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by

John R. Meyer

Once upon a time the location of towns and cities, at least superficially, seemed to be largely determined by the preferences of kings, princes, bishops, generals and other political and military leaders of society. A site's defensibility or its capabilities for imposing military or administrative control over surrounding countryside were often of paramount importance. As one historian summed up the conventional wisdom: "Cities...were to be found...wherever agriculture produced sufficient surplus to sustain a population of rulers, soldiers, craftsmen and other nonfood producers."¹ The key to successful urbanization, in short, wasn't so much what the city could do for the countryside as what the countryside could do for the city²

This traditional view of early cities, while perhaps correct in its essentials, is also almost surely too limited.³ Cities were never just parasitic; most have always added at least some economic value. For example, almost from earliest beginnings, cities provided opportunities to achieve scale and scope economies through division and specialization of labor, opportunities that were not easily exploited at individual homesites or farms.

1. David S. Landes, *The Wealth and Poverty of Nations* (New York: W.W. Norton, 1998), p. 36.

2. Strictly speaking, a city didn't necessarily need an agricultural hinterland in order to develop. The key, rather, was some sort of natural resource endowment in the hinterland. Agriculture was obviously the most common of such possibilities. Others would be mining activities of various kinds or more generally some access to a natural resource. Venice, for example, was apparently originally founded on an industry obtaining salt from sea water; trading in that salt and then expanding that trade into other possibilities fueled Venice's subsequent growth.

3. There is a rich and provocative literature on the historical role of cities, going far beyond the industrial and post-industrial focus of this study. For excellent statements, among others, of more positive arguments about the role of early cities see Jane Jacobs, *The Economy of Cities* (New York: Vintage Books, 1970), chap. 1, pp. 3-48; Lewis Mumford, *The City in History: Its Origins, Its Transformations and Its Prospects* (London: Secker & Warburg, 1961); and Edwin S. Mills and Bruce W. Hamilton, *Urban Economics*, (Boston: Scott, Foresman & Co., 1989), pp. 1-83 and Paul M. Hohenberg and Lynn Hollen Lees, *The Making of Urban Europe 1000-1994* (Cambridge, Mass.: Harvard University Press, 1996). Jacobs makes a strong pro-city case, "Cities First-Rural Development Later," while Mumford advances a more nuanced argument about the inherent symbiotic relationship between agricultural development and urbanization. Mills and Hamilton do much the same but by developing a more focused economic argument on specialization and economies of scale. Hohenberg and Lees emphasize the role of trading networks in the siting of successful and enduring urban developments. There have also been many fine studies focusing on the internal structure of urban areas that have produced, as by-products, interesting insights about the possible historical role of different cities, e.g., Alex Anas, Richard Arnott and Kenneth A. Small, "Urban Spatial Structure," *Journal of Economic Literature* 36 (September 1998), pp. 1426-1464; Leon Moses and Harold F. Williamson Jr., "The Location of Economic Activity in Cities," *American Economic Review* 57, no. 2 (1967), pp. 211-222; Raymond Fales and Leon N. Moses, "Land Use Theory and

Economists, in fact, with their emphasis on economic rationality, typically stress the role of economies of scale in the creation of cities: “most urban areas arise because of the economic advantages of large scale activities.”⁴ While true after the advent of the industrial revolution (see below), such a characterization was probably less correct prior to that; historians’ emphasis on military and administrative control may have been closer to the actuality. Certainly, prior to the Industrial Revolution, big cities were few and far between. The London of 1800 is thought to be the first modern Western city to attain a population of one million. Prior to that, Rome was considered to have been the biggest, achieving a population fluctuating between a half million and one million between A.D. 0 and 300.⁵ In a very real sense big cities were a creation of industrialization. Nevertheless, even before the industrial revolution, some cities developed markets, products and processes that subsequently were transplanted to the countryside as “cottage industries,” using so-called “putting out” systems. To the extent that cities developed trading activities, which many or almost all did, they also created potential gains from trade by exploiting comparative advantage. In particular, entrepot or depot cities, located at transport hubs or transshipment points, quite naturally developed related trading and marketing activities.⁶ As Hohenberg notes: “Clusters of thriving commercial cities, notably in northern and central Italy and in the Low Countries, grew in size, activity, and wealth out of all proportion to the service potential or surplus availability of their surrounding countryside.”⁷

In fact, a rather good case can be made that the number of and growth in cities might have been much greater in the pre-industrial era if kings, bishops and military had less influence.⁸ Following this line of argument, under absolutist regimes property “is always potentially insecure.” Particularly pernicious and inhibiting of economic development was the alleged power to arbitrarily impose “destructive” taxes: “Tax policies, broadly interpreted,

the Spatial Structure of the 19th Century City,” *Papers and Proceedings Regional Science Association*, 1972, pp. 49-80.

4. Mills and Hamilton, p. 8.

5. *Ibid.*

6. Hohenberg and Lees emphasize these processes and their subsequent evolution into trading networks that influence the durability and survival of different urban sites. Also see Jacobs, *op. cit.* and E.M. Hoover, *The Location of Economic Activity* (New York: McGraw-Hill, 1948).

7. In *Urban Systems and Economic Development: The European Long Term and its Implications*, prepared for the World Bank as part of this same survey.

8. J. Bradford DeLong and Andrei Shleifer, “Princes and Merchants: European City Growth Before the Industrial Revolution,” *Journal of Law and Economics* 36, no. 2 (October 1993), pp. 671-702.

are less favorable under autocrats than under nonautocratic..., merchant-controlled, governments.”⁹ Accordingly, if European merchants had not shared power with autocrats in the Middle Ages, Europe’s urban population might have been twice as large in 1650, all else equal, and, speculatively, the Industrial Revolution might have happened much earlier.

So even very early cities often could and did contribute at least something to the economic welfare of their hinterlands. Nevertheless, the locational choices of pre-industrialization cities may have been dominated by political and military considerations, with trade important but a runner up. Even so, a city’s origins or ancestry may have made a difference to subsequent success or growth; entrepot or depot cities seemingly fared better than those founded strictly on political or military considerations. However, history was no guarantor of success or failure; some entrepot cities languished after industrialization and some “politically” founded cities prospered. The one undeniable generalization was that industrialization made a difference.

The Impact of Industrialization: (1) Logistics

Patterns of urban development changed with the Industrial Revolution, in degree and absolutely as well. Certainly, economies of scale came to the fore and the economic calculus for choosing an urban location became much more complex. Economies of scale alone, of course, would create or augment some urban sites. Such economies, however, were insufficient to explain the clustering of related and similar activities at particular points in space, thus creating truly large cities after industrialization.¹⁰

The early stages of industrialization emphasized, not too surprisingly, new and better ways of satisfying the most basic physical human needs: food, clothing, housing (construction), and transportation.¹¹ Mechanical drills, fertilizers, and consolidation of many small farm units into large scale operations revolutionized the production of food, in the process releasing the manpower needed for other industrial activities. Factories replaced home production of textiles, using water and later steam and electric power to propel such inventions as the flying shuttle, the spinning jenny and the cotton gin. New iron and steel

9. *Ibid.*

10. Two standard and recommended sources on patterns of European urban development would be Jan de Vries, *European Urbanization, 1500-1800*, (Cambridge: Cambridge University Press, 1984) and Paul Baroch, Jean Batou, and Pierre Chavre, *La Population des Villes Europeenes de 800-1850* (Geneva: Libraire Droz, 1988).

making processes made it economical to use iron or steel rather than wood in tools or implements for construction. Watt's steam engine revolutionized water transport and when later combined with iron or steel rails released a number of urban location decisions from dependence on water access. Watt's engine also released manufacturing from dependence on water power and its sites.

Most of the new industrial activities were of a scale far exceeding comparable prior undertakings. They often involved the accumulation of substantial raw material and labor inputs. With larger scale, larger markets were needed. Locations that economized on the attendant logistics—assembly of inputs and shipping final product to market—became preferred sites for urban development.¹² In short, because “locations differ in factors such as soil, climate, mineral deposits, and access to waterways ... trade arises and production specializes by location.”¹³

The relevant logistical considerations eventually went far beyond simple transport cost or factor price minimization. They included not only physical handling costs but allowances for the fragility and carrying costs of inventories, the importance of timely access to markets, the durability of products and inputs, etc. Distinctions between “transport-oriented” and “product-oriented” industries, and between those with a “market” or “materials” orientation, help capture some of the relevant considerations but not all. (In general, industries with a transport and materials orientation are thought to be more logistically sensitive.) It is the totality of all costs that counted—transportation, production, marketing, etc. For a particular industry using a particular technology, only a few sites might possess this cost-minimizing quality. At such points new industrial cities came into being, and as would be expected from the pursuit of comparative advantage, were often highly specialized in their products (e.g., Detroit, Buffalo, Pittsburgh, Glasgow, Dortmund, Anshan, Nagoya, Monterey, Manchester¹⁴). The production of iron and steel perhaps provided the most obvious example of these location

11. Perhaps, though, as Mumford argues, at some considerable sacrifice in non-materialistic satisfactions.

12. A. Weber apparently pioneered this line of inquiry. A very good introduction to the effects and intricacies of physical logistics (transfer costs) on location decisions can be found in E.M. Hoover, *op. cit.* Hoover summarizes and extends earlier work by Weber, Losch and others. Walter Isard's pioneering work on regional development was also heavily based on industrial logistics, using input-output analysis to quantify the relationships; see, for example, W. Isard, et al., *Industrial Complex Analysis and Regional Development; A Case Study of Refinery-Petrochemical-Synthetic Fiber Complexes and Puerto Rico* (Cambridge, Mass.: MIT Press, 1964).

13. Anas, Arnott & Small, p. 1445.

14. Both in England and New England.

processes at work but variations on the same theme were to be found in the choice of locale for producing many other products as well (e.g., textiles, lumber, farm machinery, chemicals, automobiles). As a consequence of the Industrial Revolution, urban site location no longer depended so much on the productivity of the surrounding countryside but rather on how a particular site facilitated the production and distribution of a specific product using a specific technology. Urban development at a logistically advantaged site for industry generally augmented the value of surrounding countryside (by bidding up real estate values and by providing more trading opportunities and a generally larger market for nearby farmers and other suppliers).

Of course, the new industrial cities didn't have to be at entirely new sites. Indeed, the older cities, though founded for different reasons and based on a quite different economic calculus, usually had an advantage, all else equal, in competing for the new industrial activities. To start, they had established populations and therefore advantages in assembling labor forces and accessing markets. If final demand for a product was related to population and income levels, as was usually the case, the existing cities represented readily available and concentrated markets. They also usually had more and better infrastructure, including transport facilities. Existing depot cities may have had a particular advantage:

On the organized transfer network are certain strategically located transfer "nodes," with special locational advantages as procurement and distribution points and therefore as processing centers for all kinds of activities in which transfer [logistic] costs are locationally important. There is only a limited number of such nodal points and each is a production center for manufacturing as well as for trading and intermediate handling operations. Since the transfer advantages of these points rest partly on large-volume traffic and frequent and flexible service, there is evidently a cumulative pressure toward concentration of transfer advantage.¹⁵

Another important advantage of established cities was and is that almost by definition they were and are better situated to perform an "incubator role" in creating new industries, firms, and economic opportunities. Small new startup activities commonly must procure various supplies and services from outside vendors. These are far more likely to be available in established, older and larger cities than in younger and smaller ones. Many astute observers of urban development believe, in fact, that incubating new activities is the key to successful

15. Hoover, *op. cit.*, pp. 119-120.

regeneration or continued development of any urban economy.¹⁶ Not surprisingly, therefore, many of the older pre-industrial cities did prosper and grow with industrialization, often in a ring just beyond the walls of the original.

The pre-industrial urban sites that grew rapidly after industrialization, however, usually served the particular logistical needs of at least one new industry. Reducing the costs of shipping final product (by being near large populations) wasn't necessarily enough, especially if processing greatly reduced the weight and mass of the product at various intermediate stages of production. Quite possibly, the most efficient location might be at the site of a major raw material input, if that input were very heavy, extensively used, difficult to transport, and processing wasn't marked by substantial scale economies. (Sawmills for lumber and slaughterhouses for cattle after the development of refrigerated transport come to mind.) Even more complicated arrangements might emerge: for example, if logistics dictated a strong one way flow to one or a few sites thereby creating large empty backhauls, then the efficient general equilibrium choice might be to locate some minority of capacity "upstream" to take advantage of reduced rates per ton mile on empty backhauls. Different production technologies, moreover, were likely to have very different logistics and location strategies. For example, while it is quite possible to imagine mine-mouth production of electricity from coal, substantial wellhead production of electricity from natural gas seems very unlikely (because gas is much less expensive to move than coal and one mine-mouth typically produces many more BTU's than one wellhead). In the same vein changes in technology could substantially change the attractiveness of different locations (as illustrated below).

In short, the sites for the new cities producing heavy industrial goods were chosen so as to minimize overall costs of transportation, production, marketing and distribution and these choices depended on processing a great deal of information. The answers were certainly not always readily obvious; many possibilities had to be assessed:

It appears that advantageous production points from the standpoint of transfer [logistic] costs as a whole are found sometimes in material sources, sometimes in markets and sometimes in specially situated intermediate points. In any given case the choice will depend upon the relative proportions of materials

16. R. Vernon, *Metropolis 1985* (Cambridge, Mass.: Harvard University Press, 1960), p. 6. Also see B. Chinitz, "Contrasts in Agglomeration: New York and Pittsburgh," *American Economic Review* (May 1961), pp. 279-89. Perhaps the earliest, and certainly one of the most eloquent, statements of this thesis was by Jacobs, *op. cit.* One of the most recent, and analytically thorough, is by E. Glaeser et al., "Growth in Cities," *Journal of Political Economy* (1992), pp. 1126-1152.

and products, the structure of transfer costs, and the sequence of material sources, junctions and markets on the transfer network.¹⁷

Free markets, of course, are well designed for sorting out these various possibilities and providing incentives for producers to find the best of them. Significantly, early industrialization, in keeping with the accompanying general political shift toward *laissez faire*,¹⁸ also moved urban location choices to the market and away from administrative or political control. After industrialization, only specially created capital cities (e.g., Canberra, Brasilia, Washington, D.C., many U.S. state capitals) or cities in command/control economies could or would ignore economic considerations when evaluating alternative sites for development. While political considerations could still be important, especially in more totalitarian and autarkic societies,¹⁹ they lacked the dominance they had in the pre-industrial era. **A substantial substitution of market for administrative or political location choices may perhaps be the fundamentally most important difference between urban development before and after industrialization.**

Of course, if a particular product using a particular technology can be produced at minimal costs at many locations, then logistic considerations may have little to do with site location. The location of such industries, sometimes called “footloose industries,” may be more like that of retailing, determined by marketing considerations: specifically, it might be hypothesized that producers will distribute themselves so as to achieve at least some spatial monopoly.²⁰ Industries such as these usually will have little to do with determining major new city locations or sites. Indeed, absent substantial economies of scale, such industries are more or less likely to follow available markets, falling more into the category of local industries than export industries (as defined below).

Nevertheless, a totally different (but not mutually exclusive) explanation of the impact of industrialization on urban location choices can be constructed from scale economies alone, using the concepts of central place theory. Trade occurs not because of the pursuit of comparative advantage but rather from the exhaustion of scale economies at different levels

17. Hoover, *op. cit.*, p. 47.

18. For example, early industrialization was synchronous with Adam Smith’s life, times and publication.

19. See Glaeser in this volume and Alberto F. Ades and Edward L. Glaeser, “Trade and Circuses: Explaining Urban Giants,” *The Quarterly Journal of Economics* (February 1995), pp. 195-227.

20. Hoover, *op. cit.*, explores these issues in some depth. Many of the spatial “nesting” models of central place theory might also be viewed as illustrating these concerns.

relative to market demands in different industries. Cities are to be arranged hierarchically by size:

The small urban areas contain only those industries with scale economies exhausted by the demands of small populations. The larger urban areas contain, in addition to small scale industries, industries with scale economies exhausted only by the demands of a larger population. The larger urban areas supply such products not only to their own residents, but also to residents of small urban areas. The largest urban areas contain all types of industries and are the only urban areas containing those industries whose scale economies require the demands of the largest population to exhaust them.²¹

In such a system large cities export to small cities but not vice versa: the trade gap apparently is closed by small cities exporting to the agricultural sector which in turn exports to large cities.

Obviously, such a model, while elegant and a source of many useful insights, is not particularly helpful in explaining why industrial cities differ so widely in their basic economic characteristics and activities. Indeed, in such a central-place scheme, cities of equal size would have similar industrial mixes, even in export industries, unless sharply different demand patterns were for some reason extraneously specified for different cities of the same size. Since it is rather easier to visualize and document interregional or geographic differences in supply than demand structures, such a model appears of little use for exploring observed differences in regional economic development. The model seems, rather, mainly suited to explaining the location patterns of “footloose” industries with ubiquitous technological and resource availabilities; it also provides important additional understanding of the advantages of scale in urban development.

The Impact of Industrialization: (2) Agglomeration Economies

Logistics as a defining influence on urban location choice was, of course, particularly appealing when heavy industries were involved, as was largely true during the early stages of industrialization. Heavy industries, almost by definition, had large tonnages of materials to be processed per dollar of final product produced. When the physical weights processed per dollar of final product began to decline with the advance of industrialization, new explanations of urban location choices seemed needed. While logistics might easily explain

21. Mills and Hamilton, *op. cit.*, pp. 13,14.

why Pittsburgh was a logical place for development of the open-hearth steel industry, there was no readily apparent strong logistical explanation of why Silicon Valley emerged where it did or why Silicon Valley's various spin-offs or clones emerged where they did. Physical logistics were usually quantitatively trivial for electronic products (although sometimes quite complex qualitatively); a total annual output of electronics valued at hundreds of millions of dollars or more might be transported in one small truck or air freighter. The so-called post-industrial society, with its emphasis on communications and information transfers and on software rather than hardware, seemed even further removed from concerns about physical logistics. Furthermore, by the time a post-industrial society emerged, transport and communication technologies had so improved and proliferated that many activities could be done almost anywhere; location choices were increasingly free of meaningful physical constraints.²²

Nevertheless, many new industries, both late industrial and post-industrial, seemed to favor congregating close to one another, either in old urban centers or at the fringes of established urban areas.²³ It is easy to understand why only a few sites might be logistically efficient for the production of heavy industrial products. It is not so obvious why high value products of little physical weight, and therefore largely free of logistic problems, would want to cluster closely together and thus endure all the congestion and other negative externalities of high densities.

The explanation, it seems, resides in a phenomenon that economists came to call agglomeration economies (although the concept may have first been articulated by non-economists, e.g., Jacobs and Mumford). Agglomeration economies are the positive benefits derivable from being in close proximity with others, particularly those engaged in similar businesses or interests. It is "a term which refers to the decline in average cost as more production occurs within a specified geographical area."²⁴ In short, congestion and high

22. But hardly totally free. Glenn Ellison and Edward L. Glaeser in "The Geographic Concentration of Industry: Does Natural Advantage Explain Agglomeration?" *The American Economic Review* (May 1999), pp. 311-316, estimate that between 20 and 50 percent of urban concentration in the U.S. today "is due to natural advantages."

23. For one description of processes that could generate such fringe developments, see Joel Garreau, *Edge City: Life on the New Frontier* (New York: Doubleday, 1991).

24. Such a definition, of course, would also include conventional economies of scale associated with a particular plant site or location owned by a single firm. Usually, though, the term agglomeration economies has been reserved for "positive technological and pecuniary externalities that arise between economic agents many of which may be under different ownership in close spatial proximity due, for example, to knowledge spillovers,

densities aren't all bad. For example, with density some basic infrastructure might be shared and user unit costs reduced. Indeed, the same might be said of almost all specialized inputs of production, perhaps particularly labor skills.²⁵ Proximity may also facilitate dissemination of new ideas and production techniques. Certain intellectual spillovers may only be available in large cities, say those caused by diversity or access to international human capital.²⁶ Customers may insist on comparative shopping and this can be facilitated by producers and their showrooms being available at only one or a few locations. Customer feedback on changing needs and attitudes may be more easily gleaned if a producer is located in the midst of or near major competitors. Knowledgeable financial, banking and legal services for a particular industry may only be available near that industry's main production locations.

The incubation function thus should come much more naturally to agglomerative than to logistic cities. Logistic cities, by definition, are specialized in their functions. By contrast, diversity of resources and supplier functions is generally cited as a major externality of agglomeration.²⁷ The advantages of diversity through agglomeration seem well supported by both recent developments in economic theory and empirical research. "The logic underlying these models [emphasizing the independent role of diversity in enhancing economic efficiency] suggests that national growth is enhanced by the heterogeneous features of modern cities, and the empirical evidence suggest that these efficiency gains are not trivial."²⁸ In short, many new light industries or post-industrial activities might be described as "external economy industries" whose firms "have a compelling need to be close to other [similar] firms in order to make sales or hold down costs."²⁹ Such economies have been labeled "economies of localization if between firms in the same industry, and economies of urbanization if across

access to a common specialized labor pool, or economics of scale in producing intermediate goods" (Anas, Arnott, and Small, *op. cit.*, p. 1427). The more limited or focused usage has been adopted in this paper.

25. G. Dumais, Ellison & Glaeser report that: "the location process appears to be dominated by the labor mix of a particular area; plants do seem to locate near other industries when they share the same type of labor." (*Geographic Concentration as a Dynamic Process*, NBER Working Paper 6270).

26. As hypothesized by Ades and Glaeser in, "Trade and Circuses: Explaining Urban Giants," *op. cit.*

27. For a fine survey of agglomeration affects in general, and the benefits of diversity in particular, see John M. Quigley, "Urban Diversity and Economics Growth," *Journal of Economic Perspectives* 12, no. 2 (Spring 1998), pp. 127-138.

28. Quigley, *op. cit.*, p. 137.

29. R. Vernon, *Metropolis 1985* (Cambridge, Mass.: Harvard Univ. Press, 1960), p. 6.

industries.”³⁰ As the names imply, localization economies would produce cities specialized by industry while urbanization economies should lead to diversification or a mix of industries.

In essence, at least some cities should be able to reap advantages from economies of scale in much the same fashion as individual business enterprises. The economies of urban concentration or agglomeration would then be based on the same fundamentals as for productive enterprises in general. Division of labor (“specialization of functions as between firms”) can increase with city size. The larger the city, the more specialized operations and services that can be farmed out to specialized providers, all else equal; a producer located in a smaller place would be more likely to have to do it for himself. Furthermore, providers of specialized services in large cities can achieve a larger scale and therefore more of any available scale economies. Just in time production processes, and attendant lowering of inventory cost, can also be more easily achieved in large cities because in the large city “more can be obtained at short notice if necessary.”³¹

But there must also be limits to what constitutes acceptable or efficient city size.³² While strongly endorsing the agglomerating influence of scale economies, Krugman observes:

Yet we do not all live in one big city, nor does the world economy concentrate the production of each good in a single location. Obviously there is a tug of war between forces that tend to promote geographic concentration and those that tend to oppose it. What is immediately striking is that there are external effects on both sides. So there is a market failure case to be made both that any given agglomeration is too big (look at the congestion and pollution) and too small (think of the linkages and spillages that we generate by having more activity here).³³

A similar balancing occurs when attempting to define whether an industry’s location decisions are dominated by logistic or agglomeration considerations. The distinction between a logistically and an agglomeration determined location is not discrete. Elements of both may be involved in particular cases. Nevertheless, distinctions can be made. An industry with substantial natural resource inputs available at only a few discrete sites, marked geographic

30. Anas, Arnott & Small, p. 1446. See Krugman for a discussion and citations of this literature. Hoover also developed and articulated similar ideas in his classic survey monograph. Obviously, economies of localization, if present, would intensify the site specialization observable in logistic cities.

31. Hoover, *op. cit.*, pp. 119-121; Krugman, *op. cit.*; and Mills & Hamilton, *op. cit.*

32. See E. Glaeser, “Are Cities Dying?” *Journal of Economic Perspectives* 12, no. 2 (Spring 1998), pp. 139-160.

differences in factor input prices, a high percentage of costs spent on transport and considerable processing or raw material weight per dollar of final output, seems likely to be dominated by logistical considerations when choosing a location; importantly, given a market to be served, such an industry is also not likely to have all that many realistic location alternatives. By contrast, a firm in an industry with a low percentage of transport cost, little weight per dollar of output, few or no important natural resource inputs and short product and technological cycles (as explained below) will probably be dominated by agglomeration considerations when choosing a site; moreover, if such a firm is an early entrant to the industry, it could have a very wide range of feasible location choices while a late entrant, because of localization economies, may feel restricted to a choice among sites already populated by its peers.³⁴

Overall, after the Industrial Revolution cities developed for any one or more of several reasons:

- (1) because an autocratic government had so willed and had enough power to extract sufficient taxes from the “neighbors” to pay the costs;
- (2) because particular locations were logistically the lowest cost sites for assembling factors of production and reaching markets;
- (3) because market entrepreneurs at certain locations identified, and exploited, opportunities to arbitrage or trade between their locations and others;
- (4) because of agglomeration economies (of localization or urbanization) that made it cheaper to start or expand production near other businesses;
- (5) because of scale economies that made it cheaper to expand output at an existing production site rather than starting anew;
- (6) because of central place economies or import substitutions (see below) that make it efficient for a city to meet more and more of its own and others needs as its size increases.

33. Paul Krugman, “The Role of Geography in Development,” a paper delivered at the Annual World Bank Conference on Development Economics, April 20 and 21, 1998, Washington, D.C. pp. 2, 3 and 28. Also see his “Increasing Returns and Economic Geography,” *Journal of Political Economy* 99, no. 3 (1991), pp. 463-499.

34. Krugman, placing great emphasis on the self-reinforcing feedbacks in urban location decisions, notes: “In many cases aspects of natural geography are able to matter so much not because natural features of the landscape are that crucial but because they establish seeds around which self-reinforcing agglomerations crystallize.” (*Op. Cit.*, p. 24.) Also see Duncan Black & Vernon Henderson, “Spatial Evolution of Population and Industry in the United States,” *American Economic Review* (May 1999), pp. 321-327.

Note that economies of scale empower or motivate several of these (e.g., 4, 5 and 6). Some, moreover, may not persist unless also simultaneously aided and abetted by others (e.g., 3 in the long run probably needs 2 or 4). Some seem constrained or applicable to only a few particular geographic sites or locations (1, 2, and possibly 3 and 4); others seem to be largely independent of geography (5 and 6). Some were operative before as well as after the Industrial Revolution (1 and 3) while the others were mainly of importance only after; one, in fact, came strongly to the fore only with the emergence of post-industrial societies (4).

Certainly, with industrialization, the calculus for choosing sites for urban development, previously mainly the province of politics, military considerations and entrepot activity, became much more complex and imbued with many more market considerations. In the early phases of industrialization, with the accent on developing heavy industries with heavy burdens of physical input processing per dollar of final output, the emphasis was on finding locations that minimized logistical costs of production. As industrialization proceeded on to lighter industries (some with remarkably little weight per dollar of final output) and to the post-industrial world of services and information industries, the focus was more on the need for and availability of agglomeration economies. Whatever the route or causal chain, a rational argument could be identified for why many activities might want to congregate at just a few sites, thereby creating new cities as well as expanding some old.

Prosperity and Depression: The Role of Export Industries

A shift in emphasis from logistic to agglomeration economies also induced an enhanced interest in modeling the dynamics of urban development and, in particular, the feedbacks between different agglomeration effects and technological and demographic developments. Because of the durability of urban infrastructure, and a desire to be relevant, these models were often characterized by disequilibria and could be quite complex.³⁵ Despite this complexity, these modeling efforts also coalesced well with policy interests, both public and private; mayors, city councils, housing ministers, city planners, developers, suppliers of building materials, etc. all wanted to know where future urban development might be located. They were not, moreover, just interested in the very long term trends associated with the

35. For an excellent discussion and evaluation of these modeling efforts see Anas, Arnott and Small, *op. cit.*, pp. 1444-1454.

evolution of logistical or agglomeration effects; policy makers also had to be concerned with the possibility that various cyclical influences, some possibly quite short term in nature, could have important implications for the viability and prosperity of urban areas.

Of particular interest was understanding why cities that seemed rather similar in agglomeration characteristics sometimes had such different economic experiences, if not in their processes then in their timing (and often both). Almost every major industrial country seems to have an old manufacturing “belt” where several cities have decayed while a few have continued to prosper. The Northeast and Midwest of the United States, for example, had many medium-sized cities built around employment provided by a few (say 2 to 5) major manufacturers. Many of these cities experienced serious trauma as one or more of their major employers disappeared or migrated elsewhere (giving rise to the sobriquet of “Rust Belt” for much of this region). Some of these cities have recovered quickly from these traumas; some have not really recovered at all. In short, not all differences in urban development patterns seem easily explained by differences in agglomeration or logistical economies, at least as these are readily observable or apparent. Different cities, even some that share a common history or structure, seem to experience different cycles of prosperity and depression—in timing, depth, duration, persistence, etc.

The natural question is what explains these differences? To a first approximation, they seem best explained by differences in basic export industries.³⁶ While there can be many complications in quantitatively defining the economic or export base of a city or region, the concept is nevertheless very useful for many qualitative purposes, especially diagnostics. The concept of export base is founded on the idea that industries in any city or region can be divided into two categories: those that serve the local or home market and those that sell to others (outsiders). Of course, many or even most industries do a bit of both, but usually one activity dominates. Bakeries, delicatessens, and other preparers of fresh foods usually serve a nearby or local market. Complex manufactured goods, on the other hand, usually must be exported or sold to others in order to attain efficient scale; no one would expect Detroit to absorb all of its automobile output or Rochester all of its copying machines, optical equipment or cameras. The same can also be said of services: Boston, for example, produces more higher

36. Also see Ades & Glaeser, *op. cit.* As observed by Glaeser in an accompanying report, political considerations can and do take precedence in some cases.

education, research and medical services than it can absorb locally; New York produces financial and corporate services for a national and international market; Washington, D.C. manufactures more government services than the surrounding federal district needs.

Once a city's dominant or most important export activities have been identified, much can usually be inferred about both the city's internal and external patterns of development, including the city's relative state of prosperity, or whether it is growing, declining, stagnating, or reviving. An expansion of exports, moreover, should generate a more than proportionate increase in the local economy, that is by a multiple greater than one (usually called the export or base multiplier).

Cities, of course, can grow for reasons other than export expansion, at least for a limited period of time. Specifically, cities, especially those that are growing or expanding, can enjoy periods of employment expansion occasioned by so-called import substitution or import replacement. As cities expand and grow, they eventually achieve markets large enough to permit more and more local industrial activities of an efficient scale. Instead of importing a product, a growing city begins to supply its own. This new output, moreover, should generate much the same multiplier effect (or more),³⁷ on local services as an increase in exports. Technological changes in manufacturing processes that achieve efficient production at lower scales of output would have much the same effect. Assuming that scale economies characterize most industrial activities, larger cities would obviously have more incentives or opportunities for import substitution than smaller cities (just as they would have more export possibilities, all else equal, in central place theory).

Sometimes too, import substitution or replacement can offer a comfortable transition or cushion when a city suddenly experiences a decline in some of its important export activities; for example, such a phenomenon was apparently observable in Los Angeles just after World War II, when Los Angeles lost much of its air frame and other defense activities, but hadn't yet brought its local economy up to manufacturing all of the products that the city's scale would efficiently permit³⁸

While relevant, import replacement is not a total substitute for exports. As one of the most ardent expositors and advocates of import replacement as a generator of city growth has

37. Possibly because of fewer "leakages" to outside suppliers

38. Jacobs, *op. cit.*, pp. 151-154.

said: “Anything that halts the export-generating processes of a city ultimately kills the import-replacing process too.”³⁹ Furthermore, import replacement is likely to be almost a zero-sum game: one city’s gain by import substitution may be largely offset by another’s loss of exports. The only true gain would be a reduction in overall production or supply costs (say from reduced transport needs) that overcame or outweighed the benefits of comparative advantage from trade; this leads into an analysis of when manufacturers should expand their capacity and whether it should be from expansion of existing facilities or by establishing new branch plants or “abandoning” some market to competitors, etc.⁴⁰

Three Basic Cycles

If the current state of a city's economic health is likely to depend largely on the health of its export base, that, in turn, will usually depend on where the city's dominant export activities are situated relative to three basic types of development cycles,⁴¹ those for product, technology and relative factor input costs.

The best known and defined of these cycles, because of its widespread use in a wide variety of industrial analyses, is the product cycle. The fundamental notion is that most products follow a basic pattern of initial discovery and development, followed by a period of steady growth, eventually stabilizing at or near a saturation level wherein all or almost all potential users are in possession of the product, followed by a period of at least relative and possibly absolute decline that finally culminates in extinction or a very low steady state of output. All this commonly reflects the product's replacement over time by new and better ways of performing the same economic function. Obviously, the product cycle is analogous to the growth and development cycle observable in most flora and fauna, the main differences being the lesser regularity or predictability of product cycles and eventual displacement in a product cycle usually not being by a newer and younger version of the same genus but by something substantially different.

39. *Ibid.*, p. 163

40. For a good discussion of these possibilities see Roger W. Schmenner, *Making Business Location Decisions*, (Englewood Cliffs, N.J.: Prentice Hall Inc., 1982). An excellent empirical investigation of manufacturing demographics in the U.S. can be found in Dumais, Ellison & Glaeser, *op. cit.*

41. The word “cycle” connotes a regularity in the ebb and flow that probably does not aptly characterize these concepts. Nevertheless, conventional usage has done so, apparently because cycle also connotes the crucial importance of a time dimension. For further discussion of these concepts, see Ross J. Gittell, *Renewing Cities*, (Princeton, N.J.: Princeton University Press, 1992), Chap. 2.

Product cycles can be of quite different lengths: bread has obviously had a very long run while many recent computer software programs have not. There is, in fact, some evidence that recent product innovations have seemingly had shorter runs than those that preceded—although care must be used when making such comparisons because recent product innovations, by definition, should have a shorter **average** life than those surviving from earlier periods. Nonetheless, it is at least widely believed that product lives have declined. Incidentally, if true, then the incubation capabilities of cities would be of increasing importance.

The technological cycle or process pertains to the dissemination and development of production technologies over time.⁴² Typically a new production technology takes time to disseminate and also becomes more effective or efficient with use (the so-called “learning curve”). Nevertheless, even with continuous improvement, entirely new technologies may appear that produce the product or service better than the old technology; if the new technology achieves this superiority in virtually all circumstances and situations, it is often characterized as a “dominant technology.” Dominant technologies may, of course, themselves be eventually displaced by a better technology. Similarly, it is almost axiomatic that a new product will involve a new technology or at least a production process that embodies some distinctive or original features. Different technologies are also likely to be differently suited to different situations so that two entirely different ways of producing a product or service may be observable at one and the same time. Technological cycles might also be place specific, relating to infrastructure or other local services, rather than being specific to a particular industry.

Different factor or input prices (or related availabilities) are typically the explanation of why different production technologies may be in use contemporaneously in a particular industry. Differences in relative factor prices, or positioning in the factor price cycle, may also explain many other aspects of location choice, especially when interacting with technological changes.⁴³

Changes in relative factor prices can occur for many reasons. Most commonly cited is

42. Cf. L. Nabseth & G.F. Ray (eds.), *The Diffusion of New Industrial Processes: An International Study* (Cambridge, U. K. : Cambridge University Press, 1974).

the depletion, and therefore increasing cost, of procuring raw materials from established sources: in essence, the “mine gets played out.” Labor costs at a particular location may also go up over time; the labor force becomes older on average and therefore commands more pure seniority pay (which may or may not be offset by greater skill and productivity);⁴⁴ or unionization achieves more capture of location rents; or new industries locate nearby and bid up the general wage level; or altered demographics (e.g., lower birth or immigration rates) alter the labor supply,⁴⁵ etc. Similarly, taxes at a particular location may go up over time, reflecting a wide variety of influences ranging from improved public services to public sector capture of location rents. At any rate, it is widely believed that relative factor input prices tend to increase over time for a particular product produced at a particular site using a particular technology; while not inevitable, such tendencies certainly have been observed on occasion.

At first glance, the existence of a factor price cycle might seem to contradict a basic economic theorem, that of factor price equalization. Factor price equalization hypothesizes that if labor, capital and other factors of production are all mobile (capable of moving freely from one production location to another) then the price of such factors should be equalized over all regions engaged in open trade.⁴⁶ The existence of a factor price cycle does not deny the possibility of factor price equalization, given its assumptions and sufficient time for equilibrium to be achieved. In the real world, however, the mobility assumptions may rarely be met and various external shocks to the system may prevent arrival at a long-run equilibrium. A basic tenet of the “cyclical analyses” outlined above, in fact, is that almost all industries are “constantly in play,” experiencing constantly changing circumstances of product, technology and factor prices that make static equilibria almost impossible to attain.

43. A relatively early elaboration of factor price cycles and their influence on regional economic development can be found in R.A. Leone and J.R. Meyer, “The New England States and Their Economic Future: Some Implications of a Changing Economic Environment,” *American Economic Review* (May 1978), pp. 110-115.

44. For some highly intriguing explorations of these “lifetime pay” and related “implicit contracts” between employers and employees, see the essays in G. Eliasson and C. Green (eds.) and C. R. McCann, Jr., (assoc. ed.) *Microfoundations of Economic Growth: A Schumpeterian Perspective* (Ann Arbor: Univ. of Michigan Press, 1998). Especially see the chapter on “Corporate Restructuring, Technological Change, and the Distribution of Labor Income” by D.L. Brito, M.D. Intriligator, and E.R. Worth.

45. In this connection it is interesting to note that Kuznets in his studies of development found, as have many other economic demographers, that declining birthrates were generally and positively associated with urbanization. Kuznets, *Economic Growth of Nations: Total Output and Production Structure* (Cambridge, Mass.: Belknap Press, 1971).

Accordingly, the exploration of factor price cycles doesn't so much deny the logical validity of or empirical tendencies toward factor price equalization as it does its possible real world relevance or achievability at particular points in time.

Some Expository Illustrations

The effects of the three cycles—product, process, and factor price—are perhaps best understood by reference to real world illustrations. These illustrations can pertain both to industries and their development over time as well as to particular sites or cities.⁴⁷ They were chosen so as to illustrate a wide range of possibilities: technological changes that convert an industry from a high degree of concentration or localization to being “footloose” and vice versa; cities apparently founded on much the same kind of advantages but experiencing very different recuperations when traumatized; different interactions between technological change and factor prices, etc.⁴⁸

At the level of a particular industry, the post-war development of the soda ash industry aptly illustrates the interaction of technological and factor price considerations and the general impact of these, and their attendant logistics, on site choices for the industry. Soda ash is widely used in glass making, detergents and certain other chemical processes. Soda ash can be obtained from underground mines, the best of these apparently being mostly located in Southwestern Wyoming, or, alternatively, be created “artificially” by employing a patented chemical process (the Solvay) that uses a great deal of energy and capital but only very modest inputs of location-specific raw materials and labor. Until the Wyoming mines came on stream in the early 1970's, the artificial process, which from a purely technical standpoint was efficiently implementable almost anywhere, was a dominant technology. Obviously, the artificial or Solvay process for manufacturing soda ash will be more attractive with distance from Wyoming (or other good soda ash or trona mines) and ready availability of cheap energy

46. For a good exposition of the principle, see G.H. Borts, “The Equalization of Returns and Regional Economic Growth,” *The American Economic Review* (June 1960), pp. 319-47.

47. Mills and Hamilton, *op. cit.*, sprinkle their text with many such illustrations; in particular see their Chapter 2.

48. To some extent the illustrations were chosen to illustrate the diversity of responses of location choices to technological change. For example, it is widely hypothesized, probably with at least some empirical justification, that technological change has generally worked to disperse industry. Any such tendency is hardly universal, however, as the steel and soda ash cases discussed below indicate; the steel case, moreover, further illustrates the possibility that the impact of technology on dispersal may also depend on relative factor prices, with prices in Europe favoring a selection of steel production technology that works against dispersal vs. a price situation in the U.S. that favors dispersal.

and capital. Not surprisingly, then, when Wyoming natural soda ash first came onto the market, its early displacements of Solvay process occurred in the Western United States; less obviously, but not totally inexplicably, the last U.S. Solvay production was in upstate New York (and therefore reasonably close to markets and relatively inexpensive Niagara power). Because of large “sunk” capital investments in Solvay plants, as well as considerable distance from Wyoming, Europe and Asia continued producing large amounts of artificial soda ash; in the late 1970s and early 1980s increased energy prices and considerable progress in reducing the costs of transporting soda ash (much of this progress being due to deregulation of U.S. railroads), artificial production of soda ash in Europe and Asia was stable to down. By the mid-1980s, and in spite of a considerable reduction in world energy prices in the early 1980s, little or no additional capacity for artificial production of soda ash was added anywhere. Wyoming trona accounted for more than all the expansion of world soda ash production in the 1970s and 1980s. Natural soda ash had apparently become a dominant technology.

Employment in a soda ash industry based upon natural sources or mines will be mainly in providing transport (and therefore likely to be very geographically diffused), and in the mining itself. The mining, of course, could be highly concentrated if only a few locations provide cheap supplies of good quality and quantity. While that actually appears to be the case, soda ash mining also appears to be so mechanized, and the mines in such remote locations, that very little discernible urbanization has occurred; southwestern Wyoming seems only slightly more urban than prior to the development of the soda ash mines there.

The iron and steel industry provides an even more dramatic interaction between the three cycles and with very pronounced locational consequences. The product cycle in steel might be described as being at a very mature stage. Steel usage in the United States, and even the world, seems stable to down. There has been considerable substitution away from steel towards other packaging and structural materials: aluminum and other metals, plastics, reinforced concrete, etc.

The open hearth process for production of steel, the technology overwhelmingly used for development of most of the U.S. industry, also seems to be in a mature phase, increasingly dominated either by so-called basic oxygen process (BOP) or direct reduction in mini-mills. The choice between BOP and mini-mills, in turn, depends on relative factor prices; mini-mills mainly use scrap metal as a raw material input while BOP uses a much more conventional

mix (usually more than 50 percent) of raw iron as an input. Accordingly, mini-mills have increasingly become the preferred technology in the U.S., where scrap is not only widely available but plentiful and cheap, while BOP has come to dominate European production where scrap is less available and more expensive. As the name implies, mini-mills are also able to operate efficiently at relatively low rated capacities (that is, are less subject to economies of scale), being efficient in a range from 500,000 to 1 million tons annually; BOP seems most economically conducted at a quite large scale, that is with plants of 5 million tons of annual capacity or more. The only open hearth steel mills in the U.S. still in competition are large scale and relatively new (post World War II) plants incorporating at least some features of BOP through so-called oxygen lancing or similar devices.

In the circumstances, it is easy to understand why Pittsburgh became a very depressed place in the 1960s and 1970s. To start, its principal export activity was producing and selling steel that increasingly was a product in less demand, especially in the U.S. Many Pittsburgh steel plants were also of an inefficient medium size, roughly two to four million tons of annual capacity, and were among the oldest of the open hearth plants in the U.S. Furthermore, sources of raw materials became more distant and expensive as Labrador and Venezuela increasingly replaced the Mesabe Range in upper Minnesota as a source of iron ore for U.S. steelmakers. Coking coals remained available from the usual sources in West Virginia, but perhaps at some increase in cost. Finally, unionized U.S. steel workers were at one time proclaimed to be the “highest paid production workers anywhere in the world”; whether or not Pittsburgh steel workers ever achieved such an exalted status would be difficult to determine definitively but certainly in the post-World War II decades they were paid well by most comparative standards. Similarly, it has been rumored that taxes and cost of local services accelerated disproportionately in Pittsburgh and environs. In short, Pittsburgh appears disadvantaged with respect to all three cycles: product, technology and factor price. It is hardly surprising, therefore, that reviving the Pittsburgh economy has proven to be quite difficult, although progress appears to have been made (mainly by pursuing opportunities to develop and incubate new industries and enterprises).⁴⁹

The locational consequences of steel’s travails are straightforward. Prosperity and growth in the U.S. steel industry has mainly been at many mini-mills around the country,

49. Again, see Chinitz, *op. cit.*

oriented to serving regional or local markets. Much of this represents a transfer of activity away from Pittsburgh. Pittsburgh may also have been hurt by an expansion of foreign suppliers in the U.S., as the industry alleges. Because of the widespread availability of steel scrap in the United States, and the small scale required for efficient production, the U.S. steel industry today represents a footloose situation with many possible efficient production locations. As suggested earlier, this is a situation in which marketing considerations, rather than production logistics, are likely to be dominant in determining location choices.

Many of the same destabilizing forces were also once at work in the New England textile industry. Development of textile manufacturing plants along the river valleys of New England, especially those with some proximity to the port of Boston, was a leading manifestation of the Industrial Revolution in North America. The mills were located wherever a river experienced a falls or drop, thus generating water power to turn the textile machines. Because of this reliance on water power, New England mills tended to cluster very tightly about river sites near waterfalls or rapids. These early New England textile mills wove both cotton and woolen textiles, with cotton coming from the American South and the wool from almost everywhere, including nearby farms in New England. Because New England farms were experiencing consolidation and rationalization like many other farm areas around the world at the time of the Industrial Revolution, New England had a plentiful labor supply for manning the new mills. To the extent there were any deficiencies, these were rather easily made up by immigration since New England was located closer to Europe (and particularly Ireland) than most of the U.S. Nineteenth century New England also pioneered the development of new textile weaving machinery and ginning methods, giving New England some lead in technology over most other areas, both in the United States and abroad. New England was also close to final markets in North America and because of efficient “Yankee Clipper” and “packet boat” water transportation, not too far logistically from European markets as well.

The main locational consequence of early New England textile development was the creation of a series of mill towns along the river valleys, specifically wherever a drop occurred in a river sufficient to generate power. Some of these mill towns developed to a considerable size (e.g., Lowell, Lawrence, Springfield, Manchester). Some also specialized in manufacturing machinery for the textile and other industries. In essence, New England in the

nineteenth century represented a good logistic solution to low cost factory manufacture of textiles. It was, though, a somewhat delicate and unstable situation.

Cotton, for example, was clearly much more in supply and inexpensively available at southern U.S. locations than in New England, but southern rivers had lower or few falls. With emancipation and rationalization of Southern agriculture, inexpensive factory labor became increasingly available in the South. The development of railroad transportation in the second half of the nineteenth century gave southern locations better access to seaports and northern big city markets.⁵⁰ Most importantly, the development of the steam engine, and then of electricity and electrical motors, meant that textile mills no longer had to be crowded awkwardly close to river waterfalls. They could now be located away from water, perhaps on spacious flat sites chosen because of their access, say, to good rail and road transport or cotton supplies.

The textile industry of New England, therefore, slowly but surely began to migrate to new southern locations, mainly in the Carolinas. By the middle of the twentieth century, most of the textile industry had disappeared from New England. Actually, the slow pace of the process was somewhat surprising; apparently continuing good access to markets and inputs as well as sunk costs in manufacturing capital held much of the activity in place until the plants were thoroughly depreciated—and perhaps even dilapidated. At any rate, by the middle of the twentieth century New England had a plentiful supply of empty textile mills.

Significantly, most of the factors of production did not disappear with the industry. Besides empty mills, a skilled and well-disciplined factory labor force remained behind. New England also retained many other economic advantages, not the least of which were a well developed financial sector and many of the leading educational and research institutions of the world. These eventually coalesced to revive the New England economy. Specifically, high-tech industries, mainly in electronics and software, developed rapidly in New England. Perhaps most symbolic of this was the placement of the headquarters of what at one time was the second biggest electronics firm in the world (Digital) in the abandoned building

50. Krugman (*op. cit.*, pp. 14 and 15) puts great stress on this phenomena for explaining patterns of wage differentials between different regions: “A continuing decline in transport costs – loosely speaking, the continuing process of globalization—eventually produces a reversal of fortune. The reason is that the peripheral region has a competitive advantage in the form of lower wages. At first this advantage is more than offset by [the original production center’s] superior access to markets...and inputs... However, as the level of transport

previously housing the world's largest woolen mill. New England also expanded its "exports" of educational, research and medical services.⁵¹

Various New England towns went through this transition experience from decline to revival in rather different ways with rather different successes and failures. Much depended upon the availability at various locations of facilities and skills. Mill towns that were more into the provision of machinery and other supplies tended to do better than those involved in the production of textiles themselves, though there were exceptions. Similarly, different niches of the textile business experienced different product cycles. Aided by a general substitution away from textiles woven from natural towards artificial fibers over much of the period, some specialized textiles in particular niches prospered, and in some cases even continue to operate in New England. For example, a mill in Lawrence, Massachusetts, manufacturing polar fleece from reprocessed plastic, burned down in 1995; it was subsequently rebuilt to even greater scale and better specs and is once again operating at the Lawrence location.

In short, and in general, much depended on where a city and its declining industry were located relative to the three basic development cycles. Those that were suffering substantial difficulties in all three, like Pittsburgh, experienced prolonged difficulties before effectuating any revival. Others, suffering only from one of the three cyclical difficulties, often could effectuate a much less traumatic and prompt revival.⁵²

Summary and Some Observations on Public Policy

Cities have long had both a parasitic and a stimulative economic relationship with their hinterlands. The parasitic relationship, as many historians have suggested, may have been dominant prior to the Industrial Revolution, possibly dampening both urban and economic development in the Middle Ages. The location of urban development after the Industrial Revolution, however, increasingly had little to do with the natural resources or agricultural characteristics of the surrounding countryside and much to do with how a location fitted the logistical needs of manufacturing processes. These processes located so as to

costs declines the importance of these linkages also declines. So there is a second critical point in which industry finds it profitable to move to lower wage locations."

51. Leone and Meyer, *op. cit.*

minimize their costs of assembling resources and reaching markets; if only a few sites served that purpose, industry clustered there, creating new cities or rapidly growing old ones. Taken together with the increasing importance of scale economies in manufacturing, these influences created many truly large cities for the first time. Cities, as the world now knows them, were largely a creation of the Industrial Revolution and these industrial cities clearly bestowed as many benefits on their countrysides as they derived from those countrysides.

As the Industrial Revolution proceeded, more and more products were produced that had little or almost no logistical requirements. Nevertheless, these new industries also displayed a strong tendency to cluster together. Even more dramatically, a similar clustering tendency was also observable among information, communications and related service activities that characterized post-industrial society.

Economists hypothesize that this new or continued clustering seems best explained by agglomeration economies. Agglomeration economies are those efficiencies reaped from being in close proximity with other businesses, both one's competitors and others. Urban developments or expansions based upon agglomeration economies were less physically specific or defined than for those founded on logistics, although pure size and diversity seem to help. A key variable, in fact, often seemed to be where it all got started, with the "historical accident" of original location sometimes being a substantial percentage of the total explanation of eventual location choice.

As industrial products became lighter (in the sense of having more final value per pound of materials processed), they also may have tended to have shorter cycles or lives (stated as an empirical regularity with no causality imputed). As a consequence, generating new products or concepts became increasingly important if an economy were to keep pace and develop up to its potential. Because of their access to information and a relatively plentiful supply of diverse and relatively efficient factors of production, "agglomeration cities" seemed particularly attractive for incubation or development of these new products.⁵³ "Logistic cities" could also play this role but usually not as effectively because of a narrower and less diverse base in supplying activities and information sources. Logistic cities, largely

52. See Cf., Gittell's account, *op. cit.*, of the decline and revival of Jamestown, N.Y., contrasted with the revivals of New Bedford and Lowell, Mass.

53. This also meant that cities increasingly became the sites for incubation or encouraging the entrepreneurial activities that lie at the heart of long-term economic growth.

because of their specialization, also seem more vulnerable to adverse turns in product, technological and factor price cycles.

Wherever done, incubation of new industrial activities apparently has become an increasingly important urban function. As such, this new function represents still another potential contribution by cities to their hinterlands. That is, cities with an incubating capacity, not only potentially bestow access to larger markets and land value gains to surrounding agricultural and other primary production, but can also become a fundamental contributor to the constant process of renewal and technological advance that is needed to grow a market economy.

Indeed, unless a regional or national economy is exceptionally well endowed with natural resources, economic growth in an increasingly global economy may almost require every major regional or national economy to have a city with at least some basis in agglomeration economies. In fact, if market incentives fail to create such a city, developing economies based on raw material extraction and processing might be well advised to “set aside” a portion of national income for the systematic development of one or more “agglomeration” cities. Such cities provide not only a location for incubating new activities but also an interface with the world. They collect information from outside and disseminate information on the local economy and its possibilities. They are likely to be the point of entry for foreign direct investors; in fact, not only the point of entry but all too often the eventual long term location too (as suggested by the pattern of development in many developing economies, but perhaps particularly by the Chinese coastal regions). They become the logical place for intermediating investments, both by foreign and domestic institutions. While public policies to promote the growth of already relatively prosperous urban centers may seem regressive (in their implications for income distribution), such policies may nevertheless leave everyone better off by creating a larger totality for sharing.⁵⁴ Of course, special public policies to promote the creation of “agglomeration” cities may or may not be needed. Market forces and incentives may do so on their own, especially since prosperity and economic

54. As Markusen observes in an excellent review of the potential tensions between efficiency and social-equity goals in industrial and regional development programs: “an emphasis on high tech industrial sectors will tend to reinforce the advantages of regions with already high per capita incomes and relatively faster rates of regional growth.” A. Markusen, “The Interaction between Regional and Industrial Policies: Evidence from Four Countries, (Korea, Brazil, Japan and the United States),” paper presented at the World Bank’s Annual Conference on Development Economics, Washington, D.C., April 28-29, 1994.

survival in a global economy may depend on it.⁵⁵

Nevertheless, creating cities capable of incubating new business activities and interacting constructively with the larger global economy may not always be easy or all that automatic, particularly where previous development has been largely based on primary industries and logistical advantage. Even cities founded more on agglomeration than logistical economies will vary widely in their adaptability and the strength of their economic base. Some industrial cities have prospered and some have not. Some products have become obsolete or in much reduced demand, some production technologies have been displaced by newer and better technologies, and some locations have experienced adverse changes in factor prices in response to constantly evolving circumstances of supply and demand. As a consequence, many urban locations and cities have lost much of their economic advantage. These “losers” seem concentrated, for the most part, in industrial cities that originally had their genesis as desirable logistical locations for manufacturing a particular product using a particular technology. Such cities either revive by finding new industries and activities, or stagnate, continuing into decline; as the Pittsburgh experience illustrates, finding successful new activities for such situations can be difficult, especially if they are simultaneously disadvantaged in the product, technological and factor price cycles of their basic export industry (steel in Pittsburgh’s case). Again, it remains a very open, and underinvestigated, question whether and to what extent public policy interventions are needed to create an urban structure conducive to economic growth. Market incentives may suffice and the possibility cannot be overlooked that perhaps some cities are best downsized or even abandoned.

This raises another important policy question: Should the goal of government policy be to place public investments where they will most likely “succeed,” by being in cities that have strong regenerative powers? Or should aid be directed so as to help those locations with lowest incomes and least hope? If high economic or financial gain to cost ratios are the investment goals, already advantaged cities usually would be favored. If “equity” and helping the disadvantaged are the goals, the opposite may hold (as in most regional equalization policies). Arguments can be made for either, with personal preferences and judgements

55. For a sophisticated statement of why market incentives might fail see Quigley, *op. cit.*

entering critically.⁵⁶

The recent tendency in public policy has apparently been to favor efficiency: “Cities, “it is widely said, “should pay their way.”⁵⁷ Given the limits on capital available to most developing countries, and the many demands and needs for such capital, a highly selective urban policy, focusing on just one or few urban locations, may well be best. Furthermore, developing even one “agglomerative city” with the ability to tap into international sources of information, technology and finance may be quite challenging for many or most developing countries.

These various hypotheses and analyses about urban economic development also suggest that much is in the empirical detail. Conceivably, technological changes may occur that will eliminate the agglomeration economies of cities. It has been suggested that “information technology is rapidly making the need for face-to-face contact and cities obsolete.”⁵⁸ (Apparently, much the same was said with the advent of the telephone in an earlier generation.) New technologies that reduce scale economies in manufacturing could also make cities less needed but as noted above, cases can also be found where new technologies or changes in relative factor prices have had just the opposite effect. Cities have many purposes, logistical and political as well as agglomerative; even if the agglomeration economies of cities became less abundant, reasons still might exist for maintaining at least some high density development. No particular purpose would be served by discarding the communication advantages of that density. Furthermore, the available empirical evidence “does not suggest that telecommunications is a substitute for face-to-face contact and cities.”⁵⁹ As always, the desirability of high density living depends on weighing the advantages against the disadvantages, a balancing that will change continuously as technology, demographics and other influences change. Significantly, under current and prospective circumstances, there

56. For an illuminating empirical investigation of these issues in one particular context see Denise Tao Yang, “Urban-Biased Policies and Rising Income Inequality in China,” *The American Economic Review* (May 1999), pp. 306-310.

57. Even though, as Quigley points out (p. 133): “Diversity and variety in consumer goods or in production inputs can yield external scale economies, even [as]...individual competitors and firms earn normal profits.”

58. While answering the question negatively, see the provocative piece by E.L. Glaeser, “Are Cities Dying?” *op. cit.*

59. *Ibid.*, p. 149. Also see J. Gaspar and E.L. Glaeser, “Information Technology and the Future of Cities,” *Journal of Urban Economics*, forthcoming.

seems to be at least as much reason to be optimistic as pessimistic about the future of cities.⁶⁰

In short, different cities will have different strengths and weaknesses, requiring different development strategies.⁶¹ These differences will reflect different histories, resource endowments, industrial diversities, scale economies, physical features and accessibility, among other qualities. It is easy to understand why many city planners and other students of urban development insist (perhaps too fervently sometimes) that policy and related planning must be site specific. Certainly, broad generalizations should be drawn with care.

Nevertheless, one very broad conclusion does seem to emerge: investments in urban development and infrastructure (whether done by public or private agencies) should be an integral part of most national economic development programs. Simply reforming agriculture or developing primary extractive industries will likely not be enough. Cities must also be expanded, not only to provide a home for farm workers separated from the land by agricultural rationalization, but also as locations for incubating new economic activities to fill the voids that will inevitably be created by the ebb and flow of product, technology, and factor-price cycles. In today's world of global competition, moreover, that incubation process goes beyond domestic concerns to include important "information and financial liaison" with the outside world.

A successful incubator is likely to be a city that has origins in some depot or transportation hub activities, some prior development in industries oriented to agglomeration economies, diversity in its industries and export base, enough size to have developed cumulative and self-reinforcing growth processes,⁶² and relatively strong access to a wide spectrum of human skills and capital. A less promising profile would be a small city founded on logistic advantages for one specific industry and technology and little pre-industrial history as an urban location.⁶³ Again, too, the "cyclic positioning" of a city's export industries will also make a difference.

All this would suggest that a Hong Kong, Shanghai or Guangzhou are more likely to succeed than Anshan or Dailan. A Bangalore, Bombay or a Madras seem more likely to

60. Glaeser's "Are Cities Dying?" provides a fine overview of these issues and ends on a generally optimistic outlook, especially if local governments avoid policy mistakes commonly occurring in the past.

61. Michael Porter's suggested "strategic planning" approach for revitalizing depressed inner-city areas in North America might also be well-suited to diagnosing these particular problems. See his "New Strategies for Inner-City Economic Development," *Economic Development Quarterly* (February 1997), pp. 11-27.

62. See Krugman, *op. cit.* & Glaeser, et al., 1992, *op. cit.*

succeed than Chandigarh, Bhopal or Jamshedpur. Perhaps, too, Kuala Lumpur, and certainly Singapore, should be more successful than Pedang. In the same vein a Bandung or a Jogjakarta would seem more promising than Palembang. Finally, of the Spanish-speaking cities of Latin America, Buenos Aires, Santiago and Montevideo, and to a lesser extent Lima, would seem to have an advantage over Caracas, Asuncion, Quito and Sucre.

Of course, there is nothing infallible about these diagnoses and prognoses. The argument also minimizes the distinct possibility that many developing countries, with so many raw material resources yet to be developed, will also develop some important new centers for basic industries, founded on logistic advantages. Some of these might also develop into agglomeration cities, given time and sensible public policies. Almost by definition, many different kinds of cities will emerge in developing economies; infrastructure investments in these, properly chosen and directed, might have very large positive effects on national economic development.

Public policy mistakes, though, could also be expensive. Significantly, even though location choices involve large sunk and highly durable investments, market forces do seem to work if given time. Locations with empty buildings, unemployed labor and available sources of other supplies usually do eventually attract investment and are renewed. Perhaps the soundest public policy is to facilitate and hasten, if possible, these remedial market forces. This would argue for limited government involvement in the actual development operations and for greater reliance on the private sector. A need for government oversight, though, may well persist; agglomeration economies are largely based on scale economies and externalities and the presence of these externalities has long been one of the better arguments for government intervention to improve economic welfare. Perhaps it should also be remembered (as many city planners have long pointed out) that cities are places for people to consume as well as to produce, to rest and relax as well as to work, pushing the argument for public policy interventions (for better or worse) far beyond the purely economic.

63. Again, see Chinitz's comparisons of New York City and Pittsburgh, *op. cit.*