG was dressed up in unnecessary mathematics which excluded the work of economic geographers as the new model was too mathematical for the previous generation to apprehend. According to Barnes (2004a), the economic geographer would require a massive retro-education in formal theory and techniques if they want to understand and participate in NEG. This proves the first half of the third characteristic of Johnson. Similarly, simplification was made for alternative utility and demand functions and production structures (Baldwin et al. 2003, Forslid and Ottaviano 2003) which made the second generation of NEG models analytically solvable and easier to handle by the younger academic individuals when intellectual efforts were made.

Fourth, the new theory had to provide the gifted and less opportunistic scholars with a new attractive methodology compared to the pre-existing ones. This new methodology will require the scholars to have a broad mathematical as well as empirical base to understand it. As indicated

above NEG was designed in a general equilibrium model of monopolistic competition. Fujita, Krugman and Venables (1999) state that there are three classes of models: regional models, urban system models and international models. The regional model basically includes the core-periphery model, introduced in Krugman (1991a), as a basic introductory framework for the new economic geography— a framework that illustrates how the interactions among increasing returns at the level of the firm, transport costs and factor mobility can cause spatial economic structure to emerge and change. On the other hand, according to Garretsen and Martin (2010), economic geography by geographers is highly focused on cultural, social and institutional accounts, which were disregarded by NEG theorists mainly because geographers did not focus narrowly on the formal modelling and hypothesis testing with which economists are comfortable. Hence, this shows that the methodology provided by “New” theory is more methodologically attractive to economist compared to the ones provided by the geographers and hereby this meets the fourth characteristic of Harry Johnson.

Lastly, the fifth characteristic emphasizes the empirical relationship introduced by the econometricians to estimate the relationship between components (see the survey by Head and Mayer 2004). The NEG provides ample opportunity for the sort of empirical work for which applied economists are trained and proficient. The model has examined the relationships between market access and wages and between market access and industrial location and has confirmed the central characteristic of economic geography which is the existence of multiple equilibria (Redding 2008). This shows that NEG not only provides a theoretical base but also emphasizes study of empirical relationships which provides econometricians and applied economists an opportunity to measure relationships between specific components in ways not previously done by geographers.

The German Tradition of Location Theory

The work of the German location theorists played a major role for the foundation of regional science. Isard (1949) cited, as influential for the emergence of regional science, in chronological order of relevant publication: Johann Heinrich von Thünen (1826-63), Albert Schäffle, Wilhelm Roscher, Wilhelm Launhardt (1885), Alfred Weber (1909), Andreas Predöhl (1925), Oskar Engländer, Hans Ritschl, Hans Weigmann, Walter Christaller (1933), Erich Schneider, and August Lösch (1940) (see Ponsard [1958] 1983, Blaug 1979). This rich tradition was long neglected by mainstream geography. In his very influential work on *The Nature of Geography* (see Hartshorne 1959, Entrikin and Brunn 1989 for its influence), Richard Hartshorne ([1939] 1961, pp. 420-21) barely mentioned location theorists such as Thünen and Weber, remarking that “American economists in particular have shown little interest in this field and at the time the writer was concerned with it were hardly aware of Weber’s work, which, in any case, Palander has shown to be impracticable.” Although Hartshorne (1927) had once engaged in location analysis, Hartshorne ([1939] 1961) emphasized areal differentiation, not the search for explanatory theory. Similarly, on the eve of the quantitative turn in geography, T. W. Freeman’s *A Hundred Years of Geography* (1961, pp. 162-63) discussed Lösch on the economics of location only briefly, as an unimportant special topic. Hartshorne ([1939] 1961, pp. 99-100) and Freeman (1961, pp. 149-50) noted, but with little interest, the economist Josiah Stamp’s “Geography and Economic Theory” (1937), with Freeman remarking that “there are endless complexities in the location of industry” and Hartshorne confusing Josiah Stamp with the geographer L. Dudley Stamp. In contrast to pre-1960s geographers (and, largely, pre-1960s

economists), regional scientists such as Isard and Fujita paid close attention to the pre-World War II tradition of location theory.

Von Thünen's contribution to spatial economics was discussed in the first volume of *The Isolated State* (1826-63)¹⁵ where he extended the classical theory of rent from differences in fertility of land to differences in location. This volume of Thünen's writing was not available in English translation until 1966. In *The Isolated State* Thünen assumed a homogenous or isolated space around is a city where goods are bought and sold, with production of diverse products organized in rings around the city. This "monocentric city model" provided the theoretical foundation for urban economics. Transport cost determined which commodities were produced in the inner or outer ring. Perishable commodities had high transportation costs, so they secured the inner ring, and the commodities having lower transportation cost secured the outer rings. The area beyond the outermost ring was uncultivated wilderness. The rent of land varied according to proximity to the centre: highest for land in the center and zero at the boundary of uncultivated wilderness.

Masahisa Fujita (2011) termed Thünen "the founding god" of modern economic geography, including not only traditional economic geography and location theory, but also the modern urban economics as well as the so-called New Economic Geography¹⁶. Location theorists and economic geographers (both "traditional" and "new") always referred to Thünen on location of agricultural activity, but not in the context of agglomeration economies or city

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¹⁵ Thünen's title referred, perhaps ironically, to the philosopher Fichte's *The Closed Commercial State* ([1800] 2012). According to Isaiah Berlin (1999, p. 126), "There is even such a thing as romantic economics, particularly in Germany, in the form, for example, of the economics of men like Fichte and Friedrich List, who believed in the necessity of creating an isolated State, *der geschlossene Handelsstaat*, in which the true spiritual force of the nation can exercise itself without being buffeted by other nations; ... where the purpose of economics ... is the spiritual self-perfection of man, and does not obey the so-called unbreakable laws of economics."

¹⁶ Samuelson (1983, p.1468) notes that "Among geographers and location theorists, Thünen is a founding God."

formation, where Fujita and Jacques-François Thisse ([2002] 2013) held that Thünen's agglomeration factors matched Krugman's explanation for the emergence of a core-periphery structure. The recognition of Thünen's contribution in their book harked to their first joint article, "Spatial Competition with a Land Market: Hotelling and Von Thünen Unified" (1986). Krugman's stress on novelty together with Fujita's emphasis on how much was retained from Thünen, Hotelling and Isard satisfied Harry Johnson's criterion that the new approach must give the impression that it is a new theory but still encompass the aspects of the prevailing orthodoxy of continuing validity or usefulness.

Paul Krugman (1991b, pp 14-15) states that "The basic story of geographic concentration that I will propose here relies on the interaction of increasing returns, transportation costs, and demand. Given sufficiently strong economies of scale, each manufacture wants to serve the national market from a single location. To minimize transportation costs, she chooses a location with large local demand. But local demand will be large precisely where the majority of manufacturers choose to locate. Thus there is a circularity that tends to keep a manufacturing belt in existence once it is established."

Thünen's centripetal forces as identified by Johannes Bröcker (2015) – scale economies due to indivisibilities and to division of labor, economies of shopping, labor market matching in cities, risk sharing -- correspond with Krugman's description of the core-periphery model of the NEG. Fujita explains that, despite the similarities, Krugman clearly highlighted the circular causality between agglomeration of industries and workers using demand externalities whereas Thünen was less explicit about circular causality. According to Fujita (2011), recent technological breakthroughs have made it possible for economic geographers to analyze Thünen's work better, even though not all his work has yet been brought to light.

Mark Blaug (1979), writing on “The German hegemony of location theory: A puzzle in the history of economic thought,” observed that spatial economics has a remarkable history which began with seminal writings by Thünen and included Alfred Weber’s revolutionary *The Location of Industries. Part I. Pure Theory of Location* (1909) which extended Thünen’s analysis of the spatial distribution of agricultural activities to explain the location of industrial plants. Despite these early developments, locational problems received little attention throughout the nineteenth and first quarter of the twentieth century, turning economics into what Isard (1956, pp. 25-26) termed “a wonderland of no spatial dimensions.”

The model of the location triangle developed by Alfred Weber (elder brother of the sociologist Max Weber) was solved not by Weber himself but in an appendix by George Pick, a mathematics professor in Prague where Weber had previously held the chair of economics. Weber’s model resembled the model formulated by Carl Wilhelm Friedrich Launhardt in 1882 and 1885 where, building on Thünen in a more rigorous mathematical style, he illustrates a geometrical solution for three points with weights. Friedrich, when translating Weber (1909) into English in 1929, observed that Weber was not acquainted with Launhardt, whose influence is apparent in Pick’s Mathematical Appendix rather than in the text itself. However, neither Weber nor Pick cited Launhardt (1885), and they were reproved accordingly by Bortkiewicz in a review of Weber’s book (see notes by C. J. Friedrich, the translator, in Weber 1909, pp. 238-39; Perreux 1998, Bröcker 2015).

Walter Christaller introduced central-place theory in his book *Central Places in Southern Germany* (1933), establishing a powerful theoretical base for the study of the factors of location, size and number and the geometrical arrangement of cities in space. According to central-place theory the principle purpose of a settlement is the provision of goods and services for the

adjacent market area. Lösch's *Economics of Location* came out in 1940 as *Die Räumliche Ordnung der Wirtschaft* (Lösch 1940) and in 1954 in English translation by W. H. Woglom and Wolfgang F. Stolper (the best known for the Stolper-Samuelson theorem in international trade theory). The economist Lösch built his theory based on the work of the geographer Walter Christaller (1933), taking a deductive approach of formal modeling where Christaller's book had been more descriptive. In contrast to Christaller who started with the highest-order when dealing with the central place system, Lösch derived partial equilibria for each network of market areas grounded on Chamberlin's monopolistic competition, finding hexagonal market areas, but he did not take into consideration the problem arising from extending Chamberlin's symmetry assumption to the spatial market (Beckmann and Thisse 1986, Bröcker 2015).

Masahisa Fujita on Location Theorists from Thünen to Isard

Fujita (1999) in his speech entitled "*Location and Space-Economy at half a century*" discussed Walter Isard's major work, *Location and Space-Economy* (1956), stressing the three basic ideas discussed by Isard on the general theory of location and space-economy. First, the general theory of location and space-economy must be something more than the traditional general equilibrium analysis based on perfect competition. The traditional general equilibrium analysis of Walras, Pareto and Hicks did not incorporate spatial dimensions clearly or include the consequence of transport and spatial cost on the economic activities in space, so it could not explain endogenous concentration of economic agglomeration.

Second, general theory should be identical with the general theory of monopolistic competition. Isard referred enthusiastically to the German location theorist August Lösch (1940) but also Chamberlin's seminal work on *The Theory of Monopolistic Competition* (1933), which

emphasized product differentiation. Third, the evolutionary approach should be used to represent dynamic relations in the general theory. The spatial economy is explained using two opposite forces of the centripetal drive of increasing returns and the centrifugal effects of diminishing returns.

Conclusion: Economic Geography, New Economic Geography, Geographical Economists

The essential question in economic geography relates to the explanation of uneven spatial development. Geographers long approached this question descriptively, stressing areal differentiation rather than seeking a generally applicable theoretical framework. From the mid-1950s to the 1970s, geographers increasingly based their research on the ideas of Lösch and other German location-theorists, by means of statistical models and quantitative methods. Many geographers, including several who had been prominent in regional science and in the quantitative turn in geography, subsequently inclined towards Marxist political economy and methods of historical materialism in the 1970s and 1980s (Shephard and Barnes 1990, Amin and Thrift 2000, Martin and Sunley, eds., 2007, Garretsen and Martin 2010, Harvey 2014).

Space and geography did not receive nearly as much consideration from majority of economists before 1990. Over the past two decades, neglect of geography by economists has been mended by a subfield which is now widely recognized as “New Economic Geography” (NEG or geographical economics). Krugman (1991a, 1991b) introduced this approach without knowledge of Fujita (1988) or Abdel-Rahman (1988) and with minimal attention to Isard, whose *Location and Space-Economy* (1956) appeared in the bibliography of Krugman (1991a) but not the index. Fujita and Abdel-Rahman, starting from Isard’s regional science, used the Dixit-Stiglitz model of monopolistic competition to study agglomeration in a general equilibrium

framework, emphasizing (as did Krugman) the policy implications of such analysis. All these authors were concerned with understanding uneven spatial economic development, and particularly the phenomenon of spatial agglomeration of economic activity, with their work coming together in Fujita, Krugman and Venables (1999). Fujita and Thisse ([2002] 2013), Baldwin et al. (2003), and Proost and Thisse (2019) survey the subsequent development of NEG as a systematic and consistent analysis of the location of economic activities.

Geographical economics or the new economic geography emerged from two sources, international trade theory within economics for Krugman and regional science for Fujita and Abdel-Rahman, as scholars from each field extended the Dixit-Stiglitz monopolistic competition model of product diversity to location in space. The emergence of this approach involved, and continues to involve, contestation of disciplinary boundaries between economics, geography and regional science with the disputes between geographical economists and radical economic geographers being not over whether to use economic theory, but about which sort of economic theory to rely upon for spatial analysis.

Krugman, at least until 1995, considered himself to be the sole founder of NEG and held that mathematical models had not been sufficiently utilized by conventional economic geographers while they were dealing with the problems of regional economics. This paper suggests that Harry Johnson's five characteristics provide framework to consider how dressing up an existing theory with new confusing name and attractive mathematical modelling, together with ability to deal a policy-relevant issue not adequately in existing theory, could have accounted for the acceptance for NEG. Concepts borrowed from the Dixit-Stiglitz monopolistic competition model in industrial organization assisted Krugman and Fujita in modelling NEG

and, in Krugman's case, the new trade theory, while Isard's regional science and the long tradition of German location theory shaped the work of Fujita and Abdel-Rahman.

The new economic geography has contributed towards an enormous high-quality research in this field. Notwithstanding the criticisms made towards NEG it has some characteristics which cannot be neglected like formal modelling which helps to detect assumptions giving specific results and maintain consistency as well as meticulous empirical analysis focusing on categorizing and testing uncertain theoretical predictions. As Krugman (1998b, p. 7) observed, a theory must last or be superfluous based on its empirical relevance and success.

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