

Networks of Capital and Midwestern Industrialization:
Cleveland, Ohio 1880-1914

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What's tougher than finding good ideas is Michigan's lack of a venture-capital infrastructure: that networking web of fund managers, accountants, bankers, lawyers and entrepreneurs who feed off one another's deals and make them easier to do ... you can make the argument that Michigan was the most successful entrepreneurial state in the country in the first half of this century. Its success was equal to anything Silicon Valley will ever do.

At the same time, that entrepreneurship was so successful that it built huge organizations, and that became the economic model around here (interview with Rick Snyder, ex-president of Gateway 2000 and founder of Avalon Investments, a Michigan-based venture capital firm, *Crain's Detroit Business* May 4, 1998).

The relationship between entrepreneurship, financial institutions, and regional development is a crucial question today for economists and policy makers. This relationship is central in the transition economies of Eastern Europe and the former Soviet Union as well as in the traditional "developing regions" of India, Africa, and Latin America.¹ While development has been more successful in the Far East, the recent banking and currency crises there suggests that a better understanding of the appropriate design of financial institutions for different stages of economic development is crucial. This article uses the case of successful development in the U.S. Midwest in the late nineteenth and early twentieth centuries to improve our understanding of this relationship, and in doing so, make more concrete the much vaunted role of social capabilities in successful economic development.²

1. In recent years economists have increasingly thought about economic development in terms of regional and urban issues. Cite urban economist at Harvard and Krugman.

2. Cite David Landes on social capabilities.

Between 1860 and 1914 the American Midwest was transformed from a primarily agricultural region, with average incomes half that of New England and the Middle Atlantic states, to the industrial heartland of the leading industrial country in the world, with incomes well above the national average. The region also emerged as a leading source of new technology, at the same time that patenting rates in New England and the Middle Atlantic fell dramatically.³ Considering the importance of these changes to U.S. economic development, there has been remarkably little research on how the Midwest successfully initiated the growth process. Some research has focused on the integration of the Midwest into the national economy as growth rates in the U.S. as a whole increased.⁴ Others have focused on factors internal to the Midwest, such as its pattern of urbanization or its rich natural resources, often noting that the American South, while part of the same political entity, did not experience similar growth over this period.⁵ The existing research on the emergence of an industrial economy in the Midwest simply does not have sufficient or appropriate data to identify the critical factors and institutions in this process.

Regional development in a capitalist economy requires successful entrepreneurship, that is to say, the formation of productive, innovative, and growing firms. The creation of such firms requires bringing together a variety of resources: labor, capital, managerial expertise, information about technologies, and information about market demand. I argue that a crucial element to regional development is the creation of local and regional institutions that match capital - that is, potential investors - to people with information about new technologies and market

3. See Lamoreaux and Sokoloff, "Patents."

4. Parker, "From Northwest to Midwest" and "Native Origins of Modern Industry."

5. See Page and Walker, "From Settlement to Fordism."

opportunities.⁶ In doing so, these institutions foster the formation and growth of innovative firms.

I argue that it is important that these institutions be local or regional because, in many cases, the bundling of financial capital and managerial expertise is crucial to firm success.⁷ The gains from bundling financial and managerial expertise create complementarities between investment projects and particular investors. A potential entrepreneur (i.e. an individual with information about an invention or an unserved market) does not just need financing. He (or she) needs business advice. So the entrepreneur will not be indifferent about the source of finance. Some sources of finance will increase the value of the project relative to other sources of finance. The best investor for the project will be someone who can offer appropriate, specialized managerial expertise to the entrepreneur.

The corollary to this argument is that anonymous markets are not always the places most conducive to economic development to raise capital. Rather economic development is facilitated when capital is raised through identity-inflected networks. It is only in such networks, where the transactors know each other, that capital can be bundled with managerial expertise.

Identity-inflected networks are much more likely to be local or regional networks, at least in the 19th century. Extra-regional capital that is invested without mediation by a local institution

6. For similar arguments regarding other regions and periods, see Price “Economic Function” and Weiman “From Old South to New.”

7. This idea is well accepted among venture capital specialists today. For example, in a special section devoted to explaining venture capital to small firms *Crain's Detroit Weekly* wrote, “initial/seed investors often help management recruit key personnel, establish sound management practices and provide access to suppliers, banks and potential customers” (June 8, 1998, p. E-4). For a more academic treatment of the subject see, Antonio Gledson de Cavalho, Ph. D. dissertation, University of Illinois 1997.

is more likely to be “portfolio capital” and separated from managerial expertise. Local mediating institutions, on the other hand, are much more likely to be able to provide information to the investor and the entrepreneur that will allow them to decide whether this investor-entrepreneur match will have large complementarities or not.

Thus economic development is most likely to take place in regions that have local and regional institutions that connect investors and entrepreneurs and provide information to them about potential complementarities. These institutions can be formal capital market institutions such as banks and stock exchanges or they can be informal institutions (i.e. not capital market institutions) such as universities, churches, and social clubs. When these institutions perform this function of connecting individuals they create a network of investors and entrepreneurs. We describe the institution that connects people as a “nodal” institution in a network of individuals.

Perhaps the most successful institutions are those which are nodal in a network that includes not only local entrepreneurs and investors but also extra-regional investors. A successful nodal institution includes in its network entrepreneurs and investors who will complement one another. It must be able to identify and expand its network to include new entrepreneurs and new investors that will complement the existing network members. But the network must also be of sufficiently limited size as to economize on search costs for members of the network. Institutions which make this matching process more efficient facilitate economic growth.

While capital and labor certainly can and did flow across regions, information about market opportunities, information about the skills, aptitude, and gumption of individuals, and information about newly developed technology tends to be very local. (I will usually presume that “local” has a geographic meaning, but especially as information flows across new

technologies like the telegraph, telephone, and now the Internet, local may also mean “nearby” within a network of linked individuals.)

Institutions and the networks of which they are a part will facilitate economic development to a greater extent if they have the following three characteristics. First, it is necessary that the network that includes individuals with complementary resources. Second, matching will be more efficient the shorter the search process necessary for a successful match is made. The search process will be shorter in a smaller network, but this has the obvious tradeoff that the expected complementarities will be lower. Alternatively, a segmented network that allows people to search first among the most likely matches will increase the efficiency of the matching process. Third, networks that are permeable to new individuals, who may provide superior matches, will create greater complementarities.⁸ Thus there is a tradeoff between economizing on the search process and consummating the best (i.e. most complementary) match.

Matching institutions are often necessary in developing regions for linking other resources, such as capital and labor, as well. For example, Rosenbloom has shown that employment agencies were critical in helping to re-allocate labor from Europe to newly industrializing regions of the United States during the nineteenth century.⁹ It was not enough for someone in the Upper Peninsula of Michigan to announce a high wage and wait for copper miners to arrive. In well-developed, dense markets that would be sufficient. But in this case it was necessary for copper mining firms, created by investors in Boston, Massachusetts, to hire

8. Domhoff, *Who Rules*, suggests that the success of American capitalism has depended not simply on its ability to sustain a “ruling class” but on the ability of its social and educational institutions to draw into that class the “best and brightest” of outsider (e.g. immigrant) groups.

9. Rosenbloom, “Looking.”

employment agencies in New York City to provide information to miners in Finland before it was possible to take advantage of the profit opportunities “inherent” in the rich copper veins of the U.P.¹⁰ These employment agencies were institutions that were nodal in a network that included capital in Boston, firms in Michigan, and miners in Finland. By matching these resources, they helped to create successful enterprises in an undeveloped region.

The employment agency is an example of an institution that facilitates development by providing members of a network with detailed information about particular economic opportunities. An alternative solution to providing such detailed information is to standardize things so that less information is required. Thus we also see a second kind of institution emerging in developing regions. Institutions of this second type provide mechanisms to standardize resources. Once what is being traded is standardized, prices are sufficient information to support exchange. This way of solving information problem opens up trade to many more people, but it also has fixed costs. Standardization only makes sense where there are large number of transactions. For example, grain exchanges in the late nineteenth century transformed what a very heterogeneous product into standard grades. This standardization reduced the amount of information necessary to participate in grain exchange and opened up the market to many, otherwise insufficiently informed participants.¹¹

This transformation is relatively simple for grain; it is much more complex for the shares

10. Gates, *Michigan Copper*.

11. See Cronon, *Nature's Metropolis*.

of a firm. Stock exchanges are institutions that attempt a similar transformation on these more complex resources. The standardization of information disclosure requirements for securities is a step toward establishing “homogeneous” goods in which investors can make decisions based only on the price of securities. But the information problems with securities are inherently more difficult to solve than with corn, because there is a problem of moral hazard. The problem is not simply one of disclosure: How big are those grains of corn? How big is the cost of producing those widgets? With securities there are not only more way to disguise the security’s true type, say by misrepresenting costs, but it is also possible to change the securities type by allowing costs to increase after the investment has been made. Thus standardization is more difficult and networks for providing information remain important to this day.

The existing history of the Midwest suggests a variety of institutions that may have linked capital to ideas - ideas about market opportunities and ideas about new technologies. Information about market opportunities - pockets of demand unsatisfied by current sources of supply - is often held by distribution intermediaries such as wholesalers, distributors, brokers, and, in vertically integrated firms, sales representatives. Economic development is encouraged where these distribution intermediaries also have information about potential suppliers who might be able to enter the market to satisfy that demand and where the distribution intermediaries have an incentive to provide that information to potential suppliers. One of the advantages of vertical integration is that firms can use internal incentives to induce employee sales agents to provide information about market opportunities to the firm.¹² But independent distribution intermediaries

12. See, for example, the discussion of the importance of employee-salesmen in locating new markets for chemical by-products and providing information about unsatisfied demands of current customers after the Dow Chemical Company decided to vertically integrate (Levenstein,

have also found it in their interest to provide information to manufacturers, or, in some cases, to integrate backward themselves. For example, prior to vertically integrating the Dow Chemical Company's distributors often gave it advice about where it should invest to develop production technology for new chemicals. Dow's distributors had information about customer demand and they hoped to profit from providing information to Dow, by becoming the intermediary that supplied the new product to customers.¹³

Other institutions often played a key role in linking ideas about new technologies to sources of capital. As with the employment agency example given above, there were businesses that specialized in this kind of matching activity. For example, the late nineteenth and early twentieth centuries saw increasing numbers of patent agencies opening in cities across the United States. These agencies, in addition to helping inventors obtain and defend their patents, helped them to locate investors who would purchase or license the patent for commercial development.¹⁴

Other times much more informal institutions served as the loci of overlapping networks of inventors and investors, such as the Western Union office in Cleveland in the 1880s and 1890s or the bar of the Hotel Ponchettrain in Detroit in the early 1900s.¹⁵ There are also cases of manufacturing firms themselves providing technological and managerial expertise to other firms within Midwestern industrial districts.¹⁶

Accounting, ch. 3). Dorman, "Nonconvexity" provides a formal treatment of this problem.

13. Levenstein, *Accounting*, ch. 3

14. Lamoreaux and Sokoloff, "Patents."

15. See Adams, "History."

16. See Mowery, *Boundaries*, and Graham and Pruitt, *R&D*.

Both the work of Lamoreaux and Sokoloff on patent agencies and these case studies of technological change in particular industries focus on the search process undertaken by the inventor. This paper attempts to examine the other side of this search, the process undertaken by the owners of capital. In particular, it looks at the existence of network relationships among banks and between banks and local manufacturing firms listed on the Cleveland Stock Exchange. Even if, as has generally been assumed (but not demonstrated for the Midwest during this period), banks did not themselves intermediate the allocation of capital from investors to firms because of legal restrictions limiting the provision of long term capital to manufacturing firms, banks may have had information about individuals that allowed them to play the role of matchmaker. For example, we know that a Cleveland, Ohio bank played exactly this role in the formation of the Dow Chemical Company in the 1890s.¹⁷

While this paper focuses on the role played by banks - a formal, capital market institution - and asks whether they were nodal in an information network that provided information about market and technological opportunities to potential investors, I am not claiming that these formal institutions were necessarily more important than less formal ones. Other institutions, which we do not usually think of as part of capital markets, may also have been crucial to the growth process, facilitating the flow of information about opportunities among networks of individuals, and making public to members of the network information about the characteristics of individual members. These other institutions include informal or non-economic networks, such as family and extended kinship networks, educational institutions, and business clubs.¹⁸ For example, it is

17. See Levenstein, *Accounting*, ch. 3.

clear that the Case School of Applied Science (predecessor of Case Western Reserve University), while not a formal capital market institution, was a place where inventors and investors met.¹⁹ Similarly, one suspects that business clubs, like the Union Club of Cleveland, were important centers for information exchange among local businessmen. Where these clubs welcomed outsiders with interesting ideas and reinforced a cultural disposition to embrace new technologies, they were more likely to facilitate economic development than where they served primarily as a barrier to newcomers and reinforced cultural values of exclusivity and group status.

This approach to the role of institutions in economic development raises several questions about the process of Midwestern economic development specifically as well as the more general question of why different institutions that match investors and ideas work better to foster growth at different places and times. Two central questions are, first, what were the geographic dimensions of the institutions supporting firm creation and technological change in the Midwest? Were they primarily local or regional, linking agricultural areas to small manufacturing cities and hence to regional financial centers like Chicago?²⁰ Or did they foster economic development by integrating the Midwest into national markets?²¹ Second, what types of institutions were significant in the matching up of investors with innovations, of capital with ideas? Were banks nodal in a network of information flow, as Lamoreaux finds for New England in the early 19th

18. See Lamoreaux, *Insider Lending*, and Lamoreaux and Glaisek, "Vehicles."

19. See Levenstein, *Accounting*, ch. 3.

20. This is the position taken by Page and Walker in "From Settlement."

21. This is the implication of work as varied as the regional studies of Pred, *Urban Growth*, and Meyer, "Midwestern Industrialization," the sectoral studies of Davis, "Investment Market," and Lamoreaux and Sokoloff, "Patents" and the industry studies of Johnson and Supple, *Boston*

century, or were they largely peripheral to the development process?²² If banks were not a nexus of information flows, what institutions were? Did local stock brokers, and the exchanges they created, play this role, facilitating the flow of capital to manufacturing firms before they had significant access to Eastern capital markets? This paper only just begins to answer these questions by examining the activities of the Cleveland Stock Exchange, and the banks and manufacturing firms associated with it.

The Cleveland Stock Exchange, 1900-1914

As a first step in addressing these questions, I have analyzed the records of one local capital market institution, the Cleveland Stock Exchange, from its formation in 1900 through 1931. The Cleveland Stock Exchange is one of many exchanges established in the Midwest in the late nineteenth and early twentieth centuries. In addition to the better known exchange in Chicago, there were exchanges in Cincinnati, Columbus, Detroit, Louisville, Pittsburgh, St. Louis, Toledo, and Toronto. Each annual volume of the Cleveland Stock Exchange records includes an entry for each firm listed on the exchange. The content of these entries is not standardized before World War I, but includes a description of the firm's activities including mention of any innovative technologies, a financial statement from which we can take not only the size of its capital stock but also its use of different types of capital (such as preferred stock and bonds), the names of its officers and directors, and its bank. The volumes were published by local investment brokerage firms, with the cooperation of the exchange, for potential investors.

Capitalists, and Gates, *Michigan Copper*.

22. *Insider Lending*.

Most years also include information on the volume of trade, high and low prices of individual stocks, and trading in unlisted or “outside” securities during the previous year.

Our examination of the Cleveland Stock Exchange provides us with information about both strategies for solving the information problem discussed above: standardization and networks. The Cleveland Stock Exchange itself represents an attempt by a group of local Cleveland stock brokers to increased standardization and, with daily reporting of prices in the newspaper, provide a commitment that would mitigate moral hazard on the part of brokers (if not of manufacturing firms themselves). The success (or failure) of these regional stock exchanges in providing capital to local industries is a measure of the success of the strategy of standardization. The records of the exchange provide us with detailed information about the firms traded on it, including their reliance on different forms of capital and their connections to particular banks and individuals. Thus the records of the exchange (as distinct from the history of the exchange itself) are a source of information about informal and bank-centered networks in Cleveland during this period. This article attempts to use the information available on the Exchange to address both these issues.

History of the Cleveland Stock Exchange

The Cleveland Stock Exchange was founded in 1900 by a group of Cleveland brokers “who had [previously] made ... trade in Cleveland securities ... an incident of their regular transactions, upon the New York Stock Exchange and the Chicago Board of Trade.”²³ There had been an active (i.e. publically reported) market in the securities of local firms since the early

23.Prior, “Cleveland.”

1880s. Several Cleveland brokerage firms specialized in buying and selling local securities.²⁴

The exchange was formed at the instigation of the local chamber of commerce and with the active support of local banks (many of which became associated with the exchange as “inactive members”).

Opening in March, the exchange quickly announced itself a success. Sales averaged about 1500 shares a week for the first six months, reaching an aggregate value of securities traded of \$150 thousand over the period.²⁵ The pace of trading picked up over the next six months, as sales volume ranged from 2500 to 5000 securities a week. Recalcitrant local brokers joined the exchange, convinced by the success of its first six months. The number of active members (brokers who were allowed to trade on the exchange) increased from twenty in October 1900 to the maximum allowed of thirty in January 1901. By February, a seat on the exchange sold for \$650. The original cost of a seat had only been one hundred dollars.²⁶

In 1903, 106 firms listed their stock on the Cleveland Stock Exchange (Table 1). The number of firms listed on the exchange stayed roughly constant over the period 1903 to 1914, though there was clearly a dip in the total number of firms in the middle of the period. The exchange itself attributed a decline in trading early in the period (not observable in Table 1 because of missing data) to the financial crisis of 1903.²⁷ The decline in the number of listed

24. *Cleveland Plain Dealer*, January 31, 1886, p. 1, June 1886, and August 22, 1886.

Sep 12, 1886

25. *Cleveland Plain Dealer*, September 23, 1900.

26. *Cleveland Plain Dealer*, February 1, 1901, p. 9.

27. Prior, “Cleveland.”

firms appears to reflect shifts in the industrial composition of the exchange. Consolidations, especially in telephones, but also in other utilities, were associated with a decline in the number of such firms listed on the exchange. Transportation and utilities made up almost 70% of the listings in 1903, and only about 35% in 1913. The overall number of firms listed remained constant because of the increase - almost a quadrupling - in the number of manufacturing firms listed. There were also a significant number of banks and banking institutions on the exchange - about one quarter of all the firms listed. Their number remained roughly constant throughout the period, and their shares were traded regularly, unlike those of many manufacturing firms whose shares were traded only intermittently. Trading activity on the exchange fluctuated quite widely, reflecting periods of financial speculation and crisis, but the secular trend probably had a stronger upward tendency than Table 2 indicates, as the importance of trades in unlisted shares increased.

The Role of the Cleveland Stock Exchange in Financing Local Firms

The first set of questions that can be asked of the stock exchange records pertains directly to the functioning of this particular local capital market institution. Did the exchange serve a distinct, and perhaps more innovative, population of firms than those who had access to national capital markets? New York capital markets were conspicuously reluctant to serve the needs of manufacturing firms during this period.²⁸ Did these regional exchanges provide capital to types of firms with little access to national exchanges? For Cleveland, the answer to this question is clearly yes (Table 3). While there are some firms who are listed both on the Cleveland Stock Exchange and the New York Stock Exchange, before 1914 the number is quite small (Table 4). This is the case despite the inclusion on the Cleveland Stock Exchange of a number of firms,

28. See Davis and Cull, *International Capital Markets*, and Davis and Gallman, "Sophisticates."

often legally domiciled in New Jersey or Delaware, that were the result of national mergers. (In each case, a significant Cleveland firm was one of those participating in the merger.) One might expect that such firms would have access to the New York Stock Exchange and its, presumably cheaper, sources of capital. But American Fork and Hoe, American Ship Building, Cities Service, and the National Carbon Company were all traded on the Cleveland Stock Exchange but not on the New York exchange. There were also six large breweries, each the result of the merger of several component breweries and each using a technology that required access to large amounts of capital that were traded on the Cleveland rather than in New York. (These were the Cleveland and Sandusky Brewing Company, Dayton Breweries, Hoster Columbus Associated Breweries, Huebner Toledo Breweries, Kansas City Breweries, and Stark Tuscarawas Breweries.) Several nationally prominent, Ohio manufacturing firms, e.g. B. F. Goodrich, Firestone Tire and Rubber, Goodyear Tire and Rubber, Grasselli Chemical Company, and Sherwin Williams, were listed on the Cleveland Exchange, but were not added to the New York Exchange until later.

More generally, a large proportion of the firms listed on the Cleveland Stock Exchange were local manufacturing firms or local banks (Table 5). While the most actively traded stocks on the Cleveland Exchange appear to be the same kinds of stocks, such as railroads, most actively traded in national markets, even among utility and traction stocks there was a qualitative difference from the New York Exchange. Those listed on the Cleveland Exchange were smaller and more locally-oriented, including many inter-urban trolleys, local telephone companies and similar firms. These firms were generally not traded on the New York Stock Exchange (Table 4).

A substantial majority of the firms listed on the exchange located their operations in Ohio, with between a third and a half of all listed firms located in Cleveland itself. The largest group of

non-Ohio firms was from other Midwestern states. This includes such distant firms as a brewery in Kansas City, Missouri and a pharmaceutical firm in Wheeling, West Virginia, but for the most part they were railroads that ran from Chicago or Detroit into Southern Michigan and even into Ohio itself or firms with similar close ties to Ohio. Similarly, the Canadian firms on the Exchange were located nearby in Ontario. A careful analysis of any connections to Cleveland of the firms in the Northeast and “other” categories (in Table 6) has not yet been done. However the president of the Exchange, L. W. Prior, wrote in 1904 that “trading on the Cleveland exchange has not been confined to exclusively Cleveland stocks. Among the listed stocks and bonds are those of numerous ... companies ... owned and controlled by Cleveland capitalists.”

As indicated in Table 1, many more firms were traded on the exchange than were formally listed. The rules of the exchange provided for trading of unlisted securities, as long as the broker wishing to offer the securities provided the exchange’s Governing Committee with sufficient (as determined by the committee) financial information regarding the securities. These unlisted trades did not require any application, fee, or information from the firm whose securities were being offered.²⁹

Banks as Nodal Institutions in the Cleveland Capital Market??

Next I use the data from the Cleveland Exchange on the directors and banks affiliated with each firm to determine whether banks played the role postulated above, bringing together groups of businessmen for investment in a variety of projects. Were there informal relationships among firms and banks that are reflected in the data? If they did play this role, then we might expect to see overlapping directorships among firms affiliated with the same bank. Are there networks in

29. “By-Laws of the Cleveland Stock Exchange” *Cleveland Securities* 1903, p. 92.

which banks are nodal? Are there relatively segmented networks, with connections among banks and firms that are relatively enclosed, or are there many overlapping relationships linking banks and firms across the entire group of firms traded on the Exchange?

In 1903, 67 of the 90 non-banking firms listed on the Cleveland Stock Exchange had a director who was also the director of a Cleveland bank. All 10 of the manufacturing firms listed on the exchange had a banker on their board of directors. In contrast only half of the telephone firms, and less than a quarter of the transportation firms had bankers on their boards. Presumably in those industries reliance on a public stock exchange was more familiar and more acceptable both within the firm and within the financial community.

There also appears to have been substantial interaction among the members of the boards of directors of the banks themselves, and, this interaction appears to have increased over time. In 1903, there were 814 individuals who served as directors for Cleveland's 71 banking institutions (banks, savings and loans, trust companies). 140 of these individuals served as directors of two banks, 34 as directors of three, 13 as directors of four banks and 2 as directors of five banks. While there are more banking institutions in Cleveland in 1903 than in 1910 (presumably as a result of financial downturns in 1903 and 1907), the interlocks among bank directors seems to be fewer. While the data are not yet organized to examine links between particular banks and particular non-banking firms, a cursory glance at the data suggests that such links did exist in some cases. For example, at least four of the directors of the East End Savings Bank, which underwrote the Dow Chemical Company's first large bond issue, also served as Dow directors.

In 1910, 588 individuals served as directors for Cleveland's 41 banking institutions (banks, savings and loans, trust companies). 110 of these individuals served as directors of two

banks, twenty as directors of three, and five as directors of four banks. Fifteen of the twenty directors of the Bank of Commerce, the largest national bank in the city (and one whose stocks were regularly traded on the Exchange), served as directors for other banks. Ten of those directors actually served at least three banks. The Bank of Commerce had multiple interlocks (that is, more than one director who served on the boards of both banks) with Citizens Savings and Trust Company (7), Guardian Savings and Trust (2), Society for Savings (2), Superior Savings and Trust (2), and the Cleveland Trust Company (2). Eighteen of the 38 directors of the Cleveland Trust served as directors for other Cleveland banks. It had multiple interlocks with the following banks: First National Bank (5), Guarantee Title and Trust Company (4), and Bank of Commerce (2). Sixteen of the 29 directors at the Citizens Savings and Trust Company served on the boards of other Cleveland banks. 27 of the 42 directors of the First National Bank served other banks as well. It had multiple interlocks with the following banks: Central National (2), Citizens Savings (2), Cleveland Trust (5), Guardian Savings (5), Peoples Savings (3), and Society for Savings (3). 19 of the 33 directors of Guardian savings served other banks.

There were also several banks that seemed to have close ties to one another, as opposed to directors who served the banking community of Cleveland broadly. The Central National Bank and the Superior Savings and Trust Company had five directors in common, and virtually no shared directors with other banks. Similarly Woodland Avenue Savings and Trust Company and Broadway Savings and Trust Company shared seven directors with each other, but had only three directors with links to other banks.

Conclusion and Comments on Future Research

The results presented in this article are still partial and preliminary. In particular, a closer

examination of the existence of networks of individuals who served the firms and banks represented on the Cleveland Stock Exchange, and through which information about market possibilities may have been transmitted, is required. But the evidence here suggests that there were multiple links among this particular set of Cleveland institutions and the businesses that they served. The Exchange itself was probably not a crucial locus for private information exchange, but it did allow many, perhaps relatively uninformed investors, to participate in the entrepreneurial activities of the region. It also increased liquidity to the issues listed and traded on it, and therefore, presumably, provided listing firms with less expensive capital. The data available on the firms listed on the Exchange suggest that there were multiple links between local banks and local firms. These links may have allowed information about the activities of these firms to flow to potential investors who were also bank customers. These links may in fact reflect the role of banks in providing such information, as was the case in connections between the East End Savings Bank and the Dow Chemical Company. At this point, however, we must admit that these conclusions are still quite speculative.

This paper focuses on the role that formal capital market institutions, such as banks and stock exchanges played in linking ideas to investors. In order to get an understanding of the relative significance of such institutions, it would be useful to examine other less formal, and perhaps more personal, networks and institutions. Were institutions like Cleveland's Union Club - where the Dow Chemical Company's Board of Directors held its monthly meetings - important in facilitating the flow of information and the matching of capital to investment opportunities? Did educational institutions, such as the Case School of Applied Science or the University of Michigan Engineering School, play a significant role? Case certainly played this role in the formation and early years of the Dow Chemical Company, as several Case alumni, Case's chemistry professor, and Case's president were large stockholders and members of Dow's first Board of Directors. Similarly, before 1914 the Michigan Engineering school formed a department of engineering research to "promote cooperation between the University, the state of Michigan, and private industry." Correspondence of the faculty, student groups, and administrators involved in the creation of this department suggests that the department was building on a long-standing tradition of working with firms in the region. While investigating these informal institutions' role is more challenging than studying traditional capital market institutions, it will allow us to measure the importance of that amorphous, but much vaunted notion, "social capabilities," in economic development. By analyzing their importance in the context of a study of more traditional capital market institutions, we will be able to determine not simply the social prerequisites to growth but the ongoing interaction of these different kinds of institutions in the process of economic development.

Table 1

Number of Firms Listed and Traded on the Cleveland Stock Exchange
1900-1914

Year	Number of Firms Listed	Number of Firms, Including Unlisted Firms	Number of Firms Whose Stocks were Actively Traded*	Number of Equity Issues Actively Traded*	Number of Bond Issues Actively Traded
1900**					
1901					
1902			61	71	
1903	106				
1904					
1905			43	59	26
1906	79	92	42	62	30
1907	81	95			
1908			31	42	22
1909	80	91	35	47	28
1910	75	87	42	53	29
1911***	95	135	78	105	37
1912	102	118	53	76	27
1913	109	155	86	118	28
1914*** *	110	160	87	126	20

*Some firms had more than one type of equity listed and traded on the exchange. The number of preferred equity issues increased over time. Almost all the railroads and utilities, as well as a few manufacturing firms, also had their bonds traded on the exchange.

**The Cleveland Stock Exchange opened for business April 16, 1900.

*** For 1910 and before, all traded banks are treated as unlisted firms. Beginning in 1911 it is possible to distinguish between listed and unlisted banks, and the listed banks are included with other listed firms. There are also unlisted manufacturing firms and unlisted bonds which are reported for the first time. Thus it may be that there were more issues traded in earlier years, but which are not reported in the extant sources.

****The Cleveland Stock Exchange was closed from July 31, 1914 to November 23, 1914. During that time 4,329 shares were traded, valued at \$326,206, through a "Special Committee" arranged for the purpose. These trades are included in the numbers above.

Table 2
 Aggregate Volume and Value of Trading on the Cleveland Stock Exchange
 1900-1914

Year	Number of Shares	Value of Shares Traded
1900*	82,199	5,223,117
1901	240,475	15,822,085
1902	352,179	23,409,368
1903	95,872	5,993,351
1904	80,680	5,244,144
1905	432,569	24,236,425
1906	256,128.5	15,028,236
1907	141,538.25	7,648,118
1908	137,649.5	5,164,732
1909	178,259	7,091,086
1910	178,180 (plus 5959 unlisted shares)	7,965,103 (listed shares only)
1911	97,292.5 (plus 21,179 unlisted shares)	6,915,103 (listed shares only)
1912	110,892.5 (plus 46,679 unlisted shares)	8,006,838 (listed shares only)
1913	54,761 (plus 39,490 unlisted shares)	4,804,529 (listed shares only)
1914**	47,353.5 (plus 29,458 unlisted shares)	4,019,339 (listed shares only)

*The Cleveland Stock Exchange opened for business April 16, 1900.

** The Cleveland Stock Exchange was closed from July 31 to November 23, 1914. During that time 4,329 shares were traded, valued at \$326,206, through a "Special Committee" arranged for the purpose. These trades are included in the numbers above.

Table 3

Comparison of Firms on the Cleveland and New York Stock Exchanges

	New York Stock Exchange		Cleveland Stock Exchange		
	Railroad	Non-railroad	Railroad	Manufacturing	Other
1900	143	130			
1903			40	10	53*
1910	146	160	26	31	33*

*This number does not include financial institutions whose stock was traded, but not officially listed, on the exchange.

Sources: Davis and Cull (1994), p. 63, and *Cleveland Securities: A Stock Exchange Handbook*

Table 4

Multiple Listings:

Firms Listed on Both the Cleveland and New York Stock Exchanges, 1903-14

Year	Number of Firms on Both Exchanges	Names of Firms on Both Exchanges
1903	5	American Chicle, American Linseed, Detroit United Railway, Lake Shore Electric Railway, Toledo Railway & Light
1904		
1905		
1906	2	Detroit United Railway, Toledo Railway & Light
1907	2	Detroit United Railway, Toledo Railway & Light
1908		
1909	2	Detroit United Railway, Toledo Railway and Light
1910	3	Detroit United Railway, Northern Ohio Traction & Light, Toledo Railway & Light
1911	3	Detroit United Railway, Northern Ohio Traction & Light, Toledo Railway & Light
1912	1	Northern Ohio Traction & Light
1913	4	Detroit United Railway, B. F. Goodrich, Northern Ohio Traction & Light, Toledo Railway & Light
1914	2	Detroit United Railway, B. F. Goodrich

Table 5

Industry Make-Up of Firms Listed on the Cleveland Stock Exchange, 1903-1914

Year	Total	Mining	Manufacturing	Transportation	Telephone	Gas & Electric ^a	Banking
1903	106	6	10	47	20	7	16
1904							
1905							
1906	92	3	13	36	10	6	24
1907	95	2	14	40	10	4	24
1908							
1909	91	3	15	33	10	9	21
1910	87	4	17	31	10	3	22
1911	95	5	21	32	10	4	23
1912	102	5	33	33	2	7	22
1913	109	5	37	33	2	6	26
1914	110	4	38	33	2	6	25

a. Firms that had both traction and electric light businesses are included in transportation, and excluded from gas and electricity.

Table 6

Location of Firms Listed on the Cleveland Stock Exchange, 1903-1914

Year	Total ^a	Cleveland ^a	Other Ohio	Other Midwest ^b	Northeast (NY, NJ, PA)	Canada	Other ^c
1903	106	30	50	15	8	1	2
1904							
1905							
1906	92	32	39	10	3	1	3
1907	95	30	40	12	3	1	2
1908							
1909	91	40	39	8	1	1	2
1910	87						
1911	95						
1912	102						
1913	109						
1914	110						

Sources: *Commercial and Financial Chronicle* January 18, 1936 and September 20, 1930; *Harper's Weekly* April 23, 1904; *Cleveland Securities: A Stock Exchange Hand-Book* volumes 1906, 1907, 1910, 1911, 1912, 1913, 1914 (published by the Finance Publishing Company).

a. This number includes Cleveland banks that were traded on the Cleveland Stock Exchange during the years 1906-1910, but whose listing status is unclear.

b. The firms that fall into this category were located in the following states: Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, and Wisconsin. The most significant were Michigan and Illinois.

c. The firms that fall into this category were located in the following states: Maryland, Texas, and Washington, D.C.

REFERENCES

- Adams, Stephen. "History of Western Electric." Warren, New Jersey: Mimeo, 1996.
- Cronon, William. *Nature's Metropolis*. New York: Norton, 1991.
- Davis, Lance E. "The Investment Market, 1870-1914: The Evolution of a National Market." *Journal of Economic History* 25(1965): 355-399.
- Davis, Lance E. and Robert J. Cull. *International Capital Markets and American Economic Growth, 1820-1914*. Cambridge: Cambridge University Press, 1994.
- Davis, Lance E. and Robert Gallman. "Sophisticates, Rubes, Financiers, and the Evolution of Capital Markets: US-UK Finance, 1865-1914." Presented to the Franco-American Conference, Cambridge, Mass., 1993.
- Domhoff, G. William. *Who Rules America*. New York: Prentice-Hall, 1967.
- Dorman, Peter. "Non-convexity and Interaction in Economic Models." East Lansing, Michigan: Unpublished paper, 1995.
- Engerman, Stanley and Kenneth Sokoloff, "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies: A View from Economic Historians of the United States." In Stephen Haber, ed., *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914*. Stanford, Calif.: Stanford University Press, 1997.
- Gates, William B. *Michigan Copper and Boston Dollars: An Economic History of the Michigan Copper Mining Industry*. Cambridge, Mass: Harvard University Press, 1951.
- Graham, Margaret and Bettye Pruitt. *R&D for Industry: A Century of Innovation at Alcoa*. Cambridge: Cambridge University Press, 1990.
- Johnson, Arthur M. and Barry E. Supple. *Boston Capitalists and Western Railroads: A Study in the Nineteenth-Century Railroad Investment Process*. Cambridge, Mass.: Harvard University Press, 1967.
- Lamoreaux, Naomi. *Insider Lending: Banks, Personal Connections, and Economic Development in Industrial New England*. Cambridge: Cambridge University Press, 1994.
- Lamoreaux, Naomi and Christopher Glaisek. "Vehicles of Privilege or Mobility? Banks in

- Providence, Rhode Island, during the Age of Jackson.” *Business History Review* 65(1991): 502-527.
- Lamoreaux, Naomi R. and Kenneth Sokoloff. "Patents and the Evolution of the Market for Technology in the Late Nineteenth and Early Twentieth Century United States." Los Angeles: unpublished paper, 1995.
- Levenstein, Margaret C. *Accounting for Growth: Information Systems and the Creation of the Large Corporation*. Stanford, Calif.: Stanford University Press, 1998.
- Meyer, David. “Midwestern Industrialization and the American Manufacturing Belt in the Nineteenth Century.” *Journal of Economic History* 49(1989): 921-937.
- Morgan, Peter. “A Model of Search, Coordination, and Market Segmentation.” Buffalo, New York: Mimeo, 1998.
- Mowery, David C. "The Boundaries of the U.S. Firm in R&D." In *Coordination and Information: Historical Perspectives on the Organization of Enterprise*, edited by Naomi R. Lamoreaux and Daniel Raff. Chicago: University of Chicago Press, 1995.
- Page, Brian and Richard Walker. "From Settlement to Fordism: The Agro-Industrial Revolution in the American Midwest." *Economic Geography* 67(1991): 281-315.
- Parker, William N. “From Northwest to Midwest: Social Bases of a Regional History.” In *Essays in Nineteenth Century Economic History: The Old Northwest*, edited by David Klingaman and Richard Vedder. Miami, Ohio: Ohio University Press, 1975.
- Parker, William N. “Native Origins of Modern Industry: Heavy Industrialization in the Old Northwest Before 1900.” In *Essays on the Economy of the Old Northwest*, edited by David Klingaman and Richard Vedder. Miami, Ohio: Ohio University Press, 1987.
- Pred, Allan R. *Urban Growth and City Systems in the United States, 1840-1960*. Cambridge, Mass.: Harvard University Press, 1980.
- Price, Jacob. “Economic Function and the Growth of American Port Towns.” *Perspectives in American History* 8(1974): 123-86.
- Prior, L. W. “The Cleveland Stock Exchange.” In *Harper’s Weekly* 48(1904): 623.
- Rosenbloom, Joshua L. “Looking for Work, Search for Workers: U.S. Labor Markets after the Civil War.” *Social Science History* 18(1994): 377-403.
- Weiman, David F. “From Old South to New: Metropolitan and Regional Development in the Lower South, 1860 to 1920.” In *The Changing American Countryside: Past, Present, and*

Future, edited by Emery Castle and Barbara Baldwin, 37-52. Corvallis, Oregon: Western Rural Development Center at Oregon State University, 1996.

Primary Sources:

Cleveland Securities: A Stock Exchange Handbook (vols. 1903, 1906, 1907, 1909, 1910, 1911, 1912, 1913, 1914, 1915). Published by Finance Publishing Company: Cleveland, Ohio.
The New York Times.

Commercial and Financial Chronicle January 18, 1936 and September 20, 1930

Harper's Weekly April 23, 1904