The Dynamics of Industrial Growth in the Old Northwest 1830-70: An Interdisciplinary Approach

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Historians have customarily talked about the economic development of the Old Northwest in the middle years of the 19th century within an agrarian framework.[1] Though the Jeffersonian image has been modernized and modified by studies of the rapid growth of commercial farming, of the national importance of mineral and forest resources, and of urban frontiers, little systematic attention has yet been given to the growth of a manufacturing sector. Presumably western industrial enterprises were either nonexistent or unimportant.[2]

A similar conclusion about the insignificance of manufacturing in the Old Northwest in the period 1830-70 could be reached from a different approach -- namely an analysis of the process of American industrialization. Throughout both the customary and "new" discussions of the timing, location, and causes of industrial growth, attention has been focused on the Northeastern States. Presumably cotton textiles, heavy goods, or the railroad provided the keys to understanding the rise of the factory system somewhere between 1815 and 1850. But neither the West nor the South was destined to play a noteworthy part in the modernization of the economy.[3]

Given this disinterest in or lack of information on western manufacturing in a period in which the American economy was undergoing rapid change, some quantitative evidence must first be produced to show that there was an industrial sector which fulfilled a significant function in both regional and national development. Then it is possible to discuss alternative approaches to analyzing the dynamics of growth before suggesting a new synthesis. What then were the foundations of the modern Great Lakes manufacturing belt?

THE MANUFACTURING DIMENSIONS OF THE OLD NORTHWEST

Throughout the middle 19th century New England and the Middle Atlantic States produced most of the country's manufactured goods.

But the absolute and relative contributions of the West grew steadily, with marked increases occuring in the 1860s (see Table 1). Within the expanding West, the Old Northwest, containing some 70 percent of the area's population, contributed a similar proportion of its industrial output.

Disaggregating the statistics further, the leading manufacturing state in the Old Northwest was Ohio which had combined the initial advantages of early settlement with an abundant resource base. However, as population spread westward during the 1840s and 1850s, and as the area's resource base was more fully utilized under the impact of transportation and technology, Ohio's regional contribution fell from 53.0 percent in 1850 to 35.4 percent in 1870. By that date Illinois had begun to rival Ohio and contributed 24.6 percent of the value added by manufacture in the Old Northwest. Illinois's growing competitive position stemmed from good access to resources on both an intrastate and an interstate level, and this in turn was primarily a reflection of the rapid rise of Chicago as a national transportation center. Michigan and Wisconsin both expanded their industrial sectors on a more limited basis, drawing heavily on lumbering activities in the 1860s. In the 20-year period from 1850 to 1870 they increased their share of the region's value added from 9.5 and 7.3 percent respectively to 15.8 and 9.9 percent. Indiana produced a declining share of the region's total output, namely 15.8 percent in 1850 and 14.3 percent in 1870.[4]

The relative position of the individual states within the region was not only a function of settlement patterns and transportation links, but was also connected to the variety of their manufacturing.[5] Within the United States, the West in general and the Old Northwest in particular made noteworthy contributions in the branches of farm implements manufacturing, flour and lumber milling, liquor manufacturing, and meat packing -- in other words, either in primary processing industries or in branches directly connected with agricultural productivity (see Table 2). Within the Old Northwest, Ohio's early dominance showed in all branches other than in farm implements. This lead was threatened only by the rapid growth of lumbering in Michigan and Wisconsin in the 1860s and of flour milling, brewing and distilling, and meat packing in Illinois in the same decade. Then by the early 1870s Ohio was starting to specialize in the heavy industries -- a trend which was later mirrored by both Illinois and Wisconsin. But in the period prior to 1870 the Old Northwest could be classified mainly as a processing region with secondary contributions being made by the heavy goods and household consumer groups.

The preponderance of the processing branches fostered an initial dispersion of manufacturing activities, which in turn produced a dual pattern of growth. Not only did industrial establishments evolve through structural stages from household to shop and mill and then to factory but they also moved, at a slower

Table 1
THE MANUFACTURING PROFILE OF THE OLD NORTHWEST, 1840-70
(Value added[a] in thousands of dollars)

States	Year 1840[b]	As percent of US total	Year 1850	As percent of US total	Year 1860	As percent of US total	Year 1870	As percent of US total
Ohio	16,905	6.31	28,014	6.03	51,891	6.07	112,582	6.45
Indiana	4,132	1.55	8,356	1.80	15,227	1.78	45,482	2.60
Illinois	3,137	1.17	7,575	1.64	22,022	2.57	78,021	4.48
Michigan	3,112	1.16	5,033	1.08	15,023	1.75	50,252	2.89
Wisconsin	636	0.23	3,878	0.84	10,712	1.25	42,459	2.15
Old Northwest	27,922	10.42	52,856	11.39	114,875	13.42	317,700	18.21
Western States[c]	36,771	13.73	75,156	16.19	158,553	18.51	470,128	26.95
United States	267,723	100	463,983	100	854,257	100	1,743,892	100

Sources: *Sixth Census, 1840, Compendium; Senate Executive Documents,* 35th Cong., 2nd Sess., Doc. 39 (1858-59); *Eighth Census, 1860,* Vol. 3, *Manufactures;* and *Ninth Census, 1870,* Vol. 2, *Wealth and Industry.*

[a]
[b]Computed by subtracting the cost of the materials from the value of the product.
[b]Figures for 1840 are for capital invested.
[c]Ohio, Indiana, Illinois, Michigan, Wisconsin, Iowa, Minnesota, Nebraska, Missouri, Kansas, and Kentucky, as defined in the 1860 Census.

Table 2
MAIN VARIETIES OF MANUFACTURING IN THE OLD NORTHWEST, 1850-70
SELECTED INDUSTRIES
(Value added in thousands of dollars)

Industry	Year 1850	Old Northwest percent of US total	Year 1860	Old Northwest percent of US total	Year 1870	Old Northwest percent of US total
			Processing branches			
Cooperage	1,561	34.82	2,240	30.95	5,052	36.00
Flour and meal	6,954	30.20	13,015	32.47	25,006	32.22
Leather	1,796	12.10	1,986	8.71	5,020	14.55
Liquors	2,856	36.15	8,169	36.04	14,038	31.18
Lumber	6,398	20.68	13,561	25.31	45,200	37.60
Provisions	1,352	53.44	2,083	29.37	6,027	42.58
			Heavy industry			
Agricultural implements	1,218	27.69	5,417	45.28	15,407	50.36
Iron and iron goods	3,492	13.56	6,617	14.21	25,450	18.85
Machinery	1,796	10.79	5,436	16.69	13,299	17.08
			Household-consumer branches			
Blacksmiths	1,752	16.01	1,311	15.93	7,012	24.51
Boots and shoes	2,617	8.68	4,498	9.14	10,261	11.65
Clothing	1,977	8.75	5,776	13.89	11,630	15.11
Furniture	2,199	18.99	4,543	26.03	11,336	26.22
Tinware	1,210	12.45	1,838	20.38	4,547	21.07
Total	52,856	11.39	114,875	13.42	317,700	18.21

Sources: *Senate Executive Documents,* 35th Cong., 2d Sess., Doc. 39 (1858-59); *Eighth Census, 1860,* Vol. 3, *Manufactures;* and *Ninth Census, 1870,* Vol. 2, *Wealth and Industry.*

speed, through the locational change from smaller to larger urban centers. There was a hierarchy of industrial places, ranging from Chicago, Cincinnati, and Cleveland at the top, through intermediate points such as Dayton, Detroit, and Indianapolis to smaller centers such as Quincy, Terre Haute, and Racine. Indeed those industries which laid the foundations of the Great Lakes manufacturing belt were a remarkable combination of traditional and modernizing elements.

Having thus established the presence and nature of a western manufacturing sector in the mid-19th century, two important and interrelated questions need to be asked and if possible, answered. What were the dynamics of this growth and how should substantive research procede in order to obtain a deeper understanding of the process? Several alternatives present themselves to the historian who, albeit indirectly, can draw on a vast body of empirical studies in both western and economic history.

THE HISTORICAL APPROACH

Frederick Jackson Turner, a pivotal figure in the historical interpretation of the West, viewed the manufacturing frontier as the last stage of an evolutionary pattern of settlement and economic growth [80]. But his approach which concentrates on lateral spread tends to ignore the structural changes concurrently taking place in industrial organization. Given improvements in technology and expansion of markets, the firm evolved from the household unit through the domestic system to the craftshop and mill, to the manufactory and finally to the factory.[6] Western industrial enterprises adopted and adapted the more sophisticated units of organization and their evolution was shortened or telescoped as settlement moved west.[7] The Ohio frontier witnessed most of the customary forms of manufacturing but entrepreneurs in Wisconsin in the 1850s often started at the craftshop or mill level and moved rapidly into factory organization.

Approaching manufacturing in the Old Northwest from the Eastern perspective, historians have tended to use another mirror image -- where the West is a pale reflection of the contemporary East rather than an earlier version of itself.[8] Again, however, the looking glass distorted reality. The new West was an attractive location for two types of eastern entrepreneurs: those with little capital but ample training and those with solid financial backing and much ambition. In view of their monetary constraints the former began operations on a lower level by catering to local hinterlands. Once having accumulated sufficient resources they could enlarge their enterprises to a size and organizational structure similar to those in the East. But given the time lag and the site location, modifications needed to be made to allow for new technologies and western market conditions.

The well-endowed entrepreneurs were financially able to replicate eastern shops or factories, but they did not do this for three reasons. Though developing rapidly, the western economic infrastructure was still too immature to cater to sophisticated labor and transportation demands and thus western manufacturers had to begin on a lower threshold than their eastern counterparts. Alternatively they might only be interested in establishing a branch plant which was unlikely to operate independently of the market dominance of its parent and presumably eastern company. Third and most important, the cost advantage of western resources suggested that to maximize profits, varieties of manufacturing other than those already well developed in the East should be emphasized. Given increasing regional specialization and an emerging national market, the West had greater potential for manufacturing than to duplicate existing facilities.[9]

If then the Old Northwest was developing its own peculiar style of manufacturing in the period 1830-70, what was responsible for this distinctiveness? Historians have pointed to two main agents of change when discussing the region's general economic development, namely new modes of transportation and the spread of commercial agriculture. Perhaps these agents either separately or together also explained the rise and style of western industries.

Improved systems of transportation could play a triple role in stimulating western manufacturing. Steamboats, canals, and plank road and railroad projects could encourage new and positive ways of thinking about potential markets. Then their actual construction called for the western presence of men, materials, and capital, which in turn stimulated the use of local resources and the rise of service industries. Third, when the transportation links were operative, they provided a reliable and, at least with the railroads, a fast and all-weather means of connecting the West to regional, national, and even international markets.[10] Using their abundant resource base western manufacturers were then encouraged to build and expand industrial operations.

This triple role of transportation is, however, an insufficient explanation for the rise of western manufacturing because it fails to account for the two-way impact of new means of communications. Steamboats, canals, and railroads also facilitated the importation of manufactured articles into formerly isolated parts of the West. And when certain consumer goods made in older and better equipped eastern establishments became more accessible in western markets, the local growth of some branches of manufacturing was seriously impeded.[11]

If improved transportation could both stimulate and inhibit western manufacturing simultaneously, should the spread of commercial agriculture on family-sized units of operation be viewed as the major determinant of industrial growth? The impact of profit-oriented cereal and livestock production can be approached in terms of backward and forward linkages. As new and improved

machinery was needed to increase outputs, commercial farming stimulated the rise of a local agricultural implements industry. The presence of service industries such as blacksmithing, shoemaking, and furniture making also developed as a response to the needs of farmers who were now fully occupied in raising cash crops. Then these crops, which were low in value and high in bulk, could be processed locally into more profitable commodities such as flour, beer, leather, and meat, thus establishing a forward linkage from the farm to the processing industries. Commercial farming could therefore have a triple impact on western manufacturing.[12]

But the role of commercial farming, like that of new means of transportation, does not supply an adequate explanation of industrial growth in the Old Northwest in the period 1830-70. In the first place the exploitation of other primary resources such as lumber and minerals, together with their backward and forward linkages, is downplayed, if not ignored. Second, assigning priority to the agricultural sector negates or at least begs the question of the role of machine technology acting independently of farming as a stimulus to manufacturing.

THE ECONOMIC APPROACH

If historical studies do not provide suitable models for analyzing early western manufacturing activity, can concepts drawn from other disciplines such as economics, geography, or regional science either supply a workable thesis or suggest ideas for formulating an alternative synthesis? Here the Old Northwest must be treated both as part of the economic hinterland of the mercantile Northeast and as an emerging heartland for more recently settled frontier areas. The region is gradually but effectively brought into a market economy which has local, regional, national, and even international ranges and it is able to benefit from an existing machine technology at the same time as stimulating and even innovating change. Development economics might thus offer some useful tools of analysis.

In recent years economists have debated two main thrusts in "development economics" -- growth through a series of stages and growth stimulated by an export sector. The stage theory has been approached in two ways. The more customary design suggests either a simple three-tier model or a more refined five-tier model. In the former, production emerges from a predominantly primary stage consisting of farming, fishing, forestry, and mining, to a secondary stage which witnesses the rise of construction and manufacturing and eventually matures into a tertiary stage where increasing outputs are derived from service industries. In the latter, primary activities take up two stages, the second of which sees improved living standards and increasing specialization. Secondary activities also encompass two stages, processing and then

manufacturing using imported materials. The fifth stage incorporates the expansion of service occupations.[13]

If the usual stage theory is applied to the Old Northwest in the middle 19th century, then that region was either in the process of transition from the first to the second stage in the simple model or from the second to the third stage in the more refined model. But problems arise in making the theory operational because the mechanism of moving from one to another stage is not clearly defined. Certainly it may be possible to measure the transition by ascertaining changing sectoral proportions of capital invested, occupational distribution, or income generated, but bare statistics say little about the dynamics of growth.[14] Furthermore, as the stage theory downgrades the external relationships of the area under consideration, it suffers from practical weaknesses when considering the Old Northwest which was part of a national economy and did not develop in a vacuum.

The "new" stage theory -- the Rostovian concept -- uses another five-tier approach consisting of traditional society, a period of preconditions, a "take-off," the drive to maturity, and the age of high mass consumption. These stages are more easily identifiable because they are specified in measurable economic terms. In Rostow's model the Old Northwest again appears to be moving from the second to the third stage. Most of the preconditions have been fulfilled and, in view of the increasing investment in agriculture and transportation and the growth of new industries, "take-off" would seem to be under way.

However, problems again arise in trying to apply this stage theory to the case study of the Old Northwest. In the first place "take-off" cannot be compressed into any two or three decades in the region's growth in the middle 19th century. Then it is not possible to distinguish one industry which is strong enough to fulfill the role of the leading sector. Furthermore, as with the traditional stage theory, the Rostovian approach minimizes the impact of interregional flows and external relationships.[15]

If neither stage theory offers a suitable vehicle for the analysis of early western manufacturing, does the export base theory provide a better alternative? Briefly this design suggests that the timing and speed of an economy's growth depends on the success, characteristics, and multiplier effects of its export sector.[16] In the example of the Old Northwest the main exportable commodity in the period 1830-70 was agricultural surpluses, particularly wheat, which were sent East in increasing amounts either for internal consumption or for reexport. Then in view of the widespread patterns of farm ownership, the income generated from this export sector was either used to pay for imported manufactured goods or was invested in expanding farm operations and in developing local industries.

At first sight the Old Northwest appears to fit an export base theory of growth but two major problems remain unresolved. The processing branches of manufacturing and the services or household

consumer goods sector rose simultaneously with and not subsequent to increased farm productivity. The processing industries were thus part of the export sector rather than dependent on income originating there for capital investment. Second, the emphasis on agricultural outputs belies the diversity of the region's resources. Other raw materials such as lumber and minerals were exploited independently of farm activity. Thus investment and residential construction were neither solely nor necessarily dependent on farm productivity.[17]

THE GEOGRAPHICAL APPROACH

In view of the problems of applying either main theory of development economics to the case study of the Old Northwest it might be helpful to turn to the discipline of geography to gain a better understanding of intraregional and interregional relationships and thus of internal and external elements of growth. Space utilization has been discussed both theoretically and empirically in terms of hierarchial matrixes which are differentiated by occupational functions such as agriculture, retailing, or wholesaling, and which are focused on towns and cities. Central place theory with its analysis of the relationship between urban points and their hinterlands thus tends to be market-oriented. The pattern of the market structures varies according to changes in population and modes of transportation as well as in the ability of an established center to maintain its initial advantage.[18]

Applying central place theory to the problem of manufacturing growth in the Old Northwest in the period 1830-70, there should be a hierarchy of centers which consumed the region's industrial output. The small communities with their sawmills, gristmills, blacksmith forges, and tailor shops catered only to the local market. The medium-sized towns provided a wider range of manufactured goods while provincial cities such as Chicago, Cincinnati, and Milwaukee offered a full range of products. These higher-ranking centers had grown from minor places to become nodal points for manufacturing activities either because of the advantages of site location, for example, on a natural waterway, or because of economic aggression in building canals or railroads.

Central place theory does contribute to an understanding of the historical record. Early descriptions of Chicago, Cincinnati, and Milwaukee were not greatly dissimilar to those of Alton, Marietta, and Racine. Yet within one or two decades a hierarchy of urban places had emerged and the largest centers had begun to specialize their activities. Their city directories no longer listed only mechanics but proudly pointed out the presence of large mills and factories -- establishments requiring capital investments and labor supplies which were not available in small towns. They were thus able to sell their manufactures to a wider market as well as to supply the home demand.[19]

However, the directories of western cities not only listed mechanics and manufacturers, they also included numerous retailers. Furthermore, the annual statements of their boards of trade reported substantial imports of manufactured goods. In other words, even the large urban places were not self-sufficient. Their hinterland in turn provided market outlets for articles made in cities outside the region. The Old Northwest was not settled in a vacuum. It was part of a national economy and it is impossible to discuss its growth without considering long-distance trade connections.

The mercantile model takes up this deficiency and in turn suggests that the basic sources of growth and change are external to the area under consideration. Exogenous influences both predate and take precedence over any internal influences. Thus the commercial capacity of the Atlantic coastal cities and New Orleans shaped the initial resource utilization of the Old Northwest. These ports acted both as depots for the collection of staple commodities from the interior and as entrepôts for the distribution of goods in their hinterlands. Large quantities of manufactured wares were sent west and effectively competed with articles made locally in smaller establishments. Thus the existence and size of these western enterprises was dependent on the antecedent trade patterns of the mercantile ports. Only when their regional production of staples increased markedly did western towns start to assume an entrepôt role and export their own manufactured goods to the newer parts of the West.[20]

Although the mercantile model does allow for the internal mechanism of regional and urban development, local factors are subsidiary to and postdate the influence of trade. As such, no provisions are made for the early growth and market dimensions of those industries which arose simultaneously with the increased output of raw materials or for those industries whose cost advantage depended on changes in machine and transportation technology. Somewhat like the export base theory, the mercantile model fails to achieve a correct balance between internal and external elements of growth when applied to the Old Northwest.

AN ALTERNATIVE SYNTHESIS

Does an alternative approach exist or must the rise of western manufacturing be merely described without developing a conceptual framework? Can a synthesis be evolved which takes into account both the internal role of the region's resource base and the external influences of established trade centers, growing urbanization, and improvements in transportation and technology? Possibly a latent export analysis formulated in a framework of superimposed market areas may offer some suggestions. What then are the main premises of this interdisciplinary approach?

Stated briefly, manufacturers in the Old Northwest in the middle third of the 19th century operated within three distinctive

types of markets whose ranges fluctuated as changes in transportation and technology altered the potential resource base of the region and the competitive status of older, and for the most part, better equipped manufacturing centers. A complex pattern of industrialization emerged in which the processing branches fully satisfied local demands and also exported surpluses to northeastern and foreign markets. The heavy industries had both a local market and an expanding market in the newly settled West. In contrast to both of these groups, and of least importance in the development of the future Great Lakes manufacturing belt, the household-consumer goods sector only maintained partial control of the local market. Some further statements on the nature of each manufacturing branch may provide guidelines for detailed empirical work.

The region made most rapid progress towards industrialization in the processing branches. Utilizing the rich lumber and mineral resources of the Great Lakes area and the increasing farm outputs of the prairies, processors catered initially to neighborhood markets. Then as these owners of small gristmills, sawmills, butcher markets, and tanning yards gradually built up their capital and their sales expertise they were able to ship their increasing outputs eastward, either by water or rail, to national and even international markets. Older manufacturing centers in the northeastern states did not pose a strong competitive threat because the cost of shipping low-value, bulk commodities over long distances made western processing more profitable, particularly at transshipment points. Thus processing was not only the leading industrial sector in the Old Northwest, it also contributed a notable portion of the national output (see Table 2).

The heavy industries of the Old Northwest formed another branch of manufacturing with both intraregional and interregional market thresholds. The increasing demands for primary products created a simultaneous need for improved farm machinery, flour, sawmill equipment, and steam engines. Local ironmasters and machinists were initially well placed to meet this need because they were partly shielded from the competition of older firms, even those in backstate New York and Pennsylvania, by problems encountered in shipping high-cost goods. When the railroads effectively broke down regional protection in the 1850s and 1860s, those western enterprises which had built up sufficient capital not only survived but found new markets, first for railroad equipment and repairs and then for the machinery needs of the expanding frontier.

The household-consumer branches of manufacturing in the Old Northwest operated within a third type of market structure. Artisans such as tailors, tinsmiths, and cabinetmakers also began their enterprises while partly protected from competition by the cost of importing finished goods. However, their shelter was much less secure than that of the local ironmaster. Even when mercantile credit and capital intervened to help transform the craftsman into the manufacturer, western factories still encountered serious problems in overcoming the challenge provided by mass-produced, medium-

priced eastern imports. Certainly there was a local market both for specialized and ready-made household consumer goods, but it was more restricted than that of either the processing or heavy industries. The export market had few, if any, points of access.

CONCLUSION

Production statistics show that in the period 1830-70 the Old Northwest had a manufacturing sector which contributed from 10.4 to 18.2 percent of the nation's output. But neither these figures, nor a historical description of the region's industrial profile, nor economic and geographical theories, suggest specific reasons for the dynamics of growth. To attempt such an explanation, the historian must first disaggregate the profile into distinct groups and then examine the ability of each group to adapt to changing economic conditions on both the regional and national levels. This analysis can best be achieved by using a framework of superimposed market structures. The processing branches sold products in four ranges of markets; local, regional, national, and international; the heavy industries catered to two, local and regional facing westward; the household-consumer branches rarely rose above the local level. The size of these market areas altered as settlements moved west and as a more mature industrial infrastructure was built up, but in the middle years of the 19th century the Old Northwest was developing its first manufacturing capacity.

NOTES

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1. The Old Northwest, which consists of the five states of Ohio, Indiana, Illinois, Michigan, and Wisconsin, is basically a political or administrative region. Though the area shows some economic coherence in the terms of institutional developments and the timing of its settlement, it would be necessary to include the backstate areas of New York and Pennsylvania to achieve natural or geographic boundaries. For discussions on the nature of regions see [28, 35, and 27].

2. Though there is no single volume on the economic history of the Old Northwest many monographs and general works have dealt with different parts of the region and its various economic activities during the middle years of the 19th century. See, for example, [38, 24, 9, 18, 76, 32, 73, 36, 83, and 1]. Three early monographs provide valuable narrative information on aspects of western manufacturing: [53, 47, and 69]. Two more recent works

are [23 and 86]. For a broader approach to early western manufacturing see the articles by Fred Bateman, James D. Foust, and Thomas J. Weiss, for example, in [6].

3. When manufacturing outside the Northeast is discussed it is regarded merely as being highly resource oriented. The standard work on American industry is [19]. For a traditional economic history see [30]. For newer interpretations see [37, 34, and 25]. Douglass C. North in [61] recognizes the growth of service industries as well as resource-based industries.

4. For general information on the Old Northwest see [11, 46, 49, and 74].

5. Western industries can be divided into three main groups -- processing, heavy goods, and domestic consumer branches. The processing industries refined the natural resources of minerals, lumber, and farm produce in their first or primary stage. They produced goods either for direct household consumption, for example, flour, beer, or meat or for consumption by other industries, for example, leather or lumber. The heavy goods group included furnaces, foundries, machine shops of all descriptions, and miscellaneous iron ware. The domestic consumer goods branch consisted of those industries making household articles such as clothing, furniture, and kitchen utensils and shops doing repairs. They thus included craftsmen often working on a custom basis, and the jobbing portion of retail stores, as well as manufactories and factories.

6. [79]. For a discussion of the differing terminology used in describing the stages of industrial organization see [21].

7. The most coherent statement of this "telescoping" process refers to the commercial production of western farmers [18].

8. Any discussions tend to be implicit rather than explicit. See, for example, [33 and 87].

9. See [53, 47, 69, 23, 86, 59, 55, 85, 89, and 84].

10. This a particular version of the more general thesis suggested by Leland H. Jenks [48]. For other pertinent discussions of the impact of new means of transportation, especially railroads, see [76, 32, 34, 73, 22, and 68].

11. For a wide ranging discussion of the concept of "initial advantage," see [67].

12. For a concise theoretical statement, see [5]. For indirect empirical observations see, among others, [38; 24; 9; 18; 32; 86; 19, Vol. 1; 26; 70; 4; 88; 66; 50; and 20].

13. The three-stage model is discussed by Allan G. B. Fisher [31] and by Colin Clark [16]. For the five-stage model see [44].

14. For general measurements of sectoral activity see [37, 51, and 29].

15. See [72]. For a convenient set of criticisms, see [71].

16. Douglass C. North is the chief exponent of the export-base theory (see [62, 60, and 61]). See also [77, 78, and 63].

17. The empirical observations are based on a broad range of historical works. See, among others, [76, 38, 24, 18, 32, 19, 74, 49, 86, 8, 39, 45, 52, and 65].

18. The two main exponents of central place theory are Walter Christaller [14] and August Losch [54]. For a convenient listing of the widespread application of the theory, see [7].

19. These empirical observations are based on, among others, [2, 64, 40, 41, 75. 10, 13, 16, 58, 12, 15, 56, 57, 42, 3, and 43].

20. James E. Vance, Jr. [82] is the main exponent of the "mercantile theory." For other relevant discussions see [67 and 81].

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