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FROM SETTLEMENT TO FORDISM: THE AGRO-INDUSTRIAL REVOLUTION IN THE AMERICAN MIDWEST*

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The Midwest has often served as a paradigmatic case of capitalist development and a proving ground for American theories of urban and regional growth, although interest in the successful history of the region has diminished in recent years. Existing approaches based on central place, staples export, cumulative causation, and industrial take-off concepts all miss the mark, despite their several contributions to an understanding of the midwestern experience. New ideas coming from industrial geography provide a spur to rethinking the nineteenth century roots of the birthplace of Fordist mass production. Four considerations stand out: (1) The indigenous evolution of industry and productive capabilities, starting from the very earliest periods of settlement; industry did not follow the plow, it built the plow. (2) The symbiotic relation of agriculture and manufacturing in a process of agro-industrialization, and the particular materials processing and farm supply sectors that led midwestern growth; external trade was not the driving force of expansion, but rather internal development of income and productivity. (3) The network of small and large cities embedded in the territorial production complex; the Midwest was a system of cities, to be sure, but one based on a common social production base as well as on circulation, and one which did not implode into its largest cities. (4) The distinctive course of midwestern development as compared with other major regions of the United States; the Midwest was not of a piece with the rest of the northeastern manufacturing belt.

The Midwest of the United States has long served as a paradigmatic case of regional development. From the pioneer settlements of the Old Northwest at the outset of the nineteenth century to Ford's revolutionary assembly line in the early twentieth century, the Midwest enjoyed a century of exuberant expansion at the end of which it had become the world's premier industrial zone. In our day, new places have come along to steal the Midwest's thunder: California, Japan, Emilia-Romagna. Once great factories and mills lie shuttered and small towns decimated [82]. The electronic age has not been kind to the Midwest. While far from finished, the Midwest has certainly been humbled. Perhaps, then, a time has come for reflection anew on the bases of growth and change in the past.

In an earlier, more confident time, the Midwest was commonly held up as an example to the modern world of the true path to capitalist growth: a potent mix of agricultural extension agents, railroads, and heavy industry. There has been an immense naivete about the peculiarly favorable conditions enjoyed by Americans on the road to capitalist development, and even about the struggles and social costs that were part of that largely successful story [*109*]. A century of capitalist expansion and revolutionary breaks, of painful experiments and frequently dashed hopes around the world has made us more attentive to the varied conditions and severe obstacles facing peoples elsewhere. Yet the midwestern experience cannot be set aside easily, if only for its weight in U.S. history. What is surprising is that at this late date the case of the Midwest is still widely misunderstood.[1]

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[1]To begin with, there is no consensus among historians and geographers as to the appropriate definition of the Midwest's boundaries. Yet differing interpretations have resulted in divergent conclusions concerning regional economic growth. The heart of the Midwest, in our view, is the area lying in the crook of the Ohio and Mississippi rivers and up along the shores of

It is necessary, therefore, to offer some major correctives to the existing literature on nineteenth-century midwestern growth, from which lessons can be drawn for the whole of regional development theory. They rest on principles drawn from the new industrial geography of the last decade, which is in turn aligned with the classical political economy of Ricardo, Marx, and Schumpeter against neoclassical general equilibrium theory [*161*]. This line of thinking takes a decisively productivist turn in theorizing the geography of economic growth, in contrast to the prevailing exchange- and circulation-based models of the previous half-century. It holds that rising productivity in industry and agriculture is the principal motor force of regional development, driven by the capitalist imperative to augment the forces of production in search of surplus value [*19; 64*]. Industries do not so much locate at particular sites as they create places at the same time as they expand their productive activities. Conversely, regions do not grow merely by trading or attracting economic activity, based on their natural endowments; rather, they industrialize by producing commodities in demand, improving production methods, multiplying their division of labor, reinvesting capital in further expansion, and remaining competitively viable.

The first thesis of this paper is that manufacturing was part of the settlement of the Midwest from the beginning, not a later addition to a previously established agricultural base. Industry did not locate in the Midwest so much as it helped create the region, as part of a vigorously expanding division of labor with agriculture.[2] The foundation for Midwestern growth was a broad, synergistic process of "agro-industrialization." We concur with Post [*129*] and Pudup [*136*] that the complex of industries that produced farm machinery, tools, and supplies and processed agricultural raw materials formed the heart of the American industrial revolution before the Civil War, and even for some time thereafter. In arguing for agro-industrialization, it is necessary to reorient economic history away from heavy industries and emphasize the contribution of resource-processing activities, along with farming itself. It is equally essential to acknowledge the importance of agrarian class relations for the industrialization process taking place in factories, workshops, and cities at a distance from the farm but intimately enmeshed in a vital relationship of mutually supportive development across wider production systems.

A second principle of economic geography is the importance of geographic specificity, or spatial divisions of labor [*100*]. This means emphasizing the differentiation and localization of industries against such ag-

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the Great Lakes from Erie to Superior. This area includes the entire states of Ohio, Indiana, and Illinois, along with southern Wisconsin and southern Michigan, plus northern Missouri, eastern Iowa, and southeastern Minnesota. For the Greater Midwest, we would add the river cities and borderlands: Pittsburgh and the Alleghenies, Louisville and northern Kentucky, the rest of Missouri, Kansas City and eastern Kansas, western Iowa, Omaha and eastern Nebraska, western and northern Minnesota, northern Michigan, and Wisconsin. The idea of a Midwestern core and periphery is discussed at length by Garland [*53*].

The physiographic and economic core of the region is thus the prairie Corn Belt and the river valleys. For example, Kentucky cities lying on the Ohio River accounted for 65 percent of that state's total manufacturing output in 1870, while Kansas and Nebraska cities located on the Missouri accounted for 40 and 80 percent, respectively, of their state totals. Walsh [*175*] thus includes the states of Kentucky, Kansas, and Nebraska in her definition of the Midwest, rounding out the 11-state group defined as the Western States in the 1860 census. Extending the province into the various plains, forest, bluegrass, and mountain borders along its fringe cannot be taken too far without absurd results, but equally controversial is the designation of northern Kentucky as part of the cotton South, Pittsburgh as part of the Northeast, or western Iowa as part of the High Plains (cf. Wade [*171*]).

The sequence of settlement that helped define the subregions of the Midwest was roughly as follows: 1800-20, from Pittsburgh down the Ohio Valley to St. Louis at the junction of the Missouri and Mississippi Rivers; 1820-40, the southern Great Lakes shores, from northern Ohio to Milwaukee; 1840-60, infill of the Prairie heartland across to eastern Iowa and southern Minnesota; post-Civil War, the penetration of the northern woodlands and eastern plains from the central Midwest.

[2]For a general brief on the importance of the division of labor in political economy and geography, see Sayer and Walker [*148*].

gregate generalities as central place systems or industrial take-off theory and defining the special qualities of people and places on which successful industrial production and innovation rest. Class relations and technical competence across the division of labor are heterogeneous and unevenly distributed, giving rise to a world of "many capitalisms" within the great arch of this globe-straddling economic system ([*161*]; cf. Lipietz [*91*]). New variants arise as capitalism expands, often into unlikely sites such as frontier territories seemingly far from markets or inputs, because they offer fresh social territory in which class relations put on a new face, possibilities seem unlimited, and resistance is little developed. In this furiously dynamic process of capitalist expansion, new industries and methods repeatedly break forth, new localizations arise, and successive waves of growth are associated with the rising (or renewed) industries of their time [*98*]. These "new industrial spaces" are central to the continuing renewal of the capitalist system [*154*]. Yet because the practical mastery of technologies and business affairs specific to different industries is embodied in the people and organizations who learn and grow with the industry, successful activities do not sprout up and succeed just anywhere.

Our second thesis is that the Midwest enjoyed a peculiarly fortuitous implantation of agrarian and industrial social relations, which gave wide vent to the creative energies of farmers, skilled workers, and capitalists. On this basis was constructed a flourishing set of industries, which developed a competitive level of technical competence very quickly and rose in many cases to national or even international prominence. Most of the early industrial activity was natural resource extraction or processing, much of it tied directly to farming. This pattern of geographical industrialization can only partly be explained in classic Weberian fashion or in terms of staples exports, because midwestern industries developed themselves through an evolution of productive capabilities that owed nothing to nature and everything to regional social arrangements, human capabilities, technological advances, and divisions of labor yielding powerful external economies. And as its industries grew and changed, not only was growth sustained and the internal space economy of the region reworked, but so, too, was a sequence of events unleashed that catapulted the Midwest to the pinnacle of the industrial world by the early twentieth century.

A third idea that has lately received a good deal of attention in economic geography is the territorial production complex. A stimulus has been the discovery of burgeoning industrial districts in the late twentieth century in places such as Emilia-Romagna and southern California [*6; 20; 154*]. They bear a strong resemblance to the clusters of small firms commonly found in such industries as textiles, cutlery, and guns in the nineteenth century [*146; 155*]. Long declared dead, but never actually eliminated from the scene by twentieth century factory production and corporate organization, the workshop, small firm, subcontracting, and territorial modes of industrial organization have made a comeback by the force of specialization, scope economies, flexible contracting relations, and shifting technical alliances, as well as the amassing of a rich (and often highly exploitable) labor pool [*153; 173*].[3] The spatial scale and internal differentiation of territorial production complexes have been insufficiently treated, however; industry localization can occur at levels from the submetropolitan to the multistate region [*161*]. In this regard, theories of industrial districts, past and present, still have much to learn from earlier approaches to city systems in the circulationist vein, especially the work of Pred [*130; 132; 133*]. Towns and cities together play a crucial role in territorial development that the term "region" commonly elides.

Our third thesis is that the nineteenth-century Midwest developed into a territorial production complex of great geographic breadth and internal richness. Within this complex were embedded a vast number of mutually reinforcing activities:

[3]This is not the place to delve into the strengths and weaknesses of the flexible specialization thesis; for further discussion, see Walker [*174*].

farming, of course, but also manufacturing specializations, mercantile trade, and finance. In exploring the spatial form of the Midwest, particular emphasis must be put on the neglected role of small industrial cities in the process of regional industrialization and the formation of a dense network of urban places. Most accounts of nineteenth-century urban-industrial growth focus on large cities, relegating small cities to a secondary and commercial role. And, while several writers have documented small city industrial vitality in this period, a satisfactory explanation of their role in midwestern development has yet to appear.

Finally, the overwhelming consensus for most of the twentieth century has been that the United States has had a single industrial core, the northeastern manufacturing belt, which grew up in New England and spread south to Baltimore and west as far as the Mississippi Valley. Midwestern development, in this view, simply repeated an essential national pattern as settlement flowed westward. This theme is a constant among geographers and regional economists who otherwise disagree on whether the essential process was one based on export of farm surplus, evolution from local trade to industrial take-off, or incorporation of regional urban hierarchies into a national city-system. Yet it has recently been challenged by industrial geographers on the basis of widespread evidence that regions have distinctive histories of industrialization and that urban and regional hierarchies are not as stable as previously thought, thanks to the revolutionary effects of industrialization [*98; 100; 161*].

Our final thesis is that industry did not spread across the United States to create a single, unified manufacturing belt from New Hampshire to Iowa. The Midwest is different in important ways from the rest of the United States, despite strong common foundations for capitalist development throughout. It enjoyed a distinctive natural and social basis for its agro-industrial development as compared with, say, California, Appalachia, or the South. Equally important in differentiating it from the Northeast, however, were its industrial specializations, which became more, rather than less, pronounced over time. Its city-system and transportation network also took on a characteristic flavor. The Midwest did not merge and converge with the Northeast; it began, rather, with a different twist on common themes, underwent some important internal transformations, and progressively diverged within the overall mold of U.S. capitalism. The capstone of this industrial divergence was the world-shaking invention of Fordist mass assembly in the car industry.

Before proceeding to the evidence in support of these four theses, we need to take up the existing approaches to the development of the Midwest. This detour is necessary both for the immensely valuable discussions of the subject that have come down to us and for illustrating the persistent blind spots of geographers and economists that serve as counterpoint to our revisionist historical-geographical account.

Existing Theories of Midwestern Growth and Urbanization

The development of the Midwest has been explained by means of four models: central place, export-base, cumulative causation, and industrial take-off. They have arisen as part of larger debates over capitalist growth and welfare, but the Midwest has served as the principal empirical springboard for their elaboration among American geographers and regional economists.

The simplest models are based on central place theory and its corollaries, in which the causal mechanism is principally local or internal trade that grows up organically from a subsistence base. Subsequent theories have been largely directed against central place theory, as it lacks any compelling grounds for explaining growth and bears little correspondence to American realities. The second family of models, called export-base or mercantile, is based on long-distance trade and rests squarely on the Ricardian tradition of comparative advantage. These models offer some valuable historical insights into the commercialization, externalization, and urbaniza-

tion of the Midwest, but they fail to account sufficiently for the dynamics of regional growth, the number of industrial cities, or the distinctive evolution of the Midwest. We take this failure as a symptom of a wider conceptual problem: the privileging of demand to the exclusion of production in the study of the economy and its geography.

The third family of models takes its inspiration from Keynes' schism with mainstream economics and rests on a wider comprehension of economic circulation that includes, besides trade in goods, transfers of capital, flows of income, movements of information, and migrations of labor. These circulationist models arose in reaction to the panglossian welfare implications of most trade theory, stressing the geographical tendency toward uneven development under capitalism. Here too, however, production and industrial revolution take a back seat, small cities play a negligible role, and the distinctiveness of the Midwest fades against an overgeneralized backdrop of city-systems. The last set of models derives loosely from Schumpeter's idea of technologically leading sectors driving capitalist expansion and shares his conservative mission, in answer to Marx, of grasping the nettle of industrialization while removing the sting of capitalism.

CENTRAL PLACE THEORY AND ORGANIC DEVELOPMENT MODELS

The central place theory of midwestern growth focuses on intraregional trade and the development of a regional urban system. Berry [9] brought the work of Christaller [28] and Lösch [93] into the Anglo-American literature by means of a study of southwestern Iowa. In this model, a hierarchy of cities (central places) develops to meet demand for goods and services emanating from a previously settled countryside. Access to consumers is the key to business location, which settles into an elegant, distance-minimizing hexagonal pattern in a state of equilibrium.

Central place systems are self-contained and lack any internal growth mechanism other than addition of rural population. Writers in this vein may posit an organic process of evolution through a series of stages—subsistence farming, emergence of towns and local-serving industries, intensification of farming and industry, and finally specialization in exporting industries [*74*]—without any careful specification of the causal forces at work [*114*]. Or they may say that agriculture and industry spread steadily westward from the original manufacturing area of the United States, in New England, due to growing factor cost differentials between the developed core and undeveloped periphery [*17*]—which merely moves the problem backward in time and space.

While Midwestern growth was unquestionably propelled by rural settlement from the east and high rural birth rates, agriculture was commercial and export-oriented from the beginning, not subsistence-based [*114; 167*]. Industry did not wait for a latter stage to appear, but was implanted at the outset, and much of the region's economic base was relatively high-cost rather than low in its early stages, yet it developed successfully [*114; 161*].[4] Central place theory also privileges the countryside over the city. Some towns did arise as local merchandise centers for surrounding farms, but most were settled at the same time as (or even before) surrounding farmland, were busy centers of trade and processing essential to the settlement process, and traded as much with each other as with surrounding hinterlands [*133; 167*].[5] Indeed, Berry's study area is exceptionally ill-chosen, for it is not even representative of Iowa, much less the entire Midwest.

The central failure of the organic approach to the development of places is that it has no meaningful conception of production and industrialization. Taken as given is a range of manufacturing activities

[4]North recognized this fact clearly from his dissertation work on the Pacific Northwest, but its full implications were lost as he pushed his favored staple export theory to the full measure in the case of the Midwest [*116*] (see below).

[5]Furthermore, the extreme commodification of land attracted capital from long distances and lent both agricultural settlement and town formation a speculative air that further undercuts any tidy geometry of the urban system [*13; 56; 162*].

selling to local markets, each of which reaches minimum efficiency at different scales of output (hence the need for larger and smaller market areas), after which constant returns to scale obtain. Central place theory was a product of the experience of southern Germany as it passed slowly into the capitalist era, with little industrialization.[6] In short, the central place model applies neither to industry location nor to regional development, but to local purchasing of a residential consumer base. It has, therefore, subsequently been relegated to the field of retail store location [*10*].

LONG-DISTANCE TRADE THEORY: EXPORT-BASE AND MERCANTILE CITIES MODELS

Export-base, or export-led growth, is probably the most widely adopted of regional development theories. In this model, regional growth is stimulated by interregional trade. The general mechanism at work is regional specialization, or the comparative cost advantages based on natural endowments, given free trade and a global division of labor [*117; 140*]. Transportation improvements are the keys that unlock trade, specialization, and regional growth. The development of export demand stimulates intensification in the lead sector, external economies, and the growth of secondary industries in a process of "diversification around an export base." Export-base theory was first applied to the antebellum United States by Callender [*24*] and Schmidt [*150*], but it was most thoroughly advanced by North [*114; 115; 116*], who took his principal inspiration from Innis' staple theory of Canadian growth (e.g., Innis [*78*]), supplemented by urban economic base models (e.g., Alexander [*2*]).

Export-base theorists hold that the Midwest grew through the export of agricultural products. In North's original formulation, the Midwest exported grain to the South and to the northeastern U.S., the South exported cotton to the Northeast, and the Northeast sent its manufactures to the Midwest and South [*116*]. This tripartite scheme of antebellum interregional trade has been widely criticized on empirical grounds: southern imports of midwestern foodstuffs and northern manufactures have been greatly overestimated due to the plantation system's relative self-sufficiency [*45; 70; 165*]. Moreover, North failed to take sufficient account of British demand for southern cotton and midwestern grain. Subsequently, the model of mid-nineteenth century U.S. growth was recast in terms of two regions, in which improvements in transportation caused the Midwest to specialize in foodstuffs and the Northeast in manufactures [*23; 138; 139*].[7] But no amount of twisting and turning can save the staple export theory from the evidence that the Midwest did *not* specialize in agriculture as transport improved during the canal era; rather, the amount and diversity of manufacturing within the region steadily increased over the period [*112*].[8] Ransom [*138; 139*] has tried in vain to rescue the specialization hypothesis by including food-processing industries as part of agriculture,[9] but this, in fact, proves the opposite: that agricultural expansion depended on correlate manufacturing from the outset.

Cities play a negligible role in North's model, but they are central to Vance's [*167*] kindred mercantile theory of western settlement. Vance firmly rejects the central place notion of endogenous growth, emphasizing instead the exogenous influence of long-distance trade via mercantile agency, with urban centers at the forefront

[6]North and Vance are rightfully scornful of theories taken from European experience and applied to North America without due consideration of the historical differences, though the relevance of these theories to European history is equally questionable. Indeed, Christaller and Lösch were really a step backward from the antecedent writing of Alfred Weber [*179*].

[7]North [*116*] himself stressed the point that trade was substantially redirected away from the older tripartite scheme toward an east-west axis in the 1840-1860 period, and Fishlow's [*45*] reconsideration of the role of the South in antebellum interregional trade concluded that Northeast-Midwest commerce was by far the most important avenue of interregional trade.

[8]Neimi's definition of the Midwest includes western New York state and western Pennsylvania.

[9]This approach is consistent with North [*115*]. Meyer [*107*] tries another variant on the same trick by making most manufacturing "trade-dependent."

of a proliferating commercial network. Frontier expansion is portrayed as a process led by mercantile cities rather than yeomen farmers and pioneer sodbusters (see also Meyer [*104*]; Muller [*110*]). In essence, the mercantile model brings cities and merchants into the export-base framework.[10] Cities were essential to the creation of the Midwest, and they did not grow up from a prior agricultural substrate. Nevertheless, in focusing exclusively on trade, the mercantile model cannot adequately account for a process of urban and regional industrialization, nor for the emergent role of small industrial cities in and among the giant entrepots.[11] As Niemi [*112*] has shown, cities in the Midwest were remarkably industrialized as early as 1820.

Recognizing the limitations of city-less, interregional export models, Lindstrom [*90*] resuscitates the role of intraregional trade in antebellum growth. Not a mere reversion to central place theory, Lindstrom's model focuses on the powerful division of labor between the city of Philadelphia and its agricultural hinterland. She argues that industrial growth in the region occurred in response to falling transport costs, which encouraged regional agricultural commercialization oriented toward urban markets and expanded the market for manufactured goods formerly produced on farms. Urban-based manufacturing emerged to supply this growing market, creating an enlarged demand for iron that, in turn, stimulated the region's coal mining and iron smelting industries. After 1840, the intraregional development potential of the Philadelphia region was exhausted, however, and growing external demand for grain, coal, iron, and manufactures became the basis of continued expansion.

Meyer [*104; 105*] extends Lindstrom's Philadelphia model to the Midwest. Regional industrial growth gets underway in response to the growth of intraregional markets. In the antebellum period, a set of replicated regional industrial systems formed across the Northeast and Midwest. These regional systems were initially characterized by broad-based, unspecialized industrial development, including pivotal producer durables. As interregional trade became more important over time, however, specialization increased, economies of scale developed, and manufactures became increasingly bound for external markets. The result is a pre-Civil War North unified into a single manufacturing belt (cf. De Geer [39]; Rostow [*144*]).

The distinction between interregional and intraregional trade is a case of the cat chasing its tail. Both are important and have been for centuries, and there is no single transition from a time when regions developed internally to one in which their development was external.[12] Whether a commodity is sold across a narrow or a wider spatial compass depends on a host of considerations, such as weight, perishability, or state of transport, as Weber [*179*] pointed out, but the overriding consideration for modern industry is whether one site comes to outcompete the others, driving out local suppliers. This depends, principally, on quality (usefulness) of the particular product and the productivity of labor employed in its production [*161*].

The major lacuna of export-led growth theory, however, lies in its overattention to trade at the expense of production. Growth is presented as demand-led, stimulated by transportation improvements and interregional comparative advantage, rather than being a result of industrial and agricultural revolutions. The same is true of the Lindstrom-Meyer variant, despite an apparent recognition of the role of urban industries in the dynamics of regional expansion. Manufacturing remains ancillary to exchange and linked to the old Ricardian-Weberian triad of transport costs, resource endowments, and ag-

[10]Vance appears to have developed his ideas directly from Innis, without exposure to North.

[11]This is particularly regrettable because Vance's work on New England [*166; 169*] does stress the importance of small industrial towns.

[12]Looking back to feudal Europe, one finds local commerce and long-distance trade developing in parallel—but often quite separately, from at least the 13th century in Britain and earlier in Italy [3; *18*]. Pred's [*133*] data show the same dualism in the United States in the mid-19th century. Some European manufactures, such as wool textiles, were export-based from the Middle Ages onward [52].

glomeration economies.[13] Yet industrialization and regional development demand a theory that addresses the growth of all the forces of production, especially those applied within factories or on farms. Division of labor, within or between regions, is an important part of this process but cannot be stripped of the workplaces and technologies in which it is imbricated [*161*]. Industry and agriculture in the U.S. achieved immense increases in productivity in the nineteenth century thanks to technological revolutions in methods of production. It was not the quantities exchanged that mattered so much as the quality, particularly of the technical inputs from industry to agriculture [35]. North and his followers fail to appreciate sufficiently the reciprocal effect of industry on agricultural prosperity, despite an awareness of early and complementary industries.

As productivity expands in any sector, it is of course likely that long-distance markets will become more important. But the multiplication of interacting activities within an industrial complex and the growth of local income also bring an increase in local outlets, so that many firms and even whole industries may thrive on intraregional trade [*161*]. In short, successful industrial regions such as the Midwest are the product of industrial revolutions in those places. In the course of those revolutions, regions and their systems of cities are constructed—often out of what seems to be thin air.

CUMULATIVE CAUSATION MODELS

Cumulative causation models reject the premises of neoclassical location theory and regional growth theory as to states of equilibrium, welfare optimization, and equitable resource allocation. Among cumulative causation theorists, Myrdal [*111*] is best known worldwide for his treatment of development and underdevelopment among nations.[14] In the United States, Pred [*130*] became the key advocate of this approach. Cumulative causation models relax the assumption of immobile factors behind both central place and long-distance trade models; capital and labor are free to move (circulate) to areas of highest return, which are the developed regions. Because returns are higher in the developed centers, factors continue to flow into them, reinforcing their advantages in a cumulative way; conversely, backward areas suffer from a vicious circle of poverty and outmigration. Advanced areas owe their higher returns to feedback effects via forward and backward linkages among productive activities, while circulation of their higher income creates secondary expansion on top of the basic base, after the Keynesian notion of multiplier effects.

Pred [*130*] uses the Midwest as the proving ground for a general circulationist theory of U.S. urban and regional development. Crucially, he adds cities to Myrdal's general regional model. He adapts the notion of an urban hierarchy from central place theory. Like Vance, however, he is strongly opposed to the city-hinterland focus of central place theory, and he argues that cities within "systems of cities" relate as much to each other as to nearby hinterlands [*133*]. Big cities first became dominant, as in the mercantile model, as trading entrepots in the first half of the nineteenth century, and they maintained their rankings by virtue, above all, of their key position in the circulation of information [*130; 131*].

Pred also considers the role of manufacturing in urban growth. Most importantly,

[13] Meyer [*107*] begins to explore industrialization through agricultural processing industries and producer durables manufacture, but he does not take his analysis into the internal dynamics of these sectors. Production remains a black box, and the term "structural transformation" remains unspecified: it appears to mean the development of transportation and communication technology, not industrial revolution in its classic meaning. In this model, then, specialization is the result of improved transportation rather than the internal dynamism of the industry. Nonetheless, Meyer [*108*] has shown that Midwestern big cities were more specialized in 1860 than older cities in the east. How is such uneven development of industry possible without differential progress in the forces of production in various sectors?

[14] Perroux's [*121; 122*] work contains similar ideas about uneven development among industrial sectors, which have been applied to spatial growth with some fruitfulness—although Perroux himself thought about the matter in a largely nongeographic way.

he augments the Myrdal/Perroux notion of industrial linkages with the geographic idea of agglomeration economies [*75; 120*]. The latter had first been enunciated in the industrial location theory of Weber [*179*], but in a strictly subordinate role. To it, Pred adds the incidence of technological innovation in the urban system, which is strongly biased upward in the hierarchy by the control of the biggest cities over the circulation of information [*131*].[15] He argues that the biggest metropolises, such as Chicago, shifted from a primarily mercantile to an industrial base around the Civil War, and they grew fat while smaller towns and cities suffered a relative decline in the later part of the nineteenth century, as their industry was sucked into the vortex of the big cities.

Pred's circulationist model introduced an important dynamism into the analysis of nineteenth century urban and regional growth. Yet for all its force, the model has several important limitations. First, the ineluctable logic of cumulative causation leads to an excessive focus on large cities at the expense of the vitality of smaller cities and towns [*105; 110*]. This big-city bias covers up the more fine-grained pattern of industrialization in smaller urban places. It now appears, moreover, that big metropolises reached their relative peak as manufacturing centers as early as 1860 [*108*].[16] Second, the hierarchy of cities is too stable, especially at the top; yet dramatic shifts in urban rankings have regularly occurred, even within regions, as in Chicago's dramatic displacement of St. Louis and Cincinnati or the decline of Louisville [*161*].[17] Similarly, new regions and their metropoles can enter the national system, but only in a lateral accretion that ends up suspiciously close to central place theory. There is insufficient recognition of the radical impact of new industrial and urban spaces on either the midwestern region or the national system.

The third problem of the circulationist model is that the distinctiveness of the Midwest and other regions is lost in the portrayal of a wider city-system and in the flux of broad circulation processes across regions. Pred, like Meyer, draws on DeGeer's [*39*] image of the northeastern manufacturing belt, which becomes an enormous, undifferentiated zone of advantage whose primacy and stability are unquestioned. Fourth, cumulative causation theory, like export-base, never plunges into the deep waters of manufacturing and production. Agglomeration forces are essentially due to urban concentration, without regard to the differentiation and internal division of labor within industries (contrast Scott [*153*]). Industrial revolution is reduced to the very thin gruel of innovation diffusion, as if technological change in industry and agriculture could be treated as the simple adoption of new ideas; while dominant for many years, this vision of technological change is now in eclipse [*12; 142; 172*].[18]

MODELS OF INDUSTRIAL TAKE-OFF

The preceding models contribute to our understanding of regional development, yet they fail to explain the Midwestern experience. Some shortcomings have been touched on, but one looms above all; in these theories, there are never any factories, workers, hogs, fields, or machines. No historian of the Industrial Revolution in

[15]Meyer [*107*] errs in lumping Pred with strict agglomeration theorists and overlooking the similarity between his and Pred's ideas on the centrality of control of trade and information in metropolitan growth.

[16]Pred (personal communication) still contests Meyer on this point, arguing that big industrial cities peaked as a proportion of regional manufacturing in 1890. Also, small industrial cities are explained by Muller and Meyer by either favorable access to larger cities or interregional transportation networks ("nodality"); they, too, do not develop from their industrial bases or have a place within larger territorial production complexes.

[17]Pred recognizes both the economic importance and the dynamic flux of smaller places, but does not see these points as fundamentally challenging cumulative causation from below.

[18]In our view, the recent work of Meyer [*107*] sticks to the key arguments of the circulationist models—priority of big cities, stable urban hierarchy, new regions plugging into the developed core, and a continuous manufacturing belt—despite a shift in emphasis toward industrialization. He does not agree with this assessment (personal communication).

Britain imagines that it involved trade, information, or division of labor alone; every account of British industrialization (or that of New England) emphasizes the development of machinery, the factory, new metallurgy, the steam engine, labor skills, and management [*72; 97; 99; 126*]. Why is it that in discussions of the Midwest all this appears to be forgotten? The development of the forces of production is an absolutely critical process in capitalist growth, which goes under the name "industrialization." This word hardly appears in the literature discussed so far.

The closest thing to an orthodox theory of the American industrial revolution is Rostow's [*144*] theory of the take-off into sustained development.[19] In it, the United States figures as a paradigmatic case for a process of modernization that eventually comes to many nations. The take-off, said to occur for the U.S. in the period 1843-60, is marked by an accelerated rate of growth and driven by the leading sectors of industry of the time: textiles in New England and railroads in opening the Midwest. The key propositions in Rostow's version of events can be used still to frame the debate over U.S. industrialization.

First, there is the idea of "leading sectors," which came out of work by Kuznets [*85*] and Schumpeter [*152*] and was later picked up by Perroux [*121; 122*] and Hirschman [*71*]. Generally, leading sectors have been conceived in a very limited way by development theorists. One habit has been to mythologize the dominant sector of the era, as in the mid-twentieth century obsession with heavy industry or the contemporary idyll of high-technology industry.[20] Another has been to see a natural sequence of leading sectors, from textiles to electronics, through which late-developing nations may pass [*27; 60*]. Rostow [*144*], to his credit, avoids both pitfalls, but he does not deploy any real range of leading sectors in his discussion of the United States. The actual history of uneven development of industries and places is difficult to summarize easily, as the case of midwestern agro-industrialization will make clear.[21]

A specific twist on the leading sector model of industrialization was the debate over the role of railroads in U.S. development. The case for railroads as the driving force in mid-nineteenth century growth was once widely promoted, by Rostow and by Chandler [*26*] in particular, but this thesis has been decisively rejected by Fogel [*48*] and Fishlow [*46*]. Fishlow showed that canals, not railroads, were the key infrastructure in lowering transport costs and opening the West to development before the Civil War. Lost in the dispute, however, was evidence on early agro-industrialization of the Midwest, which clashed with the prevailing idea that the reduction of transportation costs was the leading cause of regional growth. Nor were the implications of Fishlow's evidence taken up with regard to regional differentiation in terms of transport or industrial base; the Midwest was seen, once again, as largely a later replication of the Northeast.

North [*116*] entered the lists against Rostow with his vision of growth driven by agricultural exports, disputing two ideas popular at the time in discussions of industrialization: the priority of heavy industry and the tendency of agriculture toward stagnation [*89*]. He rightly believed, on the basis of North American experience, that regions and nations could develop on the basis of a prosperous agriculture and resource-intensive industries. On this point Rostow was inclined to agree—farmers could generate investable surpluses and consumer demand for things like textiles and cars—but he did not provide any definite industrial linkage between agriculture and manufacturing.

A further failing of both Rostow and North is the lack of evidence for a single

[19] See also the excellent debate in Rostow [*145*] and Rostow's extended reply in Appendix B of the second edition of *The Stages of Economic Growth*, published in 1971.

[20] The heavy-industry model of the Soviets is justly notorious (ironically taken up by that antagonist of Communism, Gerschenkron [*60*]), but the United States also imposed it on Puerto Rico as a model for Latin America ([*8*]; cf. Hirschman [*71*]).

[21] For an interesting discussion of Gerschenkron, along with staples theory and the shifting technical base of industrialization, see Landes [*86*].

epoch of industrial take-off in the 1840s or 1850s, marked by a clear increase in the long-run growth rate of the U.S. economy [37]. U.S. growth is characterized by a remarkably sustained rise in productivity from at least the early nineteenth century, which was produced by a rolling sequence of new advances. These advances were both sectoral and geographical. New England had jumped ahead in the early decades, upstate New York followed with the Erie Canal, and the Midwest came on board in a big way by the 1840s. But for Rostow, industrial development on the western frontier proceeded by a process of diffusion from the core, rather than new industrial revolutions in the Midwest.

And, despite North's [*116*] explicit distancing from Rostow, export-base theory's presentation of the transition from agriculture to industry suffers from the same shortcomings as the Rostovian take-off. Export-base theory creates an artificial historical disjuncture between agro-export and industrialization that parallels take-off theory's distinction between the pre-industrial stage and sustained industrial growth. They both lack a satisfactory history to the miraculous take-off point, which emerges from a set of vaguely defined preconditions [*61*]. In fact, a key condition for agro-industrialization in the Midwest was settlement by a class of free family farmers in large numbers. But Rostow was ideologically averse to a class theory of economic development, such as the Marxist-inspired work on agrarian antecedents to modernization of his Cambridge contemporary, Barrington Moore [*109*].

In any case, the explosion of literature on U.S. economic growth that issued forth in the 1950s and 1960s slowed to a trickle thereafter, leaving far too many questions unresolved. We must therefore take up the matter of midwestern industrialization and growth anew.

GEOGRAPHICAL INDUSTRIALIZATION AND THE DEVELOPMENT OF THE MIDWESTERN PRODUCTION COMPLEX

We can now propose an alternative model of the development of the Midwest as a process of industrialization and industrial revolution. That process has four aspects, which we shall treat in separate sections corresponding to the four theses proposed at the beginning of the paper. That is, the industrial revolution in the Midwest took the form of agro-industrialization, and grew from the bottom up; it had its own particular leading sectors and spatial division of labor, which were themselves changing over time; it created and was facilitated by a system of cities, in which towns played a vital role; and it developed along a distinctive path that did not converge with that of the rest of the manufacturing belt, let alone the rest of the United States.

MIDWESTERN AGRO-INDUSTRIALIZATION

Agriculture has too often been overshadowed in discussions of capitalist development by changes in manufacturing. The process of capitalist development in the United States was deeply colored by the interaction of a vibrant farm sector and rising manufactures. The centrality of "agro-industrialization" has been recently emphasized by Post [*129*] and Walsh [*175*] and, among geographers, by Pudup [*136*]. The Midwest is the classic region of U.S. agro-industrialization, although much the same synergy lies behind the growth of the mid-Atlantic states [*90*]. Capitalist development here, as in England, rests first of all with agricultural revolution: in this sense, the export-base model is correct. But manufacturing is embedded in the region from the beginning as well and gives agriculture an essential impetus, eventually overtaking it in importance.

We consider the first condition of agricultural prosperity to be the class relations of nineteenth century American farming: a mass settlement of the land by free farmers. Obviously, the midwestern harvest was likely to be a bountiful one, given natural endowments, but the intensity with which it was developed is an accomplishment of beneficial social relations. Farm families in the Midwest were able to secure title to land in large numbers and for relatively low cost. The fruits of family

labor could accrue to the family proprietor to be spent on acquisition of land, improved inputs, and household consumption [50]. Farm incomes were not, in the nineteenth century, reduced substantially by payment of rent to precapitalist or capitalist landlords, and depredations of merchants, railroads, and banks, while sometimes serious, were rarely catastrophic [55].

This is no Virgilian idyll. The freedoms of the farming class rested on the War of Independence, the Northwest Ordinance of 1787, the Pre-emption Act of 1842, and the Homestead Act. Slavery had to be rejected in the constitution of the Ohio Territory and forcibly defeated in the Civil War by the Republican alliance of farmers and manufacturers [11]. Native peoples had to be violently ejected from their lands and subjected to slaughter and humiliation. Public lands were disposed of through immense speculation and chicanery that often denied land to the poor and weak [56; 57; 147; 162]. Free farming then came undone over time as the pressures of overproduction forced waves of farmers into debt, tenancy, and failure [94]. Nonetheless, the Midwestern farmer experience compares very favorably with the horrors visited on peasantries around the world [109].

As a consequence, midwestern farmers had a substantial and rising disposable income, in the aggregate. This prosperous farming class was thoroughly commercialized. Its members sold their produce as quickly as possible on the market and purchased necessary farm inputs, such as seed, plows, and tools, and household goods, such as pots, stoves, and furniture.[22] That is, they disposed of their income on investment in expanding farm output and at the same time created a market for manufactures. Particular emphasis must be put on the propulsive nature of commercialized, family farm agriculture itself (Marx's "petty commodity mode of production"), given favorable circumstances. On the one hand, farmers were eager to expand family income and landholdings through successful production strategies, making them close cousins in outlook and behavior to true capitalist employers.[23] On the other hand, farmers were compelled to be improvers by the logic of the market; rising productivity and total output created a strong downward pressure on prices, thereby propelling farmers further into the market (and into debt) to secure better and better equipment and breeding stock [94].[24]

As in early modern Britain, agricultural revolution involved improvements in cultivation, crop varieties, soil amendments, and animal breeding that often proceeded without reference to manufacturing. The corn-hog nexus of the Midwest deserves special mention in this regard, since the humble pig was essential to absorbing surplus grain, raising farm income, and increasing fertilizer production. In addition, commercial farming eagerly absorbed new farm implements and machines that raised labor productivity, and it welcomed any fall in cost due to industrial processing of fertilizers or improvement in transportation [35].[25] Thus, as Post [129] argues, the American road to capitalism passed directly through the family farm.[26]

Small-scale commercial farming was deeply bound up in the wider dynamics

[22]Indeed, they were virtually forced on the market in order to pay off the costs of land acquisition and supplies [13; 36; 57]. Charles Post suggests (personal communication) that the transition from subsistence farming (marketing of only the surplus portions of the farmer's social product) to commercial farming (marketing of both the surplus and necessary portions) was a direct outgrowth of the speculative crisis of the 1830s. While crisis conditions periodically accelerated the transition, we contend that commerical farming was present and viable in the old Northwest from 1810 forward. From this base it spread rapidly, albeit unevenly, across the region. Complete commercialization was generalized by the 1840s, at the latest.

[23]And they often took on hired labor, though usually from other farm families [50].

[24]We should not be taken to mean that all agriculture, or all commercial agriculture, or even all free family farming systems are necessarily propulsive—as we try to indicate in the contrasting cases of the South, Appalachia, and New England.

[25]In particular, midwestern farmers adopted farm machinery rapidly after 1850 due to a shortage of farm labor owing to both the internal organization of family farms and the regional labor market more generally [38; 136; 170].

[26]For more on the history of farming and settlement, see Bogue [14], Carstensen [25], Danhof [35], Gates [55], and Shannon [157].

of industrialization and capital accumulation. Therefore, the on-farm dynamics of this process should not be overstated. Capitalist industrialization proceeded more rapidly in the sectors up and down the food producing and processing chain than on the farm itself. This was so because of the natural constraints to technical and social rationalization of the labor process and the cycle of production, owing to biology, climate, soil chemistry, and the like [*65; 96*]. The farm nevertheless served as the hub of a rapidly expanding division of labor surrounding agricultural production—a division of labor that was itself propulsive and that allowed pieces of complex production systems to be assimilated into workshop and factory-based industry, where they could be rationalized, mechanized, and intensified beyond anything possible on the farm. Over time, capitalist production has encroached on farm production (albeit unevenly across sectors due to the capriciousness of nature), while capitalist industrialists and merchants have increased their effective control (directly or indirectly) over on-farm labor. In this way, the capitalist road to agribusiness has widened into a highway, while family farming has ended up down a narrow footpath, on the edge of oblivion.[27]

It is curious that the political role of the family farm class has been so well explored in American historiography [*68; 87; 158*], while until recently little attention has been paid to its role in national economic development. This situation stands in marked contrast to the treatment of agriculture in early modern Britain or in the American South. In the former case, agrarian revolution sparked protoindustrialization and capitalist development [*3; 83*], while in the latter the agrarian class structure of slavery has been seen as the key to the South's failure to industrialize [*58; 182*].[28]

The early manufacturers of the Midwest were heavily involved with the farm sector: supplying farmers with means of production, processing farm output, or making household items. Farm inputs included farm implements such as plows, harrows, and hoes, and increasingly complex machinery, such as seed drills and reapers. They also included fertilizers and seed, sawtimber and nails for fence rails and buildings, harnesses, and carriages and wagons. The processing industries numbered among them grain milling, hog butchering, distilling, and brewing. The household items are such familiar things as pots and pans, stoves, clothing, hardware, rifles, and furniture, not to mention processed foods such as sugar, salt, and flour. Demand for all these items was steadily augmented by the falling away of household manufacture as prices fell and quality improved and as farm families applied their labor more intensively to the fields and barns [*164*].

The importance of the processing industries has been overlooked in most studies of American manufacturing growth (e.g., Clark [*29*]). We agree with Rosenberg's [*141*, p. 109] assessment that "the general neglect, often amounting to disdain, of the food processing industries in the course of industrialization is curious and difficult to understand." Indeed, processing activities were much more than simple intermediaries between grain farming and eastern demand for food products. These industries developed simultaneously with agricultural settlement and were themselves the sites of technical innovation, spreading

[27]The long-standing debate on family farming and the petty commodity mode of production in agriculture (for a review, see Buttel et al. [22]) inevitably gets caught at this fork in the road. In affirming the distinctiveness and viability of household producers versus capitalist production on the farm, one must still confront the effects of the division of labor in allowing capitalist domination of the overall production system in time.

[28]The neglect of agrarian class structure in the Midwest may be due, in part, to the way agriculture was relegated to the role of precursor to true industrialization. But the political ideology at work should not be overlooked; agrarian class analysis has, in the American context, been deeply colored by the oftentime radical views of agrarian populists, represented academically by such writers as Paul Gates and Fred Shannon; Southern slavery, on the other hand, has been rendered safe by the judgment of history; while neoclassical economics, which inspired the New Economic History, has always eschewed class as a significant category in response to the Marxian challenge.

machine-based industrial production practices quickly through the region. In fact, during the 1850s, agricultural processing industries grew faster than agriculture as a whole. This point was made by Fishlow [*46*] and more recently by Walsh [*175; 176*], who argues that the processing industries were the leading sectors of midwestern growth.

For example, flour milling was the nation's leading industry in terms of total value of product between 1850 and 1880. The industry ranked fourth nationally in value added by manufacture in both 1850 and 1860. In the latter year, the industry's capital to output ratio exceeded that of all manufacturing by more than two to one, and productivity per worker was twice that of manufacturing as a whole [*46*]. Other processing industries, such as meatpacking, brewing, and distilling, were also technologically progressive. Before 1880, meatpacking would have ranked considerably higher in output if it had not been systematically underestimated in the mid-nineteenth century due to its seasonal nature and integration into merchant activities [*175*]. In 1880, the industry ranked fourth nationally in total value of products, and it became the nation's leading industry by 1905.

Farm input industries were likewise important to national industrialization. David [*38*] argues that in 1860 the value of agricultural implements[29] equaled more than 4 percent of total national value added. This is significantly more than the share of foundry and machine shop products for that year and approaches the share of cotton goods production. By 1870, the manufacture of agricultural machinery alone accounted for 25.5 percent of the value of all U.S. machine production [*136*]. It should also be noted that the early manufacture of iron in the region (including Pittsburgh) was largely oriented toward farming and rural household products: cast iron stoves, kettles and skillets, axeheads, horseshoes, plowshares, hoes, nails, and riflebarrels [*113*].

The rapid growth of both processing and farm input industries created a proliferating network of backward and forward linkages. Forward linkages of grain processing included a variety of food manufactures, including bread and bakery products, cereals, starch, and confectionery, as well as beer and distilled liquor. The packing industry generated not only meat products, but soap, candles, glue, fertilizer, lard, and leather as well. Forward linkages of lumber sawing and planing included the production of sash and doors, barrels and boxes, furniture, machinery, carriages, and railroad ties, in addition to the direct farm input of sawtimber.

Of equal importance were the backward linkages generated by the expansion of these industries. Primary and secondary processing industries used machine-based production techniques. Iron foundries and machine shops provided inputs to these developing machine-based industries. Machine tools were central to the development of the region's agricultural implements and carriage and wagon industries. This same group of producer durable manufacturers also played an important role in the region's rapidly expanding railroad network after the mid-1850s, especially vis-a-vis the development of railroad repair facilities. Food processing and packing also generated a large demand for cooperage, thus linking back to the lumber milling and woodworking industries.

While any one of these industries may appear small in total output, employment, and income, in the aggregate they amounted to a substantial and dynamic part of the U.S. industrial base, accounting for large shares of the nation's manufacturing capital and product value [*136*]. Meanwhile, the Midwest's share of these industries was substantial and rising. By 1860, the Midwest already accounted for 19 percent of total U.S value added from manufacture, and this share increased to 27 percent in 1870 and 33 percent in 1890. One overall index of regional industrial development is the use of steam power; the Midwest's share of total national steam

[29]In which category he includes, besides tools, plows, and machinery, one-half the output of saddlery and harnesses, wagons and carts, and blacksmithing products.

power used in manufacturing increased from 9 percent in 1838 to 39 percent in 1869 [*105*].[30] In 1870, two industry groupings heavily concentrated in the Midwest, lumber/wood products and food, accounted for 50 percent of the steam power used in U.S. manufacturing [*4*].

Repeated improvements were made in all these activities, as to both the capabilities and quality of the products and the methods of production. Steel plows replaced iron, and design improved. Reapers replaced sickles and were replaced by combines in turn. Better steam engines appeared to operate the machines. Saws became bigger, sharper, and better balanced and calibrated. In short, American industry was driven by the logic of the market, competition, and capital accumulation to improve and improve again [*141*]. Aggressive businesses then urged their innovations on farmers, with the help of merchants, growing armies of salesmen, and credit. Then, too, as processors improved their methods of meatpacking by means of disassembly lines or refrigerated transport, or began milling with ceramic and steel rollers, they sought greater supplies from the countryside to meet the voracious appetites of the mills and factories. Midwestern firms were in the forefront of innovation on many fronts, as we shall see below.

It must be emphasized that these industries were based in towns all across the Midwest. As the towns grew through expanding employment and commerce, they reciprocated by purchasing a growing amount of farm produce: flour, meat, garden vegetables, sugar, and so forth. In addition to providing a strong market for agricultural goods, cities also absorbed the output of midwestern industries such as lumber, brick, ironwork, furniture, hardware, and wagons. Much of it went directly into the expansion of the urban built environment: factories, offices, warehouses, stores, houses, streets, and bridges. Indeed, what is usually called "secondary" growth by export-base theorists involved a considerable amount of industrialization based on local markets.

The farm and the city thus supported one another by means of growing demand for each others' outputs across a broad spectrum of goods. But such "demand," which serves as *deus ex machina* in neoclassical theories of regional development, had a definite social and technical foundation. It rested on the rising incomes of farm and urban households, the interwoven fabric of agro-industrial production, and the way town and countryside were joined together. Midwestern agro-industrialization depended on a prolific social division of labor between town and country, as well as among the towns, mediated by a specific industrial base. For this reason, we call the midwestern form of territorial development an *agro-urban production complex.*

There is no one geographic scale at which the mutual development of city and countryside, agriculture and industry, took place. No regional economy, whether a part of the Midwest or the region as a whole, ever existed in isolation from the larger capitalist world of a rapidly growing nation or the North Atlantic economy [*163*]. Midwestern agriculture was so productive that it quickly generated huge surpluses for disposal elsewhere, as export-base theory recognizes. Conversely, some of the finest and cheapest implements or housewares could only be found in the east or abroad and were imported long distances. But trade and regional specialization were not the only, or even the principal, engines behind global capitalist development. England's voracious appetite for American grain, timber, or cotton was propelled by its own industrial and urban revolution, as was New England and Atlantic coast demand for western produce. Furthermore, as midwestern industries developed their productive capabilities (often very quickly), their products and prices became more competitive elsewhere, and external demand quickened for everything from meat to metals.

[30]Recall, however, the problem of defining the Midwest region inherent in all such estimates. These figures are based upon research that defines the Midwest quite narrowly and can therefore be considered low estimates.

Just as important, however, was the growth of demand *internal* to the Midwest, owing to its own burgeoning cities and countryside. The agro-industrial revolution in the Midwest—not just settlement and good land—was driving that region's demand for both local and imported manufactures. To treat this revolution as merely secondary or residentiary activity on a grain-exporting economy is to distort midwestern history out of all recognition.

INDUSTRIAL SPECIALIZATIONS AND LOCALIZATIONS WITHIN THE MIDWEST

Agro-industrialization provides an overarching concept for understanding the growth of the Midwest, but the larger canvas of regional industrialization needs to be filled in. The midwestern experience cannot be grasped, however, without recovering the lost history of American industry beyond those narrowly-defined sectors by which the industrial revolution is usually measured: textiles, iron and steel, steam power, and railroads (e.g., Chandler [*26*]; Hobsbawm [*72*]; Pollard [*126*]). This does not only call for recognition of batch production industries and their industrial districts, as noted by Sabel and Zeitlin [*146*].[31] It also requires taking into consideration such humble and overlooked early mass-production sectors as lumber and grain milling, lead and coal mining, brewing, and tanning. A complete discussion of the development of midwestern industries is beyond the scope of this paper, but we can sketch in some of the sectors that gave definition and drive to the process of regional development, indicating in particular their early implantation and imbrication in the settlement process, their evolution and self-expansion, and their localization and spatial development.

Not all resource-extraction and processing activities were tied to plow agriculture, of course. Lumber sawing and planing, the Midwest's foremost nonagricultural processing industry, was the largest U.S. industry in value added in 1850 and again in 1890. The industry ranked second in that category in 1860, 1870, 1880, and 1910. In terms of total value of product, lumber and timber products ranked in the top five nationally through the turn of the century. This industry, which became increasingly concentrated in the Midwest during the nineteenth century, also led the nation in employment through the 1910s. Wood-based furniture and home construction were other major midwestern industries that grew up in conjunction with sawmilling. Cattle raising went hand in hand with leather tanning and leather products, especially shoes [*73*]. Lead, iron, and coal mining were surprisingly important regional activities, often in the midst of the corn belt in Iowa, Illinois, or Indiana [*92; 118*].

Nor were all midwestern industries tied to agriculture and natural resources in a direct way. The Midwest built other industrial achievements on its agro-industrial base, and as development moved westward, new industrial specializations emerged. The overall shift toward wider manufacturing competence is illustrated for the decade 1850-1860 by a comparison of more settled Ohio with newly emerging Illinois. Value-added by food processing, the leading sector in Illinois, quadrupled, while that for all manufacturing in that state only doubled. Meanwhile, in Ohio value-added in food processing actually decreased slightly, even as total value-added increased by half [*46*].[32] For example, the iron industry, initially focused on farm and rural household products, developed into the nation's premier industrial sector by the late nineteenth century. Pittsburgh be-

[31] A task being undertaken for the United States by Philip Scranton, who has kindly allowed us to look at an unpublished portion of this important project. See also other work by Scranton [*155; 156*]. We are not entirely in accord with the simple batch and mass production dualism used by Sabel, Zeitlin, and Scranton to characterize the wide range of industrial production methods, however; it is merely a convenient shorthand (see Storper and Walker [*161*]).

[32] The integration of the West into the "North" of the Civil War did not rest on transportation linkage, a natural alliance of free farmer and free labor, or the promise of free land to homesteaders; rather, it derived from the level of capitalist development achieved in the Midwest by 1860, a product crucially of industrialization.

came the unquestioned center of iron and steel manufacture, but northeast Ohio and the southern edge of Lake Michigan also developed formidable steel producing complexes, all fueled by iron ore from northern Minnesota. This iron and steel was then worked up into machine tools and machine-making, principally in Cincinnati and Hamilton, but also with great vitality in Cleveland, Chicago, Detroit, Toledo, and Milwaukee. Growing quickly in the last decades of the century, Ohio made over a third of all U.S. machine tools by 1900, the Midwest as a whole about 44 percent.[33]

Flour milling. Early midwestern farmers grew large amounts of both corn and wheat. The former was consumed on the farm, fed to livestock, and sold for export, but the latter was produced primarily for the market. Flour milling accompanied agricultural settlement along the rivers and streams of the upper Ohio Valley, and western millers were quick to adopt Oliver Evans' continuous and automated mill process [*21*]. As the hub of the Ohio River trade, Cincinnati developed the leading flour and grain market and became the largest milling center, although milling sites remained widely scattered throughout the region. Millers in both Cincinnati and Louisville were operating steam powered factories by 1815 [92]. Ohio dominated midwestern wheat production through the 1840s, and Cincinnati remained the center of both trade and milling. By 1841, the Queen City's receipts and shipments of flour and grain compared favorably with eastern centers' [*84*].

Cincinnati's position began to weaken after 1840. Several Lake Erie port cities emerged as important milling sites by tapping the canal network after 1840, but their success was short-lived. Grain acreage stabilized in Ohio, Michigan, and Indiana during the 1850s, while new wheat producing regions emerged to the north and south of a growing corn belt [*30; 44*]. St. Louis became the center of winter wheat milling as grain production expanded toward the Mississippi. By 1860, St. Louis had surpassed Cincinnati and ranked alongside Rochester as the nation's largest milling center [*84*]. Meanwhile, Chicago and Milwaukee competed for the grain trade of the upper Mississippi Valley, milling both winter and spring wheat. Milwaukee rivalled St. Louis in output by 1870.

Both of these cities were soon eclipsed by yet a new center. The growth of milling in Minneapolis in the two decades after the Civil War was largely a result of new production practices adopted by local millers in response to the problems of processing the regional hard spring wheat with millstones. The application of the French New Process (which effectively reclaimed the glutinous middlings) allowed Minneapolis millers to create a high quality flour, and the subsequent replacement of millstones with iron rollers achieved enormous increases in productivity. Larger, more machine-intensive roller mills were soon developed, and by 1882, Minneapolis had become the nation's leading flour producing city.

Taking advantage of their lead in the new production system, a handful of Minneapolis firms came to dominate the industry, strengthening their control over supply areas and developing extensive marketing structures. Four firms controlled 87 percent of the city's milling capacity in 1890, gathering wheat from throughout the upper Midwest and northern plains and selling their flour around the world [*84*]. Minneapolis milling companies soon developed peripheral mills in other midwestern cities. Kansas City, which emerged as an important center of hard winter wheat processing in the 1890s, came to compete with Minneapolis by the early twentieth century.

Distilling. The practice of distilling grain into alcohol also followed the expansion of agricultural production westward. After 1800, the production of liquor moved from the rye and barley-distilling states of Maryland and Pennsylvania into the Ohio River Valley. In particular, the area surrounding Louisville, Kentucky became the center of the new corn-based distilling. Exports were an important market for corn whiskey

[33]Data from unpublished work by Philip Scranton.

from the beginning, and by the 1840s, Kentucky bourbon was known throughout the nation. The development of the Kentucky industry was influenced by large numbers of Scotch and Irish settlers who carried with them strong distilling skills and traditions [*143*].

Competition for the Kentucky industry soon developed in the emerging Illinois corn belt. Peoria boasted 15 stills in 1865 and became the nation's leading liquor-producing city by 1880. In that year, the products of Peoria's 10 distilleries surpassed the output of Kentucky's 200 distilleries combined [*40*]. The rapid rise of large capacity distilleries at Peoria was certainly aided by the development of canal and rail transportation facilities, supplies of limestone water, and the existence of a cattle and livestock industry to which distilling byproducts could be sold. Of critical importance, however, were the pioneering use of continuous stills, steam power and heat, and refrigeration in the factory during the 1870s and the increasing involvement of industrial capital. Peoria's largest distillery, the Great Western Distillery, was initiated in 1881 through a partnership led by Nelson Morris, one of Chicago's emergent Big Five meatpackers [*40*]. In response to chronic problems of overproduction and competition, and after several attempts at informal pooling had failed, Illinois and Indiana producers formed a legal trust in 1887 that further concentrated the industry in Peoria. A group of Kentucky producers soon followed with a trust of their own. At the turn of the century, Illinois and Kentucky dominated liquor manufacturing in the U.S., accounting for 70 percent of the nation's distilling capacity.

Brewing. Beer production was another grain-based industrial activity that developed simultaneously with regional settlement (e.g., Cincinnati in 1805 and Chicago in 1833). Early beers were ales, porters, and stouts of English extraction, but they were displaced by the lighter lager beers, which accompanied the rapid German settlement of the Midwest after 1840. Lager breweries developed throughout the nation at mid-century, increasing in number from 431 in 1850 to 1,269 in 1860, but they were strongly localized in the German-settled, grain producing Midwest [*5*]. Cincinnati, St. Louis, Chicago, and Milwaukee developed as significant brewing centers in this period. Although brewing remained a predominantly local market industry, the steam powered and partially mechanized plants of the larger brewers had a capacity of 200,000 barrels per year by 1860 [*5*]. At this time, Milwaukee brewers were already exporting a portion of their product [*31*].

Out of a situation characterized by numerous and highly competitive local and regional producers, a handful of innovative midwestern firms came to dominate the brewing industry during the late nineteenth century. Pabst of Milwaukee developed improved malting and mashing machines and began to use artificial refrigeration, greatly improving flow and uniformity within the factory. Of equal importance was the application of advances in scientific research that allowed beer to be shipped long distances. Pasteurization in brewing was first attempted in the U.S. in 1873 by Anheuser-Busch in St. Louis. The application of pure cultured yeast in the fermentation process by several Milwaukee brewers further improved the quality and stability of the product.

When combined with advances in mechanized bottling, pioneered in the 1870s by Blatz of Milwaukee, brewers had a standardized product that could be mass produced and shipped nationally. In order to sell their new product in wider markets, these innovative midwestern brewers developed extensive branch house distribution systems and sales networks, competing with each other and with local breweries via national brand name advertising [*128*]. These growth strategies stood in sharp contrast to those of east coast brewers, who retained a regional market orientation [*31*]. By the early 1900s, a few large-scale brewers, led by Pabst, Anheuser-Busch, and Schlitz, had driven out many local breweries; between 1880 and 1910, the number of breweries in the nation declined by 35 percent, while total production increased four-fold. Because of

the rise of their mass production breweries, St. Louis and Milwaukee became the nation's premier beer-producing centers by 1890.

Meatpacking. Farmers in the Old Northwest quickly discovered that their abundant corn crops could be sold for more money if marketed on the hoof. Thus, commercial hog slaughtering and meatpacking developed in the Ohio Valley before 1820 [*175*]. In the first half of the nineteenth century, slaughtering and packing were carried out in separate facilities as part of diverse merchant businesses. Hogs were killed and packed into barrels during the winter months only and stored until river transport resumed in the spring. Because of the availability of credit and the existence of a seasonal labor force, Cincinnati developed as the principal regional packing center by 1840, although dozens of smaller seasonal packing industries were developed in cities on the Ohio and Mississippi rivers. Despite the limitations imposed by seasonal operation, Cincinnati meatpackers were highly innovative: as early as the mid-1830s, hog slaughtering facilities employed steam powered mechanized disassembly lines and a minute division of labor [62], and during the 1850s, slaughtering and packing were integrated within a single firm and under the same roof [*175*]. Beef packing, on the other hand, remained a local market-oriented activity in the antebellum period.

With the emergence of the Illinois-Iowa corn belt, hog production shifted to the west. Railroads solidified new patterns of trade in agricultural goods in the upper Mississippi Valley, and Chicago emerged as a major packing center in the 1850s. The Civil War diverted trade away from Cincinnati toward Chicago via large government contracts for meat, and the enormous profits made from these contracts, and wartime financial conditions more generally, allowed the effective weaning of industrial from merchant capital in the industry [*128*]. After the war, specialized Chicago packers began to pull away from their counterparts in Cincinnati through a series of important innovations: the stockyards, which centralized and regularized livestock supply; ice refrigeration, allowing initial year-round packing; extended mechanization of disassembly and further refinement of the division of labor within the slaughterhouse; and more extensive use of byproducts [*134; 175*]. These changes formed the context for the advent of refrigerated transport, a new product (dressed beef), and new national marketing structures, which revolutionized the industry in the 1880s and 1890s [*185*].

The firms that pioneered these changes (the Big Five) built enormous multispecies plants and quickly established an ironclad grip on the industry. Chicago became the unquestioned center of the industry after the Civil War, while growth peripheries were established in St. Louis, Omaha, Kansas City, St. Joseph, and Sioux City. A few firms outside of Chicago managed to develop along the lines of the Big Five, creating smaller packing centers in places such as Cedar Rapids, Waterloo, Ottumwa, and Indianapolis [*101*]. The Midwest as a whole absolutely dominated the national packing industry, driving out most local butchers on the east coast by the early twentieth century.

Leather tanning. The early midwestern cattle hide tanning industry was centered in the larger river cities, especially Cincinnati, Louisville, and St. Louis [92]. The last city developed into the nation's leading saddle-making center by 1870 [73]. The regional tanning industry remained relatively small and widespread before the Civil War, although advances had been made in the application of steam power and in mechanized splitting and dehairing [*178*].

In the postbellum period, however, the national tanning industry began to divide into two distinct segments, one focused on imported goatskins and the other on domestic cattle hides. Goatskin tanning, which grew dramatically in importance between 1870 and 1910, was concentrated in port cities on the east coast. This segment of the industry produced lighter leathers used in fine goods and was characterized by rapidly shifting markets, clustered small

firms, skilled labor, and shifting interfirm relationships—the classic features of specialty industrial districts [*146; 155*].

Cattle hide tanning, on the other hand, clustered around the meatpacking centers of the Midwest. This segment of the industry produced heavier leathers used in saddlery, soles, belting, and work shoes [*73*]. Midwestern tanneries produced a standardized product from a more durable raw material and could thus make more intensive use of tanning extracts, machinery, unskilled labor, and byproducts than could east coast tanneries. Between 1879 and 1899, the ratio of capital invested to value added doubled in the industry, while increasing just 32 percent for manufacturing as a whole [*73*]. Internal economies in cattle hide tanning in the Midwest gave rise to a pattern of large scale, stand-alone plants, with Chicago, St. Louis, and Milwaukee becoming the chief tanning centers. Large scale cattle hide tanneries formed two combinations in the 1890s in order to ease competition and to respond to oligopolistic practices of their cattle hide suppliers, meatpacking's Big Five [*178*]. Both Armour and Swift entered the tanning business through the purchase of large tanneries at the turn of the century.

Agricultural implements. The production of agricultural implements was strongly specialized by crop type in 1850 and was characterized by sharp sectoral unevenness; some farm operations, like reaping and mowing, had been mechanized, but most had not [*136*]. Before 1860, early workshop manufacturers employed a division of labor and specialized tools, but production itself was not mechanized. Manufacturers were located according to crop specialization; for example, the production of reapers and mowers followed the expansion of commercial wheat farming through New York and Ohio, and then into Illinois [*35; 38; 170*]. In 1860, Illinois already led the nation in agricultural implements manufacture, and Ohio and Wisconsin were significant producers [*136*].

By 1860, specialized firms outgrew their workshops and developed factory production on a larger scale, even though they were still not extensively mechanized [76]. They also began to develop financial independence from merchants and to establish their own marketing organizations [*136*]. A lasting pattern of industrial localization finally took shape between 1870 and 1890, centered on Chicago and Milwaukee, but with important subcenters in cities such as Racine, Springfield, Peoria, Decatur, Rockford, and South Bend. After 1890, the larger firms begin to diversify across various machinery lines, and a period of consolidation ensued, led by the formation of International Harvester out of McCormick and Co. and several smaller companies. The industry remained strongly localized in the Midwest: Illinois, Ohio, and Wisconsin accounted for 62 percent of capital invested in the industry and 61 percent of total product value in 1900 [*136*].

Lumber sawing and planing. During the course of the nineteenth century, lumber production moved steadily across the continent. Maine was the leading lumber state in 1800 but was soon replaced by New York, which then gave way to Pennsylvania. As settlement moved west, Ohio and Indiana became important lumbering states, and the lake states of Michigan and Wisconsin emerged as significant producers by 1860 [*186*]. The pineries and mixed hardwood forests of these last two states remained the center of the lumber milling industry until the early 1900s, supplying the voracious appetite for wood set in motion by the regional agroindustrialization process while also shipping to wider markets.[34]

Lumber milling was an early leader in mechanical innovations including the application of both water and steam power [*141*]. Significant improvements, however, accompanied the rise of northern Midwest lumber milling after 1840. By 1860, the lumbering process was hastened through the application of canthooks, saws, and better axes. Milling technology experienced a series of improvements: sash saws,

[34]Here again our upbeat tale has a downside in the ravages visited on North American forests by the wholesale onslaught of the timber industry [*124*].

muley saws, and gang saws replaced single blade reciprocating saws. Circular saws were put into use after the Civil War and, able to cut at much higher speeds, greatly improved mill output. These saws utilized thick gauged blades that were perfectly suited to high speed operation, but left an extremely wide kerf, prompting contemporary British observers to comment on the wastefulness of American lumber production [*141*]. The development of less wasteful band saws awaited developments in metallurgy in the 1870s and 1880s.

Improvement in saw technology was accompanied by the development of other cutting devices for staves and shingles, sanding machines, mechanized feeding, and specialized planing machines. At the same time, these changes in milling joined with innovations in construction to work a revolution in American homebuilding. The balloon frame was invented around 1840 in Chicago, which became the nation's center for mail-order house plans and attachments during the Victorian and craftsman periods of mass homebuilding.

In Michigan, commercial lumbering first developed during the 1830s in the Saginaw River Valley and quickly spread northward to the Au Sable River and westward to the Grand and Muskegon rivers [*43*]. Towns located at key points along these and other Michigan rivers became the state's larger milling centers. Saginaw, Grand Rapids, Muskegon, and Traverse City shipped their mill products first by water and later by rail to wholesale lumber centers, especially Chicago. The same pattern of riverine lumbering developed in Wisconsin during the 1840s. In the eastern part of the state, the industry was focused on the Menominee River to the north and the Wolf River system further south. The region's most productive lumbering districts, however, were located along the Mississippi River tributaries in western Wisconsin [*51*]. Cities such as St. Paul, Eau Claire, and LaCrosse, as well as St. Paul and Winona in Minnesota, developed into important lumber producing towns, shipping most of their product down the river. Iowa, Illinois, and Missouri mill operators, led by Frederic Weyerhaeuser, also managed to secure large supplies of Wisconsin timber, which they floated downstream to their mills. As a result, enormous timber and lumber rafts clogged the Mississippi during the latter nineteenth century, and Clinton, Rock Island, Dubuque, and Hannibal developed large lumber milling industries by the 1870s [*69*].

In this section, we have attempted to demonstrate that midwestern development rested on a constellation of agro-industries and resource processing industries in which the region specialized and excelled. These industries date from a very early time in the evolution of the Midwest, advancing along with the frontier of agricultural settlement in most cases. Each of these sectors manifested its own internal growth dynamic based on proven competence and innovation in both products and production techniques; they were not merely imitative activities playing catch-up with more advanced manufactures to the east. Indeed, they frequently bested eastern competitors along the way, resulting in clear and substantial shifts in the national patterns of industrial location (cf. Storper and Walker [*161*]).

These various sectors occupied particular sites within the larger territorial production complex, creating a distinctive spatial division of labor within the region. Industrial localization occurred at various scales: individual towns and cities, as well as regional systems of cities. Localization implies an enormous productive power, of course. A very few firms, workers, and places are able to serve a very large market, which is only possible given the revolutionary development of the forces of production. Some midwestern industries, such as pork packing and reapers, were advanced enough in conception or method to be exportable at a very early date, despite the northeastern states' advantages due to an earlier start in the same fields; thus, not all areas of Midwest began with merely localized economies, as Meyer [*105*] avers.

This spatial division of labor was by no means static. The agro-industrialization process shifted across the continent during the nineteenth century, spreading north and west from the Ohio River Valley into

the rest of the Midwest, while the internal revolutions in every industry often dramatically rearranged the patterns of localization within the region (cf. Marshall [98]). A set of local economies did not become frozen in a single mature region called the Manufacturing Belt, as held by Pred [*130*] and Meyer [*105*]. For example, meatpacking shifted from Cincinnati and the river towns to Chicago and St. Louis, and from there expanded into places such as Omaha, Nebraska and Sioux City, Iowa at the Prairie-Plains boundary. At the same time, Louisville, Kentucky, became deindustrialized a century before the term gained currency in industrial geography; after the Civil War sealed its fate, Louisville did not rejoin the industrial belt for decades [*175*].

SMALL CITIES IN THE TERRITORIAL PRODUCTION COMPLEX

We have said that the Midwest could be characterized, as a whole, as an agro-urban production complex. This idea needs to be elaborated. Regional development involves both large and small towns in larger systems of cities, as Pred [*132*] has insisted. The Midwest has been characterized by vigorous urbanization throughout its history; southern Wisconsin and Michigan, eastern Iowa and Minnesota, northern Illinois and Indiana, and virtually all of Ohio are characterized by dense city-systems [*105; 110*]. In particular, the Midwest's city-system is well filled in the lower ranks, being marked by an especially large number of vigorous small and medium-sized industrial towns dotted across the rural landscape.

The growth of cities in the Midwest is strongly associated with industry. The upper end of the scale is well known; places such as Cleveland, Toledo, and Detroit became synonymous with American industrialization in the twentieth century. But smaller cities such as Massillon, Ohio, and Dubuque, Iowa also have pride of place in the industrial pantheon.

Unfortunately, small- and medium-sized cities were virtually written out of the script by Pred's [*130*] argument for the growing concentration of economic activity in the very largest metropolises.[35] Pred's evidence is not altogether compelling, however. A fresh look at the case of Iowa, for example, reveals that small- and medium-sized industrial towns were growing vigorously during the post-Civil War period when the giant cities were supposedly rushing ahead of all contenders. For example, between 1870 and 1900, ten Iowa cities exhibited percentage increases in manufacturing employment that rivalled or surpassed the regional metropolises of Chicago, Cleveland, St. Louis, and Detroit. Without doubt, the larger cities had much higher percentages of their populations employed in manufacturing, but the rate of growth of manufacturing employment as a percentage of population in this period was higher in the Iowa cities. Moreover, while the average product per capita for these ten Iowa cities was just 26 percent of the average product per capita for the four large cities in 1870, this figure jumped to 60 percent by 1900.[36] In fact, the biggest cities reached their peak of importance in manufacturing by 1870 [*107*]. Although they continued to grow prodigiously, this growth was based principally on their dominance in mercantile and service functions [*15; 34; 132*]. In short, metropolitan industry, while hugely important, cannot be allowed to eclipse the wider compass of industrial urbanization.

Industry could prosper in towns and smaller cities for several reasons, of which three are critical: transportation, capital, and labor. First, such location had good access to local farms, particularly in the early years of milling, hog-slaughtering, and the like when land transport was poor. They enjoyed equally ready access to long-

[35]In fairness, Pred did recognize the vitality of smaller cities in terms of innovation—but only in the context of an argument overwhelmingly for the upward drift of economic growth toward the top of the urban hierarchy.

[36]These comparisons are based upon county level data from the U.S. Bureau of the Census, 9th Census of the United States, Volume 3, *Wealth and Industry*, and the 12th Census, Volumes 7 and 8, *Manufactures*. In 1870, population in all but one of the ten urban Iowa counties cited ranged between 17,000 and 40,000. In 1900, population in all but one of the ten counties ranged between 28,000 and 55,000.

distance transportation; good long-distance water transportation was present virtually from the beginning of settlement, thanks to the mighty Mississippi system, the Erie Canal's link to the Great Lakes, and the motive power of the steamboat [*171*]. The eastern Iowa river cities are a case in point. Timber could arrive from the far northwest and packed pork could depart for Europe via New Orleans [*69; 80; 101*].

Transportation is a necessary but not sufficient condition to explain industrialization, however. Higher transport costs could be overcome by lower production costs. As productivity grew, as in meatpacking following the Civil War, single factories in smaller cities such as Cedar Rapids or Ottumwa, Iowa could outcompete butchers throughout much of the eastern seaboard. Nor did the transportation network simply arrive from outside the Midwest, despite the essential role of Boston capital and Federal land grants; it was built up, in good part, by capital contributions from thriving Midwestern towns [*119*]. In addition, the network required maintenance and servicing at intermittent points, fueling such thriving town industries as cooperage for the river trade, wagons for local road traffic, and, most important, railroad repair yards. Many small cities such as Oelwein, Iowa grew up in large part around rail yards [*169*].

Second, smaller cities could offer the critical intermediary in the form of the merchant capitalist, who provided the necessary links to wider markets and often the working capital as well [*128*]. Indeed, most budding manufacturing firms, such as meatpackers, were begun as sidelines to merchant activities or quickly entered into partnerships with merchants, to join manufacturing expertise with commercial know-how and financial strength [*69; 101*]. This situation contrasts sharply with that in the South, where the big planters usually acted as intermediaries for local cotton growers and dealt directly with outside merchants from New York, Liverpool, Boston [*59*], stunting the development of indigenous merchant capital.

The third important factor was availability of skilled labor, which poured into the Midwest as part of the agrarian settlement process:[37] Swedes, Germans, Dutch, Scots, New Englanders, Pennsylvania Deutsch—a whole panoply of northern Europeans and Americans with a wide range of experience and acquired trades besides farming. For example, German craftsmen set about the shoe trade throughout the Midwest, and Welsh miners opened up the Iowa coal fields [*73; 118*]. Small towns also boasted a hardworking and reliable unskilled labor force, swollen by sons and daughters of the farmer class as population grew and land became harder to acquire as the century wore on.[38] Moreover, each town could, with time, cultivate a labor force attuned to the particular needs of the dominant plant or group of activities [*161*]. Gordon [*66*] is therefore right to raise the question of labor control in industrial location, but he neglects the equally important virtues of skill, diligence, and experience among workers (and workers turned managers and owners) that propelled industrial growth in small cities throughout the Midwest. Here again, the class relations of the Midwest contrast with those of the South, which discouraged European immigrants from settling there and lending their hands to the building of industry.

None of these conditions was viable at the level of single places, however. Small factory towns and medium-sized industrial cities were embedded in a larger fabric of cities and social relations in the midwestern territorial production complex. The territorial production complex has again become a subject of importance in industrial geography. The central idea is that spatially concentrated industrial districts are powerful engines of economic growth under capitalism. Instances of such districts in the past are legion [*146*], and they are reappearing with some force after a long period of dominance by large corporations and a more dispersed spatial division of labor [*125; 154*]. This has led to a

[37]North [*144*, p. 251] also mentions the build-up of skilled labor as essential to success of the export sector.

[38]This, too, is no agrarian idyll, as conditions of labor exploitation could be severe, as in Iowa's coal mines or Chicago's meatpacking plants.

reconsideration of territoriality throughout the whole of modern industrialism, which was never simply eclipsed by the large factory and giant corporation [*161*].

Growth in territorial production complexes is powered by a multiplying division of labor and dynamic economies deriving from specialization, flexible linkages, pooling of labor, and sharing of knowledge. That is, the division of labor is not confined either to long-distance trading relations, as in the North export model, or detail work within the factory. It occurs at the meso-level within territories, and it drives industrial growth from there. This point is what Lindstrom [*90*] and Meyer [*105*] hint at, but they fail to see that specialization *within* agglomerations can be equally powerful as a developmental force (cf. Scranton [*155*]). The division of labor helps explain *both* localization and concentration. At the same time, the traditional conception of agglomeration economies used by Pred and others is too broad, because such economies take place most strongly within industries or related industrial sectors. These rest on specific technological foundations, complementary specializations, related labor skills, and common socialization to the industry's ways of working [*161*].

The shape of territorial production complexes is a point of contention. For Scott [*153*], industrial clusters occur largely within the metropolis, but this assumption merely replicates the bias in cumulative causation theory toward the large city—perhaps not surprisingly, given the glaring paucity of small cities in Scott's principal study area, California. The Third Italy, on the other hand, consists of a densely settled fabric of smaller cities and towns, with a vital agrarian past, in Emilia-Romagna, Tuscany, and nearby provinces [*6*]. In short, we need to integrate city-systems with industrial districts in a single, more capacious concept of territorial production complexes. We believe, following Storper and Walker [*161*], that the territorial production complex is a general phenomenon that can take several forms: submetropolitan, metropolitan, regional, national, and even international.

In this conception, the smaller city subsists not by means of its own locational advantages alone, but by virtue of being part of a larger system. That system, in the Midwestern case, rests on both a relation of town and country and a system of cities of various sizes. Cities were nodal points not just of commerce (cf. Muller [*110*]), but of production as well. The transport network tied these nodes together, but so did institutions and habits of trade, mediated by the merchants and industrial firms, and patterns of labor migration within a labor pool that moved freely between town and farm and town and city [*33*]. Within this tissue of migration and trade, firms could specialize in particular product niches, replicate the achievements of competitors, and innovate new production methods; they could find supportive investors, secure skilled and disciplined labor, and pick up on the latest improvements in machines and materials; and they could expand or relocate freely throughout the Midwest, confident of finding a suitable location.

All this could take place at a distance, between towns, across half a state, or even hundreds of miles away. It could do so, essentially, because the whole region was steeped in a common way of life based on the free farmer, wage labor, commercial intercourse, and northern European national origins.

MIDWESTERN CONVERGENCE OR DIVERGENCE?

As economic geographers in the 1980s came to emphasize industrial change as the prime determinant in the fate of regions, the impulse was to be done with the intellectual legacy of regional endowment theory, which appeared to blame people and places rather than capitalism for regional underdevelopment or deindustrialization; yet it was quickly realized that the accumulated sediments of regional history remain [*100*]. These sediments are deeply colored by past industrialization; indeed, developed places are, in an important sense, "produced" through the process of industrial growth [*161*]. The distinctive nature of Midwestern development is therefore more than a matter of deep soils, broad

rivers, and great lakes. It shines through in the economic geography of the region. In this regard, the Midwest is more than an exemplar of the American road to capitalism [*129*], the western half of the antislavery north [*109*], or the last addition to the northeastern manufacturing belt [*39*]. It is a unique place forged by agro-industrialization in the century between 1820 and the First World War, between settlement and the age of Ford.

While economists have normally been blind to the importance of regional differences, geographers have long recognized the distinctiveness of the Midwest as a cultural region (e.g., Shortridge [*159*]; Zelinsky [*187*]). Unfortunately, much of the work in the cultural geographic tradition, though immensely valuable in painting a picture of material life and landscapes in different places, remains epiphenomenal, lacking grounding in economic processes of regional formation and development [*81*]. For this reason, observations concerning cultural differentiation have never been adequately incorporated into regional development theory, leaving a great hiatus in the discipline that is only beginning to be faced up to by a reconstituted regional geography [*63; 137*]. We can only indicate the lineaments of midwestern economic uniqueness here, in hope that a more complete picture of the region will emerge in future study.

To highlight the distinctive nature of the Midwest economic region, it is necessary to compare its agriculture, industry, and urbanization with those of the rest of the United States. To begin with, the social relations of midwestern farming were overwhelmingly those of the free family farm. By contrast, the South and its history are stamped by slavery and the plantation system [*58*]. Differences existed within the antebellum South, of course, and became more marked after the Civil War, as the rapid industrialization of North Carolina shows [*180*]; yet on the whole, the postbellum South continued its separate way, with its labor market deeply imprinted by the sharecropping system and its development still sluggish [*95; 183*]. The upland South, or Appalachia, which became the refuge of free white farmers [*59*], did not follow the path of the coastal plain and piedmont; indeed, West Virginia broke away to join the North in the Civil War. This slowly developing region was dominated by free farmers and small town petit bourgeoisie who were bypassed by the main circuits of commerce of the nation until the area was converted into a peripheral zone of coal mining early in the twentieth century [*135*].

To the east, New England's Puritan settlement stamped it with a village system of agriculture quite different from the isolated family farm of the Midwest, occupying individual homesteads in the cadastral survey system. Poor soil meant that the chief resources were timber and the sea, on which developed a mercantile economy that towered over the countryside [*168*]. To the west, California agriculture was dominated by big capital, thereby taking a very different turn toward modern agribusiness [*103*]. Its form of agro-industrialization generated the most advanced agribusiness in the world by the onset of the twentieth century [*47; 49*]. The Great Plains was a land of cattle barons and extensive wheat farming thin in settlement and was quickly made tributary to the booming urban centers of the Midwest [*16*]. The Mountain states, under the sway of San Francisco until well into this century, have enjoyed little settled agriculture of the plow, and have largely specialized in mining and ranching [*181*].

The Midwest and the Mid-Atlantic together formed the heartland of the free farmer on good land. Divergence among these agricultural systems is subtle, thanks in part to the continuity of settlement along this central belt as Americans moved west [*77*]. Buffalo's grain trade was a precursor to Minneapolis', while McCormick (inventor of the reaper) could move easily from Virginia to Chicago. Nonetheless, there were differences: Virginia and Maryland were stained by their long adherence to slavery, despite a general shift away from slave labor after 1830 [*11*]. Southeastern Pennsylvania was deeply marked, like New England, by its religious and political origins, especially the Germanic brand of

Puritanism that gave the Lancaster area farms their unique plain-folk character [88]. Upstate New York set the closest social precedents for the Midwest during its high tide of commercial republicanism from the 1820s to 1840s [*102; 184*].

The second sphere of regional divergence for the Midwest lay in its industrial practices and patterns. In this arena, it began with some special features and became increasingly its own master with time. It was not just a matter of early start/late start, with the Midwest following the path of the Northeast. Gerschenkron [*60*] was right to see that places entering the stream of capitalist industrialization at different times follow different paths (although he underestimated the degree of variance possible); there have been many capitalist roads to industrial development.[39] For example, economic historians have long wrestled with the differences between industrialization in the United States and Britain: in the nineteenth century, the Americans used more, bigger, and cruder machines, in general, but also evolved the highly advanced American system of machining replaceable parts that so struck British observers [*38; 67*].

The same industrial divergence can be found among regions *within* the U.S., as is evident from the histories of the leading sectors of the Midwest. As we have seen, midwesterners developed the arts of agro-processing to new heights as they revolutionized meatpacking, flour milling, brewing, distilling, and lumber milling in the nineteenth century. Some of the agro-industrial specializations of the Midwest, such as reapers and pork-packing, came early in its history, near mid-century. Others developed fully only after the Civil War. Steel is the most dramatic case of regional dominance, as the prewar anthracite-based industry of eastern Pennsylvania was displaced by the bituminous coke-fired furnaces of the western Alleghenies and eastern Ohio [*177*]. Similarly, from its beginnings as an adjunct of farm equipment, boilers, and steam engines, midwestern metalworking and machine-making evolved into the leading machine-tool industry in the world [*142*]. It did so by means of some thoroughly original practices that did not replicate the metal-craft and machining tradition of New England that had given the world Revere silver, fine brass clocks, and Colt revolvers—and the "American system." Rather, it bettered New England by such means as a peculiar expertise at metal bending quite at odds with the latter's metal cutting proclivities [*76*] and by sequenced processing of parts by dedicated machines and specialists performing less all-around operations than before.[40]

Other, less studied sectors also performed brilliantly in the Midwest as the nineteenth century wore on. Carriage and wagon manufacturers, like farm equipment makers, combined developments in metalworking and woodworking as they established strong centers in Cincinnati, South Bend, and Detroit [*41*]. As the region's leather tanning industry developed, the Midwest became a significant producer of boots and shoes. The nation's shoe industry, like tanning, was highly segmented regionally. In contrast to the fashion oriented east coast industry, the Midwest shoe producing centers of Milwaukee, Chicago, St. Louis, and Cincinnati focused on standardized heavy work shoes, operated large scale operations, and developed mass production and marketing systems [*73*].[41]

Furniture makers in Grand Rapids, Michigan pioneered machine production techniques in woodworking as that city developed into one of the nation's foremost furniture making centers. Detroit made engines for boats plying the Lake trade long before it was a center of car manufacture. Chicago moved ahead in construction technology, such as standardized house

[39]This neglect of space relative to time is typical of 20th century social science, according to Soja [*160*].

[40]The latter point is made by Scranton in unpublished material on developments in Cincinnati.

[41]The industrial differentiation of the East and Midwest along the lines of batch versus mass production has been suggested by Philip Scranton (personal communication). Such a distinction could prove to be extremely useful in understanding the process of regional industrial development, but we would caution against using this dualism as the primary tool of analysis. Batch and mass production methods coexisted within both regions.

plans based on the locally developed balloon frame and the elevator industry under the leadership of Otis [32].

Patterns of urbanization and systems of cities also vary from place to place [*161*]. The Midwest was distinctive both in the vigor of its town and city formation and in the dispersed nature of its urban hierarchy: many small towns and medium-sized cities and no single dominant metropole. In this regard, the Midwest is quite unlike most other regions of the United States—not to mention other grain-growing nations such as Hungary or Argentina (e.g., Johns [*79*]).

The atrophy of southern cities in the nineteenth century is well known [*106*]. Only New Orleans, among the cities of the South, moved to the heights of the U.S. urban system, and it was propelled by the river trade with the Midwest. Only North Carolina developed a host of small industrial towns (after the Civil War), but it lacked any large commercial, financial, or industrial metropolis [*180*]. At the opposite pole, California and the far West generated great mercantile cities but few small towns, owing to the lack of a broad farm base and the concentration of mining and timber wealth in the metropoles, especially San Francisco [*127*]. Between these two poles, New England generated two types of urban system: along the fall line, a chain of satellites to Boston and Providence, which drew labor but little else from the farms [*168*]; and in the Connecticut Valley, a dense network of small industrial towns developed around a highly advanced form of metal-working and assembly known as "the American system" [*76*].

While similar to the Midwest in their agrarian social base and agro-industrialization, the hinterlands of New York and Philadelphia were tributary to these overweening mercantile and industrial centers in a way that little of the Midwest was to its great cities. It is not surprising that Lindstrom [*90*] speaks of "the Philadelphia region" rather than "eastern Pennsylvania." Although Chicago emerged as the leading metropolis of the Midwest, competition was fierce, first with the river cities St. Louis and Cincinnati, and later against such industrial giants as Cleveland, Detroit, and Minneapolis (e.g., Belcher [*7*]). The region's city-system thus remained strong in the middle range, with a multiplication of industrial centers. In this regard, it is similar to the English Midlands; in France, by contrast, only one new industrial town was founded in the whole of the nineteenth century.[42]

The transport network deserves a word on its own as a force in the geographic divergence of industrial and urban patterns, because it is so often taken as a universalizing force leading to regional convergence. In particular, the standardization of the railroads after 1870 is usually seen as the prime cause in the emergence of a truly national economy that buried regional differences (e.g., Meyer [*105*]). Transportation improvements did not, in the manner assumed by classical regional development theory, simply link up the Midwest to older regions and expand the national territory. Transportation, like any other industry, grew and changed, and sometimes revolutionized itself. Moreover, transportation systems did not develop everywhere with the same form or intensity.

The nineteenth century saw three great transport revolutions and epochs of growth in transportation systems: steamboats, canals, and railroads [*169*]. Different parts of the Midwest were opened up by each: the river towns by steamboats, Ohio and the Great Lakes by the canal era, and the Prairie corn belt by rail. Moreover, the Midwest was continually transformed by these transport revolutions. Cincinnati was the Queen City of the riverboat era, St. Louis the King. Canals shifted the weight of development north and inward, giving Chicago, Cleveland, and Milwaukee a push to the forefront. The railroads cemented the crown on Chicago, at the expense of all its rivals. Railroads locked in the primacy of the region's central corridor, and they brought the Plains States

[42]Persky and Moses [*123*] indicate that the Northeast had more small industrial cities than the Midwest. This finding may simply be due to the serious omission of railroad, milling, and foundry towns from their data. If not, it deserves further explanation.

under the sway of the Prairie through the wheat and beef trade [*54*].

Nor did the various transport modes develop evenly across the regions of the United States. Steamboats plied the Hudson in great number, to be sure, but the Mississippi and Ohio Rivers were in a class by themselves, giving the Midwest a special flavor (captured by Mark Twain, among others). Canals were particularly the province of greater Boston, upstate New York, and Ohio, and the railroads, when they came, simply replicated the canal network in these areas [*46; 149*]. Railroad development, in turn, reached its greatest heights in the Prairie states. Chicago's centrality in this extraordinary rail network was a fact less of physical geography than of the way that Chicago took railroading to heart like no other U.S. city. Chicago built the railroads, and the railroads built up Chicago (cf. Pudup [*134*]).

CONCLUSION: FORDISM BEFORE FORD

Ultimately, one unique midwestern achievement towers over all others: Henry Ford's Model T car and assembly line, invented in 1908-13 [*76*]. This critical event of the early twentieth century comes at the conclusion of our story of the agro-industrialization of the Midwest and opens a new chapter in regional and world history. The history of Fordism, as Antonio Gramsci called it, takes us beyond our purpose in this article. Nonetheless, the dominant conception of "Fordism" in contemporary development theory and economic geography flows from a perspective on U.S. economic history that is fundamentally mistaken in ways that have been illuminated in the preceding discussion.

The French "Regulation School," led by Michel Aglietta [*1*], has elevated Ford's revolution to the defining moment of twentieth century capitalism. Fordist assembly leads the breakthrough into a regime of mass production, which is eventually joined by a corresponding regulatory mode of mass consumption after World War II, set in motion by collective bargaining with industrial unions and the Keynesian policies of the welfare state. This theory of modern capitalist development has been projected to the whole world by Aglietta's colleagues [*91*].

Nonetheless, Aglietta's [*1*] reinterpretation of U.S. development is based on a profound misreading of American, and especially midwestern, history. Aglietta believes, wrongly, that nineteenth century U.S. growth was "extensive," as opposed to the "intensive" development of the Fordist era. By extensive, he means that growth rested on frontier settlement, resource extraction, little advance in industrial productivity, and low levels of consumption, and he depicts the farming class as "subsistence" producers, workers as having little disposable income, and manufacturing as sluggishly deferring to mercantile accumulation. This is a fantastic misrepresentation of the facts, as we have presented them here, and an interpretation that combines the worst sins of central place, export base, and take-off theories. That such ideas should be presented as a substitute for the classical dynamics of Smith, Marx, and Schumpeter is a commentary on the lack of historical-geographical knowledge among contemporary scholars.[43]

Ford's triumph did not come out of thin air. American industrialization and mass production had been in motion for over a century before his experiments with the moving line. Furthermore, the Ford assembly line rested solidly on antecedent innovations from the industries of the Midwest, not simply U.S. industry in general. Ford drew liberally from the arts of metal-bending, born of the bicycle industry; skills in engine mechanics, from shipfitting; rationalized linear work-sequencing, as in the hog disassembly lines of Cincinnati packers; mechanized handling of material, in a manner recalling flour milling; standardized machining of large numbers of parts, as in woodworking; and advances in machine tooling. The trump card was to

[43]For an exhaustive and devastating critique of the Regulation School's theory and evidence (for the United States), see Glick and Brenner [*64*]. We would like to acknowledge mutually beneficial discussion with Bob Brenner in the course of writing this paper, as well as with two French critics of Regulation theory, G. Duménil and D. Lévy [*42*].

perfect standardized parts almost a century after their introduction at the Springfield Armory and thereby to best New England at its own game. Together these advances laid the foundations for the Fordist revolution in mass production applied to cars at Highland Park [*62; 76; 141*].

Fordism swept the car industry, sending plants triumphantly into Europe and the rest of United States in the 1910s and 1920s [*151*]. The entire upper Midwest rapidly answered the call of Detroit, supplying steel, metal parts, engines, bodies, paint, glass, and tires to satisfy the voracious appetite of the assembly plants. Fordist methods also swept through related industries, such as household appliances, which grew enormously in the Midwest. By the end of the Second World War, the Midwest had become more than the heartland of America; it was the industrial core of the capitalist world.[44]

Midwestern farmers provided one of the first mass markets for Ford's Model T and, of course, his tractors. Aglietta's [*1*] theory of Fordism confines the U.S. mass market to the mid-twentieth century and to unionized industrial workers, yet mass consumption of standardized goods had been one of the hallmarks of American commerce throughout the nineteenth century, much remarked on in contrast to Europe [*67; 141*]. The family farm class was a bulwark of such consumerism, but so were the middle class and working class denizens of small towns and big cities throughout the country. Whether the Midwest developed a particularly vigorous strain of mass consumer cannot be said because the research has not been done to answer this question. But there are hints that it did, such as the Midwestern origins of catalogue sales by Penney's and Sears, Roebuck, small town farm equipment outlets (and financing) and multiple product lines such as those of International Harvester, and the perfection of the traveling sales force by National Cash Register—as well as Henry Ford's car for Everyman and Sloan's model changes at General Motors.[45]

This peak of midwestern influence in the mid-twentieth century is a far cry from family farmers and seasonal hog-packing, flat boats and black soil. How was the leap made to such great heights of mass production and consumption? As we have seen, social conditions were nearly ideal from the outset of settlement: advanced European commercial civilization set loose on a fertile plain, quickly and brutally cleared of its indigenous peoples, and without a landlord class to extract its pound of rent. An empire of the independent farmer, merchant capitalist, and small industrialist, the Midwest was about as good a place for the wage worker to make a living as could be found at the time, as well. Yet class relations alone cannot explain the high road to development taken in the Midwest. On this point, we beg to differ with Brenner's pure theory of capitalist property as the generative force behind agrarian and industrial capitalism [*19; 64*]. Instead, we must turn to additional economic causes for the cumulative advance of the forces of production.

The explanations of the economists and geographers have not been satisfactory, either. No matter how much grain the Midwest exported, how many miles of rail it laid, or how many hogs it fed, it could not have reached this pinnacle of success without a process of industrialization and urbanization. No matter how many big cities were spawned by mercantile trade, no matter how swift the circuits of information, no matter how many railroads systems were rationalized through modern management, the Midwest could not have grown as it did without having revolutionized production methods across a wide range of agro-processing industries and having built an immense urban system to support and sustain the bare bones of production.

No single moment or initial condition is enough to explain the long upward course of the midwestern region. Success followed success as the march of industry was sustained, first by agro-processing, then by

[44]Compare this history with that of another immensely successful U.S. industrial region, California, which went down a very different path to movies, aircraft, and electronics, after being badly outcompeted in sectors such as cars and farm equipment in which the Midwest specialized.

[45]Our thanks to Philip Scranton for raising this question.

machinery and machine tools, then by bicycles and railroad equipment, and, eventually, by automobile assembly. The towering achievement of Fordist mass production must therefore be understood as a process of industrialization in the Midwest going back almost a century. That process of industrial revolution should be seen in terms of specific social and technical arrangements developed within a distinctive region. Only by this means can we come to grips with the early growth of the Midwest, the grand surge of industry and urbanism by the late nineteenth century, and the way the region ultimately burst onto the global stage in the early twentieth century.

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