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## Related Investing: Family Networks, Gender, and Shareholding in Antebellum New England Corporations

Research into the organization of the firm typically contrasts family businesses with impersonal corporate structures, and kinship ties among corporate elites are often associated with inefficiency and corruption. This analysis of over 14,000 equity investors and executive officers finds that familial networks were embedded in early corporations, not just among directors but also among small shareholders in the firm. Related investing was especially prominent among women and other relatively disadvantaged groups. Personal ties in newer, riskier enterprises encouraged capital mobilization in emerging ventures and persistence in shareholding, and related investing was significantly associated with lower risk of corporate bank failures. The results support a more positive view of family networks in business organizations and in overall economic development.

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According to both theory and empirical studies, kinship groups and social capital play an important role in investment, business organization, and economic development. Such connections can influence

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portfolio composition, affect investors' decisions to enter or exit the market, and inhibit actions that they might otherwise have undertaken. Family ties in particular enhance trust and social capital, the ability to monitor group members more effectively with cheaper enforcement mechanisms, and economies in reputation and signaling. Relational contracts may result in stronger commitments or incentives to adhere to agreements. Moreover, family networks at times promote capital mobilization by helping to smooth consumption and investment.<sup>1</sup> Some scholars have concluded that "intensely interconnected" social networks facilitated the diffusion of information and increased liquidity for English investors.<sup>2</sup> In short, kinship groups can be beneficial in overcoming market failure and institutional imperfections, including asymmetrical information, credit constraints, the mispricing of risk, and limited access to institutions to transfer human capital.<sup>3</sup>

At the same time, market efficiency is in part defined in terms of depersonalized transactions, where outcomes are independent of the identity of the participants, so the exploitation of personal ties can also potentially generate higher agency costs and inefficiencies. According to many analysts, the operation of family networks offers a haven for discrimination and potential redistributive measures, or even corruption and criminal activity that transfer resources from outsiders to those inside the related group.<sup>4</sup> Others have raised the possibility that, while relational investing might be productive in certain circumstances, such ties might be incompatible with efficiency in some forms of organizational structures. In a study of Victorian England, Graeme G. Acheson, Gareth Campbell, and John D. Turner concluded that the effects of family ownership depended on whether members of the group had control over the governance of the firm.<sup>5</sup> Kinship ties likely helped

<sup>1</sup> Cynthia Kinnan and Robert Townsend, "Kinship and Financial Networks, Formal Financial Access, and Risk Reduction," *American Economic Review* 102 (May 2012): 289–93. See also Jeffrey N. Gordon, "Institutions as Relational Investors: A New Look at Cumulative Voting," *Columbia Law Review* 94 (Jan. 1994): 124–92; Ranjay Gulati, "Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances," *Academy of Management Journal* 38 (Feb. 1995): 85–112.

<sup>2</sup> Edmond Smith, "The Social Networks of Investment in Early Modern England," *Historical Journal* 64 (Sep. 2021): 912–39.

<sup>3</sup> B. Zorina Khan, "Invisible Women: Entrepreneurship, Innovation, and Family Firms in Nineteenth-Century France," *Journal of Economic History* 76 (Mar. 2016): 163–95.

<sup>4</sup> Mahsa Akbari, Duman Bahrami-Rad, and Erik O. Kimbrough, "Kinship, Fractionalization and Corruption," *Journal of Economic Behavior & Organization* 166 (Oct. 2019): 493–528.

<sup>5</sup> Graeme G. Acheson, Gareth Campbell, and John D. Turner, "Who Financed the Expansion of the Equity Market? Shareholder Clienteles in Victorian Britain," *Business History* 59 (May 2017): 607–37. Christopher M. Meissner, using a limited sample of twenty-six banks, found that potential opportunism among bank officers was restrained by governance rules. Meissner, "Voting Rules and the Success of Connected Lending in 19th Century New England Banks," *Explorations in Economic History* 42 (Oct. 2005): 509–28.

family firms in the English shipbuilding industry to reduce the risk of bankruptcy, but it has been hypothesized that relational governance creates conflict with corporate modes of governance.<sup>6</sup>

Even if personalized interactions were initially prevalent for productive reasons, it is commonly contended that such connections should tend to diminish in importance as financial markets and institutions mature. As the economy evolves, according to this perspective, one might expect that transactions costs would fall and that a transition would occur toward the arguably more efficient state of depersonalized exchange.<sup>7</sup> Thus, related investing is typically viewed as a temporary phenomenon, and its persistence is associated with anomalous deviations from optimality, or outright corruption. This evolutionary assumption is evident in John Majewski's examination of the financing of transportation infrastructure in the antebellum period, in a study that drew on the experience of six railroad enterprises in Pennsylvania and Virginia.<sup>8</sup> These early expansions in transportation grids were financed by local residents or small investors who were connected by ties of kinship and community-based social capital. Majewski contends that the development of the Southern economy was retarded by the continued involvement of local investors, whereas the Northeast expanded in part because its investments evolved away from the "friends and family" approach toward arm's-length professional transactions.

In today's developing countries, an extensive parallel debate centers on the role of families and corporations in economic growth. Family businesses are common in many parts of the world, and ownership in such firms is typically not dispersed, in part because complementary institutions such as legal and political systems are often inefficient and inadequate to support the needs of the corporate form.<sup>9</sup> Even though family ownership and control are common forms of business enterprise throughout time and place, the scholarly discussion tends to be somewhat skeptical and pessimistic about the contributions of kinship

<sup>6</sup> Paul Ingram and Arik Lifschitz, "Kinship in the Shadow of the Corporation: The Interbuilder Network in Clyde River Shipbuilding, 1711–1990," *American Sociological Review* 71 (Apr. 2006): 334–52.

<sup>7</sup> Most notably, Sir Henry Maine is frequently cited for his proposal that societies would evolve from communal relationships based on status or ascribed ties to contracting by autonomous actors. See Maine, *Ancient Law: Its Connection with the Early History of Society, and Its Relation to Modern Ideas* (1861; New York, 1906).

<sup>8</sup> John Majewski, "Who Financed the Transportation Revolution? Regional Divergence and Internal Improvements in Antebellum Pennsylvania and Virginia," *Journal of Economic History* 56 (Dec. 1996): 763–88. See also Majewski, "Toward a Social History of the Corporation: Shareholding in Pennsylvania, 1800–1840," in *The Economy of Early America: Historical Perspectives and New Directions*, ed. Cathy D. Matson (Philadelphia, 2006): 294–316.

<sup>9</sup> Rafael La Porta, Florencio Lopez-De-Silanes, and Andrei Shleifer, "Corporate Ownership around the World," *Journal of Finance* 54 (Apr. 1999): 471–517.

groups.<sup>10</sup> Some regard familial relationships as a constraint on the longevity of the firm, owing to incompetence or nepotism. Minority shareholders and other outside stakeholders can be expropriated by such practices as on-the-job consumption by entrenched family members. Outside investors face the risk that both internal and external control mechanisms may be too weak to protect them from “tunneling” or corruption in the firm.<sup>11</sup> A survey of the literature on tunneling and malfeasance calls for the expansion of empirical research on family groups to other settings to better understand their functions.<sup>12</sup>

Research on the role of the corporate form of business organizations in American economic development has focused largely on the cadre of managers, directors, and other elite stakeholders in the firm.<sup>13</sup> Naomi Lamoreaux, for instance, demonstrated the importance of “insider lending” among directors of banks in early capital markets in New England.<sup>14</sup> She found that such officers tended to be related to each other and directed a significant fraction of the loans to other insiders. Lamoreaux concluded that relational links in the banking sector were an effective means of mobilizing capital rather than a sign of corruption or exploitation of outsiders. Outsiders were quite aware that their stock purchases in the bank were destined to finance the other enterprises owned by the directors of the bank and their relatives. Unrelated investors likely benefited from access to investment opportunities in the

<sup>10</sup> D. Sraer and D. Thesmar found that family firms comprised two-thirds of enterprises listed on the French stock exchange in the 1990s, and such firms outperformed their widely held corporate counterparts by making more effective use of inputs. Sraer and D. Thesmar, “Performance and Behavior of Family Firms: Evidence from the French Stock Market,” *Journal of the European Economic Association* 5 (June 2007): 709–51.

<sup>11</sup> Simon Johnson, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, “Tunneling,” *American Economic Review* 90 (May 2000): 22–27.

<sup>12</sup> Sumon Kumar Bhaumik and Andros Gregoriou, “‘Family’ Ownership, Tunneling and Earnings Management: A Review of the Literature,” *Journal of Economic Surveys* 24 (Sept. 2010): 705–30.

<sup>13</sup> This is primarily due to a lack of systematic data on individual investors, which this project was designed to redress. The literature has instead typically focused on such firm-level issues as corporate governance and ownership structures. For instance, see Eric Hilt, “When Did Ownership Separate from Control? Corporate Governance in the Early Nineteenth Century,” *Journal of Economic History* 68 (Sept. 2008): 645–85. Much attention has been directed to understanding the causes and consequences of different voting rules, such as graduated voting rights that reduced the degree of control exerted by the largest shareholders. See, for example, Colleen Dunlavy, “Social Conceptions of the Corporation: Insight from the History of Shareholder Voting Rights,” *Washington & Lee Law Review* 63 (2006): 1347–88. Howard Bodenhorn found that graduated voting rules were prevalent in early American banks and were designed to attract small investors. The general conclusion is that elites and dominant shareholders were kept in check by corporate charters and their enforcement at law. Bodenhorn, “Voting Rights, Shareholdings, and Leverage at Nineteenth-Century US Banks,” *Journal of Law and Economics* 57 (May 2014): 431–58.

<sup>14</sup> Naomi Lamoreaux, *Insider Lending: Banks, Personal Connections, and Economic Development in Industrial New England* (New York, 1996).

insiders' new ventures, for the arrangement offered the opportunity to gain enhanced profits beyond the banking sector, while diversification reduced overall portfolio risk. Insider lending comprised an efficient response to supply and demand, whereby outsiders were induced to make investments in the new industries of the day primarily because of their trust in the reputation and experience of the prominent families who founded the financial institutions. Social connections substituted for incomplete markets and helped to resolve problems that arose in the presence of such market imperfections as high risk and asymmetrical information.<sup>15</sup> In short, as industrialization got underway, insider lending facilitated risky investments in venture capital for innovative initiatives.

The almost universal focus in the literature on American corporations on the role of elite participants in the ownership structure of firms leaves open the question of whether relational connections were pervasive at all levels of business organization. If family ties were concentrated among directors and elite investors, our understanding of the role of such ties would be different from the implications if these patterns were common to all investors in the firm. However, little empirical research has been directed to the entire population of participants in the ownership and control of the firm, nor to the extent and consequences of their heterogeneity. Most research tends to be at the firm level, although within-firm heterogeneity among owners might be associated with significant unobserved variation that necessitates the analysis of the cadre of investors outside the managerial class. Such characteristics and patterns have the potential to provide important insights into the nature and consequences of kinship ties in economic development.

Similarly, although the structure of ownership might be expected to vary over the life cycle of the enterprise, the dynamics of firm ownership is still an understudied topic. Kinship links are predicted to decline over time, but if they are found to have persisted during economic development in an effective and transparent institutional environment, then their existence is less likely to be due predominantly to market imperfections. Jean Helwege, Christo Pirinsky, and Rene M. Stulz examined how the ownership of insiders changed over time and concluded that moral hazard and informational asymmetries were "irrelevant" to understanding contemporary changes in insider ownership.<sup>16</sup> However, such research does not control for kinship networks which, as discussed

<sup>15</sup> For a discussion of relevant general and comparative issues, see Jonathan Barron Baskin, "The Development of Corporate Financial Markets in Britain and the United States, 1600–1914: Overcoming Asymmetric Information," *Business History Review* 62 (Summer 1988): 199–237.

<sup>16</sup> Jean Helwege, Christo Pirinsky, and Rene M. Stulz, "Why do Firms Become Widely Held? An Analysis of the Dynamics of Corporate Ownership," *Journal of Finance* 62 (June 2007): 995–1028.

above, tend to be so globally pervasive as to warrant the term “family capitalism.”<sup>17</sup> Family ownership provides longitudinal continuities that can be especially relevant to a better understanding of the dynamics of shareholding in business organizations. For instance, if the internal incentives of the family unit were more apparent and observable over time than in the case of unrelated shareholders, the intergenerational links that characterize family membership might provide a cost-effective signal to outsiders that a firm values stability and future exchange.

This article examines the nature of related investing at all levels of the American corporation and, further, addresses how such patterns changed over the course of industrialization and economic development. The analysis is based on a novel data set drawn from the entire population of investors in all Maine corporations during the antebellum period. The sample includes information on counties, enterprises, and industries, as well as comprehensive information about individual investors in banks and other financial institutions, manufacturing firms, and transportation and telecommunications enterprises. The individual shareholders have been matched with records from the manuscript population censuses, to provide information on age, occupations, and wealth of individuals and household size. The data include cross-sections of the same firms over time, which permits the investigation of longitudinal changes in corporate ownership and the structure of the firm.

The results confirm the conventional finding that directors and other corporate elites tended to be related to others within the firm. At the same time, non-elite stakeholders, or the investors who were neither directors nor the largest shareholders, were also bound by kinship connections. Related investing was widespread among the ordinary investors and seems to have been pervasive throughout the firm and the corporate economy during the critical period of early industrial growth and expansion. The universal nature of relational investing in these data indicates that greater attention needs to be paid to the entire ownership structure of corporate enterprises and not just to the apex. Family ties were especially evident among ordinary investors in emerging industries and in the newer, riskier investments, and were associated with a lower risk of failure in financial institutions. This empirical analysis of family ties and corporate ownership supports the view that related investing plays a productive role by attenuating transactions costs and inducing inexperienced investors to contribute to the venture capital of

<sup>17</sup> See, for instance, Harold James, *Family Capitalism: Wendels, Haniels, Falcks, and the Continental European Model* (Cambridge, MA, 2009). An excellent general survey of the history of family businesses is provided by Andrea Colli, *The History of Family Business, 1850–2000* (Cambridge, U.K., 2003).

the period. The overall patterns are consistent with a more positive interpretation of kinship networks and their function in developing societies.

### Early Corporations in Maine

Many scholars credit financial markets and the spread of the corporate form of business organization with aiding the rapid industrialization and economic progress of the United States in the nineteenth century.<sup>18</sup> In the American colonies, local and interstate debt contracting were extensive, and financial institutions functioned effectively from the earliest decades. Corporations spread rapidly, in tandem with deep and accessible financial markets in debt and equity, and raised questions that were fundamental to the nature of economic and political democracy in American capitalism.<sup>19</sup> From an international perspective, corporate enterprise has been prevalent in the United States to a greater extent than in other countries. In contrast to the general conclusions from studies in developed economies at present, research in U.S. economic history tends to be consistent with a more favorable interpretation of the link between corporations and family holdings.

In New England, banks, turnpikes, and insurance companies were among the first types of corporations with diffuse ownership, and these enterprises attracted a diverse array of investors, including relatively risk-averse groups such as trustees, women, and the elderly. Banks provided a form of “saver education” that helped to inform new entrants in the market for corporate capital mobilization, and both firms and investors in subsequent ventures in transportation and manufacturing were able to benefit from their example.<sup>20</sup> In many instances,

<sup>18</sup> Douglas A. Irwin and Richard Sylla, eds., *Founding Choices: American Economic Policy in the 1790s* (Chicago, 2011). Robert E. Wright was even convinced that “the root cause of early U.S. economic growth (1780–1850). . . is the development of the financial sector, not transportation and communication improvements, not foreign trade, and not manufacturing firms.” Wright, *The Wealth of Nations Rediscovered: Integration and Expansion in American Financial Markets, 1780–1850* (New York, 2002), 193. Richard Sylla and Robert E. Wright argue that the propensity to incorporate was higher in the United States than in such European countries as the United Kingdom, France, and Prussia. Sylla and Wright, “Corporation Formation in the Antebellum United States in Comparative Context,” *Business History* 55 (June 2013): 653–69. More generally, see Ross Levine and Sara Zervos, “Stock Markets, Banks, and Economic Growth,” *American Economic Review* 88 (June 1998): 537–58.

<sup>19</sup> For an overview of corporations in nineteenth-century New England, see William C. Kessler, “Incorporation in New England: A Statistical Study, 1800–1875,” *Journal of Economic History* 8 (May 1948): 43–62. An extensive discussion of democratization and corporate organizations appears in Naomi R. Lamoreaux and William J. Novak, eds., *Corporations and American Democracy* (Cambridge, MA, 2017).

<sup>20</sup> Lance E. Davis employed the concept of “saver education” to address the diffusion and acquisition of knowledge about financial transactions and markets. Davis, “Capital Immobilities and Finance Capitalism: A Study of Economic Evolution in the United States, 1820–1920,” *Explorations in Economic History* 1 (Oct. 1963): 88–105.

banks and other financial firms served as institutional investors which helped to mobilize capital to fund emerging enterprises and industries.<sup>21</sup> Prior research has investigated banking firms extensively, but a lack of systematic data has made it difficult to ascertain the extent to which their investors differed from the institutions and individuals who provided the “venture capital” for new technologies and risky industrial undertakings of the early nineteenth century, as well as how these patterns varied over time.<sup>22</sup>

New England was the center of early manufacturing and economic development in the United States, and the Maine experience offers important insights into investors and their portfolios, corporate ownership structures, and the financing of corporate ventures. Maine was an early leader in the chartering of U.S. business corporations and, as [Figure 1](#) shows, its rate of incorporation remained competitive with those of states with much larger populations, like Pennsylvania and New Jersey. The growth in corporate enterprises reflected a general expansion in the Maine economy across all sectors, ranging from banks to shipbuilding, fisheries, lumber, and large-scale manufacturing. The state was among the nation’s leaders in many extractive pursuits, most notably shipbuilding and lumber. Moreover, during the period under review a marked structural transformation got underway, with rapid economic growth in water-fueled energy, manufacturing, and transportation. The first sawmill in the American colonies was established in Maine in 1634, and almost one thousand mills were in operation by 1820. The proliferation of natural resources and cheap sources of power propelled a surge in manufacturing in the “take off” phase during the early nineteenth century. The New England region was remarkably rich in inventive inputs, and Maine inventors were among the most innovative and productive in the nation, accounting for a substantial fraction of the most valuable patents filed in the United States.<sup>23</sup> By 1860, the economy was significantly diversified, the agricultural sector had shrunk to 40 percent, cotton manufacturing was the fifth highest in the country, and the state ranked ninth overall in U.S. manufacturing. Some of the largest enterprises in the country were founded in Maine, and their average output, capital, and employment in 1860 were

<sup>21</sup> For instance, in 1840 the Exchange Bank held equity in seven firms, and in 1855 the Maine Insurance Company had invested in fourteen other corporations in the state.

<sup>22</sup> For a meticulous investigation of such issues toward the end of the nineteenth century, see Naomi R. Lamoreaux, Margaret Levenstein, and Kenneth L. Sokoloff, “Mobilizing Venture Capital during the Second Industrial Revolution: Cleveland, Ohio, 1870–1920,” *Capitalism and Society* 1 (Dec. 2006): 1–61.

<sup>23</sup> B. Zorina Khan, *The Democratization of Invention: Patents and Copyrights in American Economic Development* (Cambridge, U.K., 2005).



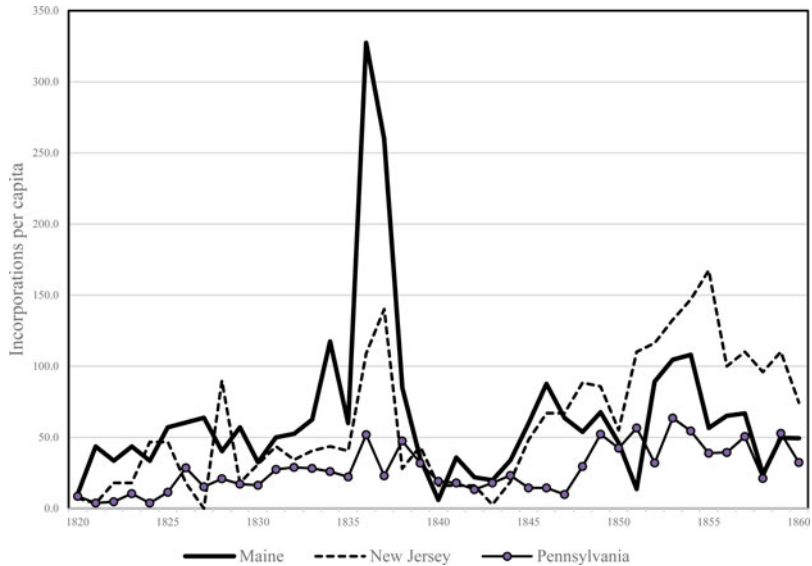


Figure 1. Incorporations per capita in Maine, New Jersey, and Pennsylvania, 1820–1860. Notes: The data represent the number of incorporations per million of state population. The compared states all granted corporate charters through special acts of the legislature during the period under review and changed to general incorporation in the 1870s: Maine in 1875, New Jersey in 1875, and Pennsylvania in 1873. (Sources: George Evans Jr., *Business Incorporations in the United States, 1800–1943* [New York, 1948]; United States Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970* [Washington, DC, 1975].)

exceeded only by those of firms in New York and Massachusetts.<sup>24</sup> Thus, the experience of this state in the antebellum period provides a valuable case study of the nature of capital mobilization during early industrialization in the United States.

Maine granted charters to business enterprises through private acts of incorporation until 1875 (after which general incorporation statutes were passed), implying that the charter applications for all of the firms in this study were individually vetted and approved by the legislature. In 1839 and 1841, business corporations were required by law to annually record and publish the complete list of the company's shareholders, thus creating a unique opportunity to evaluate overall patterns for a comprehensive panel of investors in American corporations during a period

<sup>24</sup> Fred Bateman and Thomas Weiss, "Comparative Regional Development in Antebellum Manufacturing," *Journal of Economic History* 35 (Mar. 1975): 182–208.

of rapid industrialization.<sup>25</sup> In 1845, 55 commercial for-profit enterprises were organized as corporations in Maine, with an average of 65 shareholders in each firm. The York Manufacturing Corporation had the greatest total capitalization (\$1 million), with 174 stockholders. Participation in equity funding of corporations surged during the decade between 1845 and 1855, and the percentage of the Maine population holding shares in local corporations more than doubled, to 2.4 percent (see appendix). The number of firms and the extent of capitalization similarly expanded rapidly, and by 1855 the number of corporations had increased to 122 firms, with an average of 125 shareholders. The largest railroad firms were owned by over 1,000 shareholders, and several corporations now had paid-in capital investments that exceeded a million dollars.<sup>26</sup>

The antebellum era has been described as “a statistical dark age of American corporate history,” and there is a marked lack of systematic information about equity investors even in publicly held corporations.<sup>27</sup> The data set for this study, which is unique to the United States in scale and scope, draws on a random sample of roughly half of all corporations in the state of Maine filing in 1845, 1850, and 1855 (Figure 2).<sup>28</sup> The tally includes twenty-one banks and fifteen nonbank firms in 1845; thirteen

<sup>25</sup> The 1839 law stipulated that banks should file their stockholders' lists, and the law was extended in 1841 to include all commercial (for-profit) corporations. The data in this study exclude nonprofit corporations such as towns, religious and educational institutions. The laws were likely passed to protect creditors of firms, in the event of bankruptcy. See Maine State, *Public Documents of the State of Maine* (Augusta, ME, various years); Maine State, *An Abstract from the Returns of the Directors of the several Incorporated Banks within this State, made to the Office of the Secretary of State* (Augusta, ME, various years); Maine State, *Abstract from the Returns of the Cashiers of the Several Incorporated Banks in Maine* (Augusta, ME, various years).

<sup>26</sup> In 1855, the Atlantic & St. Lawrence Railroad listed 1,747 shareholders, and the Androscoggin & Kennebec Railroad had 1,221 shareholders. The Casco Bank was owned by 391 stockholders, and the Portland Manufacturing Company by 253. The Boston & Maine Railroad was capitalized at over \$4 million, and other firms with at least \$1 million included the Portland, Saco and Portsmouth Railroad, the York Manufacturing Corporation, and the Lewiston Water Power Company. For conversion to current dollars, note that \$1 in 1850 would be worth about \$650 today relative to per capita income and \$9,000 in terms of relative output.

<sup>27</sup> Les Hannah, “Corporations in the US and Europe, 1790–1860,” *Business History* 56 (Aug. 2014): 865. Extensive shareholder data have been assembled for such countries as Britain, leading to more representative insights about corporate ownership and capital mobilization. By way of contrast, in the United States financial studies are restricted by the lack of individual-level information on investors. Shareholder lists in the United States are not systematically available for the period of industrialization prior to 1860, but some have been located in a few limited instances. For example, Lance E. Davis drew general conclusions from the records of eleven textile mills in antebellum Massachusetts. Davis, “Stock Ownership in the Early New England Textile Industry,” *Business History Review* 32 (Summer 1958): 204–22.

<sup>28</sup> The discussion for much of the article is based on the comprehensive data from 1845 through 1855. Moreover, the analysis for Table 10 of the banking sector also incorporates information for 1840, involving an additional 2,374 individual investors in Maine banks.

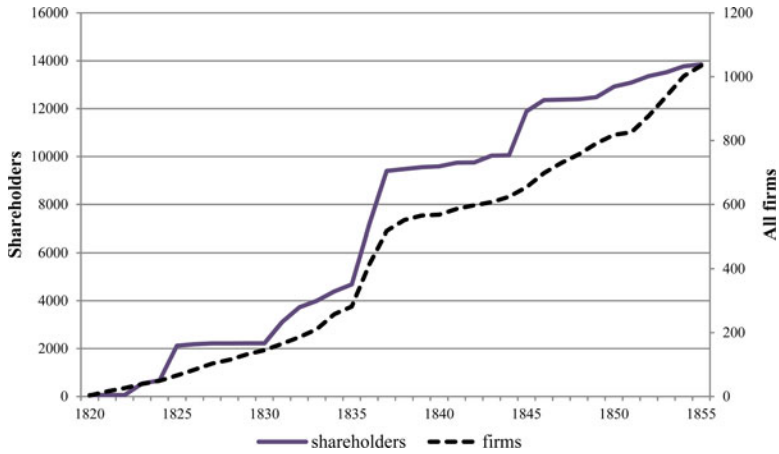


Figure 2. Cumulative frequency of shareholders in sample and of total corporations by year of incorporation. Notes: The two series show (1) the cumulative number of shareholders who had invested in corporations by the year of incorporation of the firm in which they acquired ownership, and (2) the total number of firms that were incorporated in that year.

banks and seventeen nonbank firms in 1850; and twenty-nine banks and twenty-five nonbank firms in 1855. The sample between 1845 and 1855 amounts to over 13,900 individual observations of investors in these corporations (see Table 1 and Appendix). Shareholder lists for each company included the names of the investors, the amount and/or value of shares held, and their place of residence. The lists allow us to categorize related investors, who are defined as individuals within a company who share the same surname, as confirmed by household information from the population censuses (see appendix for further discussion). They also enable identification of women shareholders, institutional and nonprofit investors, trustees and other proxy investors, the entire stock portfolio of a given investor, and persistence or turnover in ownership. The names of stockholders were matched with the federal manuscript censuses in 1850 and 1860, which provided additional information on age, real estate and personal wealth, occupation, household composition, and marital status.

At the firm level, the charters granted at time of incorporation yielded additional details about the founding members of the company, governance rules, the initial capitalization, and stipulations about shareholder liability.<sup>29</sup> These corporate charters provided insights

<sup>29</sup> Dick Sylla and Robert E. Wright generously provided access to their database of Maine corporate charters, which supplemented the sample information on charters. The provisions of

*Table 1*  
Sample of Corporations Relative to Total Maine Corporations

	1845		1850		1855		1845–1855
	Maine	Sample	Maine	Sample	Maine	Sample	Sample %
Banks	35	21	35	13	70	29	45.0
Nonbank firms	20	16	34	17	52	25	63.2
Total corporations	55	37	69	30	122	54	49.1
Percent nonbank	36.4	43.2	49.3	56.6	42.6	46.3	

Sources: Maine State, *Public Documents of the State of Maine* (Augusta, ME, various years); Maine State, *An Abstract from the Returns of the Directors of the several Incorporated Banks within this State*, made to the Office of the Secretary of State (Augusta, ME, various years); Maine State, *Abstract from the Returns of the Cashiers of the Several Incorporated Banks in Maine* (Augusta, ME, various years).

Notes: Unless otherwise stated, the quantitative analyses in these tables are based on a random sample of Maine corporations drawn from cross-sections in 1845, 1850, and 1855. The primary panel includes data on 121 firms and over 14,000 shareholder observations. For further details, see the text and Appendix.

into restrictions on directors and officers of the corporation, voting rights, accounting standards, and disclosure requirements. Maine was an early innovator in terms of disclosure rules to protect outside investors: almost three-quarters of the charters required the firm to offer regular financial statements to shareholders, and shareholders typically had the right to inspect the books of the firm at any time. Each enterprise is identified with a date of incorporation (and thus the age of the firm), industry, total number of shareholders, total capitalization at par value (paid-in capital for some), the names of the directors, presidents, and other officers, and measures of ownership concentration. Finally, county-level control variables include population and its density, economic activity such as the percentage of employment and output in manufacturing, aggregate estimated wealth from tax records, and urbanization.

Many of these corporations under review were successful at the national, and even the international, level. For instance, the North Wayne Scythe Company of Kennebec County was chartered in 1848, by Reuben B. Dunn and J. E. T. Dunn, along with four other founding members. Reuben Dunn was the president of the company, and he remained the majority shareholder, with \$67,500 in shares. The initial authorized capitalization of the enterprise was \$300,000, but in 1850 only \$130,200 was paid in. The firm manufactured scythes and other tools and implements, ultimately becoming the largest scythe manufactory in the world. North Wayne scythes were prominently displayed among the American exhibits at the 1851 Crystal Palace Exhibition in London, England, and were awarded the grand first prize medal. During the Civil War a military contract for ten thousand sword blades was granted and filled for the United States government, and the company flourished, with occasional reorganizations, well into the twentieth century.

### General Patterns of Shareholding

This section considers general patterns of shareholding during the antebellum period and identifies the characteristics of safer, low-risk investments in the banking sector, relative to newer and riskier ventures

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Maine corporate charters between 1840 and 1860 specified that the director should live in-state (40.4 percent of all charters), that directors had to be shareholders (37.4 percent), the number of directors (72.5 percent), and that officers had to give a bond (33.3 percent). Proxy voting was allowed in all cases, graduated voting schemes were stipulated in 37.4 percent of the charters, and only 2.9 percent allowed one vote per person. See Stephen Barrett Carlson, *A Quantitative Analysis of Capital Market Development in Antebellum Maine* (Brunswick, ME, 2007).

in the incipient manufacturing industry and transportation enterprises. Banking and securities markets have been well researched, especially in financial centers such as Boston, Philadelphia, and New York, which were extensive and integrated by the end of the eighteenth century.<sup>30</sup> In terms of formal banking institutions, per capita access to funds in Maine was on par with the national average.<sup>31</sup> Significantly less cliometrics research has been directed to the study of financial debt in “frontier regions,” but empirical evidence for Maine supports the view that debt markets were active and liquid from the earliest days of settlement in the American colonies.<sup>32</sup>

In efficient financial markets, decisions should be driven by expected risk-adjusted returns in a diversified portfolio rather than by such idiosyncratic factors as location, but numerous studies have detected geographical preferences among investors.<sup>33</sup> Thus, a key issue for understanding the process and extent of capital mobilization is the location of investors, while changes in these patterns over time offer insights into the evolution of capital markets. Table 2 therefore presents the distribution of shareholding by residence and industry over time. As might be expected, nonresident investors had addresses in nearby states like Massachusetts, and very few stockholders were truly foreign (from other countries), although some were from such unlikely locations as Cuba. If geographical patterns were driven by “push factors” (market inefficiencies), one would expect less clustering over time; however, in all cases the percentage of domestic investors increases over this period.

<sup>30</sup> Howard Bodenhorn, *A History of Banking in Antebellum America: Financial Markets and Economic Development in an Era of Nation-Building* (New York, 2000); Robert E. Wright, *The Wealth of Nations Rediscovered: Integration and Expansion in American Financial Markets, 1780–1850* (New York, 2002).

<sup>31</sup> Lamoreaux, *Insider Lending*; Robert E. Wright, *Corporation Nation* (Pennsylvania, 2013).

<sup>32</sup> B. Zorina Khan, “‘Justice of the Marketplace’: Legal Disputes and Economic Activity on America’s Northeastern Frontier, 1700–1860,” *Journal of Interdisciplinary History* 39 (July 2008): 1–35. This study of over thirty thousand lawsuits between 1700 and 1860 examined the residence of debtors and creditors, along with changes in spatial characteristics over time, to determine the evolution of capital markets and impersonal exchange. There was little evidence of “social tension” between debtors and creditors, and the overall results suggest that both property and debt markets were well developed and orderly.

<sup>33</sup> Janette Rutterford, Dimitris P. Sotiropoulos, and Carry Van Lieshout consider geographical preferences in Britain between 1870 and 1935. Several economists explain such patterns among U.S. investors in the twentieth century in terms of a greater ability to tap into local information. For instance, according to Jeffrey R. Brown, Zoran Ivković, Paul A. Smith, and Scott Weisbenner, “neighbors matter” because word-of-mouth communication influences financial decision-making. Rutterford, Sotiropoulos, and Van Lieshout. “Individual Investors and Local Bias in the UK, 1870–1935,” *Economic History Review* 70 (Nov. 2017): 1291–1320; Brown, Ivković, Smith, and Weisbenner, “Neighbors Matter: Causal Community Effects and Stock Market Participation,” *Journal of Finance* 63 (June 2008): 1509–31. For a contrarian view, see M. S. Seasholes and N. Zhu, “Individual Investors and Local Bias,” *Journal of Finance* 65 (Oct. 2010): 1987–2010.

Table 2  
Shareholding and Geographical Location

(a) Shareholders						
	1845		1850		1855	
	Number	%	Number	%	Number	%
<i>Banks</i>						
Maine	1,253	87.8	816	84.0	1,986	86.7
Mass.	118	8.3	68	7.0	156	6.8
Other U.S.	51	3.6	67	6.9	123	5.4
Foreign	6	0.4	20	2.1	27	1.2
Total	1,428	100.0	971	100.0	2,292	100.0
<i>Manufacturing</i>						
Maine	99	17.4	417	57.1	279	33.1
Mass.	446	78.5	281	38.5	507	60.1
Other U.S.	23	4.1	28	3.8	54	6.4
Foreign	0	0.0	4	0.6	3	0.4
Total	568	100.0	730	100.0	843	100.0
<i>Transportation</i>						
Maine	188	40.9	1,525	67.4	2,284	71.7
Mass.	240	52.2	632	27.9	654	20.5
Other U.S.	32	7.0	105	4.6	199	6.2
Foreign	0	0.0	1	0.0	50	1.6
Total	460	100.0	2,263	100.0	3,187	100.0
(b) Shares						
	1845		1850		1855	
	Number	%	Number	%	Number	%
<i>Banks</i>						
Maine	17,438	81.3	11,529	79.8	28,877	78.8
Mass.	2,616	12.2	1,467	10.1	3,956	10.8
Other U.S.	1,236	5.8	1,107	7.7	3,065	8.4
Foreign	163	0.8	353	2.4	731	2.0
Total	21,452	100.0	14,455	100.0	36,629	100.0
<i>Manufacturing</i>						
Maine	2,315	29.5	4,609	57.9	10,536	43.0
Mass.	5,247	66.9	2,273	28.5	12,107	49.4
Other U.S.	283	3.6	354	4.4	1,685	6.9
Foreign	0	0.0	50	0.6	169	0.7
Total	7,845	100.0	7,962	100.0	24,497	100.0
<i>Transportation</i>						
Maine	2,087	19.6	8,606	42.7	23,552	50.3
Mass.	8,073	75.6	9,891	48.7	9,219	19.7
Other U.S.	514	4.8	1,811	8.9	2,699	5.8
Foreign	0	0.0	6	0.0	11,333	24.2
Total	10,674	100.0	20,314	100.0	46,803	100.0

Notes: The category of "banks" refers to financial institutions including insurance companies; "manufacturing" also includes gaslighting corporations; and "transportation" includes railroads, bridges, and canals, as well as telecommunications enterprises such as telegraphs. In instances where only the value of shares held was recorded, the number of shares was inferred from the par value of the share.

The residence of shareholders varies significantly by type of industry, in a manner that seems consistent with the view that, over the course of economic development, a process of “investor education” was underway. Banks were predominantly owned by local residents, and over 80 percent of their shareholders lived in Maine, a proximity that reduced investor risk and transactions costs. It is interesting to note, by way of contrast, that manufacturing shares initially were owned primarily by investors from out of state. However, this percentage fell over time, and by 1850 local residents accounted for the majority of the value of capital invested, and they held larger average numbers of shares of the company than nonresidents.

Transportation was a volatile and risky industry, with booms and waves of bankruptcies from turnpikes through railroads, and the capital structure of transportation corporations similarly experienced marked changes over this period.<sup>34</sup> Initially, out-of-state investors comprised almost two-thirds of the shareholders, but in the 1850s this pattern is reversed, and the move toward local ownership of transportation corporations is significant. By the end of the antebellum era, Maine residents were adopting riskier portfolios, and in the process, capital was mobilized for the enterprises that would contribute to the course of industrialization and rapid economic growth.<sup>35</sup>

Numerous studies have followed Alexander Gerschenkron in highlighting the special role of banks in promoting economic development.<sup>36</sup> Table 3 provides a useful perspective on the contribution of banks, bankers, and other financial-sector transactors in funding the growth process. Banks were often owned by investors with links to finance, which is consistent with the notion of benefits from specialized knowledge, but financiers accounted for only one-third of bank shares. Instead, it is interesting to note, almost one-quarter of bank shares were owned by investors with primary links to manufacturing,

<sup>34</sup> It is not a coincidence that American bankruptcy law was closely tied to the experience of transportation corporations and “the history of corporate reorganization is the history of nineteenth-century railroad failure,” according to David A. Skeel, *Debt's Dominion: A History of Bankruptcy Law in America* (Princeton, 2001), 48.

<sup>35</sup> Private capital investment accounted for a significant share of total domestic output. Cumulative private-sector investment in turnpikes between 1800 and 1830 in the New England and Middle Atlantic states likely comprised over 6 percent of 1830 GDP. Daniel B. Klein and John Majewski, “Economy, Community and the Law: The Turnpike Movement in New York, 1797–1845,” *Law & Society Review* 26 (Jan. 1992): 469–512. For a comparative study, see Dan Bogart and John Majewski, “Two Roads to the Transportation Revolution: Early Corporations in the U.K. and the United States,” in *Understanding Long-Run Economic Growth*, ed. Dora Costa and Naomi Lamoreaux (Chicago, 2011): 177–204.

<sup>36</sup> Alexander Gerschenkron, *Economic Backwardness in Historical Perspective* (Cambridge, MA, 1962), 5–30. These studies include, for example, Lamoreaux, *Insider Lending*; Bodenhorn, *History of Banking*; and Aldo Musacchio, *Experiments in Financial Democracy: Corporate Governance and Financial Development in Brazil, 1882–1950* (New York, 2009).



Table 3  
Shareholding by Industry and Occupation

	Shareholders		Av. Value	Shares	
	Number	%		SD	%
<i>Banks</i>	2,439	100.0	1,476.9	3,437.6	100.0
Artisan	323	13.2	1,110.4	1,992.2	10.0
Farmer	378	15.5	751.2	832.7	7.9
Finance	415	17.0	3,049.7	6,564.2	35.1
Manufacturer	522	21.4	1,533.9	3,019.8	22.2
White collar	454	18.6	1,184.2	1,340.5	14.9
None	347	14.2	1,024.6	2,680.5	9.9
<i>Manufacturing</i>	916	100.0	4,192.1	13,124.3	100.0
Artisan	183	20.0	3,495.3	5,907.5	16.7
Farmer	35	3.8	1,547.4	2,618.6	1.4
Finance	146	15.9	10,899.1	29,243.1	41.4
Manufacturer	266	29.0	2,158.8	3,900.4	15.0
White collar	265	28.9	3,524.4	7,462.4	24.3
None	21	2.3	2,223.8	2,108.8	1.2
<i>Transportation</i>	3,219	100.0	1,038.9	2,316.7	100.0
Artisan	791	24.6	675.1	1,410.8	16.0
Farmer	532	16.5	586.6	1,454.3	9.3
Finance	165	5.1	3,120.6	5,221.3	15.4
Manufacturer	811	25.2	1,150.0	2,380.3	27.9
White collar	674	20.9	1,387.6	2,508.3	28.0
None	246	7.6	469.5	860.6	3.5

Notes: The shareholders were matched with individuals in the manuscript censuses of 1850 and 1860 by name and town of residence, to obtain information about state of birth, occupations, age, households, marital status, and wealth. The category of "Artisan" includes laborers; "White collar" excludes those employed in finance (bankers, treasurers, stockbrokers, and accountants). SD = standard deviation of the value of shares held. Also see notes to Table 2 and Appendix.

highlighting the symbiotic relationship that Lamoreaux identified.<sup>37</sup> Only 15 percent of shares in manufacturing enterprises were owned by manufacturers themselves or their employees, with 41.4 percent attributed to bankers and others in related occupations.<sup>38</sup> The role of manufacturers in capitalizing transportation networks is especially

<sup>37</sup> Lamoreaux, *Insider Lending*.

<sup>38</sup> Banks played a significant role in corporate governance during the Second Industrial Revolution, especially in the case of investment banks before the advent of the Federal Reserve system. See Jeffrey Fear and Christopher Kobrak, "Banks on Board: German and American Corporate Governance, 1870–1914," *Business History Review* 84 (Winter 2010): 703–36.

noteworthy. At the other end of the spectrum, despite their prevalence in the population at large, artisans and farmers played a relatively minor role in securities markets throughout the economy, weakening support for the claim that general community ties facilitated investments.

In all three sectors, the patterns indicate a high participation of professionals and white-collar workers in the financial underwriting of corporate enterprises. This group might arguably have been expected to be more risk averse than financiers and manufacturers and to have been attracted primarily to the security of banking investments. Instead, white-collar workers owned only 14.9 percent of bank stocks, compared with 28 percent of transportation shares. Another striking result is that this occupational class invested more in the manufacturing sector than shareholders employed in manufacturing (although obviously the data in the table do not control for income levels) and comprised the largest proportion of the funders of transportation corporations. This finding differs from that of Majewski, who argued that transportation improvements generated spillover benefits that encouraged farmers to pay for railroads and turnpikes, even if they were privately unprofitable.<sup>39</sup> While manufacturers certainly benefited from internal improvements, it seems less likely that professional and white-collar workers were motivated by such externalities.

Table 4 indicates another departure from previous findings and sheds light on the significant role of women stockholders in capital mobilization.<sup>40</sup> The wealthiest investor in Maine corporations was Polly Lewis (1780–1865). She was the majority stockholder in the Springvale Manufacturing Company, a highly risky textile firm that had been spun off around 1842 from the troubled and heavily indebted Sanford Company. In 1854, Lewis owned 10,892 shares, trading at par of \$100 per share in the market, and her holdings amounted to 25 percent of the total capitalization of Springvale Corporation. Abiel Smith Lewis, her eldest son, also invested in the same firm, initially holding 1,860 shares.<sup>41</sup> Two years later, her total shares had fallen by half, and those

<sup>39</sup> Majewski, "Who Financed."

<sup>40</sup> Maine recognized the independent property rights of married women prior to the period of this study, so the gender patterns are not affected by differential property laws and trading restrictions. See B. Zorina Khan, "Married Women's Property Laws and Female Commercial Activity: Evidence from United States Patent Records, 1790–1895," *Journal of Economic History* 56 (June 1996): 356–88. On women investors in England, see, for example, Ann M. Carlos and Larry Neal, "Women Investors in Early Capital Markets, 1720–1725," *Financial History Review* 11 (Oct. 2004): 197–224; and Janette Rutterford and Josephine Maltby, "The Widow, the Clergyman and the Reckless": Women Investors in England, 1830–1914," *Feminist Economics* 12 (Jan. 2006): 111–38.

<sup>41</sup> A widow whose husband had died in a carriage accident more than thirty years previously, Polly lived with her eldest son on a palatial estate in Framingham, Massachusetts. Her husband, Thomas Lewis (1771–1824), had been a prosperous merchant involved in the

*Table 4*  
Women Investors: Shareholding by Industry (Percentages)

	1845	1850	1855
<i>Banks</i>			
% investors	19.8	25.8	26.1
% share value	12.0	16.0	14.8
<i>Manufacturing</i>			
% investors	9.6	8.7	14.8
% share value	5.0	8.3	6.4
<i>Transportation</i>			
% investors	8.5	11.0	24.1
% share value	3.4	7.6	11.4
<i>All industries</i>			
% investors	15.4	14.0	23.0
% share value	7.2	9.6	10.6

Notes: “Share value” refers to par values. Also see notes to [Table 2](#) and Appendix.

of Abiel and her younger son, William G. Lewis, correspondingly increased.

The stereotype of women investors points to their tendency to cluster in the banking sector, which attracts the wealth of “widows and orphans” because of its familiarity and perceived low risk, derived from fixed-income returns and predictable dividend flows.<sup>42</sup> Women investors in Maine did indeed typically own disproportionately higher shares in bank stocks, relative to manufacturing and transportation. Women even comprised the largest group of shareholders in a number of banks, including the Medomak Bank of Waldboro and the Exchange Bank of Bangor. The share of female bank stockholders increased from almost 20 percent in 1845 to 26.1 percent a decade later, although the average size and value of their holdings remained lower than those of male investors.

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shipping trade between Boston and the West Indies. The family-owned Lewis Wharf in Boston’s North End was valued at over \$411,000 in the tax records of 1852.

<sup>42</sup> Many broad conclusions tend to be based on quite limited numbers of individuals and institutions; for instance, Anne Laurence discusses just six customers of Hoare’s Bank in England to assess how women evolved from consumers of banking services to purchasers of stocks. Laurence, “The Emergence of a Private Clientele for Banks in the Early Eighteenth Century: Hoare’s Bank and Some Women Customers,” *Economic History Review*, 61 (Aug. 2008): 565–86. For more extensive studies, see David R. Green, Alastair Owens, Josephine Maltby, and Janette Rutterford, eds., *Men, Women, and Money: Perspectives on Gender, Wealth, and Investment, 1850–1930* (Oxford, 2011); and Graeme G. Acheson, Gareth Campbell, Áine Gallagher, and John D. Turner, “Independent Women: Investing in British Railways, 1870–1922,” *Economic History Review* 74 (May 2021): 471–95.

However, like Polly Lewis, over time women's portfolios increasingly included riskier equity investments in manufacturing and transportation corporations. Most notable is the rapid increase in ownership of transportation shares: by 1855 women comprised almost one-quarter of investors in this sector, and the value of their investments had more than tripled, to 11.4 percent of equity capital.<sup>43</sup> For instance, in 1855 Nancy Covell was the primary investor in the closely held Jay Bridge Corporation, accounting for seventy-four of the eighty total shares. These patterns are inconsistent with such case studies as Majewski's railroads research, which found that few women invested in transportation stocks; instead, the results suggest that women investors in the antebellum period may have been similar to their male counterparts in terms of their willingness to explore new profit opportunities. Women were increasingly drawn into underwriting securities in riskier, newer ventures, in which it might be expected they would tend to possess little information or experience.

These findings raise the question of the mechanisms that underlay investors' portfolio decision-making. Scholars such as Lamoreaux have highlighted the role of kinship networks in the banking sector in early New England. Similarly, others have argued that, in England, both the business of the bank and investments in the stock market occurred within the context of groups linked by kinship, religion, and other non-economic ties. However, no study to date examines the extent to which related investing was prevalent, not just in a few firms or a single sector but across the entire economy, and how these practices varied during the process of economic transformation. The next section therefore investigates the role of family connections in the mobilization of capital in antebellum corporations in New England.

### Related Investing

The brothers of the Richardson family of Portland, Maine, were all prosperous merchants in the East India trade who, along with several other family members, became key insiders in some of the most important new business ventures of their day. Joshua Richardson was a Maine-born founder of the Cumberland Bank in 1813 and also started the Merchants' Bank with his brothers Israel Richardson and William Putnam Richardson. Joshua was an investor in the Portland Gas Light Company, the Portland Manufacturing Company, the Maine Bank, and

<sup>43</sup> In comparison, Acheson et al., in "Independent Women," note that in 1843, women accounted for just 11 percent of shareholders in the large British railroad they studied, and this figure only approached 30 percent toward the start of the twentieth century.

the Atlantic and St. Lawrence Railroad. He was an officer in several other firms and acted as the president and chief executive officer of the Manufacturers and Traders Bank, in which his mother, Eunice Richardson, was also a prominent shareholder.<sup>44</sup> According to the 1850 census records, Joshua Richardson held over \$20,000 in real estate assets, while his brother Israel owned \$15,000. William Putnam subsequently was appointed president of the American Insurance Company in Salem, Massachusetts. In both developed and developing societies today, such a network of interlocking directorships, social connections, and familial ties would likely raise questions about conflicts of interest and the potential for negative outcomes such as tunneling and the exploitation of “outside” investors.

Table 5 presents the patterns of related investing in banks, manufacturing, and transportation corporations, in terms of the percentage of investors within each industry who owned shares in firms where at least one other shareholder was a relative. Contrary to the notion of the decline of related investing during market expansion, the significance of kinship ties instead increases during the period of industrialization. In 1845, 40 percent of bank shareholders were categorized as related investors, a figure that had grown to almost half of all shareholding a decade later. This was also true of corporations engaged in the newer industries of manufacturing and transportation. The prevalence of kinship ties in manufacturing corporations increased to the point where more than half of the value of shares was held by related investors. Again, the most marked change was evident in transportation, where close to 70 percent of shareholders were related to other investors in the corporation. Compared with manufacturing, related investors in transportation enterprises held smaller stakes on average, amounting to roughly half of the value of shares.

The standard studies of kinship networks in an economic context tend to focus on corporate insiders, or officers who hold key managerial positions or directorships. Table 6 shows the prevalence of overall ownership and of related investing among such officers, comprising treasurers, directors, and presidents in Maine corporations. Banks and manufacturing enterprises exhibit similar trends over time. First, the officers of the firm remained roughly the same fraction of the total number of shareholders: bank insiders represented around 7 percent of all shareholders; directors and other key officials in manufacturing corporations numbered about 4 percent of shareholders. Second, insiders held disproportionately larger amounts of capital, and their ownership shares increased significantly

<sup>44</sup> In 1845 Joshua Richardson held \$1,100 in shares, whereas Eunice Richardson owned \$2,100 in the Manufacturers and Traders Bank.

*Table 5*  
Related Investing by Industry

	<i>1845</i>		<i>1850</i>		<i>1855</i>	
	<i>% Investors</i>	<i>% Value</i>	<i>% Investors</i>	<i>% Value</i>	<i>% Investors</i>	<i>% Value</i>
Banks	40.0	35.5	45.3	51.4	45.1	49.1
Manufacturing	36.5	38.4	41.3	45.4	44.7	52.5
Transportation	40.4	39.2	66.9	57.8	68.9	52.3

Notes: Related investors share the same surname as another investor in the same enterprise. See Appendix for further discussion.

*Table 6*  
 Related Investing among Corporate Insiders (Percentage of Industry Total)

	<i>1845</i>		<i>1850</i>		<i>1855</i>	
	<i>Investors</i>	<i>Capital</i>	<i>Investors</i>	<i>Capital</i>	<i>Investors</i>	<i>Capital</i>
<i>Banks</i>						
All insiders	7.8	12.1	7.3	16.6	7.1	19.5
Related insiders	2.5	5.3	4.1	12.2	3.6	13.5
<i>Manufacturing</i>						
All insiders	3.8	12.2	3.0	11.2	4.2	22.7
Related insiders	1.6	4.4	1.5	8.9	2.2	18.0
<i>Transportation</i>						
All insiders	3.6	11.0	1.0	5.2	1.3	4.9
Related insiders	1.1	1.4	0.5	3.5	0.7	3.6
Number of insiders	154	-	131	-	268	-
Percent related	33.1	-	50.4	-	51.9	-

Notes: Insiders are defined as all officers of the corporation who could be traced, including treasurers, directors, and presidents of the firm. Related insiders are those officers who share the same surname as another investor in the same enterprise. See Appendix for further discussion.

over time. By the end of the period, insiders accounted for approximately 20 percent of the capital in banks and 23 percent in manufacturing enterprises. Once again, transportation is notably different from these other industries, with a more “democratic” distribution of shareholders and share value among the officers of the corporation.

The distribution of ownership concentration for overall corporate insiders is reflected in the patterns for related investors. In 1845 a third of all officers were related to another shareholder in the same firm, and this figure soon increased to over half of all insiders. Related investing was associated with an increase in the influence of insiders in both banking and manufacturing corporations. In banks, related insiders initially owned 5.3 percent of total capital, and this had jumped to 13.5 percent of capital by 1855. Similarly, manufacturing exhibited a sharp rise in the concentration of shares in the hands of related insiders, to 18 percent of the capitalization of these firms. In the case of transportation, the level and degree of concentration was significantly lower, since related inside investors owned no more than 3.6 percent of outstanding shares.

Women were far more likely to be related to, and to live in the same household as, other investors in the same firm.<sup>45</sup> For instance, in 1840 David Wooster, a justice of the peace in Vinalhaven, owned \$700 in the Lime Rock Bank of Rockland, without any relatives listed in the shareholders’ roster. In 1845, his name does not appear among the bank’s stockholders, but the records now include Lydia Wooster, a sixty-six-year-old widow with \$200 in real estate wealth, holding \$700 in shares of the Lime Rock Bank of Rockland. An unmarried daughter, thirty-one-year-old Jane Wooster, who lived in the same household, owned \$100 worth of shares in the same bank. Apart from passively inheriting shares, women were also represented as shareholders who had made active decisions about how to allocate their wealth. When the York Bank was first incorporated in 1831, its biggest shareholder was the wealthy widow Sarah Cleaves, followed by her children, Mary and Daniel.<sup>46</sup> In 1845, after the death of her mother, Mary Cleaves became the majority shareholder, owning 10 percent of the bank, whereas her brother, Daniel Cleaves, was the second-largest shareholder and served as the president of the bank from 1849 through 1865. However, even if women like Sarah Cleaves were active investors, it is

<sup>45</sup> See appendix. If isonymy (the probability of having the same surname) were random, women would be significantly *less* likely than men to be found to be related, and we would not expect to find systematic variation across industries.

<sup>46</sup> The patriarch of the Cleaves family, Daniel Cleaves Sr., had died in 1817 leaving the largest estate in Maine at that time, created from diverse successful investments and businesses in shipping, banking, land, and manufacturing. Daniel Cleaves Jr. was around twenty-five years of age when the decision was made to contribute funds to the founding of the York Bank.



impossible to determine whether female-related shareholders made decisions wholly independently or were following the advice of relatives with more financial experience. In any event, the general point is that, whether as active or passive investors, women were more likely to be involved in financial decisions as part of a family unit than individually.

We can gain more insights into the characteristics of related investing by exploiting variation in investments across industries in terms of gender. [Table 7](#) shows that the number of women shareholders increased from 385 (8.9 percent of the total) in 1845 to 1,681 (15.4 percent) a decade later. In 1845, 57.9 percent of women appeared on the roster of related investors, growing to 66 percent in 1855, in comparison with the 30.4 percent of men who were related to other shareholders in 1845 and 54 percent in 1855. Part of the rising prominence of related investors was due to women shareholders' experience in transportation and communications enterprises. By the end of the period, fully 78.5 percent of female stockholders in railroads, canals, bridges, and telegraph corporations were related to other investors in the same firm—a significantly higher proportion than the 50.7 percent observed in banks. The lower incidence of related investing in the stable banking industry, and the higher incidence in transportation, suggests that kinship ties played a role in attenuating transactions costs in riskier enterprises.<sup>47</sup> In particular, it is likely that the burden of these transactions costs were disproportionately felt by women and other groups that were financially uneducated, less wealthy, or otherwise disadvantaged at equity investing.

The notion that related investing aided in the democratization of securities markets is supported by the kernel density distributions of related and unrelated investors, in terms of both the value of shareholding ([Figure 3](#)) and the amount of real estate wealth in their investment portfolio ([Figure 4](#)).<sup>48</sup> Just as in the case of the kernel density estimate of the value of shares held, there is greater “heaping” for related investors at the lower tails of the distribution of real estate and personal wealth. The density estimates for the transportation corporations and other enterprises are noticeably skewed leftward for related investors and to a greater extent than in the case of unrelated investors. These patterns suggest that researchers' current tendency to focus almost exclusively on the kinship networks of elite investors is likely to miss what may be

<sup>47</sup> John Majewski found that 40 to 50 percent of the shareholders in transportation corporations shared the same surname in his study of six firms in two counties in Pennsylvania and Virginia. He concluded that kinship was a means of reducing transactions costs (in this case, a hypothesized free rider problem). Majewski, “Who Financed.”

<sup>48</sup> Kernel density estimation creates a hypothesized probability density function from the shareholder observations. A Gaussian density function was used as the kernel and nonparametric techniques were employed for the density estimation. See the appendix for further discussion.

*Table 7*  
 Related Investing by Industry and Gender

	1845		1850		1855	
	Men	Women	Men	Women	Men	Women
<i>Banks</i>						
% M, % F Related	35.4	59.0	43.3	51.2	43.1	50.7
% All Bank Investors	28.4	11.7	32.1	13.2	31.8	13.2
<i>Manufacturing</i>						
% M, % F Related	34.0	60.0	39.3	62.5	41.9	61.1
% All Manufacturing Investors	30.8	5.8	35.9	5.4	35.7	9.1
<i>Transportation</i>						
% M, % F Related	39.7	47.5	66.7	68.8	65.8	78.5
% All Transportation Investors	36.4	4.0	59.4	7.6	50.0	18.9
<i>All (N = 13,890)</i>	2,123	385	3,585	582	5,533	1,681
% Related	30.4	57.9	56.4	60.0	54.0	66.0
% All investors	30.4	8.9	48.5	8.4	41.4	15.4

Notes: “% M” indicates the percentage of all men who were related investors, and “% F” indicates the percentage of all women who were related investors.

other crucial functions of related investing. Indeed, these distributions provide visual confirmation that kinship ties were especially relevant for small investors and shareholders who were less wealthy.

### Related Investing and Outcomes

What was the impact of related investing on outcomes in the firm? The cross-tabulations suggested that banks, manufacturing, and transportation corporations were characterized by different processes and outcomes. The regressions in Table 8 examine the effects of related investing, *ceteris paribus*, on the shareholders’ ownership stake in the firm, or the fraction of total shares that the individual held.<sup>49</sup> Diffuse ownership in these industries was also determined by varying factors. For instance, in banking and manufacturing, farming areas were associated with higher ownership concentration, but in transportation

<sup>49</sup> Regressions were also run that allowed the coefficients and intercepts to vary over each time period and controlled for the size of the firm in terms of the number of stockholders and for the age and location of the firm. These results confirmed that related investing had grown over time, but the pattern was not due to the elite insiders in the firm; rather, it was because of the higher percentage of shares held by the “outsider”-related investors. Similar results were obtained using a Herfindahl measure of ownership concentration.

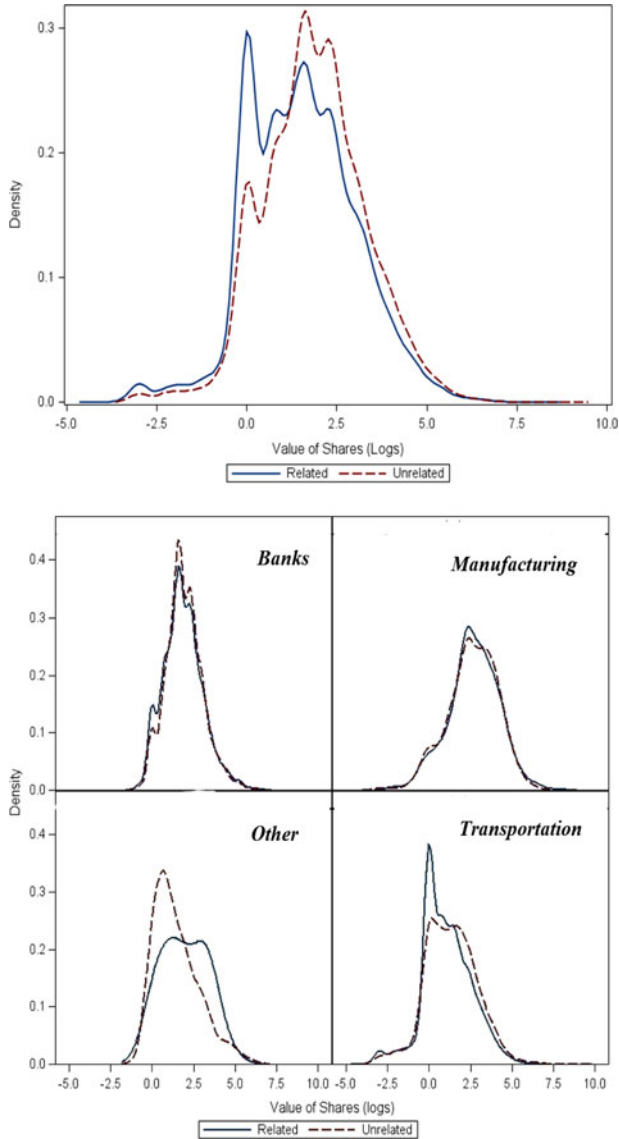


Figure 3. Distribution of related and unrelated investors. Notes: Value of shares refers to the stated par values. See Appendix for definitions of related investing and further statistical information.

enterprises, lower concentration occurred in more prosperous farming regions. For banks, older firms had lower concentration of shares, while the opposite was true of railroads. As one would expect, directors

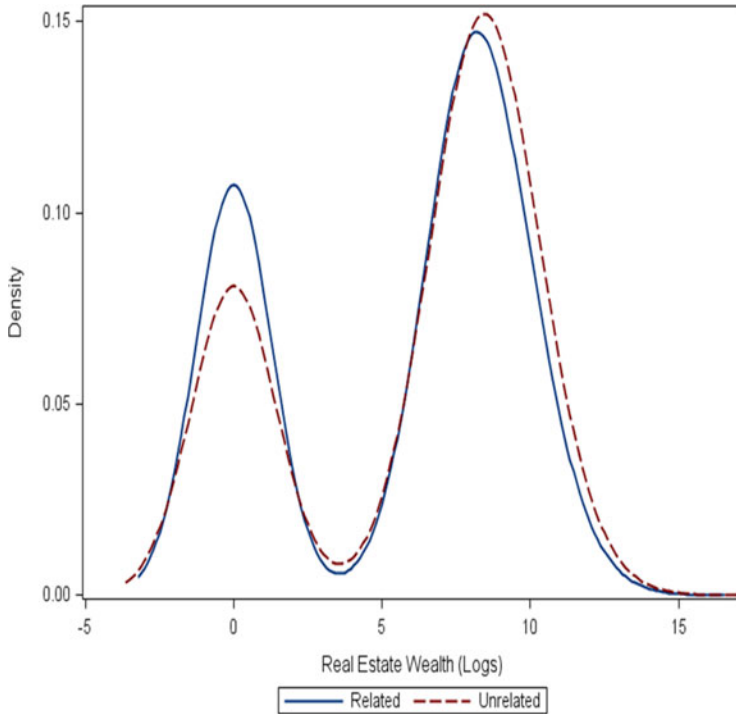


Figure 4. Distribution of real estate wealth and related investing. Notes: Shareholders' wealth was obtained by matching the sample of investors to the manuscript censuses of 1850 and 1860. See Appendix for definitions of related investing and further statistical information.

and other officers owned higher fractions of corporate stock, and this was especially true of manufacturing firms. The less-advantaged shareholders, such as women investors, owned smaller stakes in the banking and manufacturing enterprises, but they held larger proportions of equity in transportation. Directors in transportation accounted for greater amounts of shares, but related investors were associated with ownership concentration to an even greater extent. These results are consistent with the hypothesis that kinship networks facilitated higher-risk investments.

The regressions in Table 9 show the determinants of variation in “persistence,” or the holding of shares in a company for more than five years. Shareholders in manufacturing firms tended to be longer-term investors than shareholders in banking corporations, perhaps owing to the lack of early dividend payouts in many manufacturing enterprises, as well as the lower liquidity of the higher-par-value manufacturing

**Table 8**  
**Regressions: Influence of Related Investing on Ownership Share**

	<i>Banks</i>		<i>Manufacturing</i>		<i>Transportation</i>	
	<i>Coefficient</i>	<i>T-statistic</i>	<i>Coefficient</i>	<i>T-statistic</i>	<i>Coefficient</i>	<i>T-statistic</i>
Intercept	10.50***	4.02	18.9*	2.03	46.85***	13.68
<b>Investors</b>						
Maine resident	-0.41*	-1.63	6.63***	8.91	8.51***	34.12
Directors	1.55***	5.49	5.54***	4.57	1.52**	2.18
Female	0.03	0.16	-1.36*	-1.81	0.58***	2.46
Related investor	-0.5***	-3.30	-2.00***	-4.32	2.56***	14.07
<b>Firms</b>						
Established firm	-4.03***	-21.71	0.081	0.14	7.86***	26.85
Closely held	14.94***	22.92	30.68***	22.21	24.9***	28.66
<b>Time Period</b>						
Year = 1850	0.94***	4.37	4.18***	5.98	-4.72***	-11.94
Year = 1855	-0.97***	-5.55	-0.69	-1.01	2.4***	6.45
<b>County</b>						
Log(Pop)	0.08	0.41	-1.95***	-2.72	-1.55***	-6.08
Log(Farm Value)	0.13***	2.48	0.83***	4.69	-2.00***	-30.85
$R^2$	0.24		0.32		0.62	
$N$	4,535		2,420		5,857	

Notes: "Ownership share" refers to the fraction of total shares in the firm held by the individual investor. Insiders are defined as all officers of the corporation who could be traced, including treasurers, directors, and presidents of the firm. Related investors share the same surname as another investor in the same enterprise. Established firms had been in existence for at least ten years. Closely held firms were owned by fewer than twenty shareholders. The excluded time and industry are 1845 and banking. Population and farm value are estimated at the county level.

\* p = .10  
 \*\* p = .05  
 \*\*\* p < .05

*Table 9*  
 Regressions: Influence of Related Investing on Persistence in Shareholding

	<i>Coefficient</i>	<i>T-statistic</i>	<i>Coefficient</i>	<i>T-statistic</i>
Intercept	-0.03	-1.16	-0.19	-3.71***
1850	0.24	9.69***	0.23	8.62***
1855	0.43	18.44***	0.40	14.13***
Maine resident	0.07	3.81***	0.06	3.14***
Manufacturing	0.11	4.27***	0.14	5.01***
Transportation	-0.04	-2.31**	0.03	1.05
Female	-0.05	-3.22***	-0.04	-2.45***
Related investor	0.05	3.38***	0.04	2.79***
Related director			0.17	2.07**
Age of firm			0.01	2.64***
President			0.20	1.82*
Director			0.11	1.73*
Other officer			0.01	0.16
Trustee			0.012	0.45
Percent ownership			0.01	3.56***
$R^2$	0.11		0.12	
$N$	3,912		3,912	

Notes: "Persistence" refers to shares held for more than five years. Related investors share the same surname as another investor in the same enterprise. The excluded time and industry are 1845 and banking.

\*  $p = .10$

\*\*  $p = .05$

\*\*\*  $p < .05$

shares. As might be expected, concentrated ownership (in terms of the fraction of total equity held by an individual investor) was positively associated with greater persistence. Elite officers of the firm, such as the president and directors, were also more likely to retain shares for longer periods, but occupational status in general (such as white-collar positions, or financial backgrounds) was not a significant explanatory factor. Women held shares for a shorter period than male investors, which potentially signals a lower tolerance for the higher risk of equity investment. The regression results further suggest a positive role for related investing, in explaining the persistence of elite investors with family ties, as well as the persistence of non-elite investors.

An interesting issue concerns the connection between corporate performance and ownership structure in terms of the degree of related shareholding. According to a series of influential papers by Harold Demsetz and subsequent coauthors, the choice of any specific ownership

structure is an endogenous decision by profit-maximizing individuals.<sup>50</sup> As such, we should not expect to find any systematic relationship between ownership structure—including the degree of relatedness—and corporate performance. Consistent and comparable data on profitability or other performance measures are not readily available for the entire sample of corporations, but I was able to obtain detailed information on banks from 1840 to 1855. In keeping with the Demsetz hypothesis, multivariate regressions to determine the influence of related investing on performance do not find any significant relationship between familial ownership and variation in profitability.<sup>51</sup>

A study of the effect of pervasive family relationships among English shipbuilding companies concludes that these social connections significantly reduced the risk of bankruptcy.<sup>52</sup> At the same time, the authors contend that such personal ties were incompatible with corporate forms of governance, but the results of the Maine sample refute such claims. Table 10 presents regressions that investigate determinants of the probability of bank failure, from 1840 through 1855. The early 1840s was a particularly hazardous period in terms of the viability of banks, so it is not surprising that the results show the likelihood of survival increased after this period. Confidence in the overall model is bolstered by the finding that, as one might expect, higher loan-to-deposit ratios positively affect the risk of failing.<sup>53</sup> Notably, the regressions indicate that the degree of related investing was negatively related to bankruptcy and closure, implying that more extensive familial connections were associated with a lower probability of failure, holding other things constant. Further research would need to be conducted to identify the specific mechanisms involved in the linkage between stronger family ties among equity owners and the resilience of the firm.

## Conclusion

Standard approaches to the organization of the firm tend to posit a dichotomy between family businesses, where governance and efficiency

<sup>50</sup> Harold Demsetz, "The Structure of Ownership and the Theory of the Firm," *Journal of Law and Economics* 26 (June 1983): 375–90; Harold Demsetz and Kenneth Lehn, "The Structure of Corporate Ownership: Causes and Consequences," *Journal of Political Economy* 93 (Dec. 1985): 1155–77; Harold Demsetz and Belen Villalonga, "Ownership Structure and Corporate Performance," *Journal of Corporate Finance* 7 (Sept. 2001): 209–33.

<sup>51</sup> The regression results are not reported here but can be obtained from the author on request.

<sup>52</sup> Ingram and Lifschitz, "Kinship."

<sup>53</sup> Deposits provide an economical, liquid, and less risky source of loan funding for banks, compared with more costly and variable non-deposit alternatives. As shown in the financial crisis of 2008, high loan-to-deposit ratios can lead to failure for individual financial institutions and contagion effects in the banking system.

*Table 10*  
 Regressions: Related Investing and the Probability of Bank Failure, 1840–1855

	<i>Coefficient</i>	<i>T-statistic</i>	<i>Coefficient</i>	<i>T-statistic</i>
Intercept	0.71546	5.16***	0.58582	3.80***
1845	-0.14128	-1.2	-0.06393	-0.52
1850	-0.20472	-1.35	-0.13462	-0.87
1855	-0.19593	-1.78*	-0.15250	-1.37
Medium related investing	-0.17851	-1.28	-0.17810	-1.29
High related investing	-0.35359	-2.00***	-0.32627	-1.86*
Number of shareholders	-0.00220	-2.31***	-0.00214	-2.27***
Portland	0.05301	0.41	0.07690	0.60
Loan-to-deposit ratio	–		0.00777	1.84*
$R^2$	0.19		0.22	
$N$	100		100	

Sources: Maine State, *Abstract from the returns of the cashiers of the several incorporated banks in Maine* (Augusta, various years); *Maine State, Public Documents of the State of Maine* (Augusta, various years); *Maine State, Miscellaneous Papers of the Secretary of State of Maine* (Augusta, 1860).

Notes: The observations are individual banks, and failure comprises both voluntary closure and forced bankruptcy. The excluded year is 1840. “Low related investing” refers to less than 25 percent; “medium” is between 25 and 50 percent; and “high” is above 50 percent. Portland was the largest commercial center in Maine.

\*  $p = .10$

\*\*  $p = .05$

\*\*\*  $p < .05$

can be compromised by personal tastes and affinities, and impersonal corporations that are run by professional managers whose profit-maximizing decisions are independent of the identities of the owners. Alfred Chandler even contended that Britain lost its industrial leadership because of the prevalence of “personal capitalism” based on family ownership, with the implication that relational elements should wither away as part of the economic growth process.<sup>54</sup> The results from this study instead suggest that the extent of personal ownership in firms lies along a continuum, and kinship ties can prevail throughout the ownership structure of even the allegedly impersonal corporation. Moreover, such relationships became more prevalent as industrialization rapidly increased and transportation networks expanded access to national markets.

<sup>54</sup> Alfred D. Chandler, Jr., with Takashi Hikino, *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, MA, 1990).



Related investing, or family ties among the owners of firms, has been found to be pervasive in most parts of the world in the past and in the present. Research on American financial and business history has focused primarily on kinship networks among elite investors such as corporate insiders, ignoring the characteristics of the rest of the population of shareholders. From this perspective, related investing in financial capital markets is typically held as anomalous and suspect, raising the possibility that insiders are taking advantage of their social connections to avoid or manipulate internal controls in the firm. The negative connotations are highlighted in countries today where institutional and external controls are nonexistent or ineffective and corruption is endemic. In short, related investing has often been regarded with caution or marked misgivings because it has the potential to increase agency costs and serve as a mechanism through which resources within the firm are redistributed to the elite owners and officers. Others, however, argue that in the presence of market imperfections, family firms and communal relationships can be beneficial, especially for women and other disadvantaged groups. Even in studies where family connections are acknowledged to play a productive role, it is generally argued that personal ties should decline and disappear as markets become more developed.

The current project is based on a more comprehensive data set of individual shareholders than has previously been employed to study American corporations. The scope of coverage encompasses an era when the U.S. economy was undergoing rapid industrialization and growth, and many of Maine's corporations were not only leaders in the national sphere but even penetrating international markets. The results confirm the usual finding that elite insiders, including treasurers, directors, and presidents, were typically connected to other shareholders in the corporation. It is striking that, when the analysis is extended to all shareholders in the firm, the same patterns are detected. Moreover, these familial networks did not decline over time; instead, they increased as the economy developed. As such, related investing seems to have been a universal feature of equity markets in the antebellum period.

This leads to the longstanding question of why kinship ties were so prevalent, not just among insiders but also among outside shareholders. Future research will investigate supplemental issues including the potential links to variation in the characteristics and consequences of corporate governance. At least one possibility is that, although corporate insiders might have attempted to use family networks to exploit other shareholders, their ability to do so was limited by the countervailing power of family networks among outsiders. In the current article, a systematic analysis of heterogeneity across industry, gender, wealth,

ownership concentration, and persistence helped to shed light on the role of such connections in business enterprise and capital mobilization. The variation in the patterns that existed across the banking, manufacturing, and transportation sectors suggests that outsiders were able to overcome a lack of experience and information by taking advantage of their own networks.

Investors with family connections were significantly more likely to persist in holding shares over a longer term, and instead of declining as the economy developed, related investing increased over time and in all industries. Family networks were at least one of the factors that induced inexperienced investors to shift their capital beyond the conservative banking sector into the “high technology” manufacturing and transportation firms. The analysis of the effects of related investing on the concentration of ownership in the corporations suggests that this phenomenon was likely associated with a reduction in perceptions of risk, especially for the mobilization of capital to underwrite new ventures. Railroads and other risky large-scale undertakings attracted extensive equity investment that consisted primarily of small first-time investors who were able to benefit from family networks. Kinship ties further encouraged women and comparatively disadvantaged newcomers with lower stocks of personal and real estate wealth to take advantage of emerging investment opportunities. A final noteworthy result is that family networks were associated with a lower risk of closure and failure in banks. In sum, the empirical analysis in this study suggests that related investing in American corporations promoted a democratization of financial capital markets during the era of early industrialization.

*Appendix*  
A1: Sample Summary Statistics

<i>Variable</i>	<i>1845</i>		<i>1850</i>		<i>1855</i>	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>
Related (%)	0.39	0.49	0.57	0.50	0.57	0.50
Women (%)	0.15	0.36	0.14	0.35	0.23	0.42
Age of women investors (years)	44.20	16.70	46.00	16.70	55.50	15.50
Age of all investors (years)	45.60	15.40	47.30	15.30	57.00	14.50
Unmarried (%)	0.13	0.34	0.01	0.10	0.10	0.26
Household size	7.60	6.40	6.20	2.70	7.70	9.30
Real estate wealth (\$)			6,511.30	19,171.50	6,166.70	23,089.50
Personal wealth (\$)					6,041.00	20,962.70
Number of shares	16.20	33.80	10.80	32.90	15.70	96.00
Value of shares held (\$)	2,132.70	4,010.90	1,316.20	3,759.50	1,753.10	9,985.70
<i>Firms</i>						
Age of firm (years)	12.6	6.0	14.6	6.0	15.3	9.0
Shareholders per firm	65.0	53.7	178.0	341.1	125.0	214.2
Par value of stock (\$)	143.1	196.4	131.2	172.5	127.7	165.0
<i>Total</i>						
Maine shareholders (number)	1845		1850		1855	
Maine shareholders (% population)	5,221		10,376		14,298	
Number of shares	1.0		1.8		2.4	
Total capitalization (\$)	71,531		115,255		287,065	
	7,183,878		13,446,535		30,333,862	

Notes: The 50 percent sample of firms was constructed from shareholder lists for Maine corporations in 1840 (banks only), 1845, 1850, and 1855. The documents included the name of the shareholders in the firm, town, and state of residence, and either the number or value of shares invested or both. The investors were matched on name and residence in the manuscript population censuses of 1850 and 1860, resulting in a match rate of 49.0 percent for 1845, 54.1 percent for 1850, and 51.3 percent for 1855. In the final panel, "Total" refers to statistics on all shareholding in Maine, from which the sample was drawn, and identifies individual stockholders traced across all corporations, several of whom had invested in multiple firms. "SD" is the standard deviation. Additional information was obtained from the *Maine Register* and business directories, reports of bank and railroad commissioners, company reports, legislative records, newspapers and financial publications, town histories, biographies, and other sources.

## A2: Isonomy and Family Relatedness

Following pioneering research by James F. Crow and Arthur P. Mange in 1965, numerous biologists, geneticists, and anthropologists have used isonymy (homogeneity of surnames) to make inferences about relationships in select populations.<sup>55</sup> Isonomy has long been used to gauge specific genetic linkages, which involves stronger assumptions than the inference of family networks.<sup>56</sup> Such approaches have also been extended to much of the social sciences, including economic history.<sup>57</sup> Kinship measures based on isonymy will incorporate some error. False positives occur when unrelated individuals share the same surname (since some component of the frequency of names in the overall population will be random). False negatives will lead to an underestimate of family ties; this applies particularly in the case of women, because the surnames of married women typically differ from those of their relatives.<sup>58</sup> For example, women comprised eleven of the fourteen founders of the Achorn Lime Rock Company of Rockland at the time of its incorporation in 1857.<sup>59</sup> Although these women's surnames differed, deeper genealogical research revealed that they were all related as siblings or cousins. (It is interesting to note that several of these family members had also invested together in shipping and other risky business ventures.)

In this article, isonymy is assumed to represent an index of relatedness. Isonomy is theoretically independent of sample size, but it might be expected that selection by income (shareholders) and substratum (specific firm) would increase the likelihood of nonrandom kinship ties among individuals with the same name, relative to the general population. Empirically, if there is more noise than signal in this proxy, the coefficients in the regression models would tend to be biased toward zero.

<sup>55</sup> James F. Crow and Arthur P. Mange, "Measurement of Inbreeding from the Frequency of Marriages between Persons of the Same Surname," *Eugenics Quarterly* 12 (Mar. 1965): 199–203.

<sup>56</sup> For a survey, see Sonia E. Colantonio, Gabriel W. Lasker, Bernice A. Kaplan, and Vicente Fuster, "Use of Surname Models in Human Population Biology: A Review of Recent Developments," *Human Biology* 75 (Dec. 2003): 785–807. Other useful discussions include Gabriel Lasker, *Surnames and Genetic Structure* (Cambridge, U.K., 1985); and George Redmonds, Turi King, and David Hey, *Surnames, DNA, and Family History* (Oxford, 2011).

<sup>57</sup> For instance, see Gregory Clark, Neil Cummins, Yu Hao, and Dan Diaz Vidal, "Surnames: A New Source for the History of Social Mobility," *Explorations in Economic History* 55 (Jan. 2015): 3–24; and John H. Relethford, "Analysis of Marital Structure in Massachusetts Using Repeating Pairs of Surnames," *Human Biology* 64 (Feb. 1992): 25–33.

<sup>58</sup> Steven Ruggles, "Marriage, Family Systems, and Economic Opportunity in the United States since 1850," in *Gender and Couple Relationships*, ed. Susan M. McHale, Valarie King, Jennifer Van Hook, and Alan Booth (Heidelberg, 2016), 3–41.

<sup>59</sup> Maine Laws, Acts and Resolves as Passed by the Legislature (Augusta, ME, 1857), chap. 148.

Moreover, although random isonomy seriously underestimates female family relationships, the results in this study show that women were significantly *more* likely than men to hold shares with others of the same name in the same firm. Finally, I conducted an in-depth assessment that traced across censuses the actual household compositions of a subsample of investors, and this procedure bolstered the conclusion that the overall results are inconsistent with randomness.

### A3: Kernel Density Distributions

Kernel density distributions provide a visual representation of the inferred probability distribution of key observed variables drawn from the sample. Kernel density estimation (KDE) uses nonparametric methods, which do not depend on strict assumptions about the actual distribution of the data. The kernel is a mathematical function that assigns a probability to each observation in the sample. The KDE estimation formula is based on kernel weights drawn from a standard density function where the sum of the probabilities equals one and choice of a conservative bandwidth or window that helps to smooth out the discrete sample histogram (frequency bars). The estimates for this model were produced using the SAS PROC KDE procedure, which applies a Gaussian function as the smoothing kernel and automatically selects the bandwidth to construct the KDE in a computationally economical method.

The graphical display of the kernel density distributions can be highly informative about the implied probabilities of the underlying population of the sample. The figures shed light on the overall scale and location of the data, the spread, and the modality of the variables. For instance, the highest point of the curve will show where most of the observations are located, and the horizontal spread represents the variance. Unimodal distributions will have one peak, bimodal two peaks. The distributions presented in the article are especially valuable for highlighting the comparative skewness of the featured variables (such as the wealth of related versus unrelated individuals). If the distribution is skewed to the left, this implies that the mean is less than the median; if the distribution is skewed to the right, this implies that the mean is greater than the median.<sup>60</sup>

<sup>60</sup> For further discussion, see Adrian Bowman and Peter Foster, "Density Based Exploration of Bivariate Data," *Statistics and Computing* 3 (Dec. 1993): 171–77; Yen-Chi Chen, "A Tutorial on Kernel Density Estimation and Recent Advances," *Biostatistics & Epidemiology* 1 (Jan. 2017): 161–87; David W. Scott, *Multivariate Density Estimation: Theory, Practice, and Visualization* (New York, 1992); Adriano Z. Zambom and Ronaldo Dias, "A Review of Kernel Density Estimation with Applications to Econometrics," *International Econometric Review* 5 (Apr. 2013): 20–42.

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