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Book Review: *The Development of the U.S. Urban System, Vol. 1.: Concepts, Structures, Regional Shifts; Vol. 2: Industrial Shifts, Implications* by Edgar S. Dunn, Jr.

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Development of the U.S. Urban System

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The Development of the U.S. Urban System, Vol. 1.: Concepts, Structures, Regional Shifts; Vol. 2: Industrial Shifts, Implications. By Edgar S. Dunn, Jr. Washington, D.C.: Resources for the Future, 1980, 1983. Pp. xvi, 205, xiii, 266. $65.00; $75.00.

At least since the North-Tiebout debate of the 1950s there has been a tradition of cross-fertilizaton between regional science and economic history to the benefit of both fields. Although numerous landmark studies mark this symbiosis, one specific study deserves particular mention: *Regions, Resources and Economic Growth* by Harvey S. Perloff, Edgar S. Dunn, Jr., Eric E. Lampard, and Richard F. Muth (The Johns Hopkins Press, 1960). That book, by combining a massive data collection and refinement effort with the then emerging shift/share technique of regional science, provided a comprehensive picture and causal examination of variations in U.S. regional growth patterns between 1870 and 1954. It represents a direct harbinger of Edgar S. Dunn, Jr.'s two-volume study presently under review.

At the most superficial level, *The Development of the U.S. Urban System* extends the earlier work into the 1940–1970 time frame by applying shift/share analysis to decennial census regional/industrial employment statistics. This study, however, seeks to accomplish much more for, as Dunn points out in his preface to Volume 1, "[e]xplanation is always rooted in the conceptual images we bring to a field of study [and i]n the field of urban and regional development . . . the literature offers only a highly fragmented and disassociated set of concepts" (p.xv). The goal of the study is therefore to provide a unifying framework with which to analyze spatial growth patterns and to apply the conceptual apparatus developed to a period of rapid change in the U.S. economy. As such the study is more than an exercise in quantitative economic history; it also presents a new methodology and attempts to reorient the way we look at urban systems.

In keeping with these objectives, Part I of Volume 1 (consisting of four chapters) aims at modifying our approach to urban and regional development. Although it is impossible here to capture all of the nuances of Dunn's approach, several salient features can be highlighted. The author prefers to view the urban system in a relational (versus classificational) manner. The urban structure is seen as a complex set of overlapping and intersecting information- and physical-processing networks. It follows that, although regions should be defined in a behavioral/relational manner, our penchant for adopting classification schemes results in imperfect network closure. Arguing against the reality and efficacy of classical general equilibrium and central place theories, Dunn contends that the underlying transaction networks still result in both a hierarchical and systemic urban pattern.

In investigating the sources of urban change (in Dunn's view modern society contains no nonurban *relational* activities) an important distinction is made between growth and development. Growth is defined as " . . . those adaptations to environmental change made within the context of established ways of behaving . . . " (p.14). It is a scalar

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concept, operating in both positive and negative directions, associated with a change in the mix of activities and the structure of transaction networks. "Development . . . refers to adaptations to environmental change requiring changes in the way of doing things . . . " (p.14). Growth might be compared to movement along the track. Development is changing tracks. Observed growth has its seed in previous development. As we shall see, these concepts are crucial for the empirical research to follow.

Finally, Part I seeks to identify some regularity or recognizable sequences in the pattern of urban change. Regularity is found in the problem, solution, further problem sequence of developmental activity. A scenario of development stages based on this sequence is advanced. Unlike most "stage theories" of growth, however, Dunn's identified pattern is not ontogenetic. Stages can overlap, regions may not go through all the stages, they may skip stages and, most importantly, they may progress and regress. The ebb and flow of regions in development sequence is related to the locational effects of transaction network (both physical and information) articulation.

In the four chapters comprising Part II, "Representing the Urban Structure," the decennial census employment data by industry are used to illuminate the previously developed conceptual framework. Since current data systems are classificational, not relational, the marriage is imperfect. To infer more accurately relational networks from classificational systems, Dunn utilizes data at the county level (3,065 observations) and aggregates these to reflect urban regions (171 Bureau of Economics Analysis "economic areas"). These data are further organized to reflect household transaction fields and trade center levels. Chapter 6 is devoted to an overview of the total U.S. urban system. In addition to utilizing some fascinating graphic and tabular presentations aimed at capturing the totality of the system, Dunn presents an interesting comparison to the urban pattern predicted by central place theory. He sees the actual off-centered, concentrated pattern of development as the result of agglomerative and historical forces (for example, a "filling-in") rather than a central place, "drawing together" process. Interestingly the resulting pattern is dominated by the need to organize intermediate transaction networks, networks not captured in our social accounts. Some enticing spatial patterns, which can only be alluded to here, are hypothesized. These include the notions of a shadowed center (p. 76), the compensation principle (p. 77), and "halfway" urban center (p. 77), among others.

Chapter 7, by looking at regional patterns rather than the totality of the system, tests the hypotheses advanced in the previous chapter. This analysis confirms that regions are more likely to contain typically sized trade centers than a typical number of them. Observing the regional change in settlement patterns, Dunn finds that the higher order trade centers (for instance, primary and secondary wholesale-retail centers) exhibit more stability than lower order centers.

The final chapter in Part II, Chapter 8, computes indexes of industrial specialization and industrial profiles (on a 31-"industry" basis) in both 1940 and 1970 for urban regions, trade centers, and transaction fields. These activity profiles are used to infer intermediate transaction networks in these two years as well as changes in these networks during 1940–1970. It is found that urban transaction networks probably became more highly articulated and the total system became more coherent during the study period. Unfortunately, although the foregoing statement captures the flavor of the chapter, it glosses over the plethora of insights presented concerning regional and industrial transformation.

Although Part II concentrates on urban system structure while hinting at structural change, the seven concluding chapters that follow as Part III of Volume 1 (as well as the preponderant portion of Volume 2) are devoted to the analysis of that change. Chapter 9 and one appendix of Volume 1 are devoted to presenting and explaining shift/share analysis. The shift/share technique is used to describe, interpret, and analyze the pattern of urban change. It represents the bridge between the author's conceptual framework

(Part I) and the observed record (Part II). Although a full explanation of shift/share is beyond the scope of this review (and Dunn provides an excellent summary), it might be noted that the method basically breaks down observed regional growth into that attributable to overall U.S. growth (the "national growth effect") and the deviation from the national reference base (the total differential effect). The latter in turn is disaggregated into growth deviations attributable to a region's industrial structure (the industrial-mix effect) and those resulting from the specific competitive advantage or disadvantage of the region (the regional share or competitive effect). Crucial to Dunn's analysis is the identification of national-growth and industrial-mix effects with his concept of growth (that is, scalar growth), while development is reflected in the regional share effect. Although recognizing that this dichotomy is not perfect (and can be improved by better and more disaggregated statistics), this conceptual/empirical categorization is *the* major contribution of the volumes under review. Clearly this *modus operandi* highlights the fact that development takes place in space and its effects are transmitted over space. It is a useful, thought-provoking contribution.

Chapters 10 through 13 use the components of shift/share analysis to illuminate the growth/development pattern. Chapter 10 compares national-growth effects with total differential effects at the county, regional, trade center, and transaction field levels. The fact that total differential effects, 1940–1970, are only approximately 25-26 percent of national-growth effects for the entire system illustrates the inertial characteristics of the growth/development process. Particularly intriguing was the effect of inertia on the industrial Northeast and the weakening (positive) differential effect in the West. Remember the period is 1940–1970.

Chapters 11 through 13 analyze regional growth/development differentials and sequence patterns by comparing industry-mix (growth) effects and regional (development) effects. An octant code (B code) is developed on the basis of the sign and relative dominance of these two effects. At the county and urban region level (but not the trade-center and transaction-field level) regional effects exceed mix effects with the dominance of the former increasing over the 30-year time span. Counties exhibiting both positive mix and regional effects tend to be concentrated; those with the opposite signs dispersed (and specialized in agriculture and/or mining). The descriptive power of the code can only be alluded to by pointing out the characterization of B3 counties (positive regional effect dominating positive mix effects) as "on the make" or B5 counties (negative regional effect dominating positive mix effects) as "tired" B4s (dominance reversed). Much of what was found might have been expected (such as the Southeast's strengthening regional effect), but significant surprises await the reader (such as the positive regional effects in the Bos-Wash corridor). Much of what is found during the 1940s, 1950s and 1960s presages trends popularized as "new" only in the 1970s and 1980s (such as the largest centers being dominated by scalar or growth effects while middle-sized centers are most dynamic).

Finally Chapters 12 and 13 use the octant code to apply the growth/development scenario developed in Part I. Likely octant progressions and regressions are identified and tested. Although some superficial resemblances to traditional life-cycle or stage development theories are found, the ebb and flow, the existence of "sticky places," and the dynamic instability embodied in Dunn's conceptual apparatus are amply illustrated by the data. For instance, 49.5 percent of the 1940–1950, 1950–1960, and 1960–1970 sequence records may be characterized as "progressive," but 44.5 percent are repetitive with the remainder regressive.

Although Volume 1 is largely growth oriented and devoted to the study of the contribution of total industrial activity to the resulting summary shift pattern of each region, Volume 2 is development oriented concentrating on the contribution of individual regions to the interregional shift pattern exhibited by each industrial sector. The focus widens from 171 regions or 3,065 counties to 5,301 or 95,015 (= 31 × 3,065) industry/regional pairs. Chapters 14 and 15 of Volume 1 anticipate this shift of focus by investigating each industry's contribution to the overall industrial-mix effect. Further, to simplify subsequent analysis, synthetic or prototype regions are set up. These synthetic regions combine the octant or B-code categories with information on typical industrial structure. To illustrate the technique used, industries in B4 regions (see above) were characterized as leading decliners (11 of 31), lagging decliners (9), or countertrend industries. Each industry was also identified as being relatively specialized or unspecialized in the typical B4 region.

Volume 2, after an initial chapter summarizing Volume 1 concepts, methods, and results, contains a four chapter section "bridging" the (largely) growth perspective of the first volume with the developmental emphasis of the second. Chapter 2 focuses on disaggregating by industry the overall or summary industrial-mix and regional effects. The crucial conclusion, which highlights the importance of the second volume, is that "[t]he factors that generate large industrial growth rates are not often simple scalar changes in final demand . . . [t]hey are more characteristically the result of a strong developmental dynamic reflecting technological inventions and innovations in the broadest sense" (p. 11). At the risk of oversimplifying, the rest of Volume 2 is largely devoted to the development of this theme.

After examining leading, lagging, and countertrend industries by broad geographic regions (such as Upper Appalachia or Northern Plains), Chapters 3 and 4, in the spirit of Volume 1, set up a developmental code, called Code C, to describe in a generic manner the massive, multi-dimensional (shift/share effect × specialization × industry × spatial entity) matrix. In setting up the eight prototype regions identified by Code C, Dunn contrasts or juxtapositions the specialization role of industry in a region with the developmental character of industry in that region. Application of the code allows the author to demonstrate two important trends at the county level: the spread of activity specialization to previously unspecialized areas and the rearrangement of activities between already specialized areas. Significant support for the dynamics of export-base theory is found, but numerous exceptions are also noted.

In applying Code C categorizations to trade-center and transaction-field data, Dunn demonstrates that "the effect of developmental changes has been far greater on the systemic properties (that is, the generalized access characteristics) of the urban-system network than upon the system's broad geographical structure" (p. 33). That is, transaction topology dominates topography in explaining developmental patterns. In the conclusion of Chapter 4 and in Chapter 5, Dunn utilizes the C code to investigate developmental sequence patterns over the 1940–1970 period. Given the eight developmental codes and three decades of data, a large number of theoretically possible sequences exist; however, a limited number of sequence patterns dominate the results. The observed sequence paths are those to be expected on the basis of short-run equilibrium theory working in conjunction with developmental forces. Again, what is found is not only an evolutionary pattern but also (and more importantly) an oscillatory ebb and flow pattern that is consistent with neither our form growth models nor our organismic or life-cycle stage theories.

The seven chapters that comprise Part 2 of Volume 2 defy succinct review. Each of these chapters summarizes developmental changes in a group of the 31 specific industry sectors and their effects on spatial distribution of activities in the United States. Of particular interest to economic historians will be that, while concentrating on the 1940–1970 period, Dunn does place developments in this period within the context of a longer historical time span. The organization is as follows: Chapter 6, transportation; Chapter 7, other linkage industries; Chapter 8, resource sectors; Chapter 9, manufacturing as a whole; Chapter 10, materials industries; Chapter 11, fabricating industries; Chapter 12, retail trade, services, construction, the armed forces, and international trade. Although the main outlines of the industrial growth/development scenarios presented in these chapters will be familiar to historians, the additional insights rendered by Dunn's conceptual apparatus are everywhere apparent. Thus historians may feel comfortable with Dunn's use of developmental epochs and problem-solution sequences, but may gain useful insights through the volume's use of network articulation and dominance in describing transportation/communication linkages or industry-mix versus regional effects in analyzing agricultural and manufacturing dynamics.

Rather than summarily reviewing the one hundred plus pages of Part 2, let me better illustrate the richness of Dunn's approach by choosing one industrial sector, wholesaling, not often given prominence in either the historical or regional science literature. Initially note, given Dunn's emphasis on transaction networks, the pivotal role played by this "linkage" sector in any explanation of development patterns. The dual role of wholesalers as physical (good) processors and information processors is illustrated and their "seed core" role in the development of early American cities outlined. The inadequacies of traditional classification schemes to capture adequately network changes (such as the faster growth of manufacturing branches without stock versus those with stock at hand) are mentioned. As the increasing complexity of transaction systems led to increased specialization, information-processing components of wholesaling (such as factors, brokers, agents, and so on) become functionally and locationally split from goods-processing components (wholesale merchants). Within the goods-processing component a further primary versus intermediate specialization arose. The role of changing communication and transportation channels and shifting production location in this evolving pattern is discussed; wholesaling loses its city-creating role, but remains crucial in the "reweaving" of how transaction networks are hung on the nodal structure. Although the outcomes of these developments have definite geographical implications (such as growth in the Southeast) the effects on functional developments (such as the reduction of wholesale specialization at the top of the urban hierarchy—resulting from changes in the "goods" part of the industry—combined with an overall movement up the urban hierarchy—resulting from the "information" part of the sector) and network linkages (favoring locations along the interstate highway system) are given prominence. The relationship of industry change to the Code C development patterns is emphasized once again, illustrating the primacy of functional over topographic development patterns.

The final three chapters, which comprise Part 3 of the study, aim at summarizing the material, commenting on post-1970 developments, and discussing policy and methodological implications of the results. Chapter 13, in its attempt to summarize the study, points out that the developmental process in any period is always an extension into that period of the historical dynamic of the system. Hence Dunn must examine pre-1940 developments to understand the 1940–1970 period, and thus we can benefit from his analysis in our understanding occurrences in the 1970s and 1980s. Basically the 1940–1970 period is seen as one in which the "machine revolution" made it into the barn, craft shop, and household and, more importantly, the dominance of information-processing and subsidiary activity became an established fact.

Overall the effect of development on transaction networks has been to increase the number of route segments, increase route flexibility, and increase the total length of channels servicing a given area. The spatial result of this increase in system connectivity and articulation has been (1) a reduction in the number of levels in the urban hierarchy, (2) a fall in the percent of transactions internalized by a given set of boundaries, (3) a more continuous flow network, and (4) extension of fields of access and control with corollary increasing functional specialization.

Chapter 14 is devoted to a speculative exercise relating current and future trends to Dunn's conclusions emanating from his study of the 1940–1970 period. It also contains a "mini-update" for the period 1970–1977 using Department of Commerce employment estimates. Dunn suggests that the U.S. is currently in the midst of a "phase shift" or major transition characterized by a movement from emphasis on satisfaction of material wants to the fulfillment of "higher," information-intensive needs. As throughout Dunn's study, one is struck by the degree to which contemporary problems *and* problem/solution sequences, currently occupying the attention of the professional and popular literature, are anticipated or reflected in the 1940–70 period *if* one looks at the evidence in the right way.

The final chapter contains a critique of current regional economic methodology and policy in light of the author's findings. In the policy area Dunn's conclusions can be summarized as: (1) problems are not truly regional in nature (since regions are not behavioral entities), but are rather problems existing in physical- and information-processing transaction networks, and (2) since the evolutionary process is not merely scalar, decline and regression need not necessarily reflect a pathological condition to be delayed or reversed, but rather may be adaptive in nature. In both the areas of methodology and policy Dunn makes an appeal for a more catholic or holistic approach (instead of a reductionist view) and a plea for understanding the larger historical forces at work.

Dunn's study is clearly a major *tour de force*. In addition to the 30 chapters I have focused upon, however scantily, in this review, the volumes contain nearly 50 pages of appendices presenting methods and data, an extensive glossary of terms, an index and a comprehensive list of references. Thirteen microfiche file pages are included containing the basic statistical building blocks of the empirical part of the work. In addition, numerous color-coded (at the county level) maps of the United States are provided. These (along with acetate overlays showing more macro details) allow the reader to investigate further patterns referred to only briefly in the text. Resources for the Future and The Johns Hopkins Press are to be congratulated, along with the author, for producing such comprehensive, informative, and aesthetically pleasing volumes.

Dunn's study is not without faults. The terminology employed is often tortuous. Although devotees of shift/share analysis might be prepared for some of the terms utilized, many concepts, especially those evolving out of Code C, will challenge even the intrepid reader. Terms such as leading or lagging (referring to magnitude, not timing) competitive gainer/loser are difficult to relate to one's professional lexicon. The result may be "many a slip between cup and lip." Further, these two volumes must be read as a unit to do justice to the breadth and depth of the overall study. While I suspect many undergraduate term papers will have their genesis in these two volumes they clearly contain more "heady" material. If these are faults of the study, however, they pale in comparison to the author's accomplishments.

In assessing the achievements of this study, many adjectives, some of which I have already used, come to mind. It is truly a monumental piece of conceptual and empirical research. It presents a scholarly, holistic model of the growth/development process, applies the model in a most comprehensive and gratifying way to 1940–1970 U.S. experience, and suggests its universal applicability in other time frames. It is certainly a thought-provoking and challenging work. Clearly these volumes are meant to be read, reread, and thoroughly assimilated. Although their ultimate impact on economic history and regional science must await the outcome of this (often) lengthy assimilation process, I confidently predict that the process itself will be a most rewarding professional experience.