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Building Futures Markets: Infrastructure and Outcome on the Chicago Board of Trade and New Orleans Cotton Exchange, 1856-1916

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UNIVERSITY OF CALIFORNIA, SAN DIEGO

Building Futures Markets: Infrastructure and Outcome on the Chicago Board of Trade  
and New Orleans Cotton Exchange, 1856-1916

A dissertation submitted in partial satisfaction of the  
requirements for the degree Doctor of Philosophy

in

Sociology

by

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2017



The Dissertation of David L. Pinzur is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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University of California, San Diego

2017

## DEDICATION

To my parents, with love and gratitude.

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## LIST OF ABBREVIATIONS

CBOT	Chicago Board of Trade
NCE	National Cotton Exchange
NOCE	New Orleans Cotton Exchange
RWC	Illinois Railroad and Warehouse Commission

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*Society*, 45(3-4): 431-453. The dissertation author was the sole researcher and author on this paper.

## VITA

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## ABSTRACT OF THE DISSERTATION

Building Futures Markets: Infrastructure and Outcome on the Chicago Board of Trade  
and New Orleans Cotton Exchange, 1856-1916

by

David L. Pinzur

Doctor of Philosophy in Sociology

University of California, San Diego, 2017

Professor Akos Rona-Tas, Chair

Professor Isaac Martin, Co-Chair

Derivative financial instruments figure prominently in the modern global economy, but their modern origins date back to the use of agricultural futures contracts in the mid-19<sup>th</sup> century. This dissertation analyzes the construction of markets in futures contracts during this period on two exchanges—the Chicago Board of Trade and New

Orleans Cotton Exchange. Building these markets posed a unique problem. Unlike extant markets, which could operate autonomously, futures markets had to be constitutively linked with a second underlying market in order to work (e.g., a market in cotton futures linked with an underlying market in cotton itself). Making this linkage required creating infrastructural connections—with institutional, material, and cognitive components—that would allow the two markets to work in concert. Infrastructures had to support an environment in which traders on the futures market could incorporate spot market information into intentionally rational decisions.

The Chicago Board of Trade and New Orleans Cotton Exchange built their infrastructures differently. This dissertation asks two questions about this divergence: What factors caused the infrastructure on each exchange to take the shape it did? And, what consequences did these infrastructures have for market behavior? I answer these questions through analyzing the construction and impact of three critical infrastructural features: (1) the classification schemes by which spot commodities were assigned grades; (2) the material means of gathering and disseminating data, both statistics on the growth and movement of the spot crop, as well as price quotations from global markets; (3) the economic and cultural theories by which traders understood the nature of speculation in futures and its effect on spot markets. I find that the characteristics of these infrastructural elements were shaped less by any uniform concern with efficiency or fairness and more by the distinct economic, cultural, political, and organizational environments on each exchange. Additionally, I suggest that these distinct infrastructures promoted different types of trading on each market—high-risk speculation in Chicago and low-risk hedging

in New Orleans—which contributed to the divergent price volatility on these markets during the period of my research.



## Introduction – Building Futures Markets

In the period of American history between the Civil War and the First World War, markets in agricultural futures contracts became integral to the global commodity trade (Hieronymus 1977; Hoffman 1932). **Futures contracts** are fairly simple **derivative** instruments that bind two parties to a transaction for a particular class of goods, at a designated future date and price—e.g., a contract made in mid-March might specify the sale of 500 bushels of #1 spring wheat at a price of \$1 per bushel at some time in June.<sup>1</sup> These contractual obligations were then traded on the **futures markets**. The trader above who *bought* a contract for spring wheat could easily transfer his obligation by simply *selling* a contract for the same commodity in the same amount. Standardization of commodities and contractual terms enabled an active, year-round market of people trading obligations to buy or sell agricultural commodities at a future date.

Futures markets solved two major problems that had previously plagued the marketing of agricultural commodities (Santos 2002; Working 1953). First, they evened out cyclical fluctuations in supply and, thus, price. Before the advent of futures markets, **spot market** prices would rise and fall dramatically in concert with the seasons: at harvest time, a burst of supply would drive prices down, and the opposite occurred during the planting and growing seasons. With futures markets, farmers and middlemen had a year-round market of speculators ready to commit to buying the commodities, often even before they were out of the ground. Second, futures market removed much of the risk

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<sup>1</sup> Economic terms in bold are defined in the Glossary, Appendix A.

associated with storing commodities. Prior to futures markets, middlemen faced the possibility that market prices would drop between the time at which they bought and when they sold. Futures markets solved this problem, allowing them to reliably find buyers quickly after coming into possession of their goods. While storage still had certain other costs, the risk of a significant price drop was mitigated.

In these ways, futures markets revolutionized the worldwide marketing of agricultural commodities. But, critically, they did not do so simply by establishing a new market that operated as a more efficient, independent entity for buying and selling goods, but by tethering the new market to an existing one to create a more efficient *system*. Spot markets trade commodities, while futures markets trade promises to exchange those commodities. Together, they create a powerful system for mobilizing capital and marketing commodities. I describe this relation as a *constitutive linkage* between markets. This linkage did not emerge naturally or simply; it required the active construction of institutional, material, and cognitive connections between spot and futures markets. Tasked with making this connection, two of the earliest exchanges in the United States to create futures markets for agricultural goods—the Chicago Board of Trade (CBOT) and the New Orleans Cotton Exchange (NOCE)—took different paths. This divergence, its causes and its effects, are the topics of this dissertation.

In this dissertation I conceptualize the connection between spot and futures markets as an infrastructure enabling their co-functioning. Infrastructure is a concept with roots in science and technology studies that is beginning to be applied in sociological studies of markets. It refers to the systems, technologies, standards, and protocols that

underlie market action and allow interchange across multiple parties (Bowker & Star 1999; Lampland & Star 2009; Pardo-Guerra 2014; Star & Ruhleder 1996). To conceive of the connection between markets as an infrastructure is to understand it as a politically contentious and practically consequential object that broadly shapes market behaviors. It was these infrastructural connections that enabled futures traders to make intentionally rational buying and selling decisions and made futures markets viable.

An infrastructural perspective on the roots of futures markets synthesizes material from the literature on market creation on one hand, and derivatives on the other. On the topic of market construction, scholars have identified fundamental problems that markets must solve in order to operate successfully. Jens Beckert (2009; 2012) argues that markets face fundamental coordination problems stemming from the uncertainty of economic action, which they must solve by socio-structural, institutional and cultural means in order to operate at all. Rona-Tas & Guseva (2014) add data to this theoretical framework, studying the particular problems of value and cooperation that arose in the creation of credit card markets in post-communist countries. They also highlight the deceptively difficult problem of recruiting actors into the market, often against the backdrop of unstable institutions or extant social divisions (see also Yenkey 2011, 2015). The literature on derivatives focuses directly on the social foundations of the linked relation between derivatives and their underlying commodities. Scholars identify that this connection is constituted by the overlapping actions of diverse individuals and organizational actors (Millo 2007), and that the seeming abstractness of derivatives in fact comes from particular material actions (MacKenzie 2007; Maurer 2002). Others

examine the consequences of the practices by which derivatives are created. Pryke & Allen (2000) demonstrate how the calculative, risk management practices at the heart of derivative trading alter understandings of what money is capable of doing.

By analyzing futures markets in terms of their infrastructural connection with spot markets I aim to combine useful features of both of these approaches. An infrastructural approach highlights the theoretical and practical puzzles facing market creation, while also focusing on the unique constitutive linkage between derivative and underlying markets. This perspective allows for a market-wide perspective on the connection between derivatives and their underlying entities. Particularly, I focus on the infrastructural features that created the information traders needed in order to make intentionally rational decisions on the futures market—what I call their *information infrastructure*.

This dissertation focuses on three features of these information infrastructures. Each of these linked the futures market and spot market in some way, made futures markets possible, and enabled futures traders to make intentionally rational decisions:

- (1) *The classification schemes by which spot commodities were assigned abstract grades:* Futures contracts did not specify the exchange of particular bushels of wheat or bales of cotton, but for a certain general class of goods (e.g., strict middling Upland cotton or #1 spring wheat). Both exchanges needed to create systems that delineated the categorical types available and sorted spot commodities into a particular grade. It was through the operation of these systems that the trading of futures contracts was

made possible. They linked the commodity as a physical good with the commodity classifications traded on the futures market.

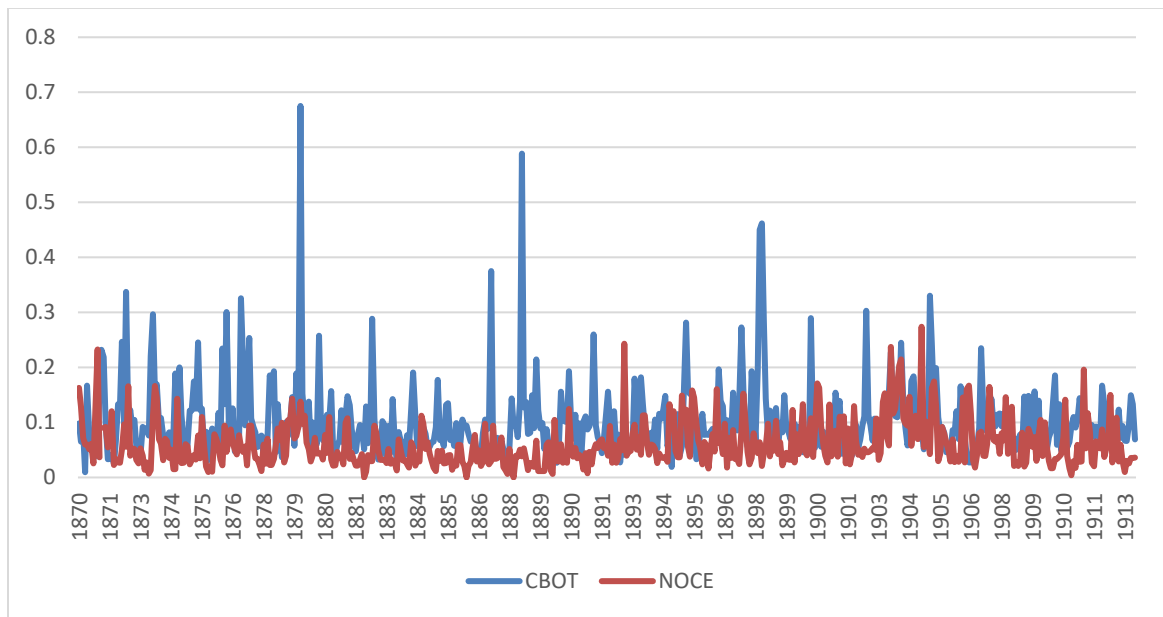
(2) *The material means of gathering and disseminating data on both the growth and movement of the spot crop and the states of worldwide markets:* These socio-technical systems expanded traders' perspectives on the market beyond the exchange floor. They brought into the exchange data on the growth and movement of the agricultural commodity, as well as price quotations from spot and futures markets around the world. Traders used this information to discern trends in worldwide supply and demand, or track price trends in other important markets. These systems provided material by which traders could orient themselves and attempt to discern future short- or long-term trends in futures or spot markets.

(3) *The economic and cultural theories by which traders understood the nature of speculation in futures and its effect on spot markets:* With the introduction of futures markets came a new type of trading: **speculation** in futures contracts. In order for speculative trades to be seen as legitimate features of the market, members of the exchanges needed to justify their economic and cultural value. Making this evaluation required detailing futures speculation's relation to the spot market. But more than simply bringing legitimacy, these understandings allowed traders to understand states of the market, the relation between spots and futures, and the impact of their own actions. It provided reasons for engaging in speculation, as well as lines between legitimate and illegitimate trades.

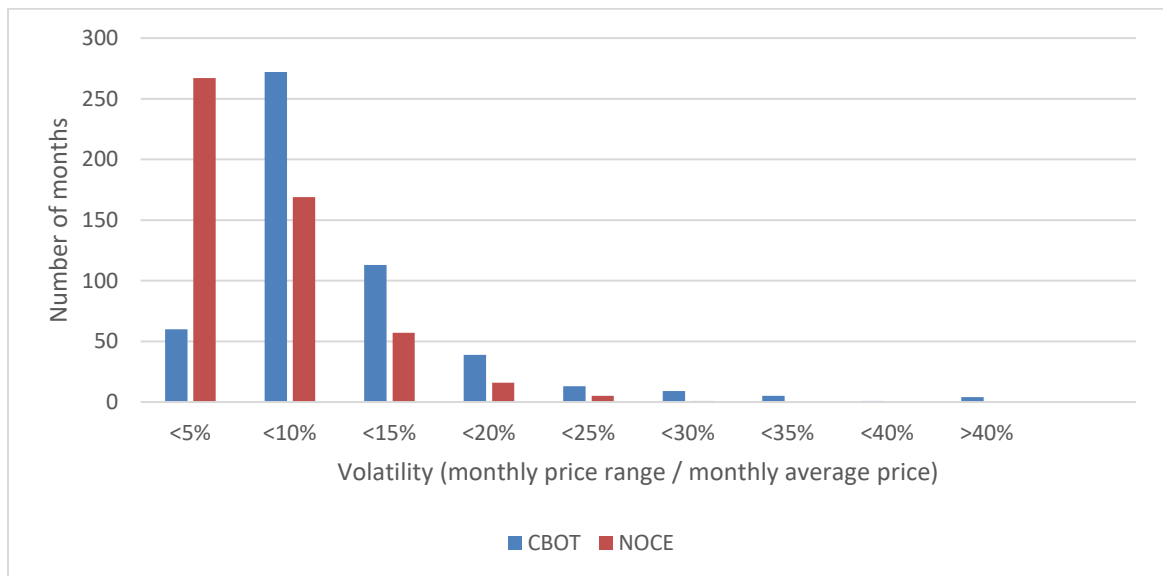
All three of these infrastructural elements had to be created from scratch. All features of how they would work were up for debate, and could be solved in several ways. The decisions these exchanges made with regard to these three features would influence the character and operation of their futures markets for decades to come.

This dissertation asks two main sets of questions about these infrastructures. The first relates to the social factors that *caused* the infrastructures to take the shape they did. Why did these exchanges link spot and futures markets the ways they did? What social, cultural, organizational, technical, or economic factors influenced the construction of their linking infrastructures? The second set of questions asks how differences in the exchanges' infrastructures may have *affected* behavior on their markets. Did the systems promote, or make more feasible, distinct styles of trading with differing levels of volatility? This question has the potential to illuminate the puzzling long-term divergence in **price volatility** found on these exchanges over the period of my research (see Figures 1 and 2; also, more generally, Bouilly 1976; Cronon 1991; Lurie 1979; Markham 2002)?

To summarize my answers to these questions, which I develop over the course of this dissertation: The infrastructures built on CBOT and NOCE differed significantly in how they constructed, gathered, disseminated, and interpreted information about the market. These differences were the outcome of struggles between diverse organizational and political actors, who drew on distinct economic, cultural, and technical logics in their attempts to make the market suit their own needs. The effects of these infrastructural differences were significant. The infrastructure on NOCE led to a futures market that



**Figure 1.** Intra-month commodity price volatility, September 1870 – August 1913. Volatility is calculated as the difference between monthly high and low prices divided by the average of the two. In mathematical terms,  $V = (\text{Monthly high} - \text{monthly low}) / [(\text{Monthly high} + \text{monthly low}) / 2]$ .



**Figure 2.** Intra-month price volatility, total months (N=516).

*Source:* Monthly high and low price data for the most commonly traded grades of wheat on CBOT and cotton on NOCE from Boyle (1922) and Boyle (1934).

featured a large amount of low-volatility **hedging** and a close connection with spot markets, while the infrastructure on CBOT promoted excessive, high-risk speculation and a rift between futures and spot markets.

### Hedging and speculation on futures markets

The method by which I make this last claim regarding the effects of infrastructure on price volatility differs enough from a standard sociological style that it warrants further explanation. The argument hinges on an analysis of the different types of trades that could be made on futures markets—speculative and hedging—and the infrastructural features that made one or the other more feasible or rational. Speculation and hedging had a symbiotic relation: speculation made the constant market upon which hedging relied, while hedging gave legitimacy to speculative trading by offering direct benefits in the spot market. Both types of trades were present on both exchanges. Yet, the ratio of speculation to hedging could vary widely, variation that would impact the level of price volatility seen on the market. My analysis hinges on highlighting the infrastructural features on each exchange that might have impacted this ratio of speculation to hedging.

To understand this argument, it is necessary to have a basic understanding of how hedging and speculation on futures markets work. Hedging is a way of using the futures market to insure against adverse price movements in the spot market. Middlemen connecting buyers and sellers in the spot market would often have to buy and store commodities to sell at a later date. Until these goods were sold traders faced the risk that



the market price for their commodity would fall, causing them a significant loss. To mitigate this risk, traders would take up a complementary position in the futures market, which they generally settled by difference, in addition to their dealings in the spot market. In this way, any loss in the spot market (e.g., from the price of spot wheat dropping while looking for a buyer) would be offset by a gain in the futures market (e.g., from having sold wheat short and profiting from the price decline). Hedging thus involved making two trades that played out in parallel, one entirely within the futures market, the other entirely within the spot market.

In contrast, speculation occurred solely within the futures market. Its goal was not to reduce risk, but to profit from it. Speculators made their money by betting on changes in the price of futures contracts. They could go “long,” buying contracts they believed were underpriced with the aim of selling an equivalent amount once prices had gone up, or “short” selling contracts that were overpriced and buying once the price had dropped; their profit came from the difference between the prices at which they bought and sold. In this way, speculators would cancel out their contractual obligations by buying and selling contracts for equivalent amounts and qualities of goods; Only rarely did speculators ever deliver or receive any actual wheat or cotton, or have direct contact with the producers or consumers of these goods. In fact, on the majority of speculative short sales, traders promised to sell commodities that they did not even own, and had no intention to own.

These trades, while both necessary components of the futures market, involved opposed rationales and relations to the underlying product market that would have had distinct impacts on price volatility. Hedging worked best when the spot and futures

markets were relatively stable and stayed roughly in step with each other, since this most effectively enabled the insurance function of the hedge. Speculation, however, was stimulated by an active market with a great deal of movement in prices, which increased the uncertainty under which speculation thrives. Hedging also had a built-in limit on the amount traded in futures, since traders would hedge only the amount of the underlying commodity they were actually moving, and end their engagement in the futures market as soon as their spot dealings were through. Speculators had no such limits. They maintained ongoing portfolios of contracts and could pump up the volume of trade as high as would benefit them.<sup>2</sup> Additionally, greater levels of speculation, *ceteris paribus*, increased the likelihood of manipulative actions such as cornering the market. **Corners** worked by trapping traders who had built up sizeable speculative positions. Corners were highly disruptive events, causing massive fluctuations in price and often scaring traders out of the market for long stretches of time. We can conclude from these differences in trading that a market that featured far more speculation than hedging would be more likely to see price fluctuations than one with a greater proportion of hedging.

Unfortunately, it is impossible to empirically determine what percentage of trades in the futures market were made as hedges versus speculation, since formally they were exactly the same. But I argue that by analyzing the infrastructural connections between product and futures markets, we can determine whether a particular exchange would make one or the other type of trading more or less feasible. This is because speculation and hedging have distinct information infrastructures under which they would thrive.

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<sup>2</sup> Marx's (1976) two circuits of capital, C-M-C and M-C-M', describe this difference quite well.

Hedging, since it involved parallel trades in the spot and futures markets required conditions where information was useful in both markets. Also, since hedging is a longer-term strategy, it did not require that information travel especially quickly, only that it be accurate. For speculation, the needs were opposite. Since traders were constantly looking to adjust their portfolio towards greater profit, the speed of information was critical. Additionally, since speculation almost always occurred entirely within the futures market, with no actual delivery of commodities, the accuracy of information was secondary—all that mattered was that everyone was working with the same information, good or bad. The distinct orientations and infrastructural needs of hedging and speculation are summarized in Table 1.

Over the course of the dissertation, I demonstrate that CBOT's infrastructure offered more support for speculation than hedging, while NOCE's infrastructure did the opposite. As a result, I argue, CBOT would have seen a higher proportion of speculation, as hedging trades moved to other markets better suited to their needs; conversely, NOCE would have encouraged hedging, while making speculation difficult. These differences would have created different baseline levels of volatility in their futures markets, offering a partial explanation for the divergence in price volatility across markets.

Table 1. Orientation and infrastructural needs of hedging and speculation.

<b>Orientation</b>	<i>Relation to markets</i>	<b>Hedging</b>	<b>Speculation</b>
	<i>Market goal</i>	Acted in both markets	Acted only in futures market
	<i>Orientation to risk</i>	Price insurance	Bet on price movements
	<i>Orientation to price</i>	Reducing risk	Assuming risk
<b>Infrastructural needs</b>		Favor price stability	Favor price fluctuation
	<i>Classification needs</i>	Index physical qualities	Create stable symbols
	<i>Information needs</i>	Long-term crop data	Fast price updates
	<i>Theoretical needs</i>	Show spot market value	Distinguish from gambling

#### Data sources

The data for this dissertation comes from three primary sources. The first, and largest, source of data for this dissertation was the archives of the exchanges. The CBOT archive is held at the University of Illinois – Chicago. Sources included annual reports, official rules and regulations, meeting minutes, and statistical data displayed on the Board. I additionally reviewed materials and reports from several important standing committees: Arbitration and Appeals; Grain; Warehouse; Market Reports; Membership; and Transportation. I also consulted books and pamphlets from the period— both those published by CBOT and those simply related to topics of interest—that were included in the Board’s library. Finally, I rounded out the data with the records of the Education Department, the Secretary’s correspondence, and the reports of the Annual Meetings of the CBOT affiliate, Council of North American Grain Exchanges. While CBOT was founded in 1848, the Board did not begin to keep records until ten years later. Most of these records, however, were destroyed in the Great Chicago Fire of October 1871. Thus

almost all of the material is from 1872 onward. Data for from prior to this point were gathered through secondary sources.

The NOCE archive is housed at Tulane University, and includes copious records from the time of the Exchange's founding. These include annual reports, official rules and regulations, and meeting minutes. Reports from several standing committees provided material for my analysis, including the Committees on Supervision; Membership; Information and Statistics; Arbitration & Appeals; Futures; Exchange Quotations; and Telegraph. Books and pamphlets published by the Exchange were also included, as well as several issues of *Cotton World*, the periodical produced by NOCE Secretary Henry Hester. In addition to the materials at Tulane, the New Orleans Public Library also has a number of additional books and pamphlets, as well as miscellaneous documents related to the New Orleans cotton trade that filled out the collection of documents.

A second source of data was exchange members' testimonies before state and federal legislators. On a number of occasions, representatives from CBOT and NOCE were asked to publicly defend the desirability and safety of commodity exchanges, futures markets, or speculation. The transcripts of these public hearings provide evidence of the exchanges' workings, as well as traders' orientations to speculation and its role in the economy. Representatives from CBOT spoke before Illinois legislators in 1870 during the Illinois constitutional convention, and again in 1883, before a special committee charged with investigating speculative trading. They also appeared before the U.S. Congress in 1914 to comment on proposed legislation. NOCE representatives testified before the New York state senate in 1882 regarding speculation in the cotton market, and

before the House Committee on Agriculture in 1895 and 1914 to comment on several proposed pieces of legislation. Members of both CBOT and NOCE gave testimony at the House Committee on Agriculture's 1892 hearing on "fictitious dealings in agricultural products," undertaken in connection with the pending Hatch Bill, which sought to regulate futures markets.

The final source of data for the dissertation was articles from the *New Orleans Daily Picayune* (later *Times-Picayune*), the *Chicago Tribune*, and the *New York Times*. These papers both reported on and editorialized the actions of the exchanges and attitudes of traders. They offer context and a non-exchange-centered perspective. Newspaper data was used selectively to flesh out areas of interest and noteworthy events from other sources.

## Outline of the dissertation

The first chapter of the dissertation sketches the foundings of the CBOT and NOCE and the creation of their futures markets. CBOT was founded prior to the Civil War, amid a technologically-fueled growth spurt that turned Chicago into a commercial hub of the North. Futures trading was introduced during the Civil War. The uncertainty and volatility produced by the War created ample opportunities for speculation in the price of commodities, and futures provided a less capital-intensive way to engage in it. By contrast, NOCE was founded after the war, in an effort to regain New Orleans' once-dominant position as the country's cotton export capital. Focused largely on revitalizing the spot trade, NOCE adopted futures trading only reluctantly, once the volume of the

business grew too big to pass up. I also discuss the regulations put in place by the federal government beginning in 1916, which ended the period of associational and state-level regulation. Finally, I justify my case selection, arguing that CBOT and NOCE allow me to investigate both the causes that shaped infrastructures in particular ways and the effects those infrastructures had on market action.

Chapter 2 develops the concept of market infrastructure, which I use to understand the production, dissemination, and interpretation of information on spot and futures markets. I begin by highlighting three broad perspectives on information within markets, taken by information economists and some sociological network theorists, institutional sociologists, and science and technology scholars. I bring together these three approaches through a discussion of “information infrastructures”—the institutional, material, and cultural means by which information is created, disseminated, and interpreted. This broad perspective enables us to consider all three of the areas highlighted above, while additionally analyzing the character of information on markets and the uses to which it can be put. According to the nature of the infrastructure involved, information may take on wholly different properties, constructing vastly different market information environments. This is seen in the cases in my dissertation, where the distinct infrastructures in place on CBOT and NOCE created information environments that promoted very different types of trading on the futures markets. The conceptual framework of “information infrastructure” thus seeks to encompass the established literature on how market devices and institutions impose a relation to information and

also to determine how market infrastructures give particular *qualities* to information, and how these qualities come to matter in market situations.

The next three chapters examine different components of the infrastructures that linked spot and futures markets and enabled futures trading on each exchange. Chapter 3 studies the grading systems that transformed concrete commodities into abstract grades that could be embedded in futures contracts. On CBOT, the grading system developed contemporaneously with the futures market and was shaped by the (not always honest) opportunities for profit available to powerful elevator owners and speculators within that system. Even when the state took over grading, political pressure on the regulatory board resulted in continued inaccurate grades. On NOCE, grading was created for the benefit of spot traders long before futures trading arose. For much of my period of research the system was based on antagonistic negotiation between buyer and seller, which resulted in grades that closely indexed the physical qualities of cotton. This was supplemented by a top-notch system of supervision and inspection that watched over cotton as it was processed and loaded onto ships. Even once NOCE centralized grading in an official body, powerful spot traders worked to ensure its continued fidelity. Finally, I argue that these differences in the ability of grades to accurately index the commodities' physical qualities resulted in a higher proportion of speculation to hedging on CBOT than on NOCE.

Chapter 4 discusses the systems for gathering and disseminating price quotations and crop statistics on each exchange. The former type of information changed from minute to minute and linked each exchange to other worldwide markets; the latter came



on a longer time scale and connected exchanges to the worlds of agriculture and transportation. CBOT and NOCE differed in the value they assigned to each type of information and their methods for gathering them. CBOT fought hard to ensure control over the dissemination of their own quotations and speedy telegraphic service with other exchanges, making credible threats that forced Western Union to meet their demands on a number of issues. But this focus on quotations came at the expense of developing an accurate system of crop statistics. On NOCE, the situation was reversed. From its inception, NOCE gathered vast amounts of statistical data on the growth and movement of the crop. But their telegraphic facilities continually lagged behind those of rival markets, particularly the Cotton Exchange in New York. I claim that these differences in the type of information gathered and the speed of its dissemination also contributed to CBOT having a higher proportion of speculative trading than NOCE.

Chapter 5 addresses the theoretical orientations that traders brought to the futures market. Traders on CBOT and NOCE differently assigned different economic and cultural value to speculation and futures trading. On CBOT, the cultural defense of speculation was made overwhelmingly in response to threatened legislation and thus focused on its distinction with gambling. But among Board members, a speculative market was contrasted economically to a dull market: speculation created action and opportunities for profit, which was good for the market as a whole. These arguments converged in the rejection of options trading, a close relative of futures that took on both a negative economic and cultural character. On NOCE, the value of futures came from being tools by which traders could push for higher cotton prices in the spot market.

Higher prices, in addition to their economic value, would help bring autonomy to the South, freeing it from reliance on Northern and foreign capital. I suggest that these infrastructural differences, unlike those in the previous two chapters, would have had only minor impacts on market behavior. Both encouraged speculation, only for different reasons. Still, the distinct understandings of futures speculation adds richness to our accounts of the evolution and institutionalization of futures markets in this period.

In the concluding chapter, I summarize the argument of the dissertation, reviewing the infrastructural differences on these two early futures markets, their causes, and their consequences. I also discuss two general contributions of the dissertation and their potential to guide further research. The first is demonstrating the necessity of studying derivative markets in terms of their constitutive, infrastructural linkages with underlying markets. I suggest that this perspective challenges and supplements the literature on market creation by noting the distinct challenges present in the creation of derivative markets. Second, I highlight infrastructural analysis as a useful analytical approach to studying the regulation of financial markets. This extends recent arguments about how to influence market-level outcomes not by imposing regulatory strictures, but by reshaping market architectures.

## Chapter 1 – CBOT, NOCE, and the Birth of Futures

The middle of the 19<sup>th</sup> century saw the rise of a new type of organization, which transformed the marketing of agricultural commodities: the exchange. Though exchanges for trading stocks had existed in the United States since 1792, commodity exchanges took longer to arrive. Commodity exchanges were corporations that brought together a range of businessmen—including merchants, warehousemen, millers, spinners, shipping agents, insurance agents, and others—for the promotion and regulation of trade. Some exchanges hosted markets in a large number of commodities, while others focused on particular commodities such as cotton, coffee, butter, eggs, leather, or petroleum.

Commodity exchanges served two broad functions. First, they regulated and oversaw a city's commodity trade. Exchanges set rules of competition and cooperation, and promoted uniformity in trade practices such as delivery, giving of margins, and setting commission or storage rates. Many exchanges established standards for assigning grades to commodities, facilitating large-scale, institutionalized trading. They also served as sites for the speedy and fair settlement of business disputes. This private arbitration process kept business from getting mired in protracted court battles and ensured that well-qualified peers would judge the cases. Beyond this regulatory function, exchanges also acted as aggregators of information and sites of markets. Prior to the founding of exchanges, commodity trading occurred scattered throughout the offices, street corners,

and saloons of a city. Information traveled through private channels and varied from one locale to the next. Exchanges centralized this information and, with it, trading. The result was a lively market, with a large common pool of information.

CBOT and NOCE were major exchanges both founded in this mid-19<sup>th</sup> century wave, CBOT in 1848 and NOCE in 1871. Soon after their foundings, both also became the sites of large markets in agricultural futures contracts. The exchanges, as organizations, were central to developing the infrastructures of these new markets in derivative financial products. This chapter outlines the histories of these exchanges, beginning with the developments that spawned the formation of the exchanges, then following on to their subsequent institutionalization of futures trading. The chapter also provides broader context on the exchanges' defining characteristics as well as their positions within the global commodity trade. This historical background provides context for the in-depth infrastructural analysis that follows in chapters three to five. I also explore why these cases are especially well-suited to an infrastructural analysis; this provides a methodological justification for the dissertation as a whole.

#### CBOT: The ascendance of Chicago & the founding of the Board

The city of Chicago grew rapidly in the 1830s and 1840s. What was, at the start of the period, a forgettable local trading post for Native tribes and English and French settlers was, by the end of it, a booming city attracting massive investment from breathless capitalists. Chicago's population increased twenty-fold and the value of its

land grew by a factor of three thousand in just a few years of this initial growth (Cronon 1991). Along with the flood of capital came a spate of growth in shipping and storing technology. By the end of the 1840s, the growth of railroads, grain elevators, and lake transportation had made Chicago the central transit point for wheat, corn, oats, barley, rye, and others agricultural commodities from the expanding hinterland, “the intermediary between small and large lots, between box cars and lake boats, between small seller and large buyer” (Lee 1938: 63). Railroads connected to northwest Illinois and southwestern Wisconsin, enticing farmers to send their wheat in by rail, rather than haul it in on wagons. Steam-powered elevators, built with train tracks on one side and a waterway on the other, stored grain and transferred it from rail to lake vessels. Once grain was loaded onto ships, the newly opened Illinois & Michigan Canal allowed shipment along either the Great Lakes or the Mississippi River, leading to the two largest ports in America. The increasing flow of goods and capital into the city led the *Cleveland Plain Dealer*, in 1858, to perceptively quip: “Chicago is a bustling city. It was formerly in Illinois, but now Illinois is in it” (Cited in Lee 1938: 95).

Alongside this growth in transportation infrastructure, a number of specialized functions emerged within the growing market, including storage, shipment, forwarding, and commission buying or selling (Lee 1938). The chain by which grain went from farmer to miller was long. Commonly a farmer sold grain to a local buyer, who would then consign the grain to a commission merchant in Chicago. Grain was shipped to Chicago by rail, almost always entering an elevator aligned with the railroad. The elevator proprietor issued receipts for this grain to the commission broker, who, seeking

to limit his exposure to price changes, sold these receipts, usually to a speculator. The receipt would then often be exchanged among speculators multiple times before eventually ending up with a shipper who would go to the warehouse and get grain that matched his receipts, which was then shipped to the mill (Lee 1938).

This complex marketing system was growing at an astonishing rate and handling increasingly large sums of both commodities and money. By the mid-1850s, more grain was moving through the city than ever before. From 1852-1857 receipts and shipments of wheat grew more than ten-fold (Taylor 1917: 141).<sup>1</sup> This was matched by an increase in the storage capacity of the city's elevators, which grew from 700,000 bushels in 1848 to 5,000,000 bushels in 1860. During this period, fully half of the wheat shipped to the eastern seaboard went through Chicago (Lee 1938). Unsurprisingly, members of the trade sought to establish some level of order and stability amid this growth. In March 1848, thirteen firms and individuals organized to establish a Board of Trade that would settle disputes, establish regulations, share information, and generally serve as a center for Chicago businessmen. In the first year eighty-two people joined the organization, representing all areas of the commodity trade (Taylor 1917). The Board drafted a constitution and by-laws, which provided for an elected Board of Directors and a handful of standing committees dedicated to critical issues in the grain trade, such as Shipping,

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<sup>1</sup> Information about the early years of the Board is scant. They did not print an annual report until 1858, and newspapers took little interest in reporting on the activities or composition of the Board in its earliest years. More seriously, their records were destroyed in the Great Chicago Fire of 1871. As a result, figures from the time before 1871 are imprecise. Nevertheless, they give a proper sense of the market's enormous growth.

### Warehousing, and Arbitration.

In these early years, the Board of Trade served primarily as a voluntary association for administering and supporting agricultural trade. But it was not until the Board's transformation into a marketplace that the organization truly caught on. Merchants had discovered that gathering together at a single trading place offered them constant opportunities for speculative dealing. These were especially frequent from 1853-1856, as the Crimean War made European markets highly volatile, offering multiple chances to try to take advantage of price movements.

The speculation of the Crimean War period was done with spot commodities; traders would buy low with hopes to sell high. This spot speculation was soon largely replaced with speculation in futures contracts. Following the creation of a set of standardized grades in 1856, traders began making and exchanging contracts to buy or sell a particular grade at some future point. The use of standardized grades and soon thereafter standardized contracts allowed futures trading to happen *en masse*. This system of futures trading required far less capital and thus enabled a larger amount of speculation. The Civil War provided—as the Crimean War had before it—a large supply of external jolts that resulted in sudden price movements (Taylor 1917). Battles represented not only advances and setbacks in the war, but opportunities to make large sums of money. The famous warehouse owner P.D. Armour, for example, made some \$2 million after selling pork short in anticipation of the peace at Appomattox—a peace which sent the price of pork tumbling from \$40 to \$28 a barrel (Markham 2002: 269).

In the spot trade as well, the Board's reach continued to grow throughout the Civil

War. Chicago took on extra rail traffic as southern routes became inaccessible. Between 1859 and 1866, the quantity of grain handled in the city more than tripled (Kendall 1956). Nine new grain warehouses, providing seven million bushels of space were built in the first half of the 1860s (Lee 1938: 109). CBOT also gained new, expansive legal powers when, in March 1859, the state of Illinois granted them a special charter bestowing the ability to appoint weighers, inspectors, and measurers whose judgments would be binding upon both buyer and seller, as well as quasi-judicial powers to decide cases of arbitration, issue subpoenas, and administer oaths (Lurie 1979). Between 1859 and 1863, the Board's membership rolls had swelled from 520 to 980 (CBOT, *Annual reports*). By the end of the war, the Board was established as a central player in worldwide agricultural trade.

#### Illinois's regulation of the grain trade

Following the war, dropping prices and high demand for agricultural commodities created an environment ripe for corners. CBOT suffered a large corner in wheat in 1866 and, two years later, saw three corners on wheat, two on corn, one on oats, and one attempted on rye (Cronon 1991). On top of these disruptions to the market, elevators and railroads were cementing collusive agreements that limited competition and consumer choice. These injustices, foregrounded through the agitation of Illinois's strong agrarian bloc, led to the state's regulation of the grain trade. Through the Illinois Constitution of 1870 and the Warehouse Act of 1871 the state assumed authority to regulate railroads and warehouses. As part of this regulation, it also created the Illinois State Railroad and Warehouse Commission (RWC). A central duty of this commission was the inspection,



grading, and issuance of receipts for all grain changing hands in the Chicago market, tasks which had previously been handled by the Board itself. This involved the state to an unprecedented degree at a very early point in the history of the derivative market.<sup>2</sup> CBOT's relation with the state was to color the development of their market over the next forty years.

By the time of the RWC's founding in 1871, Chicago's rapid rise from "frontier town" to "world's greatest market" (*Chicago Daily Journal*, April 22, 1919) was almost complete. Not even October's Great Fire slowed the commercial progress of the city. Though a number of other Midwestern cities (e.g., Duluth, Minneapolis, Kansas City, St. Louis) formed boards of trade that competed for grain forwarding business, no other primary market received even half as much grain as Chicago in any year between 1860 and 1890 (Goldstein 1928; Lee 1938). By 1880, elevator storage space had grown to over 19 million bushels (Lee 1938), and Chicago exported 153 million bushels of wheat, a new record high (Shannon 1945). Chicago was the clear center of the grain trade in the country, a position they held throughout the period studied in this dissertation.

#### NOCE: Impact of the Civil War on the New Orleans cotton trade

The commercial history of New Orleans was quite different than that of Chicago. In the pre-railroad era New Orleans's geographical position made them a natural cotton

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<sup>2</sup> This was the first instance in the country of a state assuming responsibility for grading commodities. After the RWC's constitutional authority was established in the 1876 U.S. Supreme Court case *Munn v. Illinois* several other states, including as Minnesota, Kansas and Missouri, established similar grading authorities.

market. The city stood at the mouth of the Mississippi and within close range of the lands where the majority of American cotton was grown. New Orleans was the central port for cotton, the primary export crop of the US (Rothstein 1966). In the six crop years prior to the Civil War, New Orleans merchants sold, on average, just over 47% of all the country's cotton (Bouilly 1976). As cotton accounted for over half of all American exports, this made New Orleans the commercial center of the South, and cotton the leading source of business.

The central figure in the marketing of the cotton crop during this period was the **factor**, an all-purpose commission merchant who connected the otherwise disparate groups of planters, financial interests, shipping companies, and merchants (Stone 1915). Factors were the sole link between planters in the country and all city, northern and international interests. For this reason, as compared to commission merchants in Chicago, the factor's work had a far broader scope. Factors were closely intertwined with planters' every economic action. They would lend money to planters at the start of the season, and advance them up to two-thirds or three-fourths of the market value of the produce consigned to them after the harvest (Jones 1937). They acted with great latitude to market the cotton consigned to them, based on their superior knowledge of the market and the close, trusting relationships established with clients (Woodman 1963). In fact, Stone (1915) states that relations between factors and their clients "were of the most intimate and confidential character, as close probably as was ever the case between business associates;" their associations "frequently were life-long" (Stone 1915: 559). This is not to say that factors did not exact a sizeable toll for their services. Planters were forced to

buy supplies for the farm and the homestead through factors, at greatly inflated prices, which amounted to an effective interest charge of from 40 to 110% (Shannon 1945). If the total receipts of a farmer's crop was not enough to wipe out his indebtedness for the year, his obligation to the merchant rolled over into the next year (Hammond 1897). This effectively created a system of debt peonage for many small farmers, giving Stone's previous comment about "life-long" relations a far dimmer interpretation.

But after years of prosperity, the New Orleans cotton market entered into a protracted decline, beginning in the mid-1850s and lasting for twenty years. The advance of the railroad turned New Orleans's geographic position from an asset into a liability. Railroads offered planters an attractive alternative to sending their goods down the river. This was especially true as rates dropped and improvements in cotton presses at interior towns made it possible to pack over twice as much cotton into the same car space (Hammond 1897; Shannon 1945). Once cotton arrived at the east coast, the ports of New York, Charleston, and Savannah offered better facilities and lower prices than New Orleans (Caldwell 1980). From 1860 to 1870, the number of bales shipped eastward by rail grew from 109,000 bales to 381,000. Between 1868-1871, New Orleans merchants sold an average of only 37% of the total crop, down from the ante-bellum figure of 47% (Bouilly 1976). The Civil War also led to a significant loss of business. Crop returns were remarkably low during the war years. In 1861, the South's cotton crop totaled 4 million bales; in the years 1862-1865, the combined total did not reach 3 million (Shannon 1945). Of the little cotton that was produced, even less brought money to the South. Many bales went to waste for lack of adequate storage, were thrown up on the lines of fortifications

to impede cannon balls, or were burned by the Confederates to prevent capture by the Union (Shannon 1945). Once New Orleans was occupied, northern merchants assumed control of large quantities of cotton, either through outright theft or by trading with Southern businessmen who preferred the relative security of Northern greenbacks to their almost worthless Confederate dollars (Shannon 1945).

This decline in business spelled the end of the factorage system that had reigned prior to the war. Concentrating multiple functions in the single person of the factor created an inefficient system that required large margins to cover the extensive risk being born by the factor. In times of flush production, the inefficiencies of the system caused little concern, but this period of sustained decline put increased pressure on the system. Buyers began to bypass factors, using new communication facilities to strike deals with planters in the interior directly, and shipping the cotton on through bills of lading that seamlessly moved goods across varieties of transport (Ellis 1973; Woodman 1963). Store merchants in the interior went from being adjuncts of seaport factors to being key players in the marketing of cotton in their own right (Woodman 1963). Each of the major functions of the factor—salesman, buyer and supplier of credit—was gradually being replaced by other, more efficient agencies (Woodman 1963).

#### Founding & development of the NOCE

In 1871, in the midst of this decline and transformation of the cotton trade, the New Orleans Cotton Exchange was founded. The organization was proposed in January

by thirty-six local cotton firms. Within two weeks it had over 100 members and by September had secured a charter from the state (Boyle 1934). Unlike CBOT, there was sustained interest and membership in the Exchange from the start, and a year after its founding the Exchange's had more than doubled to 225 regular members. The formal organization of the Exchange was quite similar to that found on CBOT. Government was vested in a board of directors, subject to a charter, constitution, by-laws and rules; standing and special committees were formed, dedicated to issues such as Information & Statistics, Membership, Arbitration and Appeals, Futures, Supervision, Deliveries and Finance; the membership committee and Board of Directors were given disciplinary power, and Arbitration and Appeals committees settled commercial disputes.

NOCE was a stable organization. Antebellum trade in New Orleans had been organized through elites; following the war, the occupations of the elites changed, but the reliance on tight-knit networks did not. There were several instances of well-entrenched families whose influence in the Exchange spanned decades. The Glenny family is particularly telling. J.E. Glenny served for three years on the committee on classification and quotations, twice as chair; I.E. Glenny served for four years on the board of directors, and multiple committees, including one chairmanship; E.J. Glenny served practically every year from 1898 to 1915 on the board of directors, including two stints apiece as president and vice-president; and J.W. Glenny served twice on the arbitration committee. During the period of my research, the office of NOCE president was held by three different father-son pairs – R.M. Walmsley and S.P. Walmsley; Andrew Stewart and W.P. Stewart; and John F. Clark and Russell Clark (Boyle 1934).

NOCE was founded one year after the creation of the New York Cotton Exchange; both New York and New Orleans followed the Liverpool Cotton Brokers' Association, which had formed in 1841.<sup>3</sup> Together, these three exchanges dominated the global cotton trade. New York and Liverpool were large and had sizeable speculative markets; New Orleans was third in size and remained more involved in the spot trade, at first (Bouilly 1976: 39). In New York, especially, spot trading was quite low by the time the Cotton Exchange was founded. The New York exchange was developed not to build up the trade in commodities, but to standardize futures contracts, and promote futures trading, fact which kept NOCE members wary (Bouilly 1976). While NOCE did what it could to promote business across the exchanges, adopting similar rules and working to align their classifications and practices, it remained suspicious of the other markets.

While members saw the revival of the spot trade as the primary objective of the Exchange, this did not mean that traders in New Orleans were unfamiliar with, or unamenable to, futures trading. Traders had sold commodities "to arrive" in antebellum times, and during the war futures contracts were used to keep a steady supply of cotton to Southern mills. In fact, NOCE, upon its founding in 1871, featured futures trading. But it remained quite rare at this time. Using the large, established futures market in New York was more appealing to traders than building their own in New Orleans. In the first month of trading on the Exchange, there were only three transactions in futures. From this inauspicious beginning, the trade managed to shrink even further, with only a smattering of futures trades in the Exchange's first three years. Between 1873 and 1879 no futures

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<sup>3</sup> This group spawned the Liverpool Cotton Exchange in 1888.

transactions took place on the Exchange (Ellis 1973).

NOCE finally established its own futures market in 1879, once it became clear that futures were becoming a central feature of the global agricultural marketplace, which NOCE did not want to cede entirely (Bouilly 1976). Once established, futures trading found fertile soil. While the volume of futures never matched that seen in Liverpool or New York, New Orleans maintained a sizeable volume that attracted orders from clients around the world. The city's spot trade also leveled off at this time, stemming the decline of the previous years. While spot sales had plateaued at a level approximately 20% below their high-water mark of the 1850s, they remained steady throughout the remainder of the 19<sup>th</sup> century (Bouilly 1976). New Orleans, though less dominant than before the war, remained important to world trade as a viable market for futures and the largest cotton port in the United States.

#### Federal regulation of commodity exchanges

The period of time covered in this dissertation spans from the introduction of futures on CBOT to the beginnings of federal regulation of the futures market.<sup>4</sup> Up until 1916, futures trading took place on CBOT and NOCE free from constraints at either the

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<sup>4</sup> The federal government's one brief foray into this arena during the period of my research, the Anti-Gold Futures Act, was a disaster. Passed in the midst of the Civil War, it was designed to suppress speculation in gold in order to build up the value of Union-issued greenback currency. Its effect was the exact opposite. The price of gold shot up more than 50% in two weeks and Congress quickly repealed the act. Following this, another piece of legislation regulating the futures trade was not passed for fifty years.

state or the federal level.<sup>5</sup> Though, this lack of regulation was not for lack of trying. An 1874 bill in the Illinois legislature sought to limit speculation by prohibiting the sale of grain that was not owned by the trader. In 1883, the state appointed a special House committee to investigate the Board's practices; the committee issued a scathing report urging the suppression of futures trading. The Louisiana legislature, in 1888, debated a bill aiming to affix a prohibitively large tax to speculative trades in futures. The federal government was also busy with proposed legislation. Between 1880 and 1920 some 200 bills were introduced in Congress to regulate futures and options trading; the 60<sup>th</sup> Congress (1907-1909) alone, introduced 25 bills designed to prohibit futures trading (Markham 1987). While the vast majority never made it out of committee, some were able to do so and a few, in fact, came close to passing: the Hatch Bill in 1892 and Scott Bill in 1910 both required significant lobbying from the exchanges to be defeated.

The first pieces of legislation providing for federal regulation of the commodity trade were the Cotton Futures Act and Grain Standards Act, both found in the same bill from 1916.<sup>6</sup> These first acts were tentative. The federal government mirrored the steps taken by individual states, regulating commodities (whether traded on spot or futures markets) rather than the futures markets themselves. Both acts established, and mandated the use of, federal grading standards for cotton and grain (Markham 1987). But the Cotton Futures Act did dip a toe into regulation of the futures market. It mandated a

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<sup>5</sup> While Illinois did oversee the grading of commodities via the RWC, it did not directly regulate futures trading or speculation in any way.

<sup>6</sup> The 1916 version of the Cotton Futures Act was a second version of a bill Congress had passed two years earlier. The prior act was ruled unconstitutional on a technicality shortly after becoming a law: the bill had originated in the Senate, when, as a revenue measure, it should have been drafted in the House.



single method for setting premiums and discounts on future delivery and required separate grade certificates for each bale delivered on contract rather than one for the lot (Garside 1935). While mild in their effect, these laws established the federal government's involvement in commodity exchanges.

While not regulatory in nature, the federal government did temporarily disrupt the workings of the futures market in wheat following the entry of the United States into World War I. In an effort to provision the Allied forces, the Food and Fuel Control Act of August 1917 gave the federal government the power to set the price of wheat by fiat. The Wheat Price Guarantee Act, passed in February 1919, extended the President's authority to regulate speculation and other practices on exchanges. Under these extraordinary circumstances, CBOT had little choice but to suspend their wheat from August 1917 to July 1920 (Markham 1987). Though not regulation, this interference from the state clearly makes these years unsuitable for a comparison.

Finally, following World War I, the federal government firmly established oversight over the futures trade with the passage of the Grain Futures Act of 1922.<sup>7</sup> The law required exchanges to act to prevent price manipulation and the dissemination of false and misleading crop or market information. It forced exchanges to maintain records of their transactions, which were made open to the Department of Justice and Department

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<sup>7</sup> The Grain Futures Act, like the Cotton Futures Act before it, had two iterations. It was first passed in December 1921, and was soon thereafter found unconstitutional by the U.S. Supreme Court. After this rejection by the courts, Congress quickly went back to drafting a new law. Ironically, in order to craft a bill that would not run afoul of the Court's logic, the new bill had to make stronger claims about futures trading than the original, including that it damaged the national public interest and often caused obstructions in interstate commerce.

of Agriculture. The law also caused the establishment of the Grain Futures Administration, a predecessor to the present-day Commodity Futures Trading Commission. This administration was tasked with holding exchanges to these rules. To ensure compliance with the law, they had the ability to impose a prohibitive tax of 20 cents per bushel on contracts executed on exchanges that failed to meet these requirements (Markham 1987). This fully established the federal government's regulatory role in relation to commodity futures markets, a role it has continued playing to this day.

In sum, between 1916 and 1922 the federal government significantly reshaped the operation of both spot and future markets in wheat and cotton, putting an end to the period of decentralized, private and state-level regulation. But in the sixty years prior to 1916, futures markets developed in an open environment of experimentation and local regulation. This dissertation traces CBOT and NOCE through their development and institutionalization during this period. The unique paths taken on these exchanges exemplify the variety of meanings and practices attached to futures trading at this formative time. They illustrate how futures markets grew out of, and in interaction with, extant spot markets in agricultural commodities. To understand futures markets, this dissertation argues, we must consider their myriad points of connection with these underlying spot markets.

Case selection

CBOT and NOCE both developed futures markets in the sixty years prior to federal regulation. But they were not alone in doing so. Grain futures were traded on boards of trade in New York, St. Louis, Minneapolis, and Duluth; cotton futures were traded in New York and Liverpool. So why choose CBOT and NOCE for study? Answering this question requires considering this dissertation's dual analytic goals, as described in the Introduction. The primary goal of my analysis is to reveal through an *empirical* argument how material and social factors *directly* impacted the creation of information infrastructures linking spot and futures markets. Thus, the first task of this section is to discuss what features of these markets make them useful cases with which to investigate this topic. The secondary analytic goal of the dissertation is to examine how these divergent infrastructures established unique conditions of possibility that *indirectly* impacted behavior on these markets. This is necessarily a *theoretical* argument. The second task of this section, then, is two-fold: first, to establish how these cases serve as illustrations of this theoretical argument; second, to parse the relation between this indirect cause of behavior and traditional, direct causes.

### Empirical analysis

Since the object of my empirical analysis is the infrastructural linkage created between spot and derivative markets, it is useful for my two cases to have spot markets whose histories differ up to the point of initiating the futures trade. As shown in the above history, NOCE and CBOT meet this requirement. CBOT developed out of the need

to control the Chicago spot market's rapid, technologically-fueled growth. The Board attempted to balance the interests of several powerful market actors—including railroads, elevators, and merchants—as they jockeyed for advantage in the young market. NOCE, by contrast, developed out of a more stable and established spot cotton trade in New Orleans. NOCE was formed, not to control the market, but to rebuild it after the setbacks of the Civil War. When the time came to build futures markets on these exchanges, their distinct histories with and relations to the spot market would likely push them to privilege different aspects of trade, support different groups, and develop different understandings of the economy, all of which would be reflected in their market infrastructures. These cases thus offer a chance to explore how distinct spot market backgrounds influence the creation of derivative markets and their constitutive, infrastructural linkages to the underlying spot market.

These cases are also useful because they feature markets built upon different underlying spot commodities. This difference creates space between the cases that allows for a more thorough analysis of the social and material influences on the infrastructure that emerges. If the underlying markets dealt in the same commodity both would likely implement quite similar infrastructures, since they would be dealing with the same material features of production, transportation, storage and manufacture. Additionally, we would expect to see a process of isomorphism among such markets whereby their infrastructures would converge into a single model. In the course of doing business, the exchanges would adopt the same sets of classifications, use the same statistics on the crop, and even develop similar ways of theorizing the market through exposure to shared

sources of information, such as those presented at national conferences. Having markets with distinct commodities at their bases therefore allows for their infrastructures to evolve along separate paths, enabling a clearer analysis.

A final worthwhile feature of these cases is the differing role of the state in the construction and enactment of their infrastructures. NOCE developed their infrastructure free from any direct state interference. CBOT, in contrast, was forced early on to cooperate with the state via the RWC. Through this agency, the state established control over an important component of the market infrastructure, the system for grading and creating receipts for spot wheat. This distinction provides an opportunity to explore the origins and challenges of state involvement in the construction of market infrastructures. How did the state's involvement affect the quality of infrastructure created? Did state involvement in this one area of infrastructure impact the form and operation of other areas? How did infrastructure become a source of power for the state? These questions are critical for understanding efforts at state regulation of financial markets from an infrastructural perspective.

### Theoretical analysis

The secondary goal of my analysis is to understand how infrastructure affected behavior on these markets. Here, NOCE and CBOT are useful cases because they exhibited a striking difference in behavior—a long-term divergence in price volatility (see Figures 1 and 2, p. 7 in introduction)—which I use as a focal point for my theoretical

argument. I argue that it is possible to trace this difference in volatility back to the distinct infrastructures on each market. But this claim is limited in its scope. I claim not that infrastructure *directly* caused market volatility, but rather that it created an environment that made volatility-producing behaviors, such as heavy speculation and running corners, more plausible and rational on CBOT, and less so on NOCE.

This is necessarily a theoretical claim. I argue that infrastructure acted as a “limiting cause” of volatility, a factor that sets the conditions of possibility, or establishes a range of possible outcomes, within which certain events actually occur (Wright, Levine & Sober 1992). Limiting causes are contrasted with “selective causes,” the familiar causes of economic sociological analysis, such as network geometry, institutional environment, status distinction, culture, and more. There were undoubtedly several selective causes of volatility, discussed below, at work in my cases, including network position, institutional environment, and market culture. One could assume that until the influence of these factors are definitively disproven, any analysis that proffers another possible cause (e.g., infrastructure) is worth little—it simply adds one more hypothesis to the bunch. But I argue that this is not the case. The presence of selective causes, such as differences in networks, institutions and culture, does not invalidate a study of limiting causes; these causes are complementary, not exclusive.

Still, in order to place my own infrastructural analysis in context, it is necessary to briefly review the major economic and social structural factors that might have been selective causes of price volatility on these markets. I discuss four: (1) predictability of supply; (2) network structure; (3) institutional environment; and (4) culture. I do not

discount that these features might have impacted volatility. I do, however, offer evidence that suggests their impact in these cases was likely smaller, and more mixed, than theory might at first lead us to believe. My goal in presenting this contrary evidence is to suggest that these factors do not inevitably, entirely account for the difference in volatility seen on these markets.<sup>8</sup>

#### Possible selective causes of volatility

One partial source of the volatility on these markets was simply a difference in the consistency of supply. Central here is the fact that wheat rots far more easily than cotton. Wheat was therefore more likely to go bad while in storage or in transit. The sudden drops in supply that would accompany this spoilage would cause prices to spike. This suggests that the greater volatility in the price of wheat was, in part, a function of its particular physical qualities.

But it seems unlikely that this mechanism could account for the market's persistently higher volatility over fifty years. Instances of mass spoilage were rare. Taylor's (1917) history of the Chicago Board, which includes detailed yearly accounts of

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<sup>8</sup> The inability to precisely pin down the sources of volatility on these markets is partly due to a mismatch of scale between the phenomenon and the data. Volatility occurs on a micro time scale—it depends on judgments occurring from minute to minute, or second to second. This is why ethnography is so well suited to studies of market decision-making (e.g., Beunza, Hardie & MacKenzie 2006; Beunza & Stark 2005; Smith 2011; Zaloom 2006). Historical documents capture a longer time frame, and so miss many of the immediate causes of volatility. But what historical data *do* capture well are differences in infrastructure that set the conditions within which these micro-level phenomena occur.

the markets for several commodities, only notes six years with significant instances of heating, four of which were for stocks of corn, not wheat.<sup>9</sup> He makes only one mention of spoilage in stored wheat, which occurred in 1870—unfortunate timing for warehousemen who were just then facing scrutiny from Illinois’s Constitutional convention. In addition to its infrequency, the revelation of spoilage, at least as a statement of supply used in rational calculations, would be reflected in prices fairly quickly, preventing long-term, multi-month effects. Though, if we were to imagine that instances of spoilage had broader effects—say, as rumors about further spoilage continued to circulate—volatility might last longer, as speculators wagered over the extent of the damage. But, though the evidence does show instances of uncertainty over the status of the crop, the infrequency of these moments tends to make any long-term effect less plausible.

A second influence on volatility might have been the network structures of the two exchanges. Trade networks in New Orleans were more tightly-knit than in Chicago. As discussed above, many NOCE leadership positions were filled by a rotating cast of prominent members. These small, elite-driven trading networks were a legacy of the factorage system, which had severely limited the number of middlemen in the cotton trade. We can assume that volatility within such a market might have been dampened by a number of different forces, including more rigidly enforced social norms against excessive speculation or market manipulation, the individual need to repeatedly trade with the same people, and personal friendships (Biggart 2001; Burt 1992; Rauch &

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<sup>9</sup> These mentions were found by searching the PDF file for the terms “spoilage,” “heating,” and “rotten,” along with their alternates, e.g., spoil, spoiled, spoiling, etc.



Casella 2001; Sabel 1992). CBOT, by contrast, developed out of a far more specialized and differentiated marketing system. This social distance between traders could have weakened the norms of behavior on CBOT, allowing opportunistic and manipulative behavior to become more prominent. In fact, CBOT did have some trouble getting members to follow the rules, as discussed more extensively below.

However, there is also evidence that these dense network connections did not always serve to keep markets orderly and stable. Dense networks can breed rivalry as well as trust (Dalton 1959), and in 1825, 1839 and 1842, years when the elite-based factorage system was at its peak, New Orleans saw large corners in the spot market for cotton (Bouilly 1976).<sup>10</sup> The first of these left many of the largest firms in the world insolvent and disrupted trading for months after. For fourteen weeks after the corner, the New Orleans *Price Current* magazine posted no prices because there was simply no trading to report, stating that “cotton at present is in as little demand as if there never had been such an article in the market” (cited in Boyle 1934: 24). The presence of these speculative manipulations on the antebellum New Orleans market casts doubt on the notion that the Exchange’s close ties would have necessarily lowered volatility.

Another network-related influence on volatility might have been the size of the markets. It is probable that the group of traders in the wheat pit at CBOT was larger than its counterpart at NOCE. Unfortunately, the size of these groups is difficult to discern. Records list the number of overall members in each exchange, not the number of traders

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<sup>10</sup> This is especially noteworthy because this took place in the spot market, which requires far more capital to corner than does the futures market (Bouilly 1976). This suggests that traders, in fact, were willing to expend a great effort to fleece associates in their tightly-knit network.

in the pits. In terms of overall numbers, CBOT's membership during the majority of the period under study hovered around 1,800, while NOCE averaged about 400, making the Board four and a half times larger; but, of course CBOT hosted large markets in multiple commodities (including the biggest corn market in the world), while NOCE hosted only one market in cotton. Thus it is difficult to compare the number of traders who populated the two pits. This difficulty is compounded by the fact that some traders engaged with multiple commodities, while others specialized in one.

But if the CBOT wheat pits were larger, this might have been a selective cause of volatility. Large size has been shown to promote distinct cliques of traders, which impedes the flow of information and thus increases volatility (Baker 1984; Carruthers 1996). Without data on the number of traders occupying each market, however, it is impossible to even speculate as to whether in these cases size had any effect on volatility.

Another possible influence on volatility might have been the institutional settings, understood as the governance structures and rules, both official and unofficial, of the exchanges. For the most part, though, CBOT and NOCE were quite similar institutionally. Both were state chartered organizations which set and enforced their own rules. Individuals bought a membership in each, and new applications were screened by a standing committee and put to a vote. Both organizations had similar rules regarding the types of trades that were allowed (e.g., futures trades of all kinds, as well as corners) and those that were not allowed (e.g., trades executed outside of exchange hours or off the trading floor and trading in options). One distinction, however, was that CBOT was less willing to hand down harsh punishments for engaging in prohibited trades. This

reluctance might have lowered the cost of—and increased the presence of—volatility-inducing behavior on their exchange (Abolafia 1996; Greif 1989; Williamson 1981). But, in fact, in the specific case of CBOT, this effect would likely be negligible, since the prohibited trades had countervailing affects on market volatility: trading away from the floor and at off hours tended to increase volatility, while trading options dampened it. Thus, the laxity of rules did not uniformly make CBOT more volatile.

A final influence on volatility might have been differences in cultural beliefs about how a trader should make money, or how commodity markets should operate. On this topic, there is some evidence to suggest that Chicago simply had a more permissive attitude to speculation than New Orleans—after all, the city itself was born in a speculative boom. Big-time speculators such as Benjamin P. Hutchinson—“Old Hutch,” as he was known—were mythologized in popular newspaper accounts. As Chicago gained a reputation as wild market, traders with a taste for speculation were drawn to it, creating a feedback cycle (Ferris 1988; Markham 2002). At the same time, in New Orleans, many old-guard factors decried speculation as creating a “spirit of gambling” (*New Orleans Daily Picayune*, Dec. 27, 1879). The ethos of NOCE in its early years was focused largely on the revival of the Southern spot trade in the aftermath of the Civil War, not on speculative trading (Ellis 1973). This difference in the legitimacy of speculation as a commercial activity could certainly have created a more volatile market on CBOT (cf., deGoede 2005; Fabian 1990). Yet, to say that speculation was absent or generally discouraged in New Orleans is mistaken. As noted above, the antebellum cotton market was “replete with speculative attempts to manipulate the price or corner the spot

market” (Bouilly 1976: 13). Additionally, NOCE members defended speculation using the same language of increased efficiency and risk management as did members of CBOT. Traders in both cities embraced and defended speculation and **short selling** in their quest to make a profit.

These possibilities thus remain neither proven nor disproven. While countervailing evidence and alternative explanations suggest that their influence might have been small, or mixed, the impact of differences in supply, networks, institutions and culture has by no means been disproved. Because of this I cannot argue that the divergence in volatility on these markets was caused by a difference in infrastructure and nothing else. It is, in fact, difficult to imagine two cases where all selective causes are controlled for, leaving only the influence of infrastructure present.

This inability to definitively pronounce on the relation of infrastructure to volatility may appear to be a weakness. But a symmetrical weakness exists in traditional economic and sociological analyses, which ignore market infrastructures. Both economic and sociological approaches to volatility invoke an ideal version of “the market” in their analyses (cf. Krippner’s (2001) critique of “embeddedness”). Neoclassical economists use this idealized form as is, combined with reductive assumptions about individual behavior. Institutional economists and sociologists embed this ideal of a market in myriad social relations, which they then understand to shape actors’ behaviors. Yet neither approach recognizes that markets are complex, socio-technical settings, which require extensive infrastructure to function, nor that these infrastructures themselves underlie and shape market behavior. For instance, Abolafia (1996) fails to control for the underlying

assets (futures, stocks, and bonds) in his study. The assumption he makes is that any difference in the instrument being traded and its connection to an underlying asset is of no consequence to market behavior. Baker (1984), though he studies only stock options, glides past the fact that different classes of options were traded in each of the networks he studies. There is no thought that differences at the infrastructural level (e.g., that the classes are composed of differing numbers of options) might impact volatility at all. These analyses look to social factors *within* the market, but fail to analyze the infrastructural features at their base. Thus they give only a partial explanation of market phenomena.

Infrastructures must be incorporated into sociological analyses of markets. Infrastructure is an imminently social object, shaped by competing interests and attachments. It is a battleground upon which social actors create frameworks that set fundamental limits to action. The fact that these social influences tend to disappear into the technical functionality of a complex system over time is all the more reason to bring them to light. But the general lack of work on the subject means that any such research must first address the issues of infrastructures' boundaries and characteristics, as well as how best to integrate it into our studies of markets. These are the topics of the next chapter.

## Chapter Two – Information and Infrastructure

In many popular and even academic perspectives on markets, information is held to be a—or the—critical feature. Traders gather, withhold, share, and act on information; information is good or bad, truthful or misleading; it both gives context to and is conveyed in prices; it enables judgments of the future and actions in the present. In this chapter, I examine how exactly information as a feature of markets has been conceptualized in sociological or sociologically-informed accounts. The goal is to discover which features of information can be drawn from these diverse perspectives and to consider how to integrate these elements into a single conceptual framework.

I highlight three broad perspectives on information within markets. The first approach, taken by information economists and some sociological network theorists, focuses on the movement of information through markets and among economic actors. By highlighting the unequal dissemination of economic information, and thus, the unequal distribution of economic resources, these scholars draw a sharp contrast with the information-related postulates of neoclassical economics. The second approach discussed notes that, in addition to receiving information through network channels, actors must be able to interpret and use this information in their everyday environments. The processes of meaning-making, judgment, and calculation this entails are not simple, nor are they individualistic; significant institutional and material means are put to work in the service of these ends. The final approach conceives of information as a product of socio-material construction. It focuses on the systems by which the information at the heart of the

market is created, the power relations inscribed therein, and the qualities it takes on as a result of its origins.

I bring together these three approaches through a discussion of “information infrastructures”—the institutional, material, and cultural means by which information is created, disseminated, and interpreted. This broad perspective enables us to consider all three of the areas highlighted above, while additionally analyzing the character of information on markets and the uses to which it can be put. According to the nature of the infrastructure involved, information may take on wholly different properties, constructing vastly different market information environments. This is seen in the cases in my dissertation, where the distinct infrastructures in place on CBOT and NOCE created information environments that promoted very different types of trading on the futures markets. The conceptual framework of “information infrastructure” thus seeks to encompass the established literature on how market devices and institutions impose a relation to information and also to determine how market infrastructures give particular *qualities* to information, and how these qualities come to matter in market situations.

#### Disseminating information in markets

Some of the earliest work on information in markets was concerned with its dissemination. Neoclassical economics centrally features postulates regarding the movement of information within and across markets: all available information was held to be reflected in prices; information was understood to move costlessly through the

market and be held in common by all participants (Fama 1970). In response to the proliferation of quantitative models based on these neoclassical assumptions, mid-century economists sought to more carefully study the flow of information in markets. Hayek's (1945) early efforts did little more than more explicitly draw out the mechanisms assumed by neoclassical economics. Hayek claimed that the price mechanism in a free market could efficiently disseminate local knowledge to distant parties, a feat that could not be accomplished through central planning. Though each actor has only a limited view of the economy, the whole is efficiently coordinated by the price mechanism—to Hayek, this is the “marvel of the market.”

Subsequent economists, however, have questioned just how marvelously markets actually do distribute information. They note that market transactions are often marked by asymmetric knowledge and a strong incentive *not* to reveal information to others, due either to the nature of the transaction (e.g., buying a used car, Akerlof 1970) or to the costs associated with gathering information (Stigler 1961). Under such conditions, price ceases to be an effective conveyor of information, and market order collapses. Further work among economists developed a distinct perspective that treated information as a scarce good, the acquisition of which involved a cost—information became a commodity, similar in many ways to any other commodity. The dissemination of information throughout a market then itself became an economic problem, and unequal distributions were understood as the outcome of market imbalances.

The work of information economists formed a baseline from which to consider the uneven distribution of information within markets. Sociologists built on these initial



economic analyses through a number of network-based studies. One style of network analysis studies the differential patterning and movement of information within networks. The size and density of networks are critical in this regard: information moves more uniformly through small networks, while in larger networks it breaks up among cliques (Baker 1994); it travels quickly through dense networks, but becomes more varied and useful in sparse networks (Granovetter 1973, 1974, 1985; Mizruchi & Stearns 2001; Uzzi 1997). Another type of network analysis focuses on the distribution of control over information based on an actor's network position. Being in a position to control information or broker the connection of two groups—a “structural hole” (Burt 1992) or *tertius gaudens* (Simmel 1950)—makes an actor powerful within a market. Thus, the small handful of executives that serve on the boards of multiple companies exert significant influence thanks to their ability to connect otherwise distinct parties (Mizruchi 1996; Palmer & Barber 2001; Useem 1984). Similarly, in the realm of politics, Padgett & Ansell (1993) show that the Medici's power in pre-Renaissance Florence came from spanning network disjunctures within the elite. This geometric approach to understanding network dynamics suggests that two actors who occupy similar positions within a network are “structurally equivalent” and will have roughly equivalent amounts of power in those networks (White, Boorman & Breiger 1974; Lorraine & White 1971).

This work demonstrates decisively that information travels uneven and unequal paths through the market. However, this approach fails to consider what happens once actors get ahold of this information. Implicit in this lack of attention is the idea that information is a self-evident signal, which must only be received to be understood; the

processes of interpretation and cognition remain unstudied, and tacitly understood to be individualistic cognitive acts rather than social ones. As such, this work still relies on a model of action that presupposes a rational actor involved in individual calculation. The second approach to information in markets, discussed below, critiques these assumptions, showing that information, in fact, requires a multi-faceted social setting to become meaningful. The approach thus moves beyond a focus simply on the socially patterned movement of information to scrutinize processes of judgment, meaning-making and calculation as social acts.

#### Interpretation & calculation

The theoretical ground for the critique of the information economics and network sociology perspective is the uncertainty of economic action. Even if we accept the notions—explicitly stated within information economics and implicit in network geometry approaches—that individuals will act in rational, calculative pursuit of their goals whenever possible, there are a number of environments in which this is impossible. In an uncertain environment, rational calculation is impossible because there is no way to meaningfully assess the probability of future events, whether because the causes are too numerous, too unpredictable, or too interdependent (Knight 1921). In an important sense, this is a problem of information. If we assume uncertainty, it is impossible for even the most rational economic actor to individually interpret and calculate from information. Under such circumstances, economic actors must create and rely on a multitude of social

and technical aides to narrow the possible interpretations, calculations, and actions that actors may take in an economic setting. These include “social devices” (Beckert 1996) that narrow the range of possible actions, “judgment devices” (Karpik 2010) that legitimate and validate information, and “calculative tools” (Callon 1998a) that routinize and constrain the practices of calculation. In all of these perspectives, we see that interpreting the economic environment and engaging in economic action is not an individual task, but an irreducibly social one.

Institutions and culture constitute economic actors’ cognitive experiences of the market. Institutions fundamentally construct understandings of the economic environment (DiMaggio 1994) and establish the framework of “the market” such that individual actors can then engage in creative activity (Beckert 2009; Krippner 2001). Institutions provide schemas, classifications, scripts, and routines that structure interpretation and cognition of market information (Powell & DiMaggio 1991). These interpretations of information often come to market actors readymade and determined by other economic actors. For instance, the shared cognitive schemas that provide a common frame for evaluating and interpreting events, behaviors, and actions are often constructed at the organizational field level (DiMaggio & Powell 1983; Powell & DiMaggio 1991). This is seen in the fact that CEOs drawn from different divisions within a firm view the same business environment in fundamentally different ways, interpreting the same evidence via different cognitive schemes (Fligstein 1990). These socially-constructed frameworks for interpretation are found also in other areas of the economy. For instance, in the world of art, the interpretation of market information is fundamentally shaped by

cultural beliefs about the value of art. Works of art are priced *not* according to the principles of supply and demand but according to gallery owners' roles as advocates for the artists they feature in their shows and the symbolic meaning of the prices they post (Velthuis 2003). In all cases, cultural meanings and institutionalized behaviors dialectically reinforce one another and mold social life into recognizable patterns (Zucker 1983).

Often, these broadly shared interpretations of the economy become embedded in economic theoretical models. These theories then expand in scope and taken-for-granted status, providing common guides for interpreting, and acting in, the market (Callon 1998a; MacKenzie, Muniesa & Siu 2007). These generally accepted ways of measuring and understanding the world can be considered components of an economic style of reasoning, a general perspective on how and why economic action occurs the way it does (Hacking 1992; Hirschman & Popp-Berman 2013). These are foundational, paradigmatic features of theoretical approaches to the economy. As such, they become deeply embedded in the ways of thinking within a given environment, and built into more elaborate theories as fundamental truths (Fleck 1979; Kuhn 1962). These act as calculative tools that push market actors to interpret and act upon information in similar ways (Callon 1998a). These elements also work their way more visibly into the calculative tools by which traders make sense of, and act in, the market, including sheets of stock option prices (MacKenzie 2006), tables of figures (Didier 2007), or the portfolio (Smith 2011), a process that can have performative effects on the market, as discussed at length later in this chapter.

Information also is made meaningful through the interpolation of “judgment devices” that flag differences in the qualities of products and the status of producers (Aspers & Beckert 2011; Karpik 2010). These provide mechanisms by which information is made credible, enabling actors to have faith that their information accurately represents the qualities of the commodities—or, at least, that most people will act as if it does. They include diverse features such as personal networks of close friends and associates that vouch for information’s accuracy, as well as a number of devices that give validity to third-party judgments, such as those from critics, guidebooks, the state, or independent certification boards (Karpik 2010). Judgment devices exist in a mutually supportive relationship with broad cultural understandings, and similarly work to eliminate uncertainty and promote coordination between market actors.

In addition to taking shape through the institutionalized intervention of actors outside an economic actor’s immediate circle, information is also interpreted *in situ*, by materially embedded actors on the market. Meaning-making is pragmatic and guided by the particular goals and capacities of the actors, as well as the affordances of the material environment. This pragmatic process is affected by a set of influences distinct from those impacting the creation and use of elements in the institutional environment.

One particular pragmatic challenge is that traders must constantly construct interpretations of unique and rapidly changing market situations. This involves creating frames that distinguish between those relations actors will take into account and those that will be thrown out of the calculation (Callon 1998b). These more specific, temporary framings of a market environment enable traders to spot particular profit-making

opportunities (Beunza & Garud 2007; Beunza, Hardie & MacKenzie 2006; Stark 2009). The construction of these frames is shaped by both social and material features of the environment. A company's organizational structure may come to play a significant role, in terms of how strictly they control how frames get made or used, and the flexibility of these frames in practice (Beunza, Hardie & MacKenzie 2006). Additionally, the physical layout of an office can encourage or discourage conflict between frames among different actors (Stark 2009). These frames are designed to be constantly revised and edited as they are "overflowed," as flexible, moment-to-moment calculative and interpretive tools.

Also, the material configurations of information displays have been shown to shape the methods of cognition and interpretation among economic actors. The stock ticker, for example, introduced a smooth temporal structure to the market, which enabled actors to make price variations objects of symbolic interpretation (Preda 2006). Prices written on white boards, rather than spoken between traders, made network and interpersonal relations forged on the floor of the exchange less critical than previously (Pardo-Guerra 2010). Screens function as "reflexive mechanisms of observation and projection" or "scopes" that project the reality of the market to traders (Knorr-Cetina 2003: 8). These enable traders to conceptualize the market in new ways, e.g., as intrinsically dynamic and processual (Knorr-Cetina & Grimpe 2008) or as autonomous from the individuals who comprise it (Zaloom 2004).

The connection between the macro-level institutional and micro-level pragmatic environments is revealed in the case of performativity. The theory of performativity argues that economic theories, thought only to describe the market as an external reality,

in fact craft actors and the economy as a whole so as to bring their actions more in line with the predictions of economic theory (MacKenzie 2007). But performativity is not simply a new version of the self-fulfilling prophecy, whereby economic agents collectively will into existence a new reality (Merton 1948). The efficacy of economic theory in a performative situation rather comes from its incorporation into material objects and processes “beyond human minds” (Callon 2007: 323; but see also Duhem 1996 [1894]); these range from calculative aids (MacKenzie & Millo 2003; Preda 2009) to market procedures (Garcia-Parpet 2007; Guala 2007). These objects come together in a mutually attuned assemblage of human actors, discursive elements, procedures, and technical devices—an *agencement*—that transports the theoretical perspective into a material realm (Callon 2007). Garcia-Parpet (2007), for example, documents how the physical layout and carefully controlled procedures established in the strawberry market in Fontaines-en-Sologne, France—ranging from the style of auction used to the rigorous physical separation of buyers and sellers—amounted to the “practical realization of the model of perfect competition” (Garcia-Parpet 2007: 20). The *agencement* serves as both the substance of the performance and the object that shapes economic behavior into the form proposed by economic theory. This is seen especially clearly when formulas move from one world to another. A formula may find the proper felicity conditions within the university, but when it moves to another field it may find that the sociotechnical arrangements that would have enabled it to survive in this new world are either not present or are difficult to put into place (Callon 2007).

The preceding research demonstrates that the processes of interpretation and calculation rely on a multitude of social factors. Institutions serve to provide an authoritative, yet general, orientation to information, which actors must then further interpret within meso-level organizational or market settings. The particular material tools with which they engage in cognition often serve to draw these two environments into close connection. Actors use “social devices” (Beckert 1996), “judgment devices” (Karpik 2010) and “calculation tools” (Callon 1998a) to make sense of and act upon information within economic environments.

But while this scholarship is a useful counter-position to the individualist cognitive approaches that analyzed only the movement, and not the interpretation, of information, this perspective fails to consider the socio-technical influences of the *construction* of information for the market. These approaches tend to think of information, prior to the social actions that enable interpretation and cognition, as under-determined and wholly without qualities. The final approach to information concerns itself with precisely the issue of information’s origins and pedigree. Scholars of sociology and science and technology studies analyze the processes by which information is constructed to discover the qualities that it brings to the market irrespective of the institutions, culture, and material tools within which it is embedded.

Construction



Central to this approach is to study information in relation to the infrastructures that support its creation, gathering, and dissemination. Infrastructure, a term drawn from science and technology studies, is defined as linked, interdependent, socio-technical systems—sets of standards and classifications, technological devices and protocols (Pardo-Guerra 2014)—that both support action locally and enable coordination globally (Bowker 1994; Star & Ruhleder 1996). Infrastructures tend to sink into other aspects of the environment, invisibly supporting mundane tasks and becoming visible only when they break down (Star & Ruhleder 1996). Infrastructures also are linked together through shared sets of standards, giving them scope over long distances and spans of time. They are able to undergird large-scale technical systems (Hughes 1987) by harmonizing multiple, independent technologies and communities of practice around a single, common standard (Barry 2001; Bijker, Hughes & Pinch 1987; Edwards, Bowker, Jackson & Williams 2009).

Economic sociologists are finding infrastructure to be a useful concept as they begin to conceptualize markets more as material objects (Pardo-Guerra 2014; Pinch & Swedberg 2008). The focus on infrastructure shows the socio-technical underpinnings of markets and offers another site for sociological analysis. Infrastructures are politically contested objects, the details of which affect the lives of the individuals who use them every day. Classifications and metrics discard information and elide distinctions that are critical to actors on the ground (Bowker & Star 1999; Cronon 1991; Espeland & Stevens 1998); they impose particular ways of seeing and governing that empowers certain groups while subjugating others (Foucault 1982; Lampland & Star 2009; Miller &

O'Leary 1987; Miller & Rose 1990). Processes favor the goals of some groups while hindering others (Barry 2001; Millerand & Bowker 2009). The actors most closely connected with the creation of classes, standards, calculations, or processes wield great power to define encounters, while those farthest away often find that their own practices fit poorly within the system provided (Barry 2001; Latour 1987; Star & Lampland 2009; Thevenot 1984). The mode of construction suffuses market information with power relations, circumscribing the modes of thinking and talking available to economic actors downstream as a result. Even prior to its dissemination or interpretation, then, information is the subject of a highly contested process of construction, which has significant effects on market action.

Infrastructural analyses have tended to focus on three discrete topics: (1) the creation of new objects and ways of understanding; (2) the creation of new market-related processes; (3) the creation of information to be communicated, interpreted and acted upon. The final focus is the one to which this dissertation contributes, but also the least developed in the literature. Below, I briefly review research done in the first two areas, before developing the need for and possibilities of research in the third.

Infrastructures enable or deny particular ways of acting and understanding by creating new objects, which in turn promote new ways of understanding, as well as by simply making possible new actions. In creating meaningful objects, infrastructures provide the underlying categories by which individuals understand and experience an environment (Bowker & Star 1999; Espeland & Stevens 1998). The effects of this can be

mundane, as when law schools come to understand the strengths and weaknesses of their programs through the classifications used to produce national rankings (Espeland & Sauder 2007), or when scientific research sites create new organizational structures, identities, and collaborative forms of work in response to the implementation of a new metadata standard (Millerand & Bowker 2009). But they can also have a vast significance, such as with the de-categorization of homosexuality as a mental disorder within the DSM (Kirk & Kutchins 1992).

This significance comes from the new ways of acting that are established by infrastructures, actions which often rely upon the new categories they create. By classifying commodities (Cronon 1991) or people (Fourcade & Healy 2013) we create the infrastructure to incorporate them into entirely new market processes. Poon (2009) and Rona-Tas & Hiss (2011), for example, note how grading consumers with a credit score allows them to be embedded within a suite of new practices from banks, landlords, and employers. Of course, other infrastructural changes do not rely on creating new objects, but simply enable new processes that differently fulfill an established function. This is the case with innovations in the execution and clearing of trades, which enabled the markets to take on vastly different characters (Millo, Muniesa, Panourgias & Scott 2005; Pardo-Guerra 2014).

In several respects, these points about the construction of new ways of seeing and acting are similar to those made above regarding the material and calculative tools present on markets. But one must be careful not to conflate infrastructure with technology or material tools more generally (Pardo-Guerra 2014). Infrastructures have several

particular features that distinguish them from material technologies more generally, including invisibly supporting tasks, linking communities of practice, and being understood as natural within a community of practice. Many market technologies do not meet these criteria: calculative aids such as charts of long-term price movements (Preda 2009), sheets of stock option prices (MacKenzie 2006), or tables of figures (Didier 2007), while influential technologies of economic decision-making, are all highly visible, local, and often actively contested (Pardo-Guerra 2014). These material tools are utilized differently than infrastructures, are embedded within different social settings, and have different consequences for action: infrastructures remain hidden while displays are put center stage; infrastructures last over long periods of time, while representations must continually be legitimated; infrastructures, once in place, operate largely shielded from the influence of social factors with which market devices must interact.

Additionally, the definition and examples of infrastructure given above need qualification. The above set of features gives us the sense that we can identify a system as “infrastructural,” once and for all. But infrastructure is a relational concept: what is infrastructure to one person may be structure to another, what is infrastructural at one time may become structural as conditions change (Bowker 1994; Bowker & Star 1999; Star & Ruhleder 1996). To an office worker, the servers working in the building’s basement and the cables running through its walls are infrastructures that enable their day-to-day action to proceed without a second thought; however, to the company’s IT team, they are objects of intense daily focus. Thus, it makes less sense to ask *what* makes something an infrastructure than to ask *when* it is infrastructure (Star & Lampland 2009).

Infrastructure must always be situated in relation to a set of practices, never located simply in material properties. Just as with our thinking about what is “information,” our ideas about what is “infrastructure” must be in relation to practice.

While scholars have most carefully considered how infrastructures produce new objects, ways of understanding, and modes of action, infrastructures also create new information. Scholars have recognized this function of infrastructure, but have tended to collapse it together with the creation of new objects and ways of understanding. This can be seen in the arguments that infrastructures work in part because they facilitate *communication* among the groups that use them. Star (2002: 109), for example, calls infrastructures ‘communicative tools’; Bowker & Star (1999: 286) argue that classification systems allow people to ‘communicate across the boundaries of disparate communities’; and Edwards (2010: 18) notes that a classification infrastructure is, among other things, a ‘communication ... web with both social and technical dimensions’. These scholars have tended to assume that communication occurs unproblematically once two infrastructures have been ‘plugged into’ one another via a common set of standards (Bowker & Star 1999: 35; see also Star & Lampland 2009; Star & Ruhleder 1996). A single, shared classification scheme or set of standards establishes a shared ontology across settings, which serves as a common language allowing actors to reference the same types of objects, processes, and relations (Espeland & Stevens 1998). Classifications, standards, and grades become information that conveys meaning to market actors.

Yet, while a shared ontology may make communication possible, it tells us nothing about the *quality* of communication that takes place. The issue of ‘work arounds’ serves to illustrate this point. Much research has shown that shared classifications and standards fail to create uniformity of practice across environments (Barry 2001; Bowker & Star 1999; Edwards, et al. 2009; Millerand & Bowker 2009). Familiar ways of working are retained without change, and simply labeled in accordance with a new classification scheme, for either bureaucratic or symbolic reasons (Meyer & Rowan 1977). The prevalence of work arounds suggests that a shared classificatory language does not guarantee uniform or reliable communication. Rather, understanding classification infrastructures as ‘communicative tools’ requires explicitly theorizing their character as producers of information.

The primary example of linking infrastructure with the information it produces comes from Muniesa’s (2007) study of price-setting mechanisms on the Paris Bourse and the Bolsa de Madrid. Concentrating on the issue of how prices communicate, Muniesa demonstrates that different infrastructural procedures created prices that differed in their primary semiotic mode. Simply using the last trade of the day produced a good index, but failed symbolically; making an average of trades in the last five minutes produced a good icon, but a poor index; utilizing an algorithmic auction produced a fairly good index, combined with a strong symbol. These different semiotic modes in turn promoted divergent behaviors on the market, particularly with regard to manipulation of price. Thanks to the character of the sign produced in this final configuration, market manipulation was ‘pragmatically calibrated’ and ‘rendered costly’ (Muniesa 2007: 388).

The semiotic capacity of other infrastructures has also been noted. Lampland (2010) notes that bookkeeping practices among farmers in Stalinist Hungary used ‘false numbers’ that acted not as indexes, but as icons symbolizing the implementation of rational, written management practices. Similarly, Lea & Pholeros (2010) show how conditions of work led government contractors building houses in Australia to carelessly complete government checklists and forms, producing documents that served as icons of work practice rather than indexes of building quality as intended. Pinzur (2016) has linked differences in the semiotic qualities of commodity grades to market-level divergence in price volatility over a period of decades. In each case, the quality of the information produced by market infrastructure impacted their incorporation into the environment.

Thinking about the qualities of information requires a shift in focus from the construction of infrastructures (Star 2002) to their implementation in practice (Hatherly, Leung & MacKenzie 2008). Prior research has treated the former as critical: it is the moment when partisans battle to establish the contours of the system and set into place an ontology with far-reaching political consequences (Cronon 1991; Espeland & Sauder 2007; Foucault 1982; Miller & O’Leary 1987; Miller & Rose 1990). But it is in the latter moment that information acquires its qualities. By classifying a good, transmitting a price, or creating a statistic in one way and not another, infrastructural actors construct information with distinct properties. For example, Hatherly, Leung & MacKenzie (2008) demonstrate that the meaning of the figures produced by accountants, including the basic categories of profit and loss, can vary dramatically in response to changes in classifying

practice. As the processes by which infrastructures operate change, so too are the qualities of the information they produce altered (Barnes 1983; Bloor 1997; Wittgenstein 1967).

The preceding makes clear that there is room within an infrastructural approach to consider the qualities that information has as a result of the circumstances of its creation. This is a generally understudied topic, and a critical area for study. As seen above, information, even prior to being embedded within multiple social environments in the market, has qualities that stem from the infrastructures that produce, distribute, and support it. These qualities may importantly shape the ways in which the information may be embedded or the types of actions they enable. While these informational qualities in no way determine the response of market actors, but they do establish limiting conditions on their action (Wright, Levine & Sober 1992) and make particular actions more feasible and rational. By studying the social features that lead infrastructures to be implemented in particular ways, we can uncover a distinct layer of social influence on markets that often goes unanalyzed.

#### Information infrastructure

The perspective on “information infrastructures” developed in this dissertation encompasses our thinking about creation, dissemination, and interpretation of information. All three are shaped by information infrastructures, and the qualities of information are shaped by the processes underlying each. We must analyze the life cycle of information, the social and technical environments through which it moves and



operates. By examining each of these components in action, it is possible to discover the resulting qualities given to information. Other sociological approaches fail to recognize the presence of these qualities and the constraints and affordances they present to actors. Even when the same actions are made possible by an infrastructure (e.g., classification of agricultural commodities enables futures trading) the quality of information being produced can make certain actions (e.g., speculation, hedging, manipulation) more or less likely.

In this dissertation, I study the divergent implementations of information infrastructures on the Chicago Board of Trade and New Orleans Cotton Exchange, and make an effort to broadly trace the full range of qualities of the information they produced. I trace out the processes by which infrastructures operated, the qualities of the information they produced, and consequences of those qualities on the behavior of market actors. Each of the following three empirical chapters primarily addresses the creation and impact of a different infrastructural aspect of the futures markets on these exchanges.

Chapter 3 examines the systems of classification, grading and valuation, by which physical wheat and cotton were repackaged as standardized grades. The grading infrastructures on each exchange reflected material differences between wheat and cotton, as well as the power of various groups within each market. While both systems assigned grades to commodities, the differences in when they were assigned, in what fashion, and with which material tools, meant that they operated in distinct ways. The grades, as information, had divergent semiotic and legal qualities, which undergirded different

behaviors. On CBOT, the character of the grades made speculative trading more feasible and rational, while on NOCE stable hedging trades were promoted.

Chapter 4 looks at the means of gathering and transmitting information about the supply and demand for both futures contracts and for their underlying agricultural commodities. This information took two forms: crop statistics and price quotations. This chapter shows how the infrastructures for both forms of information were built on each exchange, and why they were built differently. CBOT built up their price quotation infrastructure as part of their political and economic battles against Western Union and illegal gambling dens known as bucket shops, while doing little for the politically and economically unimportant crop statistics infrastructure. NOCE, by contrast, built on established connection with other US cotton centers to build a statistical system that restored control and respect to the South, while their efforts to build up telegraphic price systems floundered due to their poor technologies and lack of bargaining power. These differences enabled different processes of valuation on the exchanges: while traders on CBOT were encouraged to ride short-term shifts in price and seize on minute advantages and misalignments, traders on NOCE were moved toward longer-term perspectives and calculation.

Finally, chapter 5 pulls back to look at how market information was situated within a framework on the connection between spot and derivative markets and finance more generally. The distinct political challenges facing the exchanges led to several significant differences in their understanding of the economic function and cultural legitimacy of futures trading. CBOT, as part of its response to the federal government's

attempts to tax speculation, drew a sharp line between futures contracts and options contracts, arguing for the legitimacy of the former and danger of the latter. The distinction proved a powerful component of the argument that both saved futures trading and eliminated significant regional economic rivals. On NOCE, exchange leaders had little to gain from making this distinction. For them, the critical concept was the close linkage between spot and futures markets and the ability of the latter to build up Southern autonomy in the cotton trade. In reflecting the political imperatives in their local regions, the two exchanges created distinct economic theoretical perspectives on the functioning and legitimacy of derivative markets.

Taken as a whole, this offers a perspective on what I call the “information infrastructures” of these markets: the systems by which information was constructed, disseminated, and interpreted on each exchange. These systems then serve as the basis for an infrastructural analysis that spotlights the unique conditions of possibility created on each market.

### Chapter 3 – Constructing Grades

The systems for grading, or classifying, primary commodities stood at the heart of the transition of wheat or cotton from a physical good to a certificate, or receipt, providing *information* about a physical good.<sup>1</sup> Using these grading systems, exchanges would assign a particular classification (e.g., “#2 Hard Winter Wheat,” or “Strict Good Middling Upland cotton”) to each rail carload of wheat or bale of cotton. Traders would then contract to buy or sell a particular class of commodity. This deal could be made months ahead of time. This ability to make deals in a standardized product months ahead of time is the critical feature of a futures market. Before grading systems, individuals could of course still contract to deliver goods at some future point, but assurances of quality would be based on business or friendship ties, or a knowledge of the particular farmland and climate where goods came from. This interpersonal basis could never support a constant market where contracts achieve liquidity. Standardized grading systems enabled the high volume of trade needed to enable widespread speculation and hedging, the most characteristic features of modern futures markets. In short, the development of futures trading over the past 150 years is premised on sorting commodities into standardized grades.

CBOT and NOCE utilized different systems for grading primary commodities that reflected the divergent circumstances of their creation. Chicago’s system developed

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<sup>1</sup> I use the terms “grading” and “classifying” interchangeably. But it is worthwhile to note that this does not fit with the usage on the two markets themselves. On CBOT, wheat was “graded,” while on NOCE, cotton was “classed;” adding to the complication, cotton was assigned a “grade” based on the purity of the lint, as part of the broader process of being “classed.” For the sake of simplicity, I ignore these distinctions in usage.

contemporaneously with the trade in futures and thus was shaped by the opportunities for profit it provided. These opportunities, in combination with the dominant position of grain elevator operators, made manipulation of wheat and fraudulent receipting viable practices. As a result, information produced in the Chicago market regarding the quality and quantity of wheat present in the city was suspect. Even involving the state of Illinois in a regulatory capacity failed to solve these problems. In contrast, New Orleans relied on a system of classing that was created entirely in isolation from the futures market, wholly for the benefit of spot traders. Classing was adversarial and small-scale, preventing any systemic manipulation of commodities or information. The powerful position of spot traders within the NOCE guaranteed that maintaining the fidelity of classing, even at the expense of efficiency, was a foremost concern.

These grading systems, in addition to being shaped by the market relations surrounding their creation, made particular behaviors more feasible and rational. The infrastructure established on CBOT made for an uncertain relation between the warehouse receipts that represented wheat and the quantity and quality of physical wheat located in elevators. Yet, though receipts failed to accurately index the wheat they represented, these receipts could still be used automatically, without any danger of traders being held responsible for wheat being of inferior quality. This created an environment where speculation in futures could thrive in a highly uncertain environment, and where hedging would be discouraged. Conversely, NOCE created a system where the quantity and quality of cotton was well accounted for. The grading system also passed costs onto buyers and sellers by making grading a private negotiation. This meant that grades served

as accurate indexes of quality and that speculation had a potentially significant cost attached to it. Both of these features made the market more useful for spot dealing and hedging and kept speculation more narrowly confined.

#### The Chicago Board of Trade: Warehouse grading & CBOT inspection

The creation of a grain grading system in Chicago in the 1860s took place in an atmosphere of rapid growth. In the decade prior to the introduction of grading, railroads laid 2,500 miles of new track into the city, and fifteen new grain elevators were constructed, increasing the storage space in the city from 700,000 to 5,000,000 bushels. By 1860, Chicago was the clear grain shipping center of the country, bringing in more than twice the grain of the next largest market for the next three decades (Lee 1938).

Most significant to the grading of wheat at this early point were the grain elevators.<sup>2</sup> Elevators' power came largely from their position as a bridge between distinct parties in the grain trade (Cronon 1991). First, elevators served as a meeting place for buyers and sellers in the spot market. Sellers could store their wheat at elevators until they found a suitable buyer. They could also settle transactions by handing over receipts issued by elevator companies, rather than delivering the wheat itself. Second, and more critically, elevators facilitated the transfer of grain from railroad cars to ships on the lake. Elevators were built with railroad tracks on one side, from which grain would be unloaded into the warehouse, and the water on the other, where chutes would pour grain

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<sup>2</sup> Grain warehouses were known as elevators because of the process by which they raised grain on conveyor belts before sifting it into bins.

into waiting ships. Nearly all the wheat entering Chicago made this switch, which elevators made happen much faster than previously possible.

Elevator owners solidified this positional advantage through maintaining a non-competitive oligopoly in the city. By 1870, 93% of the total storage space in the city was controlled by just five partnerships, representing ten individuals. Each of these partnerships was allied with one or two preferred rail lines, which served their warehouses exclusively. This arrangement benefited both elevator owners, who took a steady stream of grain into store, and railroads, which did not have to go to the expense of delivering to multiple locations. This combination of indispensable position, oligopolistic ownership, and alliance with railroads made elevator owners powerful figures within CBOT, despite their relatively small numbers (Lee 1938).

From this dominant position, elevator owners introduced a system for grading wheat in 1856. The scheme they developed, with CBOT's help, delineated three kinds of wheat—white winter wheat, red winter wheat, and spring wheat—and four gradations of quality—club, No. 1, No. 2, and rejected (Taylor 1917). The primary impetus behind this system was to increase the efficiency of grain storage (Cronon 1991). Prior to this point, elevators needed to store each shipment of grain separately so as to maintain its unique identity, which left enormous amounts of bin space within warehouses unused. Many elevators could store 500,000 bushels or more, yet often shipments from farmers totaled only a few thousand bushels (Lee 1938). A system of grades allowed elevators to combine grain of the same grade from different sources, maintaining the aggregate quality while more efficiently using the space within their warehouse bins. Buyers would

be issued receipts entitling them not to a particular shipment of wheat, but to wheat of a certain class and grade.

It is worthwhile to pause here and consider precisely what changes wheat went through in being processed at an elevator. Grain processed at an elevator was twice transformed. First, it was physically transformed, as shipments from numerous farms were combined according to grade. If grain was miscategorized or combined improperly, the quality of the mixture would be degraded, and mills would receive an inferior product. The second transformation was not physical, but semiotic. When wheat was taken into store, the elevator produced receipts representing that grain for its owners. These receipts could then be traded or used as collateral for loans, with all parties secure in the knowledge that the holder could redeem them at will for a particular amount of wheat. Receipts informed market actors of the quantity of wheat present in the city's elevators. These two transformations anchor the analysis that follows.

The idea of a grading system was well received, as it benefited several classes of CBOT members in addition to warehousemen. Commission merchants benefited from lower handling charges once different shipments of wheat did not have to be kept separate. Also, the grading system enabled the futures market to arise. The presence of a futures market gave commission merchants a place where they could hedge their spot positions, as well as a place where speculators could bet on price movements.

In practice, though, there were problems. CBOT traders complained that the classifications were too broad, mixing together wheat of substantially different kinds. They also complained that warehouse operators graded on a lax standard in order to



attract grain into store. But, most seriously, the system made manipulation simple. This feature hinged on the permissive grading rules that elevator owners had shepherded into existence. These rules allowed elevator owners to buy and sell wheat on their own account, in addition to storing wheat for others. This made it profitable to mix wheat from different grades. Elevator operators would dilute grain of a higher grade (e.g., #1 wheat) with a lower quality grade (e.g., #2 wheat) just up to the threshold at which that mixture would move into the lower class. By doing so, the elevator could create an instant profit: by mixing 500 bushels of average quality #1 hard winter wheat with 200 bushels of #2 hard winter wheat, elevators could create 700 bushels of low quality #1 hard winter wheat. Of course, when creating receipts or selling this wheat on the market, its classification was still #1 grade – the fact that this wheat was actually of a very poor quality was only discovered once shipments had been made. The practice of mixing ruined the reputation of Chicago wheat.

Information regarding the quantity of wheat in the city was similarly uncertain because of elevator operators' production of receipts. Elevators would issue counterfeit receipts as a way of turning a quick profit in the speculative market. They would sell these forged receipts on the market when the price for wheat was momentarily high (such as during a corner or other speculative mania), then buy them back once the price had dropped. Elevator operators would profit on the price differential, at the expense of destabilizing information about the supply of wheat within the city (Taylor 1917). The charge that warehousemen were misrepresenting the quantity of grain in store and profiting from issuing fraudulent receipts was brought in the wake of corners in 1866,

1868, 1869 and 1870 (Lee 1938). These charges were verified in 1872, when two major elevators were discovered to have outstanding receipts far exceeding the quantity of grain they actually held in store (Taylor 1917).<sup>3</sup>

In 1859, CBOT created an independent inspection force that looked to crack down on these practices. Most significantly it took over grading duties from the warehouse owners. This change was meant to remove the conflict of interest present when warehouse owners did their own grading (Taylor 1917). But despite CBOT's oversight, grading continued to be plagued by mixing and fraudulent receipts. Why? One significant reason was that Board of Trade inspectors were allowed to act without restriction in spot and futures markets while at the same time being part of the grading apparatus. Thus, they faced the same temptation to manipulate receipts and disseminate misinformation as did elevator owners. In this sense, the antagonistic relation between elevators and inspectors was an illusion.

The grading system established by warehouses, even when supervised by CBOT, failed to produce accurate information about either the quality or the quantity of wheat found in the city. This uncertainty depressed the spot trade, bringing lower prices for wheat coming through Chicago (Taylor 1917).<sup>4</sup> It also created conditions where speculation could thrive. The lack of solid data regarding the supply of grain in the city

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<sup>3</sup> These frauds were only discovered through extraordinary circumstances. In the first case, the Iowa elevator burned to the ground and an examination of the remains revealed the shortage in grain. In the second, Munn & Scott elevators went bankrupt and in the sale of their holdings to Armour & Co., the shortfall of wheat in store had to be revealed.

<sup>4</sup> Chicago wheat brought four to five cents less per bushel than similar grades from other cities. Chicago grain was so bad that it was being rebranded with other locations in the name, e.g., Milwaukee Club, Amber Iowa, and Northwestern Club (Taylor 1917).

promoted diverse interpretations of the market environment and the future of prices, and an environment thick with rumors. Speculators could also be bold, knowing that elevator owners stood ready to flood the market with fraudulent receipts in the event of the market being cornered. Further, the ease with which elevators created fraudulent receipts made it possible to engage in manipulations in the futures market with minimal involvement in spots. These are conditions under which speculation becomes profitable.

#### State intervention: the Railroad & Warehouse Commission

The failure of the private grading system to produce accurate information galvanized support for state regulation of the grain trade. Through provisions in the 1870 Constitution and four separate statutes from 1871, the state created a significant regulatory apparatus to protect the quality of Chicago grades and ensure the fidelity of elevator receipts. At the heart of the regulatory system was the Illinois Railroad and Warehouse Commission (RWC), created in 1871. This commission was headed by three men, appointed by the governor for two-year terms. As their name suggests, the Commission was tasked with the massive job of regulating the transportation, grading, and storage of grain in the state.

The RWC had two jobs in relation to grading. First, it took over inspection duties from CBOT. State inspectors were stationed outside of all public elevators to sample and grade grain entering by rail car.<sup>5</sup> State inspection ensured that graders of wheat would be

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<sup>5</sup> The distinction between public and private elevators was introduced in the 1870 Constitution. The key distinction was that public elevators could combine shipments of grain, while private elevators could not. Since the need to combine grain of the same grade to economize on storage space was the impetus for

entirely separated from the trade in wheat, eliminating potential conflicts of interest and opportunities for inside trading. Second, the Commission established an office for registering and tracking grain receipts to prevent fraud. All receipts had to pass through this office at the time of their creation and again when they were canceled through delivery; fraudulent receipts would have no corresponding entry with the state registrar. Ideally, this system of state regulation would guarantee the fidelity of information about the quantity and quality of grain passing through Chicago. In reality, political and economic conditions were such that the Commission achieved only some of its goals.

The goal of establishing a registrar for elevator receipts initially failed. Elevators were required to give a bond and acquire a license to operate, both of which could be forfeited through engaging in any prohibited activity or interfering in the discharge of the Commission's duties (Lurie 1979). Though the state had the power to revoke the license of any elevator not complying with its requirements, the elevators had a simple strategy for evading this penalty: they simply refused to take out licenses or give bonds in the first place. As with their earlier negotiations with CBOT, elevator operators recognized the strength of their position when they presented a uniform front. Elevators were eventually forced into compliance with the law only through financial pressure. Banks, which lent money on the security of warehouse receipts, were becoming increasingly nervous about fraudulent receipts. Accordingly, they charged higher interest rates on their loans to balance this increased risk. Warehouses quickly discovered that the simplest way to allay

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introducing grading in the first place, it is unsurprising that nearly all of the warehouse space in Chicago was public (Lurie 1979).

these fears and reduce the interest on their loans was to register receipts with the state (Lee 1938).

CBOT paired this registrar's office with its own system of supervision. They kept a list of "regular" elevators, whose receipts were tenderable on trade. Only bonded warehouses in good standing with the RWC were declared regular. Another requirement of regularity was that elevators always post accurate reports of the grain they had in stock, allow Board of Trade certifiers yearly access to their warehouses for inspection, and accept grain arriving along any railroad line, not just a single, favored line. In this way, the Board attempted to put pressure on the elevators with the threat of making their receipts, and thus the grain they held in store, worthless on the Chicago market.

This technique had some success in promoting accurate information on the quantity of wheat in the city. The Board used the pressure of regularity to force warehouses into accepting a twice-yearly examination of the interior of their warehouses. In 1895, the Board stripped two elevators of their regular status when they would not allow inspectors access to the grain in store.<sup>6</sup> Five years later, the Board made irregular all Armour Elevator Company receipts, following the discovery that the company had outstanding receipts for wheat that was not in store.<sup>7</sup>

The complementary systems of registration and regularity, once adopted, did solve several earlier problems with the previous system of grading. They made information on the quantity of wheat in the city's elevators more accurate. Since all shipments in and out were supervised and registered through the state, statistics were

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<sup>6</sup> *Board of Directors Records*, Box 32, Folder 25, March 12, 1895.

<sup>7</sup> *OR*, Box 9, Folder 10, May 25, 1900.

carefully kept and disseminated. Also, registration of receipts eliminated the mixing of grades that had plagued the grain trade previously. Grain leaving the elevator needed to be matched to receipts held by the registrar. Thus, attempts to mix lower grades of wheat into a higher grade would produce wheat without receipts on record, which could not be shipped.

Like registration, RWC's efforts to control inspection and grading got off to a rocky start. Not two years into the RWC's supervision, CBOT was arguing that inspectors lacked the necessary expertise for the job and that inspection should be returned to the Board.<sup>8</sup> But, unlike registration, the problems with inaccurate grading only grew worse as time went on. By 1900, state inspection was so unreliable that many eastern buyers would accept the delivery of wheat from Chicago only after having their own private inspectors ensure its quality.<sup>9</sup> State inspection had become so discredited that, according to Board president W.S. Warren, Chicago certificates "were not worth the paper they were printed on."<sup>10</sup> RWC inspectors were giving higher grades than merited, allowing mixed wheat in grades that should have been pure, and ignoring the minimum weight requirements for bushels by grade.<sup>11</sup> By 1908, CBOT was receiving significant complaints from abroad. Both the American Consulate in Germany and the Liverpool Corn Association complained that orders of hard winter wheat were arriving instead as soft wheat, making them entirely unusable for the purposes of buyers.<sup>12</sup> Liverpool

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<sup>8</sup> *BDR*, Box 1, Folder 5, Jan. 20, 1873

<sup>9</sup> *OR*, Minutes of the Annual Meeting, Box 9, Folder 4, 1901

<sup>10</sup> *OR*, MAM, Box 9, Folder 4, 1901: unnumbered page

<sup>11</sup> *Committee Records*, Box 320, Folder 1, Aug. 12, 1907

<sup>12</sup> *CR*, Box 319, Folder 4, Oct. 19, 1908

threatened to stop accepting Chicago inspection certificates altogether if the problems were not solved.<sup>13</sup>

In addition to inaccurate grading, the RWC's distance—both physical and practical—from the grain trade also led it to make poor decisions. In one such instance, they altered the standards for #2 spring wheat in the middle of the trading season, which threw existing contracts into disorder. Traders, who could not be sure that buyers would get the quality of product they needed, were paralyzed: “So long as there remains an unknown quantity of this mixed wheat, which may be delivered out as 2 spring on any receipts, there is no safety in loading even a single car – nor can any samples be sent out with safety until this stock is exhausted.”<sup>14</sup>

CBOT pinned these problems on two sources: first, the appointment of inexperienced graders; second, the Commission's unfamiliarity with the necessities of everyday trade. On the first point, inspectors were not required to pass an examination or show any special familiarity with the grain trade. The Commission even employed female inspectors, which the Board took as confirmation of their disregard for hiring inspectors with the proper experience and familiarity with the trade.<sup>15</sup> CBOT charged that this lack of standards made grain inspection part of the “political machine” of Illinois.<sup>16</sup> CBOT leaders took special umbrage at regulation of the grain trade being handed out as patronage, with President William T. Baker caustically noting that “zeal in partisan

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<sup>13</sup> *Executive office records*, Box 437, Folder 3, Nov. 3, 1909

<sup>14</sup> *BDR*, Box 22, Folder 5, Jan. 24, 1890

<sup>15</sup> *CR*, Box 320, Folder 4, Oct. 24, 1911

<sup>16</sup> *OR*, MAM, Box 9, Folder 4, 1900: np

campaign work does not qualify men” for work as inspectors.<sup>17</sup> To the second point, CBOT argued that a three-person commission, located 160 miles away in Springfield, could never hope to develop familiarity with the reality of trade from moment to moment.<sup>18</sup>

After over thirty years of complaint and uncertain state inspection, and immediately following the sharp criticism in the early 1900s, CBOT took steps to guarantee the accuracy of grades and the legitimacy of their contracts. In 1905, it established their own unofficial inspection service, parallel to that offered by the state. This Department of Grain Sampling and Seed Inspection was a response to the “very general demand ... for a more efficient, disinterested and official system of resampling grain consigned to and being shipped from this market.”<sup>19</sup> Though the decisions of this inspection service were not official and could not be used to compel any change in grade, they offered an alternative grading process for those merchants frustrated with state inspection. CBOT recommended that disgruntled buyers should stipulate that their orders were to be shipped subject to approval of the Board’s Department of Grain Sampling and Seed Inspection.<sup>20</sup> This parallel system of inspection would offer quality assurances that were sorely lacking under the state system.

But this was not a systemic fix. Permanent change needed to come from a reform of the RWC, particularly the procedure for assigning inspectors. To this end, CBOT lobbied for close to twenty years to have grain inspector positions placed under Civil

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<sup>17</sup> *OR*, MAM, Box 7, Folder 9, 1895: np

<sup>18</sup> *OR*, Report of the Trade and Commerce of Chicago, Box 86, 1873

<sup>19</sup> *OR*, MAM, Box 10, Folder 25, 1905: np

<sup>20</sup> *CR*, Box 319, Folder 6, Mar. 8, 1905



Service rules in order to ensure that positions were awarded on merit.<sup>21</sup> They also pushed for increased accountability and centralization of supervision, so that inspectors' decision could be subjected to review. CBOT's Grain Committee communicated to the RWC their desire to have samples of grain sent every morning to the office of the Chief Inspector in Springfield, so that he could check up on the work of inspectors in the field. The Board maintained that this would help to reduce the number of careless and improperly drawn samples, which were leading to improperly graded shipments of wheat.<sup>22</sup> The RWC resisted any major changes for many years. It was not until 1912—forty years after their inception—that the RWC adopted Civil Service rules for appointing inspectors.<sup>23</sup>

The greater difficulty in establishing the classification system as compared to the registrar is unsurprising, given the interpretive nature of grain grading. Whereas the registrar's job was merely clerical—collecting, compiling, and disseminating information—inspectors had to be familiar with the conventions of the grain trade and expert enough to make distinctions of grade under sometimes difficult conditions.<sup>24</sup> They were required to *create* information that would serve as the basis of large economic transactions. This is a difficult task for the state to step into, especially given the lack of uniformity across states. This heterogeneity of standards is addressed in the next section.

### Opposition to standardized grades

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<sup>21</sup> *OR*, MAM, Box 7, Folder 9, 1895; *OR*, MAM, Box 9, Folder 4, 1901

<sup>22</sup> *CR*, Box 319, Folder 10, Jul. 16, 1907

<sup>23</sup> *OR*, MAM, Box 13, Folder 8, 1912

<sup>24</sup> Grading happened outside, rain or shine. Inspectors often had to work quickly to accommodate the many carloads of wheat waiting to get to an elevator.

The previous sections show that CBOT did take steps to ensure the quality of grading whether done privately or by the state, however feeble or ineffectual those steps might have been. Yet, as the following section reveals, it remained entirely unwilling to cooperate with other markets on the same issue. This unwillingness to work with other exchanges was most prominent in efforts to harmonize grading standards used across exchanges. CBOT showed a general disinclination to give up control over any aspect of its trade, whether to a state agency or a supra-organizational association of grain exchanges.

By the early 1900s, the classification of wheat into grades had spread to grain exchanges around the world. The problem was that each exchange had its own classes and standards, with no guarantee of parity between them. As an example, the grading standards from 1905-1906 for white winter wheat show a great deal of variety.<sup>25</sup> Some exchanges divided the wheat into four grades, some three; some factor in the weight of the bushel in their determination while others don't, and even those that do use weights have different cut-off points; the qualitative descriptions of the grades also vary, with certain exchanges holding higher or lower standards than others. Table 3, below, illustrates this variety in grading standards across the Chicago Board of Trade (1906), New York Produce Exchange (1905) and Toledo Board of Trade (1906). Key differences existed in the minimum weights per bushel for each grade and the amount of cheaper red winter wheat that could be permissibly mixed into a bushel.<sup>26</sup>

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<sup>25</sup> CR, Box 319, Folder 5, various dates

<sup>26</sup> Hill (1990: 19) notes that even if the markets had instituted identical standards, the tools used for inspection were crude and varied greatly from place to place. This variation would have made equivalent

Table 2. Variation in standards for white winter wheat (1905-1906).

Grade of wheat	Chicago	Toledo	New York
<b>#1 white winter</b>	No min. weight or percentage	Min. 58 lb/bu; min. 95% white wheat	Min. 60 lb/bu; no min. percentage
<b>#2 white winter</b>	No min. weight or percentage	Min. 56 lb/bu; min. 90% white wheat	Min. 58 lb/bu; min. 95% white wheat
<b>#3 white winter</b>	Min. 54 lb/bu; no min. percentage	Min. 53 lb/bu; min. 90% white wheat	Min. 56 ½ lb/bu; min. 95% white wheat
<b>#4 white winter</b>	No min. weight or percentage	Min. 50 lb/bu; no min. percentage	Min. 52 lb/bu; no min. percentage

In instances where no quantitative guidelines were given, grading relied on the expertise and discrimination of inspectors. All of the descriptors used to measure wheat, e.g., “clean,” “dry,” “plump,” and “sound,” required interpretation. Making things even less precise, some of the classification guidelines bordered on tautology: in Chicago, #3 white winter wheat was described as “not clean & plump enough for #2 white winter wheat,” a description that offers little in the way of concrete guidelines for inspectors. This is not to suggest that these qualitative guidelines could not produce uniformity within a market or even across markets, but this uniformity depended on inspectors sharing similar backgrounds and knowledge. As was seen in the previous section, the ability and expertise of Chicago inspectors was doubted by many in the grain trade. The questionable skill of state grain inspectors made uniformity on qualitative dimensions difficult to achieve.

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processing impossible. “The major obstacle to creating uniformity in grades and grading among markets was the lack of objective, standard measures and instrumentation.”

This variation in grading practice across exchanges led to numerous problems. First, since the quality of wheat was not strictly comparable, neither were prices. Merchants thus needed to perform acts of translation when comparing prices, recognizing that #2 Hard Winter Wheat from Kansas City was different from the same grade of wheat in Chicago, which was different from the same grade in Minneapolis.<sup>27</sup> This impeded trade between cities. Further, without any cooperation between exchanges, changes on one exchange would wreak havoc in others. When Minnesota's state inspection department eliminated the grade of Velvet Chaff wheat, which was still in use on CBOT, Chicago merchants received shipments of mixed wheat the quality of which was essentially in between two grades on their market.<sup>28</sup> Variation in grades also made figuring the regional supply of a given grade difficult.

By 1906, these problems were causing such trouble to the trade that multiple groups, including the USDA and the Grain Dealers National Association, began to push for uniform grading standards. Grain Dealers National Association held a "Uniform Grade Congress" in 1906. Addressing this Congress, a representative from the USDA pinned the problems of grain inspection squarely on the lack of standards:

Conditions in the cloth trade would be similar if there was no standard yard-stick or measure, or there would be an added cause for dissatisfaction even in the grain trade if a pound was legally 16 ounces in Chicago, 14 ounces in New York, and every city or community was allowed to make its own standard of weights.<sup>29</sup>

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<sup>27</sup> *OR*, MAM, Box 15, Folder 3, 1920

<sup>28</sup> *BDR*, Box 77, Folder 14, Feb. 20, 1915

<sup>29</sup> *CR*, Box 319, Folder 7, Dec. 11, 1906

The problem of inconsistent inspection was felt particularly in European markets, which had little redress for the receipt of incorrectly graded or spoiled grain. European boards of trade thus added their voices to the chorus calling for uniform standards for grading American grain.<sup>30</sup>

But CBOT resisted attempts to create uniform standards. Its leaders judged them to be desirable in the abstract, but impracticable, because of the organic nature of agricultural goods.<sup>31</sup> Reframing the above comment from a USDA representative about the lack of a standard “yard stick,” President C.H. Canby, argued that “products of the soil cannot be graded with the same exactness as is the case with manufactured products, and a certain degree of variation will unavoidably at times result.”<sup>32</sup> Wheat grown in different parts of the country had unique properties, which could be accounted for by local grading systems, but would be lost in a national or international system. But, in addition to these product-based impracticalities, there is evidence that CBOT simply objected to any system that would hurt their market. CBOT rejected the uniform grading standards put forward by the Grain Dealers National Association in 1907, for the reason that the new regulations would result in much of their hard wheat being re-graded as mixed wheat or red wheat, which would bring a lower price. Other proposed changes, such as new minimum test weights for grades and addition of new grades, were also rejected outright, with no explanation other than that they conflicted with current practice.<sup>33</sup>

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<sup>30</sup> CR, Box 319, Folder 10, Jan. 24, 1907

<sup>31</sup> CR, Box 319, Folder 4, Feb. 9, 1906

<sup>32</sup> OR, MAM, Box 14, Folder 7, 1915: 4

<sup>33</sup> CR, Box 319, Folder 10, Mar. 19, 1907

CBOT's resistance to uniform grading standards contributed to the character of the spot-futures system. Lack of uniformity caused major problems for spot dealers, and they pushed for greater alignment with other exchanges. That their call was so easily dismissed demonstrates the weak position of spot dealers. Non-spot interests dominated among CBOT members, who were able to resist external pressure to change their grades because of Chicago's position as the world's foremost grain market. The grading system that resulted thus lacked uniformity across markets, a significant impediment to spot trading on CBOT.

As a whole, CBOT's grading system failed to incorporate features that would promote a sound spot market environment. The constant uncertainty surrounding the reliability of grades introduced unnecessary risk into the merchandising of wheat. The grading infrastructure thus promoted speculation in the Chicago market at the expense of a stable spot market. We turn next to New Orleans, where the creation of market infrastructure took a different path.

#### The New Orleans Cotton Exchange: Tradition of shared standards

While in Chicago the spot and futures markets developed together, New Orleans had a long history as a major spot market long before futures were adopted (Sherman 1934). The practice of classifying cotton on dimensions such as staple length, color and purity of the lint originated in this early environment (Garside 1935). When NOCE was established in 1871, eight different grades of cotton quality—ranging from good middling

to inferior—and twelve staple lengths were commonly used in the trade (Boyle 1934).<sup>34</sup> These classifications were developed to serve parties within the spot market, with no influence from the futures market. They were used to simplify and regulate the trade, so that spinners could be assured of getting the particular quality they needed. All cotton exchanged in the New Orleans market was judged according to a single common standard.

Though classification was well-established, it still faced certain persistent problems. First, grading standards across markets were far from uniform. Each market created and relied on its own set of “types”—samples of cotton from each grade and color—to guide classers’ judgments and provide a standard for arbitration. But these local methods did nothing to harmonize standards across markets. Second, even within a local setting, variation in grading was not unusual. This variation was due to the fact that cotton classification remained private. At every sale, buyer and seller would employ an expert cotton classer to sample the bales and pronounce a judgment as to its grade. Since cotton would often change hands multiple times between the producer and the spinner, this meant the same bale would be classed multiple times, often with different results (Garside 1935). NOCE addressed the first of these issues almost immediately upon its founding; the latter was not addressed until the turn of the century.

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<sup>34</sup> NOCE futures contracts did not demand the exclusive delivery of a single grade of cotton. Rather, all contracts were made for “middling” grade cotton, and, if delivery was required, a range of grades could be tendered to satisfy the contract. Parties were compensated for any difference in quality between middling and the grade of cotton that was delivered through receiving an appropriate premium or discount on the contract price. The amount of these were determined based on market prices at the end of each day by the NOCE Committee on Quotations.

In 1872, a year after NOCE's founding, the board of directors set to work to address the problem of uniformity across markets. They began by distributing 118 sets of official NOCE types to exchanges, mills, factors and other members of the trade around the world. They requested similar type samples from all major cotton markets in return, with the hope of ironing out any discrepancies in grading standards.<sup>35</sup> NOCE leaders also pursued uniform classification standards through the National Cotton Exchange, an association comprised of representatives from major exchanges around the country. In 1874, the National Cotton Exchange created the first American standard for cotton, which soon became the *de facto* world standard when Liverpool, the largest European cotton market, signed on in 1877. NOCE's flexibility when producing this standard speaks to its desire for uniformity: leaders were willing to make changes to their own local classifications in order to fall in line with the common standard, a stark contrast to Chicago's intransigence in such matters.<sup>36</sup>

When this international harmony broke down in 1883, NOCE battled for several years to restore uniformity.<sup>37</sup> The standard grading system fell apart when the New York Cotton Exchange (NYCE) decided to adopt a new standard that would benefit their futures trade by making more cotton available for delivery on contracts. NOCE immediately complained to the National Cotton Exchange about this defection from the international standard. The next year, in protest over New York's refusal to negotiate, they refused to attend the National Cotton Exchange meeting.<sup>38</sup> When it became clear

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<sup>35</sup> *Annual report*, 1872

<sup>36</sup> *AR*, 1874

<sup>37</sup> *AR*, 1883

<sup>38</sup> *AR*, 1884



that NYCE was reluctant to return the established standard, NOCE accused them of enriching their own futures market at the expense of Southern spot markets. Longtime NOCE secretary, Henry Hester, writing in *Cotton World* magazine took NYCE to task, arguing that, “A little less of local prejudice and a more general disposition to work for the common good” would produce an international standard that would benefit all parties to the cotton trade.<sup>39</sup>

When private coordination between exchanges failed to work, NOCE turned to the federal government to implement standards. In 1899, a full fifteen years before federal involvement in the grain trade, NOCE was pressuring the Commissioners of Agriculture of the cotton states to “use earnest and energetic efforts” to pass legislation establishing standard weights and classifications.<sup>40</sup> The Board of Directors, advocating for government intervention, expressed the position of NOCE clearly: “We can understand why separate types should be made for Gulf and Upland cottons, but not why Low Middling should not be Low Middling and Middling be Middling, calling for the same cotton, barring differences that have nothing to do with grade, all the world over and at all times during the season.”<sup>41</sup> This willingness to engage with state supervision continued unabated. In 1910, NOCE president W.B. Thompson pledged that NOCE would adopt state or federal standards, if and when they were introduced (Thompson 1910). This was borne out by NOCE’s support for the Cotton Futures Act of 1914, which

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<sup>39</sup> *Cotton World*, Sep. 17, 1887, p. 37

<sup>40</sup> *AR*, 1899: 8

<sup>41</sup> *AR*, 1899: 10

standardized forms of contract, grades and modes of settlement nationwide.<sup>42</sup> The law, they argued, boosted investor confidence and made futures contracts better for hedging purposes.<sup>43</sup> In 1910, even before the passage of this federal law, NOCE voluntarily aligned their own type standards with those promulgated by the USDA, arguing that this alignment made their system not only smoothly connected to other exchanges, but fair and upright, with transactions “beyond dispute or misconception.”<sup>44</sup> This alignment was so thorough that NOCE had only a few minor changes to make following the enactments of the 1914 Cotton Futures Act and the 1923 Cotton Standards Act (Boyle 1934).

NOCE leaders showed a desire for uniform classification standards from the founding of the Exchange. It is particularly telling that these Southern businessmen desired uniformity so much that they supported federal intervention and control over the South’s staple crop. NOCE was motivated in this desire by the needs of the spot market, as evidenced by the fact that much of their campaigning for uniformity took place before futures trading even gained a foothold in the New Orleans market (Bouilly 1979).

### Protecting the crop

Beyond setting standards, NOCE also sought at this early point to guarantee the quality and quantity of cotton remained constant throughout the process of sampling bales, removing damaged bits and moving them from the presses to the docks. At the

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<sup>42</sup>The original Cotton Futures Act, making federal grading compulsory for cotton delivered on futures contracts, was passed in 1914. NOCE supported the law except for two features: first, a clause restricting foreign trade; second, the too strict limitation of grades tenderable on contract. Both objectionable features were removed in 1916 amendments to the law.

<sup>43</sup> AR, 1914

<sup>44</sup> AR, 1910: 8

time of NOCE's founding, a number of well-known problems existed in all of these areas. Under pressure to move cotton quickly, workers often handled bales carelessly, rolling them through mud or water, diminishing their quality. Also, press operators were known to skim small amounts of cotton off of bales as they were processed, and petty thieves similarly stole small amounts from bales awaiting loading on the docks. As a result, buyers often found their cotton coming in far under weight requirements.<sup>45</sup> In 1874, NOCE sought to curtail these abuses through the establishment of two departments—Supervision and Inspection—tasked with preventing fraud and protecting the quality of the cotton from the time it arrived at warehouses, through its storage on the docks, and finally as it was packed onto ships.

The supervision department's job was to oversee the preparation of bales in cotton presses and warehouses. This involved overseeing the sampling of the bales and the removal of damaged bits, so as to put the bale into merchantable condition. The goal of this department was to ensure bales were processed with a minimum of waste, or "loose." They recorded the amount of loose cotton stored at each press as well as the weight of the samples taken by each party's classers and furnished certificates of these weights if desired by the parties to the trade.<sup>46</sup> The inspection department then protected the cotton as it sat on the docks and ensured proper handling as it was loaded onto ships. Inspectors also kept books for the Exchange giving the number of bales of cotton received by every vessel, as well as the condition of the cotton received and the character of the weather

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<sup>45</sup> *AR*, 1876

<sup>46</sup> *Volumes*, Box 275, Folder 5, Feb. 19, 1905

morning, noon, and night.<sup>47</sup> Inspectors noted whether cotton was taken on board a ship in wet or dry condition, and if wet, whether the cotton was received wet or became so by being exposed to rain on the levee or being rolled through the mud.<sup>48</sup> They also noted if a ship stored cotton on its deck, exposed to the elements, a practice which had become common among shippers looking to haul as much cotton as possible on each trip. This information was available to all Exchange members and was regularly consulted when determining responsibility for cotton arriving out of condition.<sup>49</sup>

The Exchange also provided the resources to make these new departments viable. The supervision department was well-staffed from the start: a chief supervisor, twenty-six assistants, fifty or more laborers, and a team of clerks for record-keeping were employed to oversee the cotton in the city's twenty-four compresses and two rail depots.<sup>50</sup> The Exchange also acted quickly and decisively against those parties who, protesting the mandatory fees attached to each service, attempted to refuse supervision and inspection. Members who denied supervisors access to their presses were threatened with expulsion from the Exchange<sup>51</sup>; shipping lines that refused inspection had their names posted on the exchange to discourage others from dealing with them.<sup>52</sup> But, as with receipt registration in Chicago, the most convincing way to get their system off the ground was making registration profitable. Within a few years of its introduction, most shippers and press operators had come to recognize that the system raised the value of cotton abroad and

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<sup>47</sup> AR, 1875

<sup>48</sup> V, Box 285, Folder 8, Feb. 19, 1905

<sup>49</sup> AR, 1882

<sup>50</sup> AR, 1876; AR, 1877. The exact number of laborers employed varied depending on the amount of cotton being processed, with extra help hired during busy times.

<sup>51</sup> V, Box 127, Folder 42, Nov. 9, 1874

<sup>52</sup> V, Box 127, Folder 58, Oct. 20, 1875

thus provided them ample recompense for the extra fees.<sup>53</sup>

Both systems worked as intended. An early review of the supervision system claimed that it “has added more to the reputation of New Orleans for care and attention to the produce intrusted [sic] to her merchants than any other measure ever before adopted.”<sup>54</sup> The inspection department was similarly feted. It oversaw and brought certainty to a period during transportation where cotton had formerly been unprotected and vulnerable. By 1877, the amount of cotton lost to careless handling and petty theft was the lowest ever seen in New Orleans or any other market for which statistics existed.<sup>55</sup> Through the two systems, NOCE kept an eye on cotton during its entire tenure in the city.

At no other place that we know of, however, is such a thorough system of supervision maintained, where the cotton is guarded from the time it reaches the port until it is finally placed in the hold of the outgoing vessel; where every bundle of samples is weighed to see that its contents are not over the regulation weight, where the making of unnecessary loose is prevented by close and strict watchfulness, and where pilfering is rendered almost impossible. In a word, these are the objects of the New Orleans system of supervision and inspection, under which not a pound of the planters’ or country shippers’ cotton confided to the care of our merchants is unnecessarily wasted.<sup>56</sup>

The general sentiment among NOCE officials was that the system of protecting the crop established in New Orleans had no equal at any other cotton port in the world (Boyle 1934).

As further evidence of the success of the NOCE system, supervision and

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<sup>53</sup> AR, 1876; AR, 1877

<sup>54</sup> AR, 1881: 3

<sup>55</sup> AR, 1877

<sup>56</sup> AR, 1902: 22

inspection departments soon spread to other exchanges. The New York Cotton Exchange adopted NOCE's system of supervision in 1876, with the Liverpool Cotton Exchange following suit shortly thereafter, in 1877.<sup>57</sup> In addition to its adoption in other markets, the reach of the system was expanded within the New Orleans market. In 1889, the Exchange extended its system of supervision to more thoroughly cover railroad depots, bringing under its control many bales that had previously escaped supervision.<sup>58</sup> Inspection was extended even to bales of cotton that circumvented the one-cent inspection fee.<sup>59</sup> They decided that protecting the reputation of their port for safe and efficient handling was worth the financial loss and the risk of encouraging free-riding.<sup>60</sup>

NOCE paid close attention to the physical crop moving through their port. Because bales of cotton retained their identity throughout the process, the challenge was to maintain the quality of the bale throughout its processing and handling. The need to account for the quality and weight of the cotton in their care led NOCE to build a security system that guaranteed the fidelity of the grades agreed on by buyer and seller. Parties in the spot trade could be confident that cotton would be handled well or that any cases where it was not would be carefully documented.

### Centralized grading

Both the system of coordinating grading standards across exchanges and the

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<sup>57</sup> *AR*, 1876; *AR*, 1877

<sup>58</sup> *AR*, 1889

<sup>59</sup> These bales had not been supervised or inspected previously because they never entered cotton presses where supervisors were stationed. They could skip the presses altogether because they were shipped on through bills of lading, meaning that they could be immediately moved from rail to ship without any need for storage.

<sup>60</sup> *AR*, 1883

departments of supervision and inspection aimed to ensure the quality of cotton across exchanges. The goal was to help cotton and information about cotton travel well from one market to the next. But this focus on inter-market uniformity came at the expense of intra-market reliability. As mentioned in earlier section, cotton classification was a local and variable process. Cotton was re-classed at every sale, with the possibility that a single bale of cotton might be assigned multiple grades during its movement through the city's marketing machinery (Garside 1935).

This system had a number of drawbacks. First, arbitration was time consuming, labor-intensive and not uncommon. In 1883, the Arbitration Committee reported that they judged 93,300 bales over the course of the year, with 12,762 of these being further appealed.<sup>61</sup> Second, private grading enabled buyers and sellers to bypass the Exchange altogether. Private deals could be struck in small towns in the interior of the state, after which cotton would be shipped on through bills of lading, passing directly from rail to ship. The practice of private classification, in combination with increased rail service to interior points, enabled this diffuse buying and selling, lessening the commercial activity on NOCE.<sup>62</sup> This diffuse and private practice had financial ramifications. Without the imprimatur of an organizationally sanctioned grade, banks did not lend as much money on cotton certificates as the underlying commodity would warrant. As Exchange President W.B. Thompson explained in 1908:

The cotton itself is as good as gold, but the piece of paper which is supposed to represent the cotton, and upon which the money is loaned, may be worthless. If the warehouse receipt was known to the world to be perfectly good, there would be no doubt about money seeking such

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<sup>61</sup> AR, 1883

<sup>62</sup> AR, 1898

collateral.<sup>63</sup>

The lack of a universally recognized certificate limited the potential of cotton as a source of capital.

A final problem with the system of private classification has already been mentioned: the re-classification of cotton each time it changed hands. This practice created the possibility that cotton could be purchased as one class and sold as another. This was made more likely by virtue of the delicate nature of cotton classing, where subtle distinctions were made through multiple senses. The purity of the lint and color of the cotton was determined by visual inspection, which was sensitive to changes in light. In addition to their eyes, classers relied on their fingers and ears in judging the quality of cotton. Determining the staple length and strength of the fiber was accomplished by pulling apart a sample of cotton, feeling for slight differences in resistance and listening for the “cry” of the cotton as it was separated. Classers needed dexterity and sensitivity, in addition to long experience, in order to become experts.<sup>64</sup> Given the delicacy of this process, it was not uncommon for a bale to be re-classed as a higher or lower type on resale than on purchase. This fluctuation in grade promoted a divide between futures and spot markets. Speculators in futures had little interest in taking on this risk. Accordingly, they often would try to sell any contracts they held in the days just prior to delivery to avoid having to handle any actual cotton. This practice would create an over-supply of

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<sup>63</sup> Thompson, William B. 1908. *Address of W.B. Thompson, President New Orleans Cotton Exchange. The Central Warehouse Plan*, p.7

<sup>64</sup> The sensitivity required for cotton classification is clearly demonstrated by the lengths USDA officials eventually went when they took over classification duties in 1916. Cotton was classed in special humidity-controlled rooms with north-facing skylights and black and grey interiors designed to produce an even character of light throughout the day. Classing was a subtle art. As one merchant claimed, “The hands of a cotton classer should be as soft as a debutante’s and as supple as a violinist’s” (Garside 1935: 77).



contract cotton for sale, depressing prices (Garside 1935). The variability of grading produced a system where futures traders were discouraged from handling actual cotton.

A centralized system for classing and certifying cotton run by NOCE officials would resolve these problems. In 1887, following the introduction of such a system on the New York Cotton Exchange, NOCE began discussing its feasibility in their own market. The special committee appointed to investigate the system reported that while it favored the certificate system upon its merits they recognized that, “under existing conditions for handling spot cotton in New Orleans, its success might prove doubtful.”<sup>65</sup> Dealers in spot cotton were loathe to relinquish their role in classification, which they used to their own benefit. While there was not the same opportunity for outright manipulation as with grain elevators in Chicago, cotton dealers did enjoy certain benefits from being at the center of the grading process. For instance, many believed that by skillfully displaying their goods they could influence the grade assigned and thus the value of their cotton (Garside 1935). Spot dealers also benefited from buying cotton in small towns, where markets were smaller and less competitive. New Orleans dealers were also far better informed than small-town producers and middlemen about the state of markets in the city and around the world, giving them an advantage (Boyle 1934). Handing over classification to NOCE would eliminate both advantages.

As a result of this opposition from spot dealers, centralized grading made little headway for decades. The initial push made in 1887, as well as a second try coming from NOCE’s Futures Committee in 1897, were both handily defeated.<sup>66</sup> Since NOCE could

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<sup>65</sup> *AR*, 1887: 15

<sup>66</sup> *Cotton World*, Apr. 28, 1888; *AR*, 1898

not institute an Exchange-wide central classification system over the objections of spot dealers, they initially required certification only for cotton delivered on futures contracts. In 1909, they placed grading of contract cotton under the care of a salaried Board of Classers, cotton experts employed by the Exchange who would class cotton tendered on contract. The certificates of grade they issued were fully guaranteed by the Exchange.<sup>67</sup> Classers were required to work solely in this capacity and were forbidden from having any interest whatever in the cotton business.<sup>68</sup>

The system immediately brought the futures and spot markets into closer contact, to the immediate benefit of speculators. They no longer needed to hire an expert in cotton classing to move cotton in the spot market.

Under this system receivers may separate for shipment any bale or number of bales in a contract (as each bale has its own tag number and class) for use on various orders requiring particular grades of cotton. Thus every possible facility is given to both deliverers and receivers of cotton on contracts, bringing the contract and spot business into the closest possible accord and simplifying the business so that the advantages to deliverer and receiver are equal. In a word, the business has been so simplified that it does not require expert knowledge to either receive or deliver cotton on contract.<sup>69</sup>

Speculators now had two convenient, reliable choices in the event they received cotton on their contract: sell it on the open market, knowing that the grade was certified and backed by the Exchange, or redeliver it on a contract that they had sold. This movement of cotton between spot and futures markets was aided by the enormous amount of practical information featured on certificates, including the name of the press or warehouse where

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<sup>67</sup> Thompson, William B. 1909. *The New Future Rules of the New Orleans Cotton Exchange*. New Orleans: J.G. Hauser.

<sup>68</sup> Thompson, William B. 1910. *Analysis and Exposition of the Scott Anti-Cotton-Future Bill*.

<sup>69</sup> AR 1910: 27

it was stored, the number or letter of the warehouse receipt, the marks of bales, the lot or tag number or numbers, whether compressed or uncompressed and the number of bales in each grade.<sup>70</sup> This ample information—in conjunction with the Exchange’s guarantee of quality—made it possible for speculators to move easily between futures and spot markets.

Reviewing the first year of the system, the Exchange claimed that certification created, “a medium through which buyers and sellers of contracts can, with implicit confidence in the result and at a minimum cost, settle their obligations with actual cotton.”<sup>71</sup> This linkage was not only strong theoretically; in practice, the NOCE certification system enabled fast processing. In one particularly heavy trading month in 1917, NOCE successfully processed over 21,000 bales delivered on futures contracts in the last 6 days of the month.<sup>72</sup> It also achieved the desired goal of substantially lowering the number of appeals on grade.<sup>73</sup>

The success of NOCE’s certification system was so convincing that spot dealers began to recognize its value to them as well. Within two years of the inspection bureau’s inception spot traders were bringing their non-contract cotton to be graded, even though they were not required to do so.<sup>74</sup> These dealers found the NOCE certification smoothed their transactions, saved them the time (and possible expense) of arbitration, and made cotton better collateral for loans.<sup>75</sup> This voluntary involvement by spot dealers paved the

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<sup>70</sup> *AR*, 1910

<sup>71</sup> *AR*, 1910: 8

<sup>72</sup> *AR*, 1917

<sup>73</sup> *AR*, 1910

<sup>74</sup> *AR*, 1911

<sup>75</sup> Only the party whose judgment was overturned needed to pay arbitration fees.

way for NOCE to take another step towards integrating the spot and futures markets. In 1915, NOCE took over the duty of sampling—but still not *classing*—spot cotton. NOCE experts would draw a sample of every bale and store this sample for examination by interested buyers. If a seller so desired, this sample could thus be transferred to the board of classers for grading. The assigned certificates of grade would then be officially guaranteed by the exchange, and valid for delivery in the futures market. With a minimum of expense, traders could easily move cotton from the spot to the futures market.<sup>76</sup> In the crop year ending July 31, 1917, this movement from spot to futures markets occurred in 19% of the samples taken.<sup>77</sup> This meant that spot cotton could now move into the futures market just as easily as futures deliveries could be handled in the spot market.

Following the pattern described in the previous sections, actors in the spot market exerted a significant impact on the actual process of classification. Spot dealers delayed the introduction of a centralized certification system. But at least part of their opposition was misplaced. Even though NOCE acted against spot dealers wishes, they did so with the spot market's interest in mind. By centralizing grading, spots and futures were brought into closer contact, strengthening both.

As a whole, NOCE's system of classification reflected the importance of the spot cotton market in New Orleans. The needs of spot traders for consistency and uniformity informed their decisions regarding classification, certification and connection with other

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<sup>76</sup> AR, 1915

<sup>77</sup> AR, 1917

markets. The infrastructure that resulted supported a robust spot market with close ties to the trade in futures. These features kept speculation and commodity trade in a healthy balance up until federal regulation of the futures market in 1914.

## Conclusion

This chapter has described the development of two distinct grading systems on CBOT and NOCE. Each system was created within an economic, organizational, and institutional environment that shaped its workings. NOCE's system reflects an overarching concern with the spot trade. Decisions regarding classifications were made for the good of the spot market primarily, if not wholly. This orientation resulted in a market infrastructure that promoted hedging and a close relation between spot and futures markets. By contrast, CBOT's system was the product of an organization with little investment in the spot market. Spot dealers' need for accurate grading was constantly pushed off in favor of maintaining an uncertain status quo. This uncertainty made CBOT better suited to speculation in the futures market than to the actual trade of primary commodities.

These findings offer an interesting critique of current sociological theories about the classification. Most scholarship on classifications, and infrastructures generally, is most concerned with how infrastructures delineate the types of actors, things, and processes that can exist in a given setting (Foucault 1982). Analyses from this approach tend to have two features: first, they highlight the process of constructing an infrastructure as the critical moment for study. This is the moment when partisans battle

to enshrine the ontology that best suits their particular needs (Cronon 1991; Espeland & Sauder 2007; Foucault 1982; Miller & O’Leary 1987; Miller & Rose 1990). Second, they study the consequences of these infrastructures for the people who use them. They examine how people adapt their work practices so as to be in harmony with an infrastructure, whether by sincerely adopting it or by cynically engaging in ‘work arounds’ that allow them to continue the same practices, only labeled according to a new scheme (Barry 2001; Bowker & Star 1999; Edwards, et al. 2009; Millerand & Bowker 2009). We can think of this research as taking an ontological approach to the topic.

In opposition to this dominant ontological approach, my findings show the importance of taking a semiotic approach to classification. Theorizing classifications as semiotic entities requires a shift in focus from the moment of constructing classification schemes (Star 2002) to the practice of classifying itself (Hatherly, Leung & MacKenzie 2008). This latter, practical moment is when classifications acquire their semiotic content. As this process changes, so too the meaning of classifications is altered (Barnes 1983; Bloor 1997; Wittgenstein 1967). The significance of even the most basic economic classifications, such as ‘profit’ and ‘loss’, are constantly reshaped by the evolution of classifying practices (Hatherly, Leung & MacKenzie 2008). The meaning of a market’s closing prices differs according to the algorithmic processes by which it is produced (Muniesa 2007). A semiotic approach to infrastructure also is less concerned with the constraints imposed by an infrastructure and more interested in how individuals engage creatively with infrastructures as meaningful objects.

A semiotic approach is more useful than an ontological approach for understanding the significance of classifications in these cases. Different types of trades had different semiotic requirements for classifications. For instance, for speculation that did not end in delivery, the grade was only required to specify which commodity's market price was the object of the speculative bet. For the purposes of this type of trade, a futures contract for Colorado Red Wheat was essentially a bet on the price of the commodity being marketed as 'Colorado Red Wheat'—the physical qualities represented by this label could be entirely arbitrary. Hedging, by contrast, required grades to work in both futures and spot markets. For a grade to function well in the spot market the content of classifications was paramount: the grading system had to provide a fair recompense to farmers based on the quality of their product and an accurate guide to manufacturers, who required their raw materials to meet certain physical standards. If grades did not accurately index these physical dimensions, the spot market component of the hedge would be unsatisfactory.

To put this in explicitly semiotic language, speculation only required the classification system to produce viable symbols, or to act as a *symbolic infrastructure*, i.e., a logically coherent classification systems within which signs are meaningfully related.<sup>78</sup> Hedging, in addition to this symbolic infrastructure, also required a classification system that produced signs indexed to the physical qualities of

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<sup>78</sup> I rely here on Peirce's (1931-1958) trichotomy of signs: icons, indexes, and symbols. Icons signify through their resemblance to their object (e.g., a picture of a cigarette with a slash through it indicating, 'No Smoking'); indices signify through pointing to their object (e.g., dark clouds and strong winds as a sign of impending rain); symbols signify through their connection to other symbols and their associations (e.g. words, which are meaningful primarily through their connection with other words in a language). Any sign can signify in any combination of one or all of these modes.

commodities, i.e., an *indexical infrastructure*.<sup>79</sup> For indexical infrastructures, issues of practice—i.e., how grading was accomplished and integrated into the market—were critical. Recognizing these different semiotic infrastructures also makes possible an analysis of their interchange. How did grades move from acting as symbols to acting as indexes? This was a critical question on the occasions when the commodities specified on a futures contract were actually delivered in fulfillment of that contract. The exchanges' distinct arrangements for translating between these semiotic functions acted as border objects or gateways (Star & Griesemer 1989; Edwards 2010), shaping behaviors on the market.

The key difference in how the two exchanges mediated this translation from symbol to index was the presence of a warehouse receipt on CBOT, and the lack of one on NOCE. On CBOT, the receipt and the legal apparatus in which it was embedded, automatically linked the grade as a symbolic entity and tool of speculation to the grade as an indexical guide to the material commodity. This established what we might call “indexicality by fiat.” Traders who needed to settle a contract through delivery could simply buy receipts for the proper grade of wheat, and rest assured that these would satisfy their obligations. The receipt served to isolate speculators on the futures market from any cost related to handling and classifying wheat, even on the occasions when they

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<sup>79</sup> Though not featured in either of these case, *iconic infrastructures* also exist. The clearest example of an iconic infrastructure is a field guide, a pictorial system for classifying species of birds or plants. Iconic infrastructures are unique among the three types in that their status as *infra*-structural is most likely to fluctuate. While in routine cases of classification these icons are used passively as a background guide for everyday practice, they are also actively reference in more difficult cases: birders carry field guides in their packs and refer to them when they spot an unfamiliar species. Iconic infrastructures thus move fluidly between being infrastructures that invisibly support tasks and being highly visible tools.



were forced to deliver it. By contrast, in NOCE's system, speculators who were forced to deliver cotton had to confront cotton as a physical object, in a process of "indexicality by negotiation." This introduced a potentially substantial cost to settling by delivery. Parties had to hire expert classers to negotiate a grade, and even then risked losing money on the deal due to changes in grade from one transaction to another. The difference in how grades were incorporated into practice on each exchange—as permanent inscriptions on warehouse receipts on CBOT and as negotiated agreements between private parties on NOCE—thus shaped traders' orientation to settling contracts through the delivery of goods.

This difference, in turn, was highly consequential for market stability. On NOCE, the possible cost of converting futures contracts to actual commodities placed a check on speculation in the futures market. Speculators were wary of the risks and costs associated with physical delivery, and would attempt to rid themselves of any contract they suspected might require it, even to the point of selling at below market price (Garside 1935). CBOT's system of 'indexicality by fiat' removed this brake. Speculators could be confident that they could, quickly and at no extra cost, secure warehouse receipts which would satisfy their contracts. The differences in the semiotic character of grades produced on CBOT and NOCE thus promoted contrasting behaviors on their derivative markets. The low spot market fidelity of CBOT's grade made hedging difficult, while the permanent relation between its symbolic and indexical functions enabled unfettered speculation. NOCE's grade, by contrast, had high spot market fidelity,

allowing for safe hedging, and an uncertain, costly method of linking symbolic and indexical functions, which tamped down speculation.

The grading systems analyzed above were critical infrastructural components; they constructed information about physical commodities that enabled their inclusion as abstract goods in standardized futures contracts. Each exchange needed its own grading system as a prerequisite to its own futures market. But of course, markets were not islands. Each market needed to be able to bring in for the use of its members information about the growth and movement of spot crops, as well as price quotations from world markets. They also needed to disseminate the price data produced on their own market to other exchanges and trading offices. Achieving these goals required building infrastructures, such as telegraph systems and crop reports, that moved information from city to city, and between the city and country. It is to these information-moving infrastructural components that I turn next.

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## Chapter 4 – Moving Information

While creating a system of grades was a critical prerequisite to futures trading, it did not encompass the entirety of infrastructure needed by these global futures markets. Grades and standards were a categorical infrastructure, which gave each market a language with which to operate.<sup>1</sup> In this chapter, I focus on the transmission infrastructures by which each market connected to its surroundings. I analyze both the social forces that influenced the formation of these information-moving infrastructures and the consequences of those infrastructures for each market.

I look specifically at the gathering and dissemination of two types of market-related information: price quotations and crop statistics. Quotations were the prices at which commodities and futures were bought and sold on exchanges. In high-volume auction markets, this information was being constantly produced, and was the primary way in which traders came to know the state of the market. Quotations were relayed to other exchanges via telegraph, to be displayed—and continuously updated—on blackboards for the use of traders. Gathering this information from other markets was obviously a goal of this infrastructure. But just as important was the widespread distribution of a market's own quotations: the more widely a market's quotations were considered, the more influence it had to move the market itself. Crop statistics provided a different type of information, not about the price of futures but about the growth, movement, and consumption of the underlying crop. Whereas price quotations arrived in

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<sup>1</sup> Though, of course, in the previous chapter we also saw that grades were constructed in concert with other exchanges, meaning that they are not *entirely* internal.

seconds or minutes, crop statistics came weekly or monthly. They allowed traders to understand the current market situation holistically and historically, discern trends in supply and demand, and estimate probable future states of the market—i.e., to adopt a rational, calculative approach to trading. Price quotations and crop statistics thus provide the short-term and long-term information by which traders make their decisions in the futures market.

CBOT and NOCE, as organizations, assigned different values to each type of information and had distinct methods for gathering them. Their perspectives were shaped by the social and economic environments on each exchange. CBOT's policies on price quotations varied over the years in relation to the actions of two powerful nemeses: the Western Union telegraph company and bucket shops.<sup>2</sup> The Board battled these two groups for control over and access to the valuable price quotations on the exchange floor. Regarding crop statistics, CBOT publicized the data compiled by other sources, including the United States Department of Agriculture and private crop experts, but did not produce any information themselves. The information they publicized was widely recognized to be unreliable, and CBOT did not take steps to improve this situation. Influenced by their battle with Western Union and the bucket shops, CBOT treated information as private property, which the Board need not be involved with vetting or equally distributing. NOCE's policies on both price quotations and crop statistics were motivated by the economic and cultural desire to be independent of northern and foreign markets. Long-

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<sup>2</sup> Bucket shops were gambling parlors where the public could bet on fluctuations in the price of commodities being traded on CBOT. Price quotations were transmitted from the Board's floor to the shops by telegraph.

time Exchange Secretary Henry Hester built a statistical system that gained worldwide acclaim, making New Orleans a worldwide center for cotton statistics and earning Hester renown as the “Father of Cotton Statistics.”<sup>3</sup> But while NOCE was successful in creating the infrastructure for gathering crop statistics, its efforts at building a reliable telegraphic infrastructure for transmitting price quotations faltered. NOCE, beginning from a dilapidated physical infrastructure, simply did not have the economic leverage to pressure Western Union and the New York Cotton Exchange into making the changes that would have sped up service.

These policies on collecting crop statistics and price quotations resulted in markets with distinct information milieus that promoted divergent economic behaviors. On CBOT, the lack of Board-verified information created a two-tiered system: traders with better information, faster telegraphic service, or superior ability to sift out nuggets of truth from the sea of dubious claims had an advantage over other members—rightfully so, according to the Board. This inequality and unreliability both made long-term market projection difficult and did little to lower uncertainty in the short-term, making speculation on short-term price fluctuations a profitable strategy. NOCE, on the contrary, produced a wealth of reliable statistics on the growth, movement and consumption of cotton for the benefit of members. Crop statistics allowed traders to understand the current market situation historically and holistically, to discern trends in supply and demand, and to estimate probable future states—i.e., to adopt a rational, calculative

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<sup>3</sup> Frost, Meigs. 1926. *“Hester Says”: An Intimate Personal Sketch of the World’s Greatest Cotton Authority*, Theo. H. Harvey Press, New Orleans.

approach to trading. Additionally, the lack of speedy telegraphic services made speculation in futures, which required quickly spotting market opportunities, more difficult. Thus, traders on NOCE worked with much information about the long-term state of the cotton spot market, but little that could serve as fodder for short-term speculative trades. The systems by which the exchanges gathered and disseminated information in the form of price quotations and crop statistics, thus affected the types of trading prominent on each market.

#### Chicago Board of Trade

CBOT's policy on price quotations was determined in large part by their fear of two outcomes: a Western Union monopoly over telegraph services, and the unchecked growth of bucket shops. Since Western Union was a prime provider of CBOT's price quotations to bucket shops around the country, these dangers were interconnected: the more inescapable Western Union became, the less CBOT could do to keep quotations away from bucket shops; the larger bucket shops grew, the more incentive Western Union had to seek their continued business. The three-way battle that took place was fought largely through the courts, and extant histories have featured this legal component prominently. My analysis builds on this scholarship by situating these court battles in relation to CBOT's concurrent attempts to circumvent Western Union altogether and to leverage the value of their price quotations in their negotiations. These economic

maneuvers were critical to the information infrastructure that was eventually built on CBOT with respect to price quotations.

### Building alternatives to the Western Union monopoly

By the early 1870s, CBOT and other exchanges were becoming wary of Western Union's growing control of the telegraph market, with good reason. Western Union acquired several major competitors during the 1860s and 1870s (John 2010). In 1866, they swallowed up the United States Telegraph Company and the American Telegraph Company, the latter being one of its principle rivals. They further expanded in 1877, acquiring the Atlantic & Pacific Telegraph Company, which ran a competing line on the important Chicago-New York corridor. In 1881, they essentially acquired the American Union Telegraph Company by hiring its majority owner, Jay Gould, as their new president. CBOT and other exchanges noted that the mergers had led to price increases, as well as refusals to take complaints seriously or make necessary technical upgrades. Higher prices, the exchanges argued, were not going to improvements of service, but rather to paying dividends on Western Union's highly inflated stock.<sup>4</sup>

CBOT's concern over monopoly led them to endorse federal regulation of the telegraph in the early 1870s, and also to support the establishment of a state-run system of telegraphy. But they also sought to exert their own power directly. The Board's

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<sup>4</sup> *BDR*, Box 7, Folder 5, Feb. 8, 1881

relationship with the telegraph company was symbiotic: exchanges relied on the telegraph to facilitate modern worldwide trade, and telegraph companies needed the volume provided by exchanges in order to be profitable. In the latter half of the 19<sup>th</sup> century, financial news and quotations traveling between the world's exchanges made up the bulk of the information being sent by telegraph. CBOT used this need to their advantage, leveraging their status as the world's leading grain market to exert significant pressure on Western Union.

The first instance of CBOT pushing back against Western Union came in 1880, when several members, in conjunction with several Milwaukee businessmen, formed a new telegraph company that directly linked the grain exchanges in both cities, circumventing Western Union's wires. The company—named the Chicago & Milwaukee Telegraph—was an unqualified success. The company's Board of Directors was comprised entirely of Milwaukee and Chicago grain men; stock was non-transferable except by consent of this board, a fail-safe designed to keep Western Union from gaining financial control of the company, as they had with many other competitors. The cost of constructing the line was recouped within two years of operation, and the company earned 50% and 60% dividends in its first two years.<sup>5</sup> Additionally, the competition they offered drove down Western Union's prices. In 1880, at the time of the Chicago & Milwaukee's founding, Western Union charged twenty-five cents for a ten word message between the cities; in the coming years, upon losing a good portion of their business,

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<sup>5</sup> "Cheap Telegraphing Pays," *Chicago Tribune*, May 26, 1886, p.9



Western Union reduced their rates between the two cities first to fifteen, then to five cents per ten words.<sup>6</sup>

Following the success of this maneuver in Milwaukee, the Board attempted to make the same direct connection with the Merchant's Exchange in St. Louis. Members of the Chicago and St. Louis exchanges, claiming that consolidation of telegraph companies had eliminated all competition along the route between their cities, chartered the Board of Trade Telegraph Company in December 1881 to directly link their buildings.<sup>7</sup> By the end of November 1882, construction of the line was nearly complete: poles had been planted and wires hung from Chicago to East St. Louis, from which point the Company planned to lease space on the Baltimore & Ohio Company's poles running into St. Louis proper.

But Western Union, having learned the lesson of the Chicago & Milwaukee Telegraph Company, put up significant resistance to this final stage. They sent out gangs of armed men on several occasions to cut down the Board of Trade Company's wires, finally having them camp at the site to prevent any repairs.<sup>8</sup> When the Board of Trade telegraph sought redress in court, Western Union argued that the lines were cut because they were in violation of an agreement between the Baltimore & Ohio Company and the belt railroad that encircled St. Louis.<sup>9</sup> Western Union impressed upon the Wiggins Ferry Company and Illinois & St. Louis Railroad Company, which together owned much of the land in the area, to take out injunctions against the Board of Trade Telegraph Company,

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<sup>6</sup> "New Line of Telegraph," *CT*, Apr. 19, 1890, p.3

<sup>7</sup> "Telegraph War," *CT*, Nov. 29, 1882, p.3

<sup>8</sup> "Judge Wall Hearing the Case of the Board of Trade vs. Western Union at East St. Louis," *CT*, Jan. 15, 1883, p. 8

<sup>9</sup> "Telegraph War," *CT*, Nov. 29, 1882, p.3

preventing them from running wires across their property.<sup>10</sup> At this point, the fate of the Company moved to the courts. It suffered an early defeat when, in March 1883, a judge in St. Clair County Circuit Court declined to dissolve the injunction filed by the Illinois & St. Louis railroad.<sup>11</sup> Adding to this, Western Union succeeded in having a suit moved from state to the Federal Court, lengthening the process for resolving the case.<sup>12</sup> In February 1884, facing these legal setbacks and losing between \$500 and \$1,000 every day as their wires sat idle, the stockholders of the Board of Trade Telegraph Company conceded defeat—partially. While they did give up their plan to create an independent telegraph company, they still gave a long-term lease of their line to a new rival of Western Union, the Bankers' & Merchants' Telegraph Company of New York.<sup>13</sup>

In the midst of this battle over the Board of Trade Telegraph Company, CBOT engaged Western Union on another front: the dissemination of quotations to bucket shops. On December 16, 1882, CBOT notified Western Union that they must cease furnishing quotations to bucket shops within two weeks or they would be kicked off of the floor of the Board and deprived of quotations altogether.<sup>14</sup> This was CBOT's first attempt to leverage the value of their quotations to influence Western Union's policies on dissemination of information. Western Union rejected the proposed change, stating that its execution would be impracticable and would cost both them and the Board of Trade

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<sup>10</sup> "Judge Wall Hearing the Case of the Board of Trade vs. Western Union at East St. Louis," *CT*, Jan. 15, 1883, p. 8

<sup>11</sup> "The Board of Trade Telegraph Company's Woes," *CT*, Mar. 15, 1883, p.8

<sup>12</sup> "The Board of Trade Telegraph Company," *CT*, Feb. 10, 1883, p.12

<sup>13</sup> "Telegraph's Consolidation," *CT*, Feb. 12, 1884, p.8

<sup>14</sup> *BDR*, Box 8, Folder 10, Feb. 28, 1882; *BDR*, Box 8, Folder 47, Nov. 21, 1882

business.<sup>15</sup> When the two week mark came, CBOT did not follow through on their threat, but continued to use the possibility of cutting off quotations as a bargaining chip. However, their ability to use this chip was curtailed by an 1883 court ruling that forbade the Baltimore and Ohio Telegraph Company from withholding quotations from any paying customer, even a bucket shop. Western Union pointed to the injunction to claim that they faced legal reprisal for discriminating among recipients, as CBOT asked. Given the unfavorable legal environment, CBOT backed away from this position. But, as will be seen later in this chapter, it would return in a more favorable environment twenty years later.

The final attempt to fight Western Union at this early period was the effort to create an exchange-owned line between Chicago and New York. Linking the two major financial centers of the United States, this would be the Holy Grail of telegraphic independence. In January 1881—at the same time as the Board of Trade Telegraph Company was attempting to link Chicago and St. Louis—two different groups, one centered in New York, the other in Chicago, began planning a telegraph that would connect their cities. The effort had the support of the most important exchanges in New York City. The presidents of the New York Produce Exchange, Cotton Exchange and Petroleum Exchange wrote a joint letter to several major exchanges across the country urging them to support this effort. The planned company would follow the template of the Chicago & Milwaukee Company, vesting voting power on over one-half of the stock in a Board of Trustees, a majority of whom would be presidents of commercial

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<sup>15</sup> *BDR*, Box 10, Folder 2, Dec. 29, 1883

exchanges.<sup>16</sup> CBOT responded positively to this letter, appointing a committee to confer with committees from other exchanges on the matter. By October 1883, the New York Produce Exchange was ready to move forward on a plan to incorporate. It had discovered extant lines that ran from Weehawken, NJ, to 8 miles outside of Chicago, which the proposed company could appropriate for their own use. The cost of additional construction and operation were outlined, as well as the projected revenues. CBOT, however, declined to get involved. They offered little explanation, other than citing “the result of previous attempts of a like character,” likely a reference to the Board of Trade Telegraph Company, which, at the time, was losing money and mired in a prolonged legal battle with Western Union.<sup>17</sup>

The history of CBOT’s early efforts to form independent telegraph companies or dictate policy to Western Union was thus mixed. The Chicago & Milwaukee Telegraph Company was an early success, but later efforts were stymied by lengthy legal battles and adverse court decisions. Despite this checkered history, the Board clearly established that they could credibly resist Western Union: the Chicago & Milwaukee Telegraph forced down prices; the sale of the Board of Trade Telegraph Company built up a new competitor. The threats of establishing independent telegraph lines and imposing restrictions on quotations remained viable negotiating strategies, to which CBOT would return in later years.

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<sup>16</sup> *BDR*, Box 7, Folder 10, Mar. 22, 1881

<sup>17</sup> *BDR*, Box 9, Folder 34, Nov. 10, 1883

### William T. Baker and the telegraphic blackout

The early years of the Board's fight for control of their quotations was against Western Union. The next phase took on the bucket shops directly. There were two components of the Board's antipathy to bucket shops. One was economic: bucket shops drew away business that might otherwise have gone to the exchange. This diffusion of trading meant that Board prices aggregated less information, which decreased their authoritativeness. The second, more significant, piece of their opposition was that bucket shops impaired the legitimacy of the Board itself. Many bucket shop patrons thought that the shops and Board of Trade were affiliated, and thus blamed the Board when bucket shops acted unscrupulously. Others in the public hit upon the similarities between the two establishments to impugn the activities of the Board as nothing but gambling. Bucket shops precipitated and featured prominently in federal anti-futures legislation aimed at exchanges throughout the period of my research.

The fight against bucket shops from 1883 to 1889 took place in a highly litigious and uncertain environment (Lurie 1979). Bucket shops sought out injunctions against the telegraph companies and the Board of Trade, seeking to preserve the flow of quotations, while the Board countered that their quotations were private property and could be disseminated in any way they saw fit. The lower courts were inconsistent in their decisions on these injunctions, and CBOT was not willing to make any substantial moves until a test case had been decided by a higher court. This case came in 1889 and the result was not favorable to the Board. The Illinois Supreme Court ruled in the case of *New York and Chicago Grain and Stock Exchange v. Chicago Board of Trade* that the Board's

price quotations were vested with a public interest, and thus could not be withheld from any groups without first proving the illegality of their business. Subsequent court decisions even struck down the Board's attempts to impose more minor restrictions, such as distributing quotations only to Board members or replacing continuous quotations with transmissions at fifteen minute intervals. By the end of the 1880s, nearly a decade into the fight over price quotations, CBOT found themselves constrained by legal setbacks and with few options for controlling quotations.

In January 1890, faced with this conundrum, the Board elected William Baker as president on a platform of all-out attack on bucket shops. Baker argued that the Board needed to keep continuous quotations from bucket shops at all costs. If the courts would not allow the board to supply quotations to legitimate traders while weeding out the bucket shops, then the only option was to cut off quotations to all parties. Baker's "blackout" policy was enacted a few months later. On March 31, 1890, CBOT eliminated the department of market reports and ended the dissemination of continuous price quotations from the floor of the exchange. This policy excluded telegraph companies from the floor and restricted the timing of members' private telegraphic correspondence, so that instantaneous and continuous quotations could not be made.<sup>18</sup> It cut off the flow of quotations not only to bucket shops, but also to commission houses and exchanges around the world. It was a drastic policy, but one which the Board believed was made necessary by the danger of bucket shops and the unfavorable rulings of the court.

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<sup>18</sup> *OR*, MAM Box 5, Folder 18, 1891

Baker's policy faced numerous difficulties. Members, unable to speedily furnish their clients with information, were put at a disadvantage compared to traders on other exchanges.<sup>19</sup> The policy also gave a significant advantage in speculation to traders from large commission houses that were equipped with a private telegraph wire. These traders could still receive continuous quotations from other markets, while those relying on the public wire received only periodic updates. Their constant updates allowed them to act on information that had not yet reached members by the public wire. Finally, most galling to Board members, continuous quotations were still making their way off the floor and to outside parties despite the ban. Board members went to extreme lengths to get quotations out: members formed pools to collect and disseminate quotations<sup>20</sup>; commission houses ran secret wires to bucket shops; traders stood by the windows and used hand signals to communicate with correspondents outside the building (Taylor 1917). Several Chicago bucket shops actually grew during the first year of the policy, and even bucket shops in Minneapolis and St. Louis were posting quotations.<sup>21</sup> Board member Robert Lindblom, an outspoken critic of the plan who sued the Board for restricting his access to the telegraph, argued that the policy was a failure:

It is well known that in New York, in Minneapolis, in St. Louis, in Chicago, any man who wishes to pay \$1.00 a week can get every shade of quotation that is made on the Board of Trade. My own correspondents in New York who are not members of this Board have had these quotations for a years and a half, and have had this advantage over a member, that while he has had them I have been prohibited from receiving or

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<sup>19</sup> *OR*, MAM, Box 6, Folder 2, 1892

<sup>20</sup> *OR*, , Box 5, Folder 3, Mar. 31, 1890

<sup>21</sup> *OR*, Box 5, Folder 14, Nov. 9, 1891; *OR*, Box 5, Folder 14, Nov. 12, 1891

disseminating them.<sup>22</sup>

The blackout policy was failing to achieve its aim, disadvantaging Board members and failing to achieve its primary goal. After two years, Baker was voted out of office and continuous quotations restored. For the remainder of the 1890s, the Board made no headway in their legal right to control quotations: private telegraph companies collected the quotations at their own expense, and distributed them freely for own their benefit.

#### Control over quotations

In 1899, the Board hired a new attorney, a young Wisconsin Law School graduate named Henry S. Robbins. Unlike his predecessor, who, for the previous eight years had “ever striven to keep the Board out of litigation” (Lurie 1979: 165), Robbins believed the time was right for the Board to take the offensive in litigation against bucket shops. He soon had the opportunity, when in February 1900 a prominent bucket shop, the Christie-Street Commission Company, filed an injunction against the Board of Trade to prevent any cessation of market quotations. In arguing the case, Robbins actively sought to prove that the Christie company was doing an illegitimate business, a strategy that the Board’s prior attorney had thought unwise.

As part of their new offensive strategy, in May 1900, while awaiting judgment in the *Christie* case, the Board announced that it would resume collecting quotations from the floor of the exchange, taking that task away from the telegraph companies (Lurie

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<sup>22</sup> *OR*, Box 5, Folder 14, Nov. 12, 1891



1979). This was largely understood as a first step toward exerting greater control over quotations by inserting CBOT's own agents in between the trading on the floor and the Western Union company.<sup>23</sup> This step paid dividends when, on June 20<sup>th</sup>, the *Christie* case was decided in the Board's favor, stating that the bucket shop did an illegal business and thus had no right to quotations from the Board of Trade. The following day, the Board notified Western Union that they would turn over price quotations for transmission only if the telegraph company agreed to limit their dissemination to approved recipients. As they had nearly twenty years before, Western Union rejected this proposal. But this time, in the more encouraging legal environment, CBOT actually followed through on their threat and, on August 1, stopped providing continuous quotations to Western Union. Instead they provided updates every five minutes, a significant decrease in business.<sup>24</sup>

Over the next eight months, as Western Union continued to only get periodic price quotations, CBOT increased the pressure. They did this not through additional court victories, but by an older strategy: threatening to circumvent the company with exchange-controlled competitors. In September 1900, CBOT signed with the Cleveland Telegraph Company to provide continuous ticker service in the city of Chicago. Their contract gave CBOT full control over who received their quotations: Cleveland submitted a statement to the Board every sixty days listing the names of persons who received continuous quotations, and the Board was given authority to cut off transmissions to any recipient they deemed illegitimate.<sup>25</sup> In addition to contracting with the Cleveland Company for

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<sup>23</sup> "Aimed at Bucket Shops," *CT*, May 26, 1900, p. 13

<sup>24</sup> "Plan Lines For Their Own Use," *CT*, Jul. 31, 1900, p.5

<sup>25</sup> "Want Market Wires Cut," *CT*, Sep. 9, 1900, p.7

local ticker distribution, CBOT revived the plan to build an independent line linking Chicago and New York. The Board, working through a group of New York businessmen, incorporated the Exchange Telegraph Company in October 1900, with the goal of linking Chicago not only to New York but also Peoria, Indianapolis, St. Louis, Omaha, Sioux City, Kansas City, Minneapolis, Duluth, Milwaukee, Toledo, Cincinnati, Detroit, Philadelphia, Baltimore, Boston, and Buffalo.<sup>26</sup> The company projected that wires could be up and running in just over four years.

While these projections may have been overly optimistic in their details, the threat to Western Union was still meaningful. They were already losing money from the lack of continuous quotations and confronting the possibility of further pro-CBOT court rulings, and now faced the possibility of a significant, exchange-controlled competitor. As a result, Western Union signed a contract that made serious concessions to the Board. Prior to CBOT taking control of collecting quotations in August, Western Union had paid \$6,000 a year for continuous quotations, with no restrictions on their distribution, servicing offices in Chicago and beyond. In March, when they finally signed a new contract for continuous distribution, they were paying \$30,000 a year, had agreed to furnish quotations only to Board-approved recipients<sup>27</sup>, and given Cleveland Telegraph Company exclusive rights to distribute quotations inside the city of Chicago.<sup>28</sup> When Western Union returned to the floor of the exchange on April 1, it was under conditions

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<sup>26</sup> "Vote For a New Telegraph Line," *CT*, Sep. 15, 1900, p.3; "Enters Telegraphic Field," *CT*, Oct. 7, 1900, p.8

<sup>27</sup> Each approved recipient of quotations had their own set of requirements to meet, which ensured that quotations were not then used for gambling purposes (*BDR*, Box 43, Folder 5, Oct. 23, 1900).

<sup>28</sup> "Quotation War May Be Ended," *CT*, Nov. 11, 1900, p.8; "Quotation War to Continue," *CT*, Nov. 20, 1900, p.4

crafted by the Board to ensure their complete control over price quotations.<sup>29</sup>

The 1905 U.S. Supreme Court ruling on the appeal of *Christie*, which upheld CBOT's right to control its quotations, settled all quotation-related legal questions in favor of the Board. Following this ruling, CBOT kept its quotations under close control. Primarily, this meant cutting off quotations from bucket shops, which withered away. By 1917, for the first time in nearly forty years, there were no bucket shops in operation anywhere in the country.<sup>30</sup> But the Board also used its newly established property right to keep quotations away from a second less noxious, but still problematic, group: small speculators in country towns. Experience with proposed federal legislation in 1890 and 1891 had shown the Board that speculative losses by farmers and country traders provided ample fodder for denunciations of the Board of Trade. Seeking to head off hostile legislation, the Board, in March 1911, cut off quotations to recipients in towns with less than 10,000 inhabitants; in 1918, the cut-off was raised to 25,000.<sup>31</sup> Parties in cities that did not meet this mark could apply for an exemption to the rule, but had to guarantee that quotations would not be made public, and would only be for private use.<sup>32</sup> This policy aimed not only to forestall anti-futures legislation, but also to maintain the credibility of the Board's past legal arguments. President Frank Bunch, in his 1912 address to the Board made this connection:

It took ten years or more of ceaseless work in the courts and the expenditure of many thousands of dollars to obtain our present position,

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<sup>29</sup> *OR*, MAM, Box 9, Folder 27, 1902

<sup>30</sup> *OR*, MAM, Box 14, Folder 13, 1917

<sup>31</sup> *OR*, MAM, Box 13, Folder 1, 1911; *OR*, MAM, Box 14, Folder 15, 1918

<sup>32</sup> *BDR*, Box 68, Folder 12, Mar. 14, 1911

where we have absolute and unlimited control of our quotations. The strength and justice of our claims were only realized by the courts when we showed that the quotations were not distributed indiscriminately among the public but were at all times subject to our control. It therefore behooves all of us to guard with the greatest care the dissemination of these quotations in order that, if legal complications shall arise again in the future, we can sustain our identical position, as we did in the past and are doing at the present time.<sup>33</sup>

Since CBOT had won the right to control its quotations, they bore responsibility for the dissemination of those quotations. The legal path that they took to defeating bucket shops pushed them toward an even broader conservatism in disseminating quotations than they had initially pursued.

CBOT's varying policies on price quotations were responses to the needs of their battles against the monopoly of Western Union and growth of bucket shops. Their power in fighting both came not just from victories in the courts, but from their ability to effectively pressure Western Union using both the threat of creating alternate, exchange-controlled telegraph companies and the value of their quotations as bargaining chips. The animating argument behind these policies was the belief that price quotations were private goods that could be controlled or withheld as desired. Below, we will see how this belief pervaded CBOT's perspective on information more generally, including their ideas about crop statistics.

### Conflicting and unreliable crop statistics

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<sup>33</sup> *OR*, MAM, Box 13, Folder 8, 1912: np

CBOT did not give much attention to the task of providing members with statistics on the growth, movement and consumption of grain. The Board did not gather any statistics itself, and simply passed on statistics from government and private sources with no effort to vet them for accuracy. Information was often highly general or unreliable. This is, of course, not to say that no one on the Board operated with good information. But CBOT as an organization did nothing to encourage the creation or gathering of this information. Good crop statistics—like price quotations—were private goods to be acquired and utilized by individual members, rather than public goods provided by the Board. This created an environment where the statistics provided to members could not serve as the basis for any rational, long-term prognoses of the market. As the *Chicago Tribune*, echoing a refrain among traders, stated: on CBOT, “the man who trades on statistics is on the highway to ruin.”<sup>34</sup>

CBOT began producing weekly statements on the movement of grain through the city in the 1860s. But these statistics were too general to tell traders anything about the supply of wheat in the city. The report gave total amounts of wheat, corn, soybeans, and other commodities going into and out of warehouses, but did not distinguish these amounts by grade.<sup>35</sup> Since contracts were made for one particular grade only, this general information was of limited use. Similarly, in records of the movement of wheat, no distinction was made between wheat that was actually warehoused in the city and that which simply passed through the city, or was sold in the city but shipped from another location, such as Milwaukee (Taylor 1917). This made it difficult to know how much

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<sup>34</sup> “Article 4 – No Title,” *CT*, Feb. 21, 1891, p.4

<sup>35</sup> *Publications*, Box 64, Folder 21, Apr. 19, 1862

wheat was actually in the city's warehouses. It was not until 1886 that the Board moved from this omnibus method of keeping accounts to a "more enlightening system of book-keeping" that included these relevant distinctions.<sup>36</sup>

Comparative, multi-city data on the movement and price of wheat came even more slowly. In 1909, the Federal Department of Commerce's Bureau of Statistics complained that they were unable to make accurate national monthly reports of grain receipts and shipments because there was no uniformity in the book-keeping methods utilized by the country's exchanges.<sup>37</sup> In 1910, the Council of North American Grain Exchanges complained that the trade lacked a daily market report that would compare price information across multiple exchanges.<sup>38</sup> Traders on CBOT, and others in the wheat trade, were unable to gain a complete picture of the movement, consumption, or price of wheat across the country.

While statistics on the extent of the growing crop were more plentiful than those tracking its movement, they were still of dubious value (Pietruska 2012). The United States Department of Agriculture's Division of Statistics began publishing monthly crop reports in 1863. The USDA compiled their statistics using reports from hundreds of thousands of correspondents submitting from across the country.<sup>39</sup> Each correspondent reported on the area planted, the condition of the crop, and its yield per acre for a particular assigned area. These reports were not numerical measurements, but rather

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<sup>36</sup> *OR*, Box 2, Folder 10, Feb. 26, 1886

<sup>37</sup> *EOR*, Box 437, Folder 2, May 8, 1909

<sup>38</sup> *CBOT Affiliates*, Box 77, Folder 7, Feb. 8, 1910

<sup>39</sup> Willis (1902) puts the number at "perhaps two hundred and fifty thousand," almost all of whom were unpaid volunteers.

estimates of the forthcoming crop in relation to the previous year's crop. Correspondents reported their estimate as a percentage: taking the previous year's crop as equal to 100, they would assess whether the crop was, for example, 10% less (reported as "90"), 10% more (reported as "110"), or any other value. These returns were then weighted and converted into a statewide percentage.

Though one could certainly find fault in this method of estimation, the real source of error came in how the USDA converted these percentages into quantities. To do so, USDA statisticians made calculations using crop data from the most recent decennial census. The problem with this method was that figures became progressively less accurate the further one moved from the date of the census. Any errors in estimation were compounded when they served as the basis for the following year's estimates, and so on (Willis 1902). The USDA's chief crop statistician admitted in September 1886 that, as a result of this system, their current estimates of the growing crop were probably about 10% too," low.<sup>40</sup> Despite this awareness, and pledges to fix these shortcomings, government crop reporting remained inaccurate for decades.<sup>41</sup> In 1912, according to CBOT's board of directors, government crop reports were still prone to "significant error" and "radical correction."<sup>42</sup>

Further complicating the value of the USDA's data was the fact that their figures did not always match those produced by other government agencies. Many state Agriculture Boards made up their own statistics, which could diverge remarkably from

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<sup>40</sup> "Crop Statistics," *CT*, Sep. 22, 1886, p.6

<sup>41</sup> "Improved Crop Statistics, *CT*, Sep. 23, 1895, p. 6

<sup>42</sup> *OR*, Box 2, Folder 10, Aug. 23, 1912

the USDA's.<sup>43</sup> For example, in May 1888, the USDA reported that about 776,300 acres of winter wheat was growing in Kansas, while the Kansas Board of Agriculture put the figure at 1,210,500 acres, over 50% higher.<sup>44</sup> Additionally, USDA's figures did not always match those provided by the Census Bureau. In 1902, the two departments entered into a protracted debate over the significant divergence in their numbers, leading a contemporary observer to remark in *The Journal of Political Economy* that the USDA's numbers "[were] and perhaps under existing circumstances must necessarily be, so wide of the real facts of the case as to be practically worthless as a guide to traders and speculators" (Willis 1902).

In addition, correspondents were known to underreport their harvests or refuse to return forms. This was often done on the advice of local organizations which taught that publicizing crop figures depressed prices in foreign markets.<sup>45</sup> This attitude was not just found among farmers. An 1886 CBOT committee appointed to examine the financial state of the Board expressed a desire to keep production statistics close to the vest, stating that "the benefits derived from this constant *advertising of our stocks* are considered by some members doubtful."<sup>46</sup> This skepticism was even found in high federal offices. In May 1894, Secretary of Agriculture J. Sterling Morton claimed that crop statistics exerted a depressing influence in foreign markets by building up the expectation of great crops, and should thus be eliminated.<sup>47</sup>

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<sup>43</sup> "National Crop Reporting," *CT*, May 4, 1894, p.6

<sup>44</sup> "Misleading Crop Statistics," *CT*, May 17, 1888, p. 4

<sup>45</sup> "Inaccurate Crop Statistics," *CT*, May 29, 1893, p.4

<sup>46</sup> *OR*, Box 2, Folder 10, Feb. 26, 1886: np, emphasis added

<sup>47</sup> "National Crop Reporting," *CT*, May 4, 1894, p.6



All of these features made government figures poor guides to the crop situation. This information void created a demand for data that was met by independent statisticians and market prognosticators, who publicized their findings in circulars distributed by private commission houses. These reports mixed scattered statistical information with a healthy dose of gut feeling and estimation; unsurprisingly, they varied greatly. The *Chicago Tribune*, as early as 1887, was denouncing the reports of these “private-wire oracles,” saying that, “No two of them ever agree upon a prophecy—indeed they rarely agree upon statements of fact—and again no one of them yet was ever known to advise his Chicago correspondents and their customers to keep quiet and await events.”<sup>48</sup> Despite their inaccuracies, these reports continued to have a central role in the grain trade. A 1918 letter from commission merchant and prominent Board member C.H. Canby expressed frustration with the very same problem mentioned by the *Tribune* twenty years earlier:

I would also call attention to the situation surrounding some of our commercial news reporters who make a specialty of so weaving together different disconnected threads in the situation covering all kinds of theories in regard to car supply, the crop position, and movement, as to bring about exactly the kind of speculative excitement, or undue unrest, in the minds of the trade which, when apparently supported by the reputation of a leading newspaper, gives it an importance unwarranted, and in many instances totally misleading. It would occur to me that our commercial reporters should be limited strictly and entirely to the collection of commercial statistics, including receipts, shipments and prices, and be entirely prohibited from indulging in theoretical forecasts and opinions which are put together for the sole purpose of attempting to forecast the future action of the market. One missing link in these alleged statements

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<sup>48</sup> “Private New York Wires,” *CT*, Jan. 30, 1887, p.14

of fact destroys their entire argument and renders these articles not only inaccurate, but misleading and harmful.<sup>49</sup>

Board members agreed with Canby, and, a few days after receiving the above letter, adopted a measure stating that the Board would only publicize reports from crop experts who had registered with the Board of Trade.<sup>50</sup> But for the first fifty years of futures trading on CBOT, this effort to exert any organizational authority over crop reports was entirely absent.

CBOT members thus lacked a reliable, shared body of information about growing crops and world markets. In place of accurate statistics, CBOT members had unreliable forecasts, hearsay, and misinformation. Statistics from independent commission houses produced more heat than light; attempts by the federal government and umbrella organizations such as the North American Grain Dealer's Association were plagued by inconsistent reporting and suspect methodologies. Information was a resource to be acquired independently and used for personal gain, not a public good for the benefit of the Board. Thus, rather than serving as a stabilizing point for the market, crop statistics simply became fodder for additional speculation.

#### The New Orleans Cotton Exchange

NOCE's position on gathering and dissemination of information stood in stark contrast to CBOT's. This was seen, in part, in the previous chapter's discussion of the

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<sup>49</sup> *BDR*, Box 84, Folder 37, Jun. 15, 1918

<sup>50</sup> *BDR*, Box 84, Folder 37, Jun. 19, 1918

departments of Supervision and Inspection, which produced vast amounts of information regarding the minutest details of daily cotton receipts, shipments and stocks during its tenure in the city.<sup>51</sup> This same hunger for information was found in the Exchange's policies on crop statistics and price quotations. The organization sought independence and stature by becoming an informational hub and providing members the data needed to make extensive market calculations.

#### Information and the founding of the Exchange

When telling the story of information gathering on NOCE, one must begin with the person of Henry Hester. Hester was the first Secretary of the Exchange, a position he held continuously for sixty-one years, practically up to his death in 1934. He exerted a foundational influence on NOCE. At the Exchange's founding, Hester was a 24-year old journalist covering cotton and financial markets for the New Orleans *Price Current*. He was offered the job of secretary directly by E.H. Summers, one of the eighteen founders of the Exchange and its first president, on the strength of his reporting on world cotton markets. Hester accepted on the condition that he would be given a wide berth in planning the workings of the Exchange.

With this broad authority, he set out "to make the South the authority for facts concerning the growth and distribution of its great staple, cotton."<sup>52</sup> Hester's work began

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<sup>51</sup> See, e.g., *AR*, 1876; 1877; 1879; 1881

<sup>52</sup> "*Hester Says*," 1926: np

immediately. At its first meeting, the Exchange accomplished two things: found quarters to rent and appointed a Committee on Information and Statistics (CIS). In 1871 and 1872, the first two years of the Exchange, “market information” made up half of the budget (Boyle 1934). Prior to this time, information on stocks of cotton in the U.S. and around the world, as well as quotations from foreign markets, came to New Orleans from sources in New York and Liverpool. Traders feared that these reports were manipulated by those seeking lower prices, and kept New Orleans a second-tier market (Bouilly 1976). Hester argued that NOCE could protect itself from manipulation and empower members to form their own opinions on the market by building up their own statistical infrastructure rather than simply following New York’s lead. The CIS, writing in 1890, spoke to this point:

The custom of awaiting the effect of important events upon the New York market, and following in the wake of the latter, is false, both in principle and in fact; but, unless we are as well, if not better, posted than New York upon current events, there is no alternative but for this market to remain in leading strings.<sup>53</sup>

Expanding the scope of general information in order not to be in thrall to New York and foreign market centers was a general theme and goal of NOCE, particularly the CIS.<sup>54</sup>

The thought among members of the CIS was that greater quantities of information would help members to “act more intelligently.”<sup>55</sup> This hope of instilling rational, intelligent, and independent analysis of the market was a persistent feature of Hester’s tenure. There is some evidence that this rational orientation took among the membership. Soon after the Exchange’s founding, CIS committee chair Harrison Watts found that

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<sup>53</sup> *AR*, 1890: 32

<sup>54</sup> See *AR*, 1892; 1893; 1894

<sup>55</sup> *AR*, 1889: 26

early data-gathering efforts had awakened among NOCE members “a thirst for information heretofore considered valueless,” and fostered “more enlightened relations between the producer and consumer.”<sup>56</sup> This faith in the ability of statistical analysis to sway traders remained central to the Exchange as an organization, exemplified by two cases, from 1920 and 1926, when Hester was asked to prepare statements on the cotton markets in response to rapidly declining prices.<sup>57</sup> For these purposes he produced detailed statistical pictures drawing on a wide variety of figures—including carryover from the past year, government estimate of the growing crop, miscellaneous other sources of cotton (linter crop and city crop), probable takings of American mills, probable future carryover, comparisons to past years totals and prices, past years’ consumption totals, historical price trends, and prices of cotton from other regions—to show that the panics lacked any grounding in the facts. In both cases, Hester’s statistically-based assurances stemmed the fall of prices and restored confidence among sellers.<sup>58</sup>

### Crop statistics

NOCE’s most significant infrastructure-building project was the creation of a system for gathering statistics on the growth and movement of the U.S. cotton crop.<sup>59</sup> Prior to the founding of the Exchange in 1871, this information had been provided by estimates from country presses and travelers. The new system created by the CIS sought

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<sup>56</sup> AR, 1874: 106

<sup>57</sup> Hester, Henry G. 1926. *Cotton Situation*, New Orleans.

<sup>58</sup> “*Hester Says*,” 1926

<sup>59</sup> V, Box 72, Folder 8, May 24, 1871

to gather this information systematically by sending monthly surveys to informants in different cotton-producing regions. Members sent circulars to their correspondents who were responsible for reporting on acreage planted, weather conditions, and progress of the growing crop for carefully demarcated regions (Ellis 1973). The CIS noted that the first full year of crop reporting saw “a fair degree of success.” While the system could undoubtedly be improved, it was at least gathering information that had previously been uncollected.<sup>60</sup>

The qualified success of the crop reports in their first two years led the National Cotton Exchange (NCE), in September 1874, to take over the production of reports and scale up the practice to the country as a whole. Under the control of the National Exchange, the process continued largely as it had in New Orleans: NCE split the cotton-growing regions of the U.S. into multiple sections, which they then allotted to each of their member exchanges. Each exchange was in charge of sending their correspondents each month during the growing season a “uniform series of interrogatories ... relative to planting, the condition, cultivation and gathering of the cotton crops.”<sup>61</sup> These reports were then sent on for compilation by NOCE’s CIS, acting as the Central Committee on Information and Statistics for the NCE and keeping Hester in a central position at the national organization.<sup>62</sup> NOCE, working now as a functionary of the National Exchange, continued to make progress in their methods of gathering information. In their 1876 annual report, the CIS claimed that they were receiving more replies covering a larger

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<sup>60</sup> *AR*, 1872: 4

<sup>61</sup> “The Cotton Exchange Convention,” *New Orleans Daily-Picayune*, Jun. 12, 1874, p. 1

<sup>62</sup> *AR*, 1884

area every month; in 1877, they established and disseminated to other exchanges a uniform series of questions for use in obtaining information for monthly crop reports.<sup>63</sup>

But the crop reporting system was not without its flaws. NCE member bodies were having difficulty getting accurate and commensurable data for their crop and acreage reports. For some years, each exchange produced its own questionnaire, which made comparisons difficult. Even once questionnaires were standardized, NCE found that correspondents still interpreted questions differently. This problem was compounded by NCE's requirement that member exchanges merely compile responses as received, exercising no discretion as to acceptance or rejection of answers.<sup>64</sup> In addition to commensurability problems, NCE's system suffered the same problem as the USDA's in using the decennial census as a baseline for estimating later years' figures. The further it got from 1870, the less accurate the estimates.<sup>65</sup> By 1879, even getting data from about 400 respondents for its region, NOCE claimed that it could not make any "predictions" about the cotton crop but only present "an intelligent general view of the crop prospects."<sup>66</sup> In 1882, citing persistent inaccuracies, NCE discontinued compiling monthly reports of crop and acreage.<sup>67</sup>

But this cancellation did not last long. The experience of the previous years' reports, even with their problems, had awakened cotton dealers to the potential value of detailed crop statistics, and in 1884, after two years of advocacy from NOCE, the

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<sup>63</sup> *AR*, 1877

<sup>64</sup> *AR*, 1881

<sup>65</sup> *AR*, 1878

<sup>66</sup> *AR*, 1879: 304

<sup>67</sup> *AR*, 1882

National Exchange reinstated the Monthly Crop and Acreage Report. The Exchange added correspondents and implemented methodological changes that produced much improved numbers in its very first full year.<sup>68</sup> In 1887, upon the dissolution of the NCE, the publication of crop reports and statistical data was taken over by *The Cotton World*, the weekly newspaper edited by Henry Hester in New Orleans. Under *Cotton World's* stewardship, the enterprise grew, expanding to include weekly reports of the progress of cotton during the growing and picking seasons, monthly statistical statements of crop movements overland and to the seaboard, and an annual statement of the cotton crop of the United States, including reports of the cotton consumption of America.<sup>69</sup> NOCE continued to devote significant resources towards gathering statistical information, sometimes to the incomprehension of other exchanges. Writing in 1889, following the introduction of weekly statistics on movement of cotton, the Committee on Information and Statistics, said:

Our weekly reports seem not yet to be fully understood abroad, as other centres [sic] do not see how a work that was supposed to be so difficult to handle monthly can be done weekly. The trade wants news and facts, however, and as the 'weekly' is anticipating all the salient facts by monthly statements put forth elsewhere, the results are easy to anticipate.<sup>70</sup>

By the end of the decade, NOCE was reporting more data with greater accuracy than ever before. Hester's statistical work put New Orleans in a position "to furnish the world with the only reliable statistics of the cotton movement."<sup>71</sup>

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<sup>68</sup> AR, 1884; AR, 1885

<sup>69</sup> *Cotton World*, Sep. 17, 1887

<sup>70</sup> AR, 1889: 26

<sup>71</sup> "Cotton: The Largest Crop on Record of the History and Marketing," *NODP*, Sep. 1, 1891, p. 10



By 1890, Hester's system was comprehensive. Each week, his report presented a massive amount of information: the movement of cotton at 102 interior towns, as well as historical statistics (listing figures for this week, this year, and last year) on movement into sight, visible cotton, spinner's takings, exports, stocks, and prices, as well as statements of mill takings, receipts, and stocks from Liverpool and Bremen.<sup>72</sup> Hester's annual statement in 1890 also was a milestone. His team of statisticians gathered reliable data from every delivery point, each point of crossing on the Ohio, Mississippi and Potomac rivers, and from all the mills in the South, obviating the need to guess or estimate a single detail of the entire statement.<sup>73</sup> The report won praise and respect from the world's cotton markets. By the turn of the century, no man in the cotton world would think of doing business without a weekly Hester's Report, "any more than the captain of a ship would think of sailing from port without chart and compass and sextant."<sup>74</sup>

NOCE, through the construction of this impressive statistical machinery, had achieved the autonomy it sought thirty years before. President A. Brittin, speaking in 1903, expressed the new powerful position their market occupied:

Last year's business shows beyond question that New Orleans is no longer in leading strings, and that while the changes and variations in other great market have more or less influence with us as ours have with them, it has come to pass that where conditions justify, this market takes the lead and acts independently upon its own views of the legitimate effects of supply and demand, or other causes which may affect values. In brief, the people

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<sup>72</sup> AR, 1890

<sup>73</sup> AR, 1891

<sup>74</sup> "Hester Says," 1926: np

of the Cotton States have learned to appreciate the commanding position they hold in the cotton world and at last to think and act for themselves.<sup>75</sup>

NOCE became, through the labor of Henry Hester, a center of calculation producing invaluable information for cotton traders (Latour 1987). While exchanges on New York and Liverpool remained larger in terms of the volume of trading, New Orleans maintained its market share as well as its status through the provision of crop statistics that allowed for wide-ranging and far-seeing calculation.

#### The flow of telegraphic information

Though NOCE created an impressive infrastructure for gathering and disseminating crop statistics, their efforts at securing reliable, speedy telegraph service was less successful. In large part, this was due to the poor state of telegraphy in the South following the Civil War (Thompson 1972). At the onset of war, lines extending from north to south across the Mason-Dixon line had been cut, and as the war continued much of telegraphic property in the South was destroyed. Companies serving the South barely had enough business during the war to stay afloat, and certainly not enough to repair damaged lines or expand coverage. After the war, the American Telegraph Company, which offered the main route to the north seemed to be making a recovery. They absorbed two other companies serving New Orleans—the Southwestern Telegraph Company and the Washington & New Orleans Telegraph Company—and made plans to

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<sup>75</sup> AR, 1903: 8

invest half a million dollars in repairs of their lines. These plans, however, were scrapped in 1866, when the American was absorbed by Western Union. Having won a monopoly over the north-south route, Western Union subsequently did little to rebuild or expand southern lines.

As a result, telegraph service in the South lagged behind that in the north. Particularly critical for traders was the discrepancy in speed of transmission. As NOCE's Telegraph Committee recognized, "modern methods of transacting business count minutes and even seconds where hours and half hours only were formerly considered."<sup>76</sup> Shaving off these minutes and seconds remained a challenge for NOCE for over forty years. The most persistent problem related to the telegraph was the presence of "beats," instances where messages and price quotations reached commission houses along private wires faster than the same information came to the Exchange over public lines. As a result of this time differential, members associated with private houses had a chance to act on information before it became common knowledge, giving them a significant advantage in the market. Beats were noted in NOCE's annual report as early as 1883, but became a persistent concern starting a few years later.<sup>77</sup> In 1888 and 1889 there were complaints of multiple beats on fluctuations coming from New York.<sup>78</sup> These complaints were made, with some variation from year to year, throughout the next decade: in 1906, the Telegraph Committee of NOCE complained that beats were "a matter of daily, almost

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<sup>76</sup> *AR*, 1903: 9

<sup>77</sup> *AR*, 1883

<sup>78</sup> *AR*, 1888; *AR*, 1889

hourly, occurrence”; in 1910, they were still bemoaning the “wretched quotations service” with New York and Liverpool.<sup>79</sup>

The primary source of beats was the technical limitations of the public telegraph system itself.<sup>80</sup> During busy times messages would take longer to transmit. This led to serious delays at the opening of the market and at periods of large fluctuations, precisely when speedy service was most needed.<sup>81</sup> One possible solution to the problem of beats would have been to create a direct line between the New Orleans and New York exchanges, as CBOT had done with the Milwaukee Exchange. NOCE and NYCE both expressed interest in this idea and discussed its feasibility in 1904.<sup>82</sup> But, as with CBOT’s efforts to connect directly to New York, NOCE determined that the cost of a direct line was too great. The Board of Directors resigned itself to the fact that NOCE simply could not compete with private commission houses that spent hundreds of thousands of dollars on telegraphing each year.<sup>83</sup> Once they had given up on creating a new line, all NOCE could do was harangue Western Union and hope for improvements in service. These efforts did little but frustrate Exchange leaders. Writing in 1908, after two decades of pushing Western Union for improvements, the CIS admitted that their arguments had, “been gone over so often with the telegraph officials with no appreciable result, that [they were] at loss what further to do.”<sup>84</sup>

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<sup>79</sup> AR, 1906: 9; AR, 1910: 35

<sup>80</sup> AR, 1896

<sup>81</sup> AR, 1911

<sup>82</sup> AR, 1904

<sup>83</sup> AR, 1905. NOCE’s total budget for telegraphing in the same year was only \$13,850.

<sup>84</sup> AR, 1908: 31

Another source of beats was not technical, but procedural, and regarded the rules governing transmission between NYCE and NOCE. Some of these rules gave a significant advantage to private wire houses. One such rule, which NOCE first became aware of in 1896, was NYCE's so-called "ten-minute rule." This rule allowed a member to withhold reporting a trade in futures to the Exchange for ten minutes. During this time, they would privately wire news of the trade to their constituents in New Orleans, who would get the jump on other members.<sup>85</sup> A second procedural problem was that NYCE only transmitted sales—not offers and bids—to NOCE over the public wire. Private commission houses, though, did receive offers and bids. This let them see the movements of the market at a finer grain, sussing out trends early. A trader who relied on the public wire, complaining of this arrangement, gave the following example:

Some days since a certain month was quoted at 10:30 A.M. in New York, 11 cents; by 10:31, it was offered at 10.99; then at '98, '97, '96, and '95 successively; but because there were no sales we did not get a quotation until 10:33, when a transaction was made at 10.95. The successive offers of '99 to '95 were known through private resources, but the Exchange was without information because it had to wait until an actual sale.<sup>86</sup>

Thus, it was not just the technical relation with Western Union that influenced the speedy gathering of price quotations. Even when telegraph wires were in perfect working order the organizational relations with NYCE posed another obstacle.

Addressing these problems with NYCE, while not as intractable as the technical issues with Western Union, involved their own challenges. Convincing New York to alter their rules for the benefit of New Orleans took work, and changes only happened slowly.

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<sup>85</sup> *AR*, 1896

<sup>86</sup> *AR*, 1903: 31-32

It took three years of lobbying to get NYCE to change the ten-minute rule; the effort to get NYCE to report all bids and offers took over a year to be implemented. In general, any request from New Orleans had to be made compatible with, or at least not onerous to, existing practices on NYCE, or it would simply not get done.<sup>87</sup>

In addition to establishing a fast, reliable connection with traders in northern and European financial centers, NOCE also needed to attract traders from the Southern interior to place their trades in New Orleans, rather than New York. Establishing a strong telegraphic connection was the first step in winning this business. In fact, some of the difficulty NOCE faced in establishing their futures market stemmed from their inability to secure satisfactory telegraphic communication with interior points, which led traders interested in futures to do their business on the NYCE.<sup>88</sup> The need to win this business led NOCE to adopt a liberal policy respecting dissemination of their quotations. In 1883, the CIS recommended a vast increase in dispatches to the interior:

Under present arrangements with the Western Union Telegraph Company, some forty interior towns are now served three times daily with quotations of our future market. Would it not be in the long run true economy if this service were doubled as regards the number of points to which the information is communicated.<sup>89</sup>

So convinced was NOCE of the necessity of sending quotations to the interior that it did so even though interior points reimbursed less than half of its total outlay.<sup>90</sup>

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<sup>87</sup> *AR*, 1907

<sup>88</sup> *AR*, 1882

<sup>89</sup> *AR*, 1883:38

<sup>90</sup> *AR*, 1884

Despite connecting with interior points through wide dissemination of their quotations, NOCE still found that their antiquated telegraph facilities were driving away business.<sup>91</sup> New York simply offered a faster connection, and thus, a safer market. The CIS noted in 1904 that from many points in the South, it took fifteen minutes for a message to travel to and from New York, whereas the time to and from New Orleans was three or four-fold greater.<sup>92</sup> Six years later, the discrepancy in speed was exactly the same.<sup>93</sup> Not only did this mean that New Orleans saw hedges and speculative trades going to New York, but it also precluded an entire class of trades from taking place on the New Orleans market. If telegraph service were faster, the Committee claimed, it would open up the opportunity for a “straddle” business, where traders could arbitrage price discrepancies with New York.<sup>94</sup>

NOCE continually struggled to obtain fast, reliable telegraph service. While they were able to build an impressive statistical infrastructure, their position as a secondary market to New York had a significant effect on their telegraphic infrastructure. They simply did not have the stature to force the hand of the New York Cotton Exchange or the various telegraph companies. As a result, they were never able to attract orders from a broad enough area to compete with NYCE in terms of volume. These telegraphic issues served to circumscribe the New Orleans market, particularly hurting the speculative business that thrived on the speedy transmission of information.

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<sup>91</sup> *AR*, 1901; *AR*, 1903

<sup>92</sup> *AR*, 1904

<sup>93</sup> *AR*, 1910

<sup>94</sup> *AR*, 1904

## Conclusion

The analysis above reveals a stark contrast between the methods of gathering and disseminating information on the Chicago Board of Trade and the New Orleans Cotton Exchange. These divergent approaches emerged in response to distinct political, cultural and economic factors on each exchange, and had particular consequences for the types of trading found on their futures markets.

CBOT's battles with Western Union and the bucket shops led them to consider information as a private good. This position was central to their battles in court, where they sought the legal right to control the dissemination of price quotations. But this perspective also spread beyond the legal sphere into other areas of Board policy. For example, the Board did little to promote accurate public information, choosing instead to publicize unreliable government and private crop reports, with the warning of *caveat emptor* to members. Directors also put into place policies, like the blackout policy in 1890 and the switch from continuous quotations to updates every five minutes in 1900, that hurt those traders relying on public wires while enriching those using private wires. CBOT's battle with Western Union was purely over the transmission of information: they wanted information coming in to be fast and cheap, and information going out to be carefully controlled. The quality of that information and the equitable receipt of information among members were not express concerns.



On NOCE, information was conceived of as a public good. From its founding, NOCE sought to make available for its members vast quantities of information, with the goal of making New Orleans the world's authority on the cotton trade. This policy drew upon the significance of cotton as an economic and cultural product, and the perceived indignity of relying on northern and foreign financial centers for crop statistics. Henry Hester's skill as a statistician, and NOCE's active cooperation with other exchanges, mills, and railroads made NOCE an informational hub and center of calculation for the cotton trade. While the public character of information was realized in the collection of crop statistics, it was undercut by poor telegraphic service, where slow transmission times to NOCE divided traders based on their access to private wires. NOCE, being the smaller of the two main American cotton exchanges, lacked the power to force the telegraph companies to make technical changes that would have ameliorated these problems.

These differences created divergent information environments on the two markets. In terms of crop statistics, NOCE clearly had a more reliable system in place. It devoted significant resources to gathering crop information and forming partnerships with other cotton exchanges across the United States. CBOT, on the other hand, was not involved in the collection of crop data, nor did it make efforts to harmonize with other centers of the grain trade. The picture on price quotations was less clear cut, particularly for CBOT. The Board was eventually able to exert control over its quotations, which increased their value and their ability to authoritatively convey information about short-term trends. It also was able to force Western Union into providing reliable, fast telegraphic service. However, it achieved both of these ends using drastic measures

which at least temporarily exacerbated differences between traders with access to private wires and those who relied on the public transmission. The situation on NOCE was more straightforward. Telegraphic service was always poor, leading to a significant division based on access to private wires. Also the Exchange's price quotations remained less important than New York's for traders around the country.

These differences provided the conditions of possibility within which divergent types of trades and strategies could arise. On CBOT, the lack of accurate, shared information made long-term planning and statistical analysis difficult. Given this difficulty and the volume of trading enabled by the reliable—if occasionally lessened or eliminated—telegraphic service to CBOT, short-term trends were more visible and a better source of information for traders. The information being gathered and disseminated on CBOT thus encouraged speculation based on the minute-to-minute movement of prices. On NOCE, the combination of widely disseminated, highly regarded statistical information and slow, two-tiered telegraphic service pushed traders in the opposite direction. Trading on momentary price misalignments was difficult, as the speed of the telegraph meant that members were often running just behind other traders. Yet, the mass of statistical data commonly disseminated to all members enabled and promoted clear-eyed analyses of long-term market trends. Traders on NOCE would thus be more likely to engage in long-term calculation than short-term speculation.

The differences in the methods of gathering and disseminating information explored in this chapter created distinctions in the raw information with which traders worked on these markets. But this raw information still needed to be situated within a framework for understanding what effect futures trading had in the economy. Information would allow traders to act, but would not give their actions value, purpose, or legitimacy. This required a separate process of economic and cultural meaning-making on each exchange. This is the topic to which we now turn.

## Chapter 5 – Theorizing Futures

Both exchanges faced challenges regarding economic and cultural value of speculation. To the public and many elected representatives, the vast speculative business seemed to be little more than gambling, utterly disconnected from the production and consumption of physical goods. Detractors pointed to the discrepancy between actual commodities marketed and futures traded as evidence of this disconnect. For instance, in 1875, the Chicago Tribune estimated trades in grain futures to be ten times greater than the cash business, a chasm that seemed inexplicable to many.<sup>1</sup> Additionally, many found the practice of short selling—where a speculator contracted to sell a commodity in the future, hoping to profit from a decline in prices below the contracted level—to be particularly objectionable. Many viewed “bears” with suspicion, believing them to be engaged in machinations to keep prices artificially low. The downward pressure that shorts exerted on the market was particularly odious because they almost never exchanged actual physical goods as a result of their contract: sellers almost always entered into contracts to sell commodities that they did not own and never intended to own. To critics, this was just another way in which futures speculation transformed the reality of staple crops into mere fictions in a speculative game (Fabian 1990).

CBOT and NOCE defended speculation in futures and short selling in terms that were similar in several respects. Both broadly defined speculation as taking on a risk stemming from the uncertainty of price movements. Such uncertainty could not be

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<sup>1</sup> “Grain: Statistics Concerning Chicago’s Chief Interest,” *CT*, April 17, 1875:7

eliminated from the market entirely, but it could be borne by different parties. Speculators took on the burden of risk, in exchange for the opportunity to profit from that risk.<sup>2</sup> Speculation was a specialized way of efficiently managing natural market risk. Both exchanges also argued that futures markets benefited producers and consumers in spot markets. Speculation on futures markets created a constant demand for goods, a high-volume, year-round market which enabled agriculturalists to sell commodities independent of a “strictly consumptive demand.”<sup>3</sup> This eliminated the disruptive seasonal price cycles that had characterized agricultural marketing up to that point.<sup>4</sup> Futures markets also could be used to insure a spot market position, by hedging. This enabled the marketing of grain with less expense and a smaller intervening margin of profit than under previous marketing systems.<sup>5</sup> Futures markets, and the system of speculation, were defended by CBOT president Hiram Sager as a “natural and legitimate outgrowth of the great system that has been perfected for the marketing of our crops.”<sup>6</sup> These defenses of futures markets and speculation, as well as their relation to agrarian movements and court cases, have been covered in a great deal of scholarly work (Cowing 1965; Cronon 1991; de Goede 2005; Fabian 1999; Ferris 1988; Goldstein 1928; Levy 2006).<sup>7</sup>

But beyond these similarities, there were several significant differences in how the exchanges understood the economic function and cultural legitimacy of futures trading. Futures were not simply understood to be valuable because they generated

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<sup>2</sup> OR, MAM, Box 14, Folder 15, 1918

<sup>3</sup> OR, MAM, Box 6, Folder 10, 1893: np

<sup>4</sup> Sager, Hiram. 1908. *Prosperity and the Exchange: Why the Great Trade Marts of the Country are Essential to the Conduct of its Legitimate Business*. Harper & Brothers; NOCE, AR, 1898

<sup>5</sup> OR, MAM, Box 14, Folder 15, 1918

<sup>6</sup> Sager 1908: 12

<sup>7</sup> All of this work, however, has taken CBOT as the paradigmatic 19<sup>th</sup> century futures market. As I argue below, this single case method has led to a narrow understanding of the topic.

demand and evened out price fluctuations: both exchanges made other arguments uniquely shaped by the local and state-level economic, political, and cultural environment.

The argument of the chapter, in brief, is this: On CBOT, the legitimacy of futures were constructed largely in opposition to the non-legitimacy of a closely related derivative instrument, options (also known as “privileges” or “puts and calls”). This served two purposes. First, it was politically valuable as a method for distinguishing the Board from both bucket shops and the rival Chicago Open Board of Trade. Both distinctions were critical to forestalling proposed state and federal anti-futures regulation. Second, it served to establish the economic value of speculation among Board members. Members argued that options created dull markets, while futures stimulated speculation and market vitality. On NOCE, the legitimacy of futures derived from their ability to impact the spot market and their capacity to increase Southern autonomy. The distinct socio-economic environment in New Orleans at the adoption of futures trading, the cultural significance of cotton, and federal efforts to impose cotton-specific regulations all contributed to this particular understanding. These differences between major 19<sup>th</sup> century markets illustrate that theorization of futures was a contingent, local process with wide variability. It was only later, through the institutional alignment imposed by the Supreme Court and federal government, that these differences began to disappear.

#### The Chicago Board of Trade: The problem of options

In Chapter 3, we saw that futures trading developed in tandem with the spot

market on CBOT. This chapter examines another key simultaneous development: the growth of trading in options alongside of futures. Options, also known as privileges or puts and calls, were similar to futures in that they were contracts for a future transaction, at a particular price for a particular good. But there was a significant difference between the two instruments. While futures contracts *compelled* the contracting parties to exchange goods or warehouse receipts at a particular date, options gave one party—either the buyer or seller—the ability to decide whether or not to make the transaction at the contract’s call date. If that party stood to lose money by consummating the deal, they would simply not exercise the option, calling off the transaction. For instance, a trader who, at the end of the day, saw #2 wheat trading at \$1.25/bushel might secure an option to sell the very next day at \$1.23/bushel; for this privilege he would pay to his counterparty a small fee, traditionally \$1 per 1,000 bushels (Lurie 1979). Having purchased this privilege, the trader would then take one of two courses the next day: (1) if prices dropped below \$1.23/bushel, he would invoke his option, buy low in the spot market and sell at the higher, prearranged rate, making money on the deal; (2) if prices had not dropped below this mark, he would forego the option, make no sale, and lose out only on the small fee he had paid. Thus, options were inexpensive ways of making money on short-term price movements.

From the outset, the trade in options was generally condemned. The Board prohibited them in their first set of official rules for futures trading in 1865, and the state of Illinois made them illegal in 1874. Yet, despite this general disapproval and the regulations it spawned, all of CBOT’s efforts, for close to fifty years, to eliminate these

trades from its pits failed. In 1888, a CBOT special committee investigated more than 80 Board members over the course of a month for engaging in puts and calls. But, following the investigation, the committee revoked punishments and softened new rules in the face of member anger, e.g., by rewording them so that a punishment “should” or “ought” to follow discovery of option trading, rather than “shall” follow it (Lurie 1979). In 1892, Directors again passed a resolution barring trading in options, but found the resolution impossible to enforce and rescinded it a few months later. In 1895, William T. Baker was elected President on a platform that prominently called for the prohibition of options trading. But the resolutions he proposed to that end shortly after his election were soundly beaten back. In 1900, the Board passed a rule calling for the expulsion of members who traded in puts and calls, but it was not generally enforced, and was repealed five years later. In 1911, the Board passed a resolution attempting to rein in options trading among members on venues outside of the Board. But this final effort, like those before it, had little impact. Two years later, the Illinois legislature gave up the fight against options, passing a bill allowing puts and calls under certain restrictions. The Board gave up soon thereafter, passing a resolution allowing puts and calls on the floor of the exchange (Taylor 1917).

I ask two questions related to this history: first, why did options trading persist on the Board despite their continual efforts at regulation; second, how did the continued salience of options shape traders’ understandings of futures contracts? In answering these questions I highlight several factors. Regarding the first question, the fact that there were multiple local sites where options trading took place made it difficult to eliminate the



practice. As to the second question, the political environment established by proposed anti-futures legislation, and the powerful position of speculators within the Board, meant that options became a moral and economic scapegoat, allowing speculation in futures to remain an unvarnished good.

### Outlets for options

The Board of Trade was not the only place where Chicago speculators could go to trade in options. Operating alongside CBOT were two other local venues that could fill this need: the competing Open Board of Trade and the myriad bucket shops that populated the city. Both allowed speculators to trade in options—or, in the case of bucket shops, engage in a reasonable facsimile of trading options—any time the Board attempted to crack down on the practice in its own pits.<sup>8</sup> These alternative venues made it difficult to stamp out options trading, and kept the practice of option trading a lively topic of debate into the 1910s.

The Open Board of Trade was established in 1879 as a smaller exchange offering a less expensive alternative to the “Big Board.” The Open Board had a lower membership fee and permitted trading in far smaller lots. In 1882, for example, CBOT’s membership fee was \$10,000 and the minimum lot that could be traded was 5,000 bushels (Lurie 1979); the Open Board, by contrast had a fee of \$1,000 and permitted trading in 1,000 bushel lots (Taylor 1917). Soon after its establishment, the Open Board developed into a smaller, yet significant site of trade. By March, 1883, it had 180 members, and had raised

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<sup>8</sup> *OR*, MAM, Box 9, Folder 27, 1902

the membership limit to 400 to accommodate growing interest.<sup>9</sup> Like the regular Board, the Open Board featured both spot and future markets, and speculators on the Open Board, like those on the regular Board, entered into binding legal contracts.

The relationship between the Open Board and the Big Board was, at the best of times, one of uneasy cooperation. The exchanges did each get something from the other: CBOT provided market quotations to the Open Board; the Open Board provided a site for trading by call auctions, a form preferred by many members, yet not found on the regular Board. This cooperation was often punctuated by periods of animosity and competition, usually related to the state of options trading on each exchange. The Open Board did not have the same qualms about allowing options trading on their exchange. In fact, they had found that they could attract a sizeable business by offering a convenient outlet for displaced traders whenever CBOT would take actions to quash options trading on its own exchange. For instance, in 1887, when the Board of Trade passed a resolution prohibiting trade in puts and calls, the Open Board continued to allow it, and that week saw its transactions jump to incredible new heights (Taylor 1917).

CBOT directors recognized this problem and took steps to punish both members who circumvented their rules and the Open Board as an organization. In 1883, the Board passed a resolution prohibiting members from belonging to the Open Board.<sup>10</sup> This blanket prohibition was scaled back following member anger, but new members were still forced to pledge that they would not to use the Open Board to trade in puts and calls.<sup>11</sup>

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<sup>9</sup> For comparison, CBOT had 1,936 members in 1883 (*Annual Report*, 1883).

<sup>10</sup> *BDR*, Box 9, Folder 13, Apr. 2, 1883

<sup>11</sup> *BDR*, Box 21, Folder 6, Apr. 8, 1889

Additionally, CBOT cut off the supply of price quotations to the Open Board on multiple occasions—in 1883, 1887, 1904 and 1911—each time citing trade in puts and calls as the offending reason.<sup>12</sup> But the Open Board was not helpless in these fights with CBOT, and was often able to negotiate a settlement that entailed keeping the right to trade in puts and calls. Two weapons in their arsenal were extending trading hours and lowering commission rates. Both practices had the effect of drawing traders away from the Big Board and thus decreasing the value of their market's information. The Open Board used these tactics in both 1883 and 1904 to force the Board into restoring quotations.<sup>13</sup> In 1887 they took a more direct route: when the Board cut off their official supply of quotations, the Open Board simply gathered the same quotations from other markets (Taylor 1917). Thus, the Open Board was able to maintain its autonomy and reject the attempts of CBOT to enforce rules against trading options.

In addition to the Open Board, members could execute options trades in bucket shops. These small gambling shops rose to prominence shortly after the Open Board. At their peak, in 1895, there were 80 distinct bucket shops operating in the city.<sup>14</sup> CBOT tried to prevent members from using bucket shops, but this proved even more difficult than keeping them off the Open Board. Unlike the Open Board, CBOT had no direct relationship with bucket shops and thus, cutting off quotations was far more difficult., as seen in the Chapter 4. As a result they had to rely on disciplining their membership. In 1883, the Board prohibited members from using bucket shops, a rule that had weak member support and lax enforcement. Bucket shops were also spread around the city,

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<sup>12</sup> *BDR*, Box 9, Folder 13, Apr. 2, 1883; *P*, Box 2, Folder 3, Dec. 3, 1911

<sup>13</sup> *BDR*, Box 9, Folder 13, Apr. 2, 1883

<sup>14</sup> *OR*, MAM, Box 8, Folder 15, 1899

making it harder to surveil members' use of them. Directors briefly hired private investigators to stake out bucket shops across the city, but this was discontinued after member outrage over the practice (Lurie 1979).

These alternative local venues undercut CBOT's efforts at banning privileges. Option trading thus continued, despite its prohibitions in Illinois state law and the Board's own rules. The continued presence of these disfavored trades became a central focus of proposed federal regulations. This legislation only served to further the importance of defining futures in relation to options. The following section demonstrates this relational definition, and how its construction was influenced by features of the proposed laws.

#### The response to regulation

The Board's inability to enforce the law and their own regulations prohibiting options trading provided fodder for public criticism of the Board, and featured prominently in proposed federal regulations of trading, including the Butterworth bill of 1890 and the Hatch bill of 1892, which struck at both futures and options trading with the same penalties. As a result, distinguishing between the two types of derivatives became a key point of CBOT's defense of their methods as a whole. The Board hammered on the distinction between options and futures, a distinction that was often minimized or overlooked entirely in the bills. They drew distinctions between futures and options along two lines. First, they defended speculation in futures as a way to handle naturally existing risk in the marketing process, while painting options as unnecessary, parasitic, gambling contracts. Second, they argued that futures contracts, at their termination, necessitated the

delivery of real goods, whereas options contracts did not. In these two critical ways, CBOT's economic and cultural valuation of futures was shaped by the political imperative to distinguish the two types of derivative trading found on their exchange.

As we have seen, the Board argued that futures trading and speculation were vital components of modern agricultural marketing. Options trading, on the other hand, was, according to President Charles D. Hamill in 1892, "a pure bet that the market will be either higher or lower the next day."<sup>15</sup> CBOT leaders pointed to several features of options when making this claim. Options usually covered only very short periods of time—generally one day—and they could be entered into for very little money (Lurie 1979). Such short-term contracts, they argued, could not possibly offer any of the legitimate hedging or risk allocation purposes of futures. The small amount of money required to trade options was also significant. In futures trading, there was no limit as to how much money one could gain or lose in the market, while in options losses were limited to the small amount already paid as a fee. CBOT leaders, such as the anti-bucket shop crusader John H. Hill, maintained that this limitation on losses "[tended] to cause speculation to *degenerate into* gambling."<sup>16</sup> The relative ease and low cost of trading options meant they could be traded without the same careful consideration as futures and by non-expert people of small means.

Additionally, CBOT claimed that options lacked legitimacy because of their characteristic feature: the transaction specified in the contract was optional. Futures

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<sup>15</sup> Quoted in Grain Exchanges Hearing Before the Committee on Rules, House of Representatives, 63<sup>rd</sup> Congress, Mar. 3-7, 1914: 84

<sup>16</sup> Hill, John H., Jr. 1921. *The Octopus and Lesser Evils*. p. 15, emphasis added

contracts bound the holder to a transaction, in one form or another, at the contract's call date. This made it, at its core, similar to any contract used in the spot market. Options contracts, on the other hand, could be exited by one party with no exchange being made. This seemed to pervert the very notion of contract, and placed options at a greater distance from the actual physical exchange of wheat. For this reason, Board member and commission merchant, Samuel H. Greeley, could claim that, as opposed to futures, which played a vital part in the marketing of agricultural commodities, "a put or call never in the history of the trade marketed a bushel of grain."<sup>17</sup> John H. Hill made this same accusation more colorfully, saying: "'Puts' and 'calls' have no more relation to commerce than a deck of cards or a box of dice. Horse-race gambling at least inspires the breeding of fine horses; 'puts and calls' breed embezzlers and financial wrecks."<sup>18</sup>

CBOT also drew on the distinction between futures and options when establishing themselves as the sole group with the economic knowledge to competently regulate trade in futures. Legislators and agrarian activists often conflated the two terms, referring to their stance against non-spot trading broadly as "anti-option" (Lurie 1979). Board members used this confusion to paint their critics as ignorant of the true marketing processes at work. While this may not have been entirely untrue, it failed to acknowledge that confusion over the terms 'futures' and 'options' was also found among Board members. In the 1883 investigation of the Board of Trade by a special committee of the Illinois House of Representatives, witnesses in the same line of work, trading on the same Board, offered contradictory definitions of options, one defining them in relation to

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<sup>17</sup> Grain Exchanges Hearing Before the Committee on Rules, House of Representatives, 63<sup>rd</sup> Congress, Mar. 3-7, 1914: 86

<sup>18</sup> Ibid.

privileges, the other to futures.<sup>19</sup> This confusion still existed up to the first efforts at federal regulation. In 1891, right in between the debates over the 1890 Butterworth and 1892 Hatch bills, prominent Board member W.S. Crosby published a popular pamphlet which referred to futures as “options” throughout.<sup>20</sup> At the root of this confusion were two different understandings of the term. When futures were referred to as options, the “option” referred to was the choice given to sellers, of determining *on what date* during the month they wanted to make delivery or settle by differences. The “option” referred to in privileges, or puts and calls, was the choice *whether* to execute the transaction at all. The use of the term “option” to describe both instruments caused not a small amount of trouble, spawning two cases in the Illinois Supreme Court in 1875 and 1877, and a third in the Illinois Court of Appeals in 1879 (Lurie 1979).

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<sup>19</sup> “Report of the Special House Committee to Investigate Concerning the Mode of Conducting Certain Stock Speculations on the Chicago Boards of Trade, Together with the Testimony Taken Before the Committee.” May 11, 1883.

Excerpts from these testimonies are given below. They are dialogues between legislators and two different commission merchants who had been called before the committee. The first merchant draws a clear distinction between futures and options, and claims that options are synonymous with privileges:

Q: One of the purposes of this investigation is to see whether a means can be devised without prejudicing or injuring the legitimate deals in real property by circumscribing what is commonly called this option business. You call it futures, on the Board of Trade. It used to be called options.

A: There is quite a difference between options and futures.

Q: [...] What is the difference between an option and a future?

A: An option is merely a privilege of buying and selling. If I sell for future delivery I have made a contract—I buy for the future.

The second commission merchant offers a different definition, using the term “option” to refer to a futures contract, which he distinguishes from a privilege, or puts and calls.

Q: What is understood by the term option dealing, or option contract?

A: Well, the option just gives the man that sells the option of the day. For instance, you sell for the month of July; you can have any day you see fit in the month to deliver it.

Q: Is that what is ordinarily meant by the term option?

A: Yes, sir.

Q: Isn't there another meaning to it?

A: I don't know how there can be.

Q: That is, the option to sell or buy on a privileged contract?

A: Those are puts and calls; those are privileges.

Thus, even at the same point in time, in the same city, among men in the same line of business, the meaning of an “option” was unsettled.

<sup>20</sup> Crosby, W.S. 1891. *The Chicago Board of Trade and Its Policy*, Knight, Leonard & Co: Chicago.

Having made these arguments to the state, drawing the distinction between legitimate futures speculation and illegitimate puts and calls, CBOT recognized ever more urgently the need to suppress options trading on its floor. The state had been kept at bay with a particular line of argument and CBOT was now committed to keep to that tack. John H. Hill complained that:

With a degenerate board of trade, such as would result from this legislation [to legalize the trade in privileges], Congress would have very little patience. That plank of the Democratic platform upon which President Wilson was elected which denounced gambling in food products would be easily justified into an act that would destroy the great grain market in Chicago.<sup>21</sup>

President Edward Andrew also made a point of exhorting the membership to good behavior with regard to puts and calls, given that the eyes of the nation were watching. In his Presidential address of 1913, Andrew called upon members to “avoid in any way giving offense to public opinion” by engaging in the controversial practice.<sup>22</sup> Three years later, President Joseph Griffin reported that efforts to cut down on illegal privilege trading were having a positive effect on federal legislative bodies, noting that, “The Chairman of the Agricultural Committee assures me that the apparently earnest efforts of the Exchanges to eliminate abuses and maintain a high degree of business integrity and efficiency meets with his cordial approval.”<sup>23</sup> Practically speaking, the distinction between futures and options thus became a tool for forestalling federal regulation. Options became the scapegoat derivative—linked to gambling and decried as unrelated to the underlying trade—enabling futures to be framed as entirely legitimate.

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<sup>21</sup> Grain Exchanges Hearing Before the Committee on Rules, House of Representatives, 63<sup>rd</sup> Congress, Mar. 3-7, 1914: 85

<sup>22</sup> *OR*, MAM, Box 13, Folder 25, 1913: 12

<sup>23</sup> *OR*, MAM, Box 14, Folder 10, 1916: 2



## Options and speculation

In addition to these moral distinctions based on the relation to the underlying spot trade, CBOT directors also highlighted the significant economic differences between futures and options. As we have seen, directors were unified in their defense of speculation as economically beneficial; many would be inclined to agree with Board President William S. Warren's effusive claim that speculation was "the very life-blood of the grain market."<sup>24</sup> This defense of speculation provided the framework for the economic devaluation of options.

Traders objected to options because they "cooper[ed] prices within a narrow limit day after day."<sup>25</sup> They argued that options dampened fluctuations in markets to the point that opportunities for speculation in futures were significantly diminished.<sup>26</sup> This sapped the market of the energy needed to continue along at a high volume. Without using the term, the traders were arguing for the benefits of volatility. In fact, even those who supported options trading did so not by arguing that less volatility was good for the market, but by disputing options' purported dampening effect. In a 1905 resolution seeking to have privileges legalized in the state of Illinois, members noted the symbiotic relation of speculation and option trading, writing that options trading had become, "so necessary to the speculative trading in Grain that it has become almost co-extensive with it."<sup>27</sup> Thus, on both sides of the debate, the economic value of options was judged in

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<sup>24</sup> *OR*, MAM, Box 9, Folder 4, 1900: np

<sup>25</sup> *OR*, MAM, Box 7, Folder 9, 1895: np

<sup>26</sup> *OR*, MAM, Box 9, Folder 4, 1900

<sup>27</sup> *OR*, MAM, Box 10, Folder 25, 1905: np

relation to their relation to market volatility and the opportunities for speculation. The unquestioned value of speculation was central to these exercises in economic theory, as it was to debates over the value of futures.

The above shows us that the Chicago Board of Trade understood futures primarily in contrast to another financial instrument, the options contract. The co-evolution of futures and options during the Civil War, combined with the multiple local settings for engaging in trades, allowed options to be traded at a high level despite Board regulations and Illinois law. The importance of distinguishing futures and options for the purposes of combating federal legislation and producing economic theory kept this contrast salient. By smearing options trading as economically unproductive and immoral gambling, CBOT leaders could offer its prohibition as a concession to those pushing legislation, while still holding onto the more widely utilized futures trade.

#### New Orleans: Adopting futures

As opposed to Chicago, the New Orleans futures market was established within the context of a long-running, major spot market. Prior to the War, New Orleans was the largest cotton port in the United States, with a well-entrenched system for financing the cotton crop known as *factorage*. In this system individuals called **factors** would finance the production of a farmer's entire crop, as well as advance him money for supplies throughout the year. In exchange, he would have exclusive rights to merchandise the entirety of that crop, as well as a claim to future harvests if, as often happened, the farmer

was still in debt at the end of the year (Hammond 1897; Stone 1915). Futures markets replaced this entrenched system only slowly. Factors themselves opposed the futures system, saying that it inculcated a “spirit of gambling inconsistent with the [spot] trade” and brought ruin to spot markets (New Orleans Daily Picayune, Dec 27, 1879). Commission merchants also were not rushing to utilize the new system. Though the trading of futures contracts was allowed from the founding of NOCE in 1871, eight years passed in which they simply were not traded.<sup>28</sup>

NOCE members only entered into the futures game in 1879 when it became clear that they either needed to act or lose this business to other exchanges. Locally, this was represented by the New Orleans Stock Exchange, which was angling to create its own futures market (Ellis 1973). More broadly, this was represented by the New York and Liverpool Cotton Exchanges, whose futures markets were continually growing. NOCE’s Future Committee, writing in 1882, three years after the exchange embraced futures trading, made this plain:

It is not desirable to enter into an argument upon the peculiar merits of the [futures] business, suffice it that no really leading market of the world has succeeded without affording proper facilities for the purchase and sale of merchandise and produce for forward delivery.<sup>29</sup>

The committee thus did not argue for a futures market by citing economic theory, but simply with reference to the pragmatic issue of retaining market influence. As prominent member J.W. Labouisse later explained to the House Committee on Agriculture, NOCE

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<sup>28</sup> AR, 1877

<sup>29</sup> AR, 1882: 36

had adopted futures trading when it did simply because “it found it necessary to fall into line with everybody else.”<sup>30</sup>

#### The nature of speculation

Given the pre-eminence of the spot market on NOCE, it is unsurprising that the value of futures trading was tied to its ability to promote the spot trade. Reflecting on the first two full years of futures trading, the Board noted approvingly that receipts of actual cotton had increased since the introduction of futures trading.<sup>31</sup> Cotton continued to be the acknowledged mainstay of the market and futures merely “an adjunct to the spot trade.”<sup>32</sup> The futures trade was conceptualized primarily as a form of insurance which allowed NOCE greater control over the spot business.<sup>33</sup> This orientation toward the spot market continued long after the futures market had grown large and influential. Nearly thirty years after futures trading began in earnest, President William B. Thompson could still claim that, “The spot business is the most valuable division of the cotton trade to the city of New Orleans, and the spot market is the basis of the existence of the Cotton Exchange and the foundation upon which the Future contract business stands.”<sup>34</sup>

Traders claimed that this relation to the spot market made their futures market particularly sound and legitimate, and claimed that the speculative abuses found on other exchanges stemmed from the lack of a robust spot market. Looking back on the first three years of futures trading on the Exchange, Henry Leopold, Chairman of the Future

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<sup>30</sup> “Fictitious Dealing in Agricultural Products,” Committee on Agriculture, 1892: 94

<sup>31</sup> *AR*, 1881

<sup>32</sup> *AR*, 1888:15

<sup>33</sup> *AR*, 1888

<sup>34</sup> *AR*, 1908: 10

Committee explained that the large spot market was, “a guarantee of the soundness and stability of the [futures] business.”<sup>35</sup> To President Abraham Brittin, in 1903, the spot trade made the futures market, “by nature beyond the attempts of speculators to sway it without respect to supply and demand<sup>36</sup>; to President William B. Thompson, six years later, it ensured “the security of the trader and the accuracy of the quotations.”<sup>37</sup> One year later, Thompson discussed at length the importance of the connection between markets:

Furthermore, I am of the opinion that a responsive future contract cannot be maintained in independence of an actual spot market, or in isolation therefrom; that the effort to maintain the same away from and independent of a spot market, necessitates arbitrary and artificial methods of fixing the relative value of the several contract grades; that such arbitrary and artificial devices cannot result in other than fictitious values and discounts; and finally, that the power to control such valuation, in the hands of a few men, and subject to manipulation by these, as their interest may dictate, makes such a market, so controlled, the breeding grounds of the evils of which complaint is made. Or to phrase the conclusion differently, the existence and activity of such an artificial future market as I have outlined, logically accounts for the abuses which have attracted general attention and condemnation.<sup>38</sup>

The abuses found in other futures markets stem from their distance from the spot market, which necessitates “artificial” and “arbitrary” connections. NOCE, being a “natural cotton market” and at no such distance from the market in spot cotton, was naturally free from the attendant evils.<sup>39</sup>

Additionally, there was a strong belief that the interests of Southern markets like

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<sup>35</sup> AR, 1882: 35

<sup>36</sup> AR, 1903: 8;

<sup>37</sup> Thompson, William B. 1909. *The New Future Rules of the New Orleans Cotton Exchange*, Press of J.G. Hauser: New Orleans, p. 6.

<sup>38</sup> Thompson, William B. 1910. *Letter to Georgia Industrial Association*, p.3-4.

<sup>39</sup> AR, 1901; AR, 1902

NOCE were “naturally in sympathy with Southern producers.”<sup>40</sup> This alliance with the producer translated into a natural tendency to push for higher prices. NOCE’s futures market was thus seen as a necessary counter-balance to those in New York and Liverpool, both of which were “affiliated with the spinning interests” and “almost always do believe that prices will be lower, and to that end direct their efforts.”<sup>41</sup> NOCE’s futures market was thus predicated not only on economic interest, but also the duty to resist surrendering control of the market for the South’s staple crop. Were New Orleans to abdicate its market position, New York and Liverpool would be empowered “to dictate to the South and to the entire world.”<sup>42</sup>

Such arguments offered a distinct perspective on the relation between price-setting on futures and futures markets. Rather than framing price as an function of worldwide supply and demand—as was standard practice on CBOT—NOCE highlighted the power of regionally-massed buyers or sellers. In a pamphlet opposing the 1908 Scott Anti-future Act, the Exchange made the following argument:

Because Liverpool is the great market patronized by consumers, the predominant influence there is bearish, more men being interested in a declining market than in an advancing market. Because New Orleans is the great market patronized by producers, cotton bankers and merchants and by exporters, who purchase future deliveries and hedges as a protection against loss on the cotton of specific grade they contract to deliver to spinner during months to come, the predominant influence here is naturally bullish, more men being interested in an advancing market

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<sup>40</sup> AR, 1908: 12

<sup>41</sup> Thompson, William B. 1908. *Address Before the Joint Committee on Agriculture of the Senate and House of Representatives: Contracts for Future Delivery, and Effects of Adverse Legislation*, L. Graham Company, New Orleans, p.19

<sup>42</sup> *The New Orleans Cotton Exchange: Its Functions and Method of Transacting Business in Contracts for the Future Delivery of Cotton*. c. 1908. L. Graham Co., New Orleans, p.6

than in a declining market.<sup>43</sup>

This argument, that price was linked to traders' "interests," is at odds with the notion that prices are set by the balance of supply and demand. In fact, according to the theory of supply and demand the argument is backwards: the greater number of buyers in Liverpool would tend to increase prices, while the number of sellers in New Orleans would lower them. Thompson's position amounts to arguing that groups of bulls and bears colluded, at least tacitly, to push prices in a direction favorable to their market position.

Arguments about traders' interests in cotton were also expressed in terms that evoked the desire for Southern autonomy, and which must have resonated with men who had been youths during the Civil War and matured during Reconstruction. This is found in the rhetoric used to convince members on a number of topics. President William B. Thompson made such appeals while campaigning in support of the construction of public warehouses meant to lower costs and attract more cotton to New Orleans. He claimed the warehouse would "liberate the cotton trade and the commercial South from the financial domination of alien interests" and allow the South to achieve "financial and industrial enfranchisement."<sup>44</sup> He reminded listeners that, "We cannot be great so long as we are supplicants, and we shall be supplicants no longer, when we shall have placed ourselves in a position to hold that which is ours and to reap what we have sown."<sup>45</sup> On other issues, the rhetoric was just as hot, if not more so. At the 1905 conference of the Southern

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<sup>43</sup> *The New Orleans Cotton Exchange: Its Functions and Method of Transacting Business in Contracts for the Future Delivery of Cotton*. c. 1908. L. Graham Co., New Orleans, p.24

<sup>44</sup> Thompson, William B. 1908. *Address of W.B. Thompson, President New Orleans Cotton Exchange. The Central Warehouse Plan*, p. 8-9.

<sup>45</sup> *Ibid.*

Cotton Growers Association, which met in New Orleans and hosted several powerful Exchange members, Tom Watson of Georgia directly drew the link between the freedom won through control of capital and the freedom won at the barrel of a gun. Speaking on the seemingly innocuous topic of acreage reductions, he rallied the various state delegations by likening the task at hand to the military battles that their forefathers had fought in the past—North Carolinians were reminded of “the last charge of Appomattox,” Texans of the Alamo, South Carolinians of Fort Moultrie, and so on (Saloutos 1960). The battle for control of the cotton crop, Watson argued to great cheers, would require similar bravery and resolve.

NOCE thus offered both unorthodox economic arguments and distinct cultural arguments in an effort to legitimate futures speculation. Futures markets were conceptualized as valuable tools by which to ensure the vitality of the spot market and the autonomy of Southern producers and traders. Futures contracts were figurative weapons with which to fight for the full prices and full control that had been denied to Southern traders in the past.

Bucket shops, regulation, and delivery on contracts

We have seen above that a key feature of CBOT’s defense of futures was the fact that all futures contracts, as opposed to options, legally bound their parties to an actual delivery of goods or receipts. This legal obligation was critical to their defense of the non-delivery that occurred in the vast majority of cases: practices such as **offsetting settlement** or **ring settlements** were conceptualized as simplified methods that were



equivalent to what would otherwise occur via a long string of deliveries. In this way, non-delivery was reframed as delivery by other means. This perspective was forged in response to the challenges from bucket shops, which threatened the Board's economic success and cultural legitimacy, and proposed federal legislation that conflated futures and options. For CBOT, stressing delivery was a useful way of dealing with both issues at one time.

The political context in which NOCE defended speculation was different. It did not face nearly the same problem with bucket shops as did CBOT. While bucket shopping was enough of a concern for the Exchange to form a special committee dedicated to the problem in 1901, the committee often had little to report.<sup>46</sup> Their 1903 report noted that only one member had been investigated for suspected bucket shopping, and no positive proof of illegal practices was found. Compared with the same year in Chicago, where CBOT initiated nine separate lawsuits aimed at keeping quotations from bucket shops, and obtained injunctions against 70 bucket shops in Chicago, Milwaukee and Kansas City, the relative lack of urgency is clear.<sup>47</sup>

NOCE was also responding to two pieces of cotton-specific legislation that presented different challenges than the earlier Hatch and Washburn bills that CBOT had fought off. The first of these was the 1910 bill introduced by Representative Charles Scott of Kansas. The Scott Bill proposed to tax out of existence any speculative dealing in futures contracts that did not culminate in delivery. The bill would require that parties to a trade sign an affidavit stating that they intended to actually deliver or receive cotton

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<sup>46</sup> *AR*, 1901

<sup>47</sup> *OR*, MAM, Box 10, Folder 1, 1903; NOCE, *AR*, 1903

on the contracts entered into, and failure to do so would be *prima facie* evidence of gambling. The second threat was a 1913 amendment to a tariff bill, introduced by Senator Clarke of Arkansas, which imposed a 1/10 of one cent tax upon sales of cotton for future delivery, refunding the tax when cotton was actually delivered by the seller to the buyer. Critically, neither conflated futures and options as had earlier legislative attempts to eliminate speculation.

In the face of these legislative threats, and not under pressure to make any clear-cut distinction between the Exchange and bucket shops, leaders made a more sophisticated argument about the nature of delivery. As opposed to CBOT, which focused on the delivery that came at the end of every speculative futures contract, NOCE highlighted the delivery that occurred in the *spot* market as one half of a hedge.<sup>48</sup> Traders who sell futures contracts as a hedge *do*, in fact, deliver cotton—but it is spot cotton, not the cotton specified in a futures contract. Hedging worked by allowing parallel trades in spot and futures markets—having those markets intersect through forced delivery would ruin the system, by requiring traders to acquire and deliver extra cotton.

NOCE president William B. Thompson argued, in opposition to the 1913 Clarke amendment, that hedgers quite legitimately entered into futures markets with no intention to deliver or receive the commodities specified on their contract. Further, Thompson argued that, oftentimes, the nature of delivery was the exact opposite of what Congress

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<sup>48</sup> Recall that hedging involved simultaneous operations in the spot market and the futures market: hedgers would buy or sell actual cotton in the spot market, while insuring their spot cotton against adverse price movements in the futures market.

believed: manipulative trades were often those where delivery *was* made. This was true of corners, which hinged on forcing an unsuspecting party to pay high prices in order to deliver physical goods. Thompson's recognition of a clear division between the spot market, where delivery occurred, and the futures market, where it did not, mapped onto another distinction: that between cotton and *contracts* for cotton. Thompson explains:

Proponents propose to annihilate speculation in *cotton contracts*, but in the attempt to accomplish this result they will force speculation in *cotton*, and thus render the actual cotton business on stupendous speculative hazard.<sup>49</sup>

This position on the nature of futures contracts and their relation to the provision of real goods is distinct from both the position taken by CBOT. Contracts for cotton in the futures market were recognized to have an ambiguous relation to real cotton as found on the spot market. As opposed to CBOT's argument, Thompson argued that non-delivery was *not* equivalent to a pared down version of what could happen through the exchange of actual goods. The futures portion of a hedge was given a distinct identity and purpose, for which delivery was not a legitimating feature.

This argument about the insurance value of futures could not assume the same prominence on CBOT, not for any theoretical reason, but because of their battle with bucket shops. The insurance function provided by the futures portion of a hedge could be provided just as easily by a bet placed in a bucket shop. In fact, since bucket shops executed trades for very low rates, they were actually the cheapest option for traders looking to hedge against changes in the spot market. This was an argument made

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<sup>49</sup> Thompson, William B. 1913. *Statement Concerning the Cotton Future Tax Amendment to the Tariff Bill*, p. 6, emphasis original.

forcefully by bucket shop owners and supporters, who saw the Board's opposition as based less in moral scruples and more in the desire to maintain a monopoly over certain types of trades (Cronon 1991). The relative lack of bucket shops in New Orleans compared to Chicago opened up a distinct line of argument by which to establish the economic value of futures speculation.

NOCE thus presents an interesting comparison to CBOT. The futures market emerged slowly and was conceived of as ancillary to the extant spot market. The presence of a vibrant spot trade was additionally thought of as a safeguard against the excesses of the financial market, protecting NOCE traders from the manipulation found in other financial centers. Maintaining control of the cotton crop was also framed as a duty to the people of the South, a way to retain autonomy from foreign interests. This position toward the spot market, combined with proposed legislation aimed only at cotton markets, led NOCE to articulate a unique perspective on futures trading and the legitimacy of delivery. These features led futures contracts to be understood differently on NOCE than on CBOT. Their economic value lay in their ability to boost cotton prices for consumers, while their cultural legitimacy came from the autonomy and control they brought to the South.

## Conclusion

In this chapter, we have seen that CBOT and NOCE understood futures contracts and markets in different ways. On CBOT, futures contracts were understood as positive

economic and moral devices. Futures enabled speculation but involved large enough sums of money and long enough periods of time to distance themselves from mere gambling. They were enforceable contracts, which legally bound a party to close a deal, through the delivery or receipt of warehouse receipts or physical goods. Non-delivery of goods was conceptualized as, in fact, a simplified process equivalent to a long string of deliveries and re-deliveries. Both of these features were constructed in contrast to options, which was scapegoated for both the moral and economic failings of the market. This perspective was shaped by the CBOT's needs to fight off competition from the Open Board of Trade and bucket shops, while simultaneously forestalling legislation that lumped together all kinds of speculative trades in derivatives. On NOCE, futures contracts had value for a different set of reasons. Futures bolstered the spot market, lifting prices and providing insurance by means of hedging. They also promoted Southern interests and autonomy from foreign control. The status of delivery, and particularly non-delivery, on contracts was more ambiguous than that presented on CBOT. Non-delivery on contracts was not equated to a string of deliveries, but rather was conceptualized as a distinct part of a hedge, one that was entirely legitimate even though, or precisely because, delivery was never intended. NOCE's position was made possible by the distinct cultural value of cotton as a Southern emblem, their lack of local competitors, and the details of the particular, cotton-specific legislation proposed in Congress.

By drawing out these distinctions, the chapter demonstrates the local economic, cultural, and political factors contributing to the processes of theorizing and legitimating speculation in futures. Creating ideas about the economic worth of speculation and the

cultural legitimacy of speculation were not two separate processes, but two components of a single process. On CBOT, the needs to distinguish the Board from bucket shops and also to fight off indiscriminate legislation both influenced the form taken by the economic claims of speculation's value. Similarly, on NOCE, the justifications of speculation as a hedge that could raise spot market prices and also increase Southern autonomy were formed in response to local desires and the particulars of cotton-specific legislation. The economic and cultural content of justifications for controversial new products reflects local political struggles (Espeland 1998). It is through the political legitimization work that had to occur, and the context in which it occurred, that futures contracts came to take on particular cultural and economic characteristics (Callon, Meadel & Rabeharisoa 2005).

A correlate of this argument is that previous studies that focused solely on CBOT may have offered too narrow a perspective on the development of futures markets in the United States. Within economic sociology, CBOT has become the paradigmatic case for discussing the development of futures markets or the construction of standardized grading systems. This is not without reason. Chicago was the first and largest market for agricultural futures, and has continued to grow even until this day. CBOT was also involved in significant court cases that defined the legal environment in which futures markets flourished. But my findings from New Orleans suggest that the lack of comparative case studies may have promoted over-generalizations on the topic of attitudes toward and legitimization of speculation in futures.

For instance, scholars have highlighted the issue of delivery as central to the legitimization of futures trading (Levy 2006). It is indeed true that the “contemplation of delivery” was central to Justice Holmes’ 1905 Supreme Court decision affirming the legality of CBOT traders’ practice of settling futures trades by difference. This decision regarding delivery subsequently became an important touchstone for exchanges whose methods were called into question. But the case of NOCE shows that delivery, in and of itself, was not a universal concern, nor a universal good. The President of NOCE made multiple public addresses, even after Holmes’ ruling, denying the importance of an intent to deliver on futures contracts, highlighting instead the ability for futures contracts to offer insurance on spot trades. To focus on delivery and its significance in the Supreme Court’s logic is to ignore other ways of legitimating speculation in futures that co-existed with those coming from Chicago.

As a second example, the distinction between speculation and gambling was central to CBOT’s legitimization efforts. But this matter was far less prominent on NOCE, opening the possibility that the salience of this issue might have varied across exchanges. The findings of this chapter suggest that this lack of salience was largely economic and political. The distinction between speculation and gambling was simply less useful in proving the value of the futures trade in New Orleans. CBOT’s statements about speculation in relation to gambling were not simply responses to public criticism, but also strategic claims that usefully mapped onto the distinctions CBOT sought to draw between futures and options trading on one hand, and the Board and bucket shops on the other. NOCE had no incentive to draw on this same distinction. It is also possible that this

moral distinction may not have had the same power in New Orleans as it did in Chicago. After all, Louisiana had a popular state lottery from 1868-1893, which suggests that Louisianans may have held more liberal ideas about gambling than other people around the country. While my two-case design cannot speak to this possibility authoritatively, it does show that attitudes towards gambling across the country were not homogenous. The distinction between speculation and gambling was critical to CBOT's efforts to attain legitimacy, but cannot unproblematically be applied to all 19<sup>th</sup> century American futures markets.

This chapter thus uncovers the variety of ways in which futures trading was deemed useful and legitimate. It shows that, in contrast to scholarship which has focused exclusively on the case of Chicago, futures were conceptualized in a number of ways, and that no one set of features was central to their legitimacy. The orthodox conception of what futures are and what they are good for could well have been quite different had a legal challenge from another exchange made it to the Supreme Court first, or if CBOT had been able to reach consensus with their competitors. The particular understanding of speculation as "the self-adjustment of society to the probable" and the "contemplation of delivery" need not have been the centerpieces around which futures trading was legitimated. Alternative formulations existed and gave rise to unique market environments throughout the formative decades of futures markets.



## Conclusion- Infrastructure and Outcome

This dissertation has studied the information infrastructures that linked extant spot markets in agricultural commodities to newly-developed futures markets, and enabled their co-functioning. Chapter 1 served as an introduction to the cases and a methodological justification for their selection. Chapter 2 outlined the meaning of infrastructure as a feature of, and approach to studying, markets. Chapters 3-5 offered empirical analyses of three features of these infrastructures: (1) the classification schemes by which spot commodities were assigned grades; (2) the material means of gathering and disseminating data, both statistics on the growth and movement of the spot crop, as well as price quotations from global markets; (3) the economic and cultural theories by which traders understood the nature of speculation in futures and its effect on spot markets. These infrastructural connections made futures markets viable by enabling futures traders to make intentionally rational buying and selling decisions based on a real or perceived relation with the underlying spot market.

The dissertation asked two questions about these infrastructures: What factors caused each feature to take the shape it did? And, what consequences did these infrastructures have for market behavior? I begin this chapter by reviewing the answers to these questions given over the course of this dissertation. Following this, I discuss the larger lessons of the dissertation and directions for future research.

What factors caused each infrastructural feature to take the shape it did?

Chapter 3 demonstrated that, on CBOT, powerful grain elevator owners shaped the grading system to their own ends. Despite supervision from CBOT inspectors, warehouse owners gamed the system by diluting wheat and forging elevator receipts. These actions produced uncertainty over both the quality and quantity of wheat in the city. State-run grading had its own problems. The politicized Railroad & Warehouse Commission did not require that appointees have any prior knowledge of the grain trade, and officials remained unresponsive to traders' day-to-day needs. Finally, CBOT itself influenced the classification system by refusing to negotiate grading standards with other exchanges, a stance enabled by their dominant market position. The grading system that emerged from this context often failed to index wheat's physical qualities and had an uncertain relation to other markets' systems.

NOCE's system, by contrast, was developed for the spot trade, and was in use long before futures markets emerged. Spot market traders and merchants thus exerted a great deal of influence on the workings of the system. They ensured that grading on NOCE remained an antagonistic negotiation between buyer and seller, rather than a centralized process. NOCE also built a significant supervisory apparatus in response to spot traders' concerns about the maintenance of grades as cotton moved through the city. Finally, NOCE directors worked to align standards with other exchanges and promote harmony within the spot trade. These features led to a grading system that accurately indexed the physical qualities of cotton and promoted uniformity in trading across markets.

Chapter 4 showed that CBOT's methods for gathering and disseminating information were shaped by the larger conflicts they had with Western Union and bucket shops. CBOT exerted pressure on Western Union to tighten control over the dissemination of price data and keep price quotations away from illegitimate recipients. They leveraged the value of their quotations as the world's leading commodity market, and made credible threats to create their own telegraph companies that would circumvent Western Union. In this fight to control their quotations, CBOT argued that market information was a private good, a perspective which they brought to their policies on crop reports as well. CBOT made no effort to authenticate reports from outside sources or to gather statistics on their own. As a result, multiple reports circulated at any given time, creating uncertainty and rumor around the growth and movement of wheat.

NOCE developed a crop reporting system that was spurred on by their Board of Directors' desire to free themselves from reliance on Northern sources of information. Their mistrust of this information, combined with the subordinate position in which it placed NOCE, led the Exchange to build a sophisticated statistical network that traced the growth and movement of the cotton crop. Long-serving Exchange Secretary Henry Hester used his positions on the National Cotton Exchange and the editorial board of *Cotton World* magazine to expand this network across the nation, and the system he built gained renown worldwide. However, NOCE's weak position relative to Western Union and the New York Cotton Exchange made it difficult to improve the technical capacity of telegraphs and amend prejudicial rules of information sharing. Though their commitment to providing information as a public good for their members made problems with "beats"

by private wires a hotly debated topic, the Exchange was unable to force any significant improvements. This created an environment where spot market statistics were plentiful, but up-to-the-minute market quotations were not.

Chapter 5 established that CBOT evaluated futures speculation largely in contrast to a closely related type of derivative, options contracts. This was done in response to two different challenges. First, alternative local venues for trading—bucket shops and the Open Board of Trade—made options trading impossible to eliminate. The continued presence of options despite their illegality hurt the Board's legitimacy. Second, options trading featured in two proposed pieces of federal legislation that aimed to bar speculation in futures. CBOT seized upon the distinction between options and futures as a way to fight both their local rivals and the proposed legislation. On the one hand, they linked the differences between futures and options contracts to the distinction between speculation and gambling. On the other, they capitalized on confusion over these terms within legislation to delegitimize federal efforts at regulation. Options also served as a useful foil when evaluating the economic value of speculation. Speculators contrasted the lively market that resulted from futures speculation with the dullness which accompanied options trading, arguing that the use of options contracts killed beneficial fluctuations in price.

On NOCE, the economic and cultural importance of the spot trade shaped the valuation of speculation in futures. NOCE's leaders argued that their robust spot market guaranteed the value of futures trading on their exchange, in contrast to markets that needed to rely on artificial means for establishing value. They also claimed that a

significant component of the futures market's worth was that it gave New Orleans traders a tool with which to boost spot market prices. This perspective was further enabled by cotton-specific legislation proposed at the federal level. Unlike the bills which CBOT faced two decades before, these made no distinction between futures and options, but rather focused narrowly on ensuring the delivery of goods on contract. NOCE justified non-delivery on contracts through a full-throated defense of hedging. As opposed to CBOT, which attempted to cast non-delivery as equivalent to delivery by other means, NOCE argued that non-delivery on futures contracts was critical to preserving the value of actual spot goods.

What consequences did these infrastructures have for market behavior?

Chapters 3 and 4 also explore the consequences of these infrastructural features on market behavior. On CBOT, the information conveyed by grades was more likely to misrepresent the physical quality of wheat and the quantities being stored in the city. The Board's policy of treating information as a private good created a two-tiered system, where traders with better information or faster telegraphic service had an advantage over other members. Warehouse receipts that automatically called forth particular grades of wheat enabled speculation to grow quite large, as traders could be assured that they could satisfy contracts with little cost simply through the purchase of a standardized contract. These systems would have made long-term market projection difficult, while doing little to lower uncertainty in the short-term. As a result, we would expect to see increased speculation on short-term price fluctuations and the loss of hedging to other markets.

Conversely, NOCE created a system where grades closely indexed the quality of cotton, and quantities were ensured by the careful supervision of bales as they moved through the city. The Exchange produced a wealth of reliable statistics on the growth, movement and consumption of cotton, which gave members a detailed perspective on the spot market. Also, the lack of speedy telegraphic services made speculation in futures, which required quickly spotting market opportunities, more difficult. Finally, the cost of negotiating grade every time delivery was involved served as a potential cost that speculators were keen to avoid. These features combined to create a market that would promote relatively more spot market-related hedging and less pure speculation.

These infrastructural differences established distinct, limiting conditions for action on the two exchanges. Irrespective of the influence of social structural factors such as network ties, regulative institutions, or cultural attitudes toward speculation, the infrastructure of CBOT would promote a higher proportion of speculative trades than that of NOCE. I argue that these infrastructural differences were a significant reason why CBOT saw such greater price volatility than NOCE over the period of my research.

In the remainder of this chapter I note two general lessons we can draw from the questions and answers presented in this dissertation. First: Market infrastructure, broadly understood, is a particularly useful concept for studying market creation, particularly for derivative markets. Second: An infrastructural approach enables meaningful new analyses of system-level outcomes, market volatility being an example. I discuss each and propose areas for future exploration below.

## Infrastructure and derivative market creation

Infrastructures offer practical solutions to some of the theoretical problems posed by the creation of a new market (Beckert 2009, 2012; Callon 2008; Preda 2009; Ronat Tas & Guseva 2014). Infrastructures are critical components by which new markets give commodities the proper characteristics (Callon 1998b; Healy 2010; Zelizer 1979), equip traders with appropriate interests, capacities, and orientations (Caliskan & Callon 2010; Callon 2008; Crouch & Streeck 1997; Hollingsworth & Boyer 1997; Polanyi 1957), and enable actors to make rational decisions despite the fundamental uncertainty of the market (Beckert 1996; 2009; Knight 1921; Millo, Muniesa, Panourgias & Scott 2005). Established at the genesis of markets, infrastructures both solve these problems and establish conditions that influence behavior on the market long into the future. The same is true of infrastructures on derivative markets: they also help define actors and commodities, and make possible action under uncertainty. But, in solving these problems, they face the additional challenge of doing so in ways that are compatible with the solutions in place on the underlying spot market. If actors in the derived market are acting in ways that are illegitimate in the underlying market there will be conflict between them; if derived commodities are being handled in ways that clash with established understandings and practices in the underlying market, this will be contested; if derived and underlying markets require different levels of uncertainty, their conflicting needs will cause strife. Establishing a compatible relation can be difficult, as underlying and derived markets have different aims and may benefit from quite different infrastructural features.

Several findings from the dissertation illustrate this tension. Futures markets created a new economic actor in the speculator, and a new commodity in the futures contract. Defining the character of both was a contentious process, largely because the cultural orientations present in the underlying market constrained action in the derivative market. Futures, for instance, challenged the traditional spot market-based understanding of contracts. While futures ostensibly bound two parties to a transaction of physical goods, traders realized early on that the physical delivery of goods—the *raison d'être* of spot markets—was an unnecessary drag on speculation in the futures market. They created new processes, such as standardizing contracts and offsetting trades, that allowed settlement of deals without delivery. To actors in the spot market, this appeared to pervert the meaning of contracts in a morally questionable sleight-of-hand. Speculators also strained the accepted orientations to exchange by selling short items that they did not own and often never intended to own. To them, this behavior was market-making, but to many in the product market accustomed to exchanging physical goods it was gambling. The orientations in place on the spot market were challenged by new futures market practices, and compromise was only reached through decades of court battles and legislation.

Aligning the methods for managing uncertainty across underlying and derived markets also was difficult. The challenge was seen most clearly on the topic of grading the spot commodity. On both markets, spot and futures traders clashed over the acceptable level of uncertainty of grades in relation to contracts. On CBOT, the uncertainty created by a shoddy grading system caused problems for traders in the spot market, as the quality of wheat failed to meet their customers' expectations. But futures



traders could accept this uncertainty, given their general non-involvement with the physical commodity. On NOCE, the situation was reversed. Uncertainty over grading was worrisome to speculators because of the potential cost it imposed. This was why speculators lobbied for, and eventually convinced NOCE to create, a centralized grading service for contract cotton. Spot dealers, however, used the grading system to their advantage, mobilizing their own expertise to profit from the uncertainty present in transactions. In both cases a single infrastructure struggled to solve the problem of uncertainty in a manner satisfactory to parties in both markets.<sup>1</sup>

Studying derivative markets in terms of their infrastructures offers a way to examine these challenges inherent in their construction. It focuses on the constitutive linkage that material tools, information networks, and cultural evaluations produce between derivative and underlying markets, and how this connection entangles the markets in a complex, two-market system. More research on these market systems and their infrastructures is needed to address some of the particular questions suggested by this dissertation. How does the form of an extant underlying market influence the creation of its derived market? Conversely, once a derived market has been built, how does it redound infrastructurally on the underlying market from which it grew? What factors—organizational, political, cultural, or economic—impact the nature of this relationship? Under what circumstances do these linking infrastructures change over time? These

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<sup>1</sup> Interestingly, as these examples show, there is not a pre-established relation between the type of market and the level of uncertainty traders optimally desire: on NOCE, spot traders had a higher tolerance for uncertainty, while on CBOT, spot traders had less. The significance of uncertainty in the market is filtered through the institutional environment.

questions are critical for understanding the modern economy. One need only recall the 2008 housing crash and financial crisis to recognize that the links between derivative and underlying markets fundamentally shape the workings of the economy. Developing a sociological understanding of linked underlying-derivative market systems thus remains an important task for economic sociologists.

#### Infrastructural analysis & market regulation

The second broad contribution of this dissertation is demonstrating the ability of an infrastructural analysis to explain market-wide dynamics and outcomes. By comparing the information required for two different types of trades—speculation and hedging—with the information created by infrastructures on CBOT and NOCE, I demonstrate that the two markets would see divergent baseline levels of each type of trade. This analysis is unique in that it focuses on the infrastructures that set limiting conditions for market action, rather than the social structures that constrained it. Since these infrastructural differences persist over long stretches of time, they are well-suited to explain long-term divergences in behavior such as those seen in price volatility on the two exchanges. This provides a non-deterministic method for linking foundational infrastructures with system-level outcomes and dynamics. That is, it helps us to see how infrastructures shape behavior, without reducing those behaviors to mechanical effects of the infrastructures in which they occur.

This connection between infrastructure and systemic market behaviors is useful for thinking about the regulation of financial markets. It echoes the argument made by Schneiberg & Bartley (2010), who use the tools of organizational sociology to analyze market architectures. Modern financial markets, they claim, combine incredible complexity with tight coupling, an arrangement that makes them prone to “normal accidents” (Perrow 1984). Rather than attempting to regulate such markets, a difficult and resource-intensive fix, they suggest that we might make markets more stable by re-shaping their architectures, i.e., by re-segmenting and decentralizing markets, and building in redundancies. These changes in market architectures would weaken interconnections between markets and prevent failures or errors from cascading through large sectors of the economy. In this way, their argument expands the claim made in this dissertation. Both Schneiberg & Bartley’s (2010) article and this dissertation make similar claims about how the form of markets can impact behavior, irrespective of any additional coercive regulation.

Combining the “infrastructural” approach outlined in this dissertation with Schneiberg & Bartley’s (2010) “architectural” approach has promise. But the connection between these approaches still requires theoretical elaboration and empirical testing. What exactly is the distinction between market infrastructures and architectures? How, if at all, are they related to each other? Do infrastructures and architectures correspond to particular types of market behaviors, e.g., price volatility versus cascading of errors? Most broadly, how does each relate to, and interconnect, flows of information and flows

of capital? Answering these questions will go a long way toward understanding the relation between a market's foundations and its outcomes.

### The value of infrastructure

Economic sociologists have amassed a vast body of knowledge about the social structural influences that shape behavior on individual markets. But this dissertation suggests that it is also critical to direct attention away from the social structural factors that directly influence market behavior and onto the infrastructural features that indirectly shape the conditions of possibility on the market. Market infrastructures are created to solve fundamental problems of economic action; they set limiting conditions on behavior within markets. This dissertation has highlighted these elements in the case of 19<sup>th</sup> century futures markets. There, infrastructures were created to construct, disseminate, and evaluate information on futures markets, making those markets viable spaces of rational calculation. The particulars of their construction had a significant impact on behavior, making particular types of trading more feasible, or rational, on each exchange.

As a whole, the dissertation pushes toward a deeper, systemic, sociological analysis of markets, both on their own and in combination with markets to which they are constitutively linked. It offers a fresh line of thought in economic sociologists' broad move away from the traditional orienting metaphor of social structural "embeddedness" (Beckert 2003, 2007, 2009; Callon 2008; Krippner 2001; Krippner & Alvarez 2007). By shifting analysis from the market's social context to the fabric of the market itself, this

approach draws from science and technology studies, information studies, and anthropology to create a perspective on markets as socio-technically constructed objects. This multi-disciplinary, socio-material approach is necessary in order to understand the continual processes of evolution, diversification, and inter-connection that sit at the heart of modern markets.

## Appendix A. – Glossary of Economic Terms

**Bucket shop** – Shops that allowed patrons to place bets on the movement of commodity prices without actually entering into legally binding contracts. Prices from a legitimate exchange (e.g., CBOT) were relayed to the shop by telegraph. At bucket shops, patrons could deal in small quantities, far below the minimums set by exchanges. They could also deal in **options**, which were, by and large, prohibited on legitimate exchanges.

**Corner** – A gambit wherein a trader simultaneously buys up both futures contracts and the underlying spot commodity called for in these contracts. By doing so, he hopes to own a significant portion of that commodity by the time his contracts come due. At the contract's call date, he would then demand that his counterparties meet the contract by physical delivery of commodities. Since he controlled the majority of the supply, his counterparties would be forced to come to him to buy, at which point he could charge a highly inflated price. This would earn the trader a large profit. Corners required large sums of capital and were often the work of secret syndicates of traders. They could impact prices on an exchange for weeks or months. A less severe version of the same price increased caused by a shortage of supply was known as a squeeze.

**Derivative** – Any financial instrument the value of which is a function of a separate, underlying entity. This underlying entity can be any asset, an index, or an interest rate. During the time period covered in this research the underlying entities were concrete physical commodities, such as agricultural products or gold.

**Factors** – An all-purpose commission merchant who connected Southern planters to financial interests, shipping companies, and merchants. Factors would lend money to planters at the start of the season, advance them money after the harvest, sell cotton on consignment, and buy goods needed on the farm and homestead. Factors served as the central node in the ante-bellum marketing of the South's cotton crop.

**Futures contract** – A contract for the purchase or sale of a specified quantity of a commodity at a specified price and future date. Futures contracts on CBOT specified the grade of wheat that was to be exchanged; contracts on NOCE did not. Contracts matured in a particular month, and could be settled at any time during that month.

**Futures market** – A secondary market for the purchase and sale of futures contracts. These markets were enabled by the standardization of commodity grades and futures contracts. This allowed contracts to be exchanged at a high volume and for traders to easily maintain portfolios of speculative trades.

**Hedging** – The act of buying or selling in the futures market in order to insure against adverse price movements in the spot market. Hedging was done by individuals who were involved in the spot trade of commodities in order to reduce the inherent risk of adverse price movements. In a hedge, a trader balances a purchase or sale in the spot market with the opposite action in the futures market. That is, a buyer of spot goods would sell the same amount of goods in the futures market, and a seller of spot goods would buy in the futures market. The futures market portion of a hedge was generally **offset**; the spot market portion was delivered.

**Long / short position** – A long position is taken when a trader buys futures anticipating a rise in their price; a short position is taken when a trader sells futures anticipating a drop in their price. Often, these positions were taken by traders with no desire to own the commodities promised in the contracts, nor any desire to.

**Offsetting settlement** – A method of cancelling one's obligation in the futures market through assuming an opposite position. A trader who had bought a futures contract for 500 bales of basis middling cotton could offset his position by selling a contract for the same amount. His two contractual obligations would then cancel each other out. Traders could then simply pay whatever difference existed in the price at which the contract was bought and sold. This chain of offsetting transactions often extended to several traders who would need to meet and settle their respective positions. These were known as **ring settlements**, as they involved a circle of trades (e.g., A to B, B to C, C to D, D back to A). Clearinghouses were developed in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries to keep track of the long trails of deals and simplify the clearing process at the end of each month.

**Options** – Options, also known as privileges or puts and calls, were contracts for a future transaction, at a particular price for a particular good. But, unlike **futures contracts**, options gave one party—either the buyer or seller—the ability to decide whether or not to make the transaction at the contract's call date. Securing an option to either buy or sell required paying a counter-party a small fee, traditionally \$1 per 1,000 bushels. When the option came due, the trader could decide either to execute the deal as specified, or to decline to do so, in which case he would forfeit the fee he had paid.

**Ring settlement** – See **offsetting positions**.



**Speculation** – Buying or selling in the futures market in order to profit from price fluctuations. As opposed to hedging, speculation does not involve a counter-position in the spot market. Speculators bet on price movements in the spot market, which would in turn affect the value of their contracts. Speculators generally avoided any actual involvement in the spot market, and did not come into contact with primary commodities.

**Spot market** – A market for the purchase and sale of physical commodities (e.g., wheat or cotton), where buyers pay money and receive goods from sellers on the spot.

## Appendix B. – Monthly high and low prices of wheat and cotton on CBOT & NOCE

Monthly high and low price data come from Boyle (1922) and Boyle (1934). Cotton prices from NOCE are for middling cotton; this was the basis grade for all futures contracts. On CBOT, prices are for “that grade of wheat in which the most transactions were had” (Boyle 1922: 9). This grade changed over the period of time measured. The following type of wheat was used in each year: 1870: No. 1 spring; 1871-1897: No. 2 spring; 1898-1904: “Regular” wheat; 1905-1913: No. 2 red winter wheat.

I created the intra-month volatility statistic to compare the movement of prices across markets. It is calculated as the difference between monthly high and low prices divided by the average of the two; in mathematical terms,  $V = (\text{Monthly high} - \text{monthly low}) / [(\text{Monthly high} + \text{monthly low}) / 2]$ . Intra-month volatility is a particularly useful measure of volatility in futures markets. Contracts came due each month in succession and would have converged with spot prices. Thus large spot price changes within a month suggest significant volatility in futures markets.

Month		CBOT Wheat Prices			NOCE Cotton Prices		
		<u>Low</u>	<u>High</u>	<u>Volatility</u>	<u>Low</u>	<u>High</u>	<u>Volatility</u>
September	1870	97	107	0.098039216	18 1/4	15 1/2	0.162962963
October	1870	104	111	0.065116279	16 1/2	14 1/2	0.129032258
November	1870	95	103	0.080808081	16 1/4	15 1/8	0.071713147
December	1870	105	106	0.009478673	15 1/8	14 1/4	0.059574468
January	1871	110	130	0.166666667	15 1/8	14 1/4	0.059574468
February	1871	122	132	0.078740157	15	14 1/4	0.051282051
March	1871	123	131	0.062992126	14 3/4	13 7/8	0.061135371
April	1871	124	134	0.07751938	14 3/4	14 3/8	0.025751073
May	1871	125	133	0.062015504	16 3/8	14 1/2	0.12145749
June	1871	127	132	0.038610039	21	16 5/8	0.23255814
July	1871	109	129	0.168067227	20 3/4	20	0.036809816
August	1871	99	125	0.232142857	Missing	Missing	
September	1871	106	132	0.218487395	20 1/4	18 1/2	0.090322581
October	1871	112	124	0.101694915	19 7/8	18 1/8	0.092105263
November	1871	118	122	0.033333333	18 7/8	17 7/8	0.054421769
December	1871	117	121	0.033613445	19 3/4	18 1/2	0.065359477
January	1872	120	125	0.040816327	22	19 1/2	0.120481928
February	1872	123	126	0.024096386	22 3/8	21 7/8	0.02259887
March	1872	118	126	0.06557377	22 1/2	21 3/4	0.033898305
April	1872	119	136	0.133333333	23 1/8	22 1/2	0.02739726
May	1872	135	154	0.131487889	23 1/2	22 7/8	0.026954178
June	1872	121	155	0.246376812	25 1/4	24	0.050761421
July	1872	120	132	0.095238095	24 1/2	22 1/4	0.096256684
August	1872	111	156	0.337078652	20 3/4	19 5/8	0.055727554
September	1872	117	129	0.097560976	21 1/4	18	0.165605096
October	1872	107	121	0.122807018	19 1/2	18 3/4	0.039215686
November	1872	101	111	0.094339623	19 3/8	18 3/8	0.052980132
December	1872	109	121	0.104347826	19 7/8	18 7/8	0.051612903
January	1873	119	126	0.057142857	20	19 3/8	0.031746032
February	1873	120	126	0.048780488	19 7/8	19 3/8	0.025477707
March	1873	118	123	0.041493776	19 1/2	18 1/2	0.052631579
April	1873	114	125	0.092050209	19 1/4	18 1/2	0.039735099
May	1873	123	134	0.085603113	18 3/8	18 1/8	0.01369863
June	1873	117	128	0.089795918	18 3/4	18 1/4	0.027027027
July	1873	114	123	0.075949367	18 3/4	18 5/8	0.006688963
August	1873	117	146	0.220532319	18 3/4	18 1/2	0.013422819

September 1873	89	120	0.296650718	19	17	0.111111111
October 1873	93	109	0.158415842	18 3/4	15 7/8	0.166064982
November 1873	92	109	0.169154229	16 5/8	14 3/8	0.14516129
December 1873	106	117	0.098654709	16 7/8	15 3/4	0.068965517
January 1874	114	127	0.107883817	16 3/4	15 3/4	0.061538462
February 1874	115	124	0.075313808	16 1/4	15 3/4	0.03125
March 1874	117	123	0.05	16 5/8	15 1/2	0.070038911
April 1874	119	128	0.072874494	17 1/2	16 3/8	0.066420664
May 1874	117	127	0.081967213	18	17 3/8	0.035335689
June 1874	116	123	0.058577406	17 3/4	16 7/8	0.050541516
July 1874	108	117	0.08	17	16 3/4	0.014814815
August 1874	91	110	0.189054726	16 7/8	16 5/8	0.014925373
September 1874	93	102	0.092307692	16 7/8	14 5/8	0.142857143
October 1874	81	99	0.2	14 3/4	14 1/8	0.043290043
November 1874	83	93	0.113636364	14 1/2	14 1/8	0.026200873
December 1874	87	93	0.066666667	14 1/4	13 7/8	0.026666667
January 1875	88	91	0.033519553	14 7/8	14	0.060606061
February 1875	83	88	0.058479532	15 3/4	14 7/8	0.057142857
March 1875	85	96	0.121546961	16	15 5/8	0.023715415
April 1875	93	105	0.121212121	16 1/8	15 5/8	0.031496063
May 1875	89	106	0.174358974	15 3/4	15 1/8	0.04048583
June 1875	90	102	0.125	15 1/2	15	0.032786885
July 1875	100	128	0.245614035	15 3/8	14 1/4	0.075949367
August 1875	115	130	0.12244898	14 5/8	14 1/8	0.034782609
September 1875	105	119	0.125	14 3/8	12 7/8	0.110091743
October 1875	108	113	0.045248869	13 1/2	12 3/4	0.057142857
November 1875	104	113	0.082949309	12 3/4	12 1/2	0.01980198
December 1875	94	97	0.031413613	12 5/8	12 1/2	0.009950249
January 1876	95	102	0.07106599	12 1/2	12 1/4	0.02020202
February 1876	97	106	0.088669951	12 3/8	12 1/4	0.010152284
March 1876	97	105	0.079207921	13 1/4	12 1/4	0.078431373
April 1876	99	105	0.058823529	12 7/8	12	0.070351759
May 1876	96	108	0.117647059	12	11 3/8	0.053475936
June 1876	102	108	0.057142857	11 3/4	11 3/8	0.032432432
July 1876	83	105	0.234042553	11 3/8	11 1/8	0.022222222
August 1876	84	96	0.133333333	11 1/8	10 1/8	0.094117647
September 1876	82	111	0.300518135	11	10 1/2	0.046511628
October 1876	105	116	0.099547511	11	10 1/4	0.070588235
November 1876	107	114	0.063348416	12	11	0.086956522
December 1876	112	127	0.125523013	12 1/8	11 3/8	0.063829787
January 1877	125	131	0.046875	12 7/8	12 1/4	0.049751244

February 1877	121	133	0.094488189	12 1/4	11 3/4	0.041666667
March 1877	121	129	0.064	11 7/8	11	0.076502732
April 1877	126	175	0.325581395	11 1/2	10 7/8	0.055865922
May 1877	141	176	0.220820189	11	10 1/2	0.046511628
June 1877	141	155	0.094594595	11 3/8	10 3/4	0.056497175
July 1877	127	148	0.152727273	11 3/8	11 1/8	0.022222222
August 1877	100	129	0.253275109	11 1/8	10 1/8	0.094117647
September 1877	106	118	0.107142857	11 1/8	10 1/8	0.094117647
October 1877	104	114	0.091743119	11 3/8	10 3/4	0.056497175
November 1877	105	114	0.082191781	10 7/8	10 1/2	0.035087719
December 1877	106	112	0.055045872	11 1/8	10 3/4	0.034285714
January 1878	102	109	0.066350711	10 7/8	10 5/8	0.023255814
February 1878	101	109	0.076190476	10 5/8	10 1/2	0.01183432
March 1878	108	112	0.036363636	10 3/4	10 1/8	0.05988024
April 1878	106	114	0.072727273	10 1/4	10	0.024691358
May 1878	105	113	0.073394495	11	10 1/4	0.070588235
June 1878	88	106	0.18556701	11 1/4	11	0.02247191
July 1878	89	105	0.164948454	11 1/4	11	0.02247191
August 1878	89	108	0.192893401	11 3/8	11	0.033519553
September 1878	85	89	0.045977011	11	10 3/8	0.058479532
October 1878	77	88	0.133333333	10 1/4	9 3/8	0.089171975
November 1878	79	85	0.073170732	9 1/2	8 7/8	0.068027211
December 1878	81	84	0.036363636	9 1/4	8 3/8	0.09929078
January 1879	82	87	0.059171598	9 3/8	9 1/8	0.027027027
February 1879	85	94	0.100558659	9 5/8	9 1/4	0.039735099
March 1879	89	96	0.075675676	10 1/8	9 1/8	0.103896104
April 1879	84	93	0.101694915	11 3/8	10 1/4	0.104046243
May 1879	89	103	0.145833333	13 1/8	11 3/8	0.142857143
June 1879	101	107	0.057692308	12 3/4	11 7/8	0.07106599
July 1879	91	110	0.189054726	12	11 1/8	0.075675676
August 1879	84	92	0.090909091	11 1/2	10 1/2	0.090909091
September 1879	52	105	0.675159236	11 5/8	10 1/8	0.137931034
October 1879	103	120	0.152466368	10 3/4	9 3/4	0.097560976
November 1879	110	122	0.103448276	11 3/4	10 1/2	0.112359551
December 1879	122	133	0.08627451	12 1/4	11 1/2	0.063157895
January 1880	115	132	0.137651822	12 1/2	11 7/8	0.051282051
February 1880	118	125	0.057613169	13	12 5/8	0.029268293
March 1880	114	126	0.1	13	12 1/2	0.039215686
April 1880	107	115	0.072072072	12 5/8	11 3/4	0.071794872
May 1880	112	119	0.060606061	11 3/4	11 1/4	0.043478261
June 1880	88	114	0.257425743	11 3/4	11 1/4	0.043478261

July 1880	87	96	0.098360656	11 3/4	11 1/4	0.043478261
August 1880	86	92	0.06741573	11 3/4	11 3/8	0.032432432
September 1880	86	95	0.099447514	11 3/4	10 7/8	0.077348066
October 1880	91	102	0.113989637	11 3/8	10 7/8	0.04494382
November 1880	101	112	0.103286385	12	10 3/4	0.10989011
December 1880	94	110	0.156862745	11 3/4	11 3/8	0.032432432
January 1881	95	100	0.051282051	11 5/8	11 3/8	0.02173913
February 1881	96	100	0.040816327	11 3/8	11 1/8	0.022222222
March 1881	98	104	0.059405941	11	10 1/2	0.046511628
April 1881	100	107	0.06763285	10 5/8	10 1/4	0.035928144
May 1881	100	113	0.122065728	10 1/2	10 1/8	0.036363636
June 1881	107	114	0.063348416	10 3/4	10 1/2	0.023529412
July 1881	108	121	0.113537118	11 7/8	10 3/4	0.099447514
August 1881	119	138	0.147859922	12 1/4	11	0.107526882
September 1881	121	138	0.131274131	11 3/8	11	0.033519553
October 1881	131	143	0.087591241	11 3/8	10 7/8	0.04494382
November 1881	124	132	0.0625	11 1/2	11 1/8	0.033149171
December 1881	123	129	0.047619048	11 5/8	11 3/8	0.02173913
January 1882	126	136	0.076335878	11 5/8	11 3/8	0.02173913
February 1882	120	132	0.095238095	11 5/8	11 1/4	0.032786885
March 1882	124	135	0.084942085	12	11 1/2	0.042553191
April 1882	133	140	0.051282051	12	12	0
May 1882	123	140	0.129277567	12 1/8	12	0.010362694
June 1882	125	133	0.062015504	12 1/2	12	0.040816327
July 1882	125	135	0.076923077	12 7/8	12 1/2	0.02955665
August 1882	101	135	0.288135593	12 3/4	12 3/8	0.029850746
September 1882	97	108	0.107317073	12 1/2	11 3/8	0.094240838
October 1882	92	97	0.052910053	11 1/4	10 3/8	0.080924855
November 1882	91	94	0.032432432	10 1/4	9 3/4	0.05
December 1882	91	95	0.043010753	10	9 11/16	0.031746032
January 1883	93	103	0.102040816	9 7/8	9 9/16	0.032154341
February 1883	101	111	0.094339623	9 15/16	9 5/8	0.031948882
March 1883	105	109	0.037383178	9 3/4	9 1/2	0.025974026
April 1883	102	112	0.093457944	9 7/8	9 3/8	0.051948052
May 1883	108	113	0.045248869	10 1/4	10	0.024691358
June 1883	98	113	0.142180095	10 1/8	9 13/16	0.031347962
July 1883	97	103	0.06	9 13/16	9 9/16	0.025806452
August 1883	100	103	0.02955665	9 3/4	9 5/8	0.012903226
September 1883	93	101	0.082474227	10 5/16	9 5/8	0.068965517
October 1883	90	96	0.064516129	10 11/16	10 3/16	0.047904192
November 1883	92	98	0.063157895	10 5/16	10	0.030769231

December 1883	95	99	0.041237113	10 3/16	9 7/8	0.031152648
January 1884	88	95	0.076502732	10 1/2	10 1/4	0.024096386
February 1884	91	96	0.053475936	10 1/2	10 5/16	0.018018018
March 1884	83	94	0.124293785	11 1/8	10 7/16	0.063768116
April 1884	76	92	0.19047619	11 3/4	11 1/8	0.054644809
May 1884	85	95	0.111111111	11 5/8	11 3/8	0.02173913
June 1884	85	90	0.057142857	11 3/8	11	0.033519553
July 1884	80	85	0.060606061	11	10 11/16	0.028818444
August 1884	76	84	0.1	11 3/4	10 1/2	0.112359551
September 1884	73	80	0.091503268	10 3/4	9 3/4	0.097560976
October 1884	73	79	0.078947368	9 15/16	9 7/16	0.051612903
November 1884	71	75	0.054794521	10 1/8	9 1/2	0.063694268
December 1884	70	74	0.055555556	10 1/2	10 1/16	0.042553191
January 1885	76	81	0.063694268	10 5/8	10 5/16	0.029850746
February 1885	74	79	0.065359477	10 11/16	10 1/2	0.017699115
March 1885	73	80	0.091503268	10 5/8	10 1/2	0.01183432
April 1885	77	92	0.177514793	10 5/8	10 1/8	0.048192771
May 1885	85	91	0.068181818	10 1/2	10 3/16	0.03021148
June 1885	84	90	0.068965517	10 7/16	9 15/16	0.049079755
July 1885	85	90	0.057142857	10	9 3/4	0.025316456
August 1885	78	89	0.131736527	9 3/4	9 1/2	0.025974026
September 1885	76	87	0.134969325	9 1/2	9 1/8	0.040268456
October 1885	85	91	0.068181818	9 3/8	9	0.040816327
November 1885	84	91	0.08	9	8 7/8	0.013986014
December 1885	84	89	0.057803468	8 7/8	8 5/8	0.028571429
January 1886	77	85	0.098765432	8 3/4	8 9/16	0.02166065
February 1886	78	81	0.037735849	8 11/16	8 3/16	0.059259259
March 1886	76	81	0.063694268	8 3/4	8 1/4	0.058823529
April 1886	72	80	0.105263158	8 15/16	8 11/16	0.028368794
May 1886	72	79	0.092715232	9	8 13/16	0.021052632
June 1886	71	78	0.093959732	8 7/8	8 7/8	0
July 1886	73	79	0.078947368	9 3/16	9	0.020618557
August 1886	74	79	0.065359477	9 3/16	8 15/16	0.027586207
September 1886	72	77	0.067114094	9 3/8	8 7/8	0.054794521
October 1886	70	75	0.068965517	9 1/4	8 9/16	0.077192982
November 1886	73	76	0.040268456	8 3/4	8 1/2	0.028985507
December 1886	75	79	0.051948052	9 1/8	8 11/16	0.049122807
January 1887	77	80	0.038216561	9 1/16	8 7/8	0.020905923
February 1887	72	78	0.08	9 1/8	8 7/8	0.027777778
March 1887	72	80	0.105263158	10 1/16	9 1/8	0.09771987
April 1887	77	84	0.086956522	10 3/8	10 1/16	0.03058104

May 1887	81	89	0.094117647	10 5/8	10 3/8	0.023809524
June 1887	65	95	0.375	10 3/4	10 7/16	0.029498525
July 1887	68	71	0.043165468	10 7/16	9 1/2	0.094043887
August 1887	66	70	0.058823529	9 1/2	9 3/16	0.033444816
September 1887	67	72	0.071942446	9 1/8	8 13/16	0.034843206
October 1887	69	72	0.042553191	9 1/8	8 3/4	0.041958042
November 1887	72	77	0.067114094	9 13/16	9 1/8	0.072607261
December 1887	75	79	0.051948052	9 7/8	9 11/16	0.019169329
January 1888	75	78	0.039215686	9 7/8	9 3/4	0.012738854
February 1888	75	76	0.013245033	9 7/8	9 13/16	0.006349206
March 1888	72	76	0.054054054	9 7/8	9 3/8	0.051948052
April 1888	71	82	0.14379085	9 1/2	9 3/8	0.013245033
May 1888	81	89	0.094117647	9 1/2	9 1/2	0
June 1888	78	86	0.097560976	9 3/4	9 3/8	0.039215686
July 1888	79	85	0.073170732	10 1/8	9 3/4	0.037735849
August 1888	81	93	0.137931034	10 1/8	9 5/8	0.050632911
September 1888	90	165	0.588235294	10	9 5/8	0.038216561
October 1888	103	117	0.127272727	9 3/4	9 1/4	0.052631579
November 1888	102	117	0.136986301	9 5/8	9 1/3	0.0330033
December 1888	97	105	0.079207921	9 1/2	9 3/8	0.013245033
January 1889	94	102	0.081632653	9 5/8	9 3/8	0.026315789
February 1889	93	108	0.149253731	9 3/4	9 1/2	0.025974026
March 1889	96	105	0.089552239	9 15/16	9 3/4	0.019047619
April 1889	79	98	0.214689266	10 5/8	9 15/16	0.066869301
May 1889	77	87	0.12195122	10 3/4	10 5/8	0.011695906
June 1889	75	82	0.089171975	10 7/8	10 3/4	0.011560694
July 1889	77	85	0.098765432	11	10 7/8	0.011428571
August 1889	75	79	0.051948052	11 1/8	11	0.011299435
September 1889	76	83	0.088050314	10 7/8	10 1/4	0.059171598
October 1889	78	83	0.062111801	10 1/16	9 7/16	0.064102564
November 1889	79	81	0.025	9 11/16	9 9/16	0.012987013
December 1889	77	80	0.038216561	9 11/16	9 5/8	0.006472492
January 1890	74	78	0.052631579	10 11/16	9 5/8	0.104615385
February 1890	74	76	0.026666667	10 11/16	10 3/8	0.029673591
March 1890	76	80	0.051282051	11	10 11/16	0.028818444
April 1890	77	90	0.155688623	11 11/16	11	0.060606061
May 1890	90	100	0.105263158	11 7/8	11 9/16	0.026666667
June 1890	84	93	0.101694915	11 7/8	11 7/16	0.037533512
July 1890	85	94	0.100558659	11 3/4	11 7/16	0.026954178
August 1890	89	108	0.192893401	11 3/4	10 3/8	0.124293785
September 1890	95	105	0.1	10 1/4	9 3/4	0.05



October 1890	96	103	0.070351759	10 1/16	9 11/16	0.037974684
November 1890	91	102	0.113989637	9 9/16	9 1/16	0.053691275
December 1890	88	93	0.055248619	9 1/8	8 13/16	0.034843206
January 1891	87	96	0.098360656	9 5/16	8 15/16	0.04109589
February 1891	93	97	0.042105263	9 1/16	8 3/4	0.035087719
March 1891	94	104	0.101010101	8 3/4	8 5/8	0.014388489
April 1891	102	114	0.111111111	8 11/16	8 5/16	0.044117647
May 1891	99	108	0.086956522	8 3/8	8 5/16	0.007490637
June 1891	92	101	0.093264249	8 1/4	7 7/8	0.046511628
July 1891	85	95	0.111111111	7 15/16	7 3/4	0.023904382
August 1891	87	113	0.26	8	7 5/8	0.048
September 1891	91	100	0.094240838	8 1/2	8	0.060606061
October 1891	92	99	0.073298429	8 3/8	7 15/16	0.053639847
November 1891	91	97	0.063829787	7 7/8	7 3/8	0.06557377
December 1891	89	93	0.043956044	7 1/2	7	0.068965517
January 1892	84	90	0.068965517	7 3/16	6 13/16	0.053571429
February 1892	82	92	0.114942529	6 7/8	6 1/2	0.056074766
March 1892	77	90	0.155688623	6 1/2	6 1/4	0.039215686
April 1892	77	85	0.098765432	7	6 3/8	0.093457944
May 1892	80	86	0.072289157	7 3/16	7	0.026431718
June 1892	78	88	0.120481928	7 1/2	7 1/16	0.060085837
July 1892	76	80	0.051282051	7 3/16	7	0.026431718
August 1892	74	80	0.077922078	7 3/16	6 15/16	0.03539823
September 1892	72	74	0.02739726	7 7/16	6 15/16	0.069565217
October 1892	69	74	0.06993007	7 13/16	7 7/16	0.049180328
November 1892	70	73	0.041958042	9 7/8	7 11/15	0.243256034
December 1892	69	72	0.042553191	9 11/16	9 5/16	0.039473684
January 1893	72	77	0.067114094	9 5/8	9 3/16	0.046511628
February 1893	72	76	0.054054054	9 1/4	8 13/16	0.048442907
March 1893	73	78	0.066225166	9	8 5/16	0.079422383
April 1893	71	85	0.179487179	8 3/16	7 7/16	0.096
May 1893	68	76	0.111111111	7 5/8	7 1/4	0.050420168
June 1893	64	69	0.07518797	7 7/8	7 5/16	0.074074074
July 1893	55	66	0.181818182	7 3/4	7 7/16	0.041152263
August 1893	56	64	0.133333333	7 5/8	6 13/16	0.112554113
September 1893	63	69	0.090909091	8 3/16	7 5/16	0.112903226
October 1893	61	66	0.078740157	8 1/8	7 5/8	0.063492063
November 1893	59	62	0.049586777	7 3/4	7 7/16	0.041152263
December 1893	59	64	0.081300813	7 9/16	7 1/8	0.059574468
January 1894	59	63	0.06557377	7 3/4	7 5/16	0.058091286
February 1894	54	60	0.105263158	7 7/16	7 1/16	0.051724138

March 1894	56	59	0.052173913	7 5/16	7 1/8	0.025974026
April 1894	57	64	0.115702479	7 5/16	7	0.043668122
May 1894	53	59	0.107142857	7 1/16	6 13/16	0.036036036
June 1894	53	60	0.123893805	7 1/8	6 7/8	0.035714286
July 1894	50	58	0.148148148	6 7/8	6 5/8	0.037037037
August 1894	52	55	0.056074766	6 5/8	6 7/16	0.028708134
September 1894	51	55	0.075471698	6 1/2	5 11/16	0.133333333
October 1894	51	52	0.019417476	5 3/4	5 3/16	0.102857143
November 1894	51	56	0.093457944	5 1/2	4 7/8	0.120481928
December 1894	53	57	0.072727273	5 5/16	5 1/16	0.048192771
January 1895	49	55	0.115384615	5 3/16	5	0.036809816
February 1895	50	52	0.039215686	5 3/16	5	0.036809816
March 1895	52	55	0.056074766	5 7/8	5 1/16	0.148571429
April 1895	54	63	0.153846154	6 3/8	5 3/4	0.103092784
May 1895	61	81	0.281690141	7	6 3/16	0.123222749
June 1895	69	81	0.16	7	6 5/8	0.055045872
July 1895	61	71	0.151515152	6 3/4	6 1/2	0.037735849
August 1895	59	69	0.15625	7 11/16	6 9/16	0.157894737
September 1895	55	62	0.11965812	8 3/4	7 9/16	0.14559387
October 1895	59	61	0.033333333	9 3/16	8 5/16	0.1
November 1895	56	58	0.035087719	8 5/8	8 1/16	0.06741573
December 1895	54	59	0.088495575	8 3/16	7 3/4	0.054901961
January 1896	57	64	0.115702479	8	7 13/16	0.023715415
February 1896	62	67	0.07751938	8	7 1/2	0.064516129
March 1896	61	66	0.078740157	7 13/16	7 3/8	0.057613169
April 1896	62	67	0.07751938	7 3/4	7 5/8	0.016260163
May 1896	58	63	0.082644628	7 3/4	7 3/8	0.049586777
June 1896	54	59	0.088495575	7 3/8	6 13/16	0.079295154
July 1896	54	59	0.088495575	6 13/16	6 1/2	0.046948357
August 1896	54	59	0.088495575	8	6 13/16	0.160337553
September 1896	55	67	0.196721311	8 1/8	7 5/8	0.063492063
October 1896	67	77	0.138888889	7 5/8	7 1/8	0.06779661
November 1896	72	82	0.12987013	7 1/2	7 3/16	0.042553191
December 1896	76	81	0.063694268	7 3/8	6 11/16	0.097777778
January 1897	73	81	0.103896104	7	6 7/8	0.018018018
February 1897	72	76	0.054054054	7 3/16	6 11/16	0.072072072
March 1897	71	76	0.068027211	7 3/16	6 15/16	0.03539823
April 1897	66	77	0.153846154	7 9/16	6 15/16	0.086206897
May 1897	69	76	0.096551724	7 9/16	7 5/16	0.033613445
June 1897	67	73	0.085714286	7 5/8	7 3/8	0.033333333
July 1897	68	78	0.136986301	7 13/16	7 5/8	0.024291498

August 1897	76	100	0.272727273	7 11/16	7 1/16	0.084745763
September 1897	85	100	0.162162162	7 1/16	6 1/16	0.152380952
October 1897	83	90	0.080924855	6 1/8	5 1/2	0.107526882
November 1897	86	91	0.056497175	5 1/2	5 1/4	0.046511628
December 1897	86	91	0.056497175	5 3/8	5 1/4	0.023529412
January 1898	89	108	0.192893401	5 3/8	5 3/16	0.035502959
February 1898	95	108	0.128078818	5 11/16	5 1/4	0.08
March 1898	100	107	0.06763285	5 3/4	5 7/16	0.055865922
April 1898	101	123	0.196428571	5 13/16	5 9/16	0.043956044
May 1898	117	185	0.450331126	6 1/16	5 11/16	0.063829787
June 1898	75	120	0.461538462	6 1/16	5 15/16	0.020833333
July 1898	66	88	0.285714286	5 7/8	5 5/8	0.043478261
August 1898	65	75	0.142857143	5 11/16	5 3/8	0.056497175
September 1898	63	68	0.076335878	5 3/8	4 7/8	0.097560976
October 1898	62	70	0.121212121	5	4 13/16	0.038216561
November 1898	65	69	0.059701493	5 1/16	4 3/4	0.063694268
December 1898	63	70	0.105263158	5 1/4	5	0.048780488
January 1899	67	76	0.125874126	5 3/4	5 3/16	0.102857143
February 1899	70	74	0.055555556	6	5 3/4	0.042553191
March 1899	67	74	0.09929078	6 1/16	5 11/16	0.063829787
April 1899	70	76	0.082191781	5 3/4	5 5/8	0.021978022
May 1899	68	79	0.149659864	5 7/8	5 11/16	0.032432432
June 1899	72	79	0.092715232	5 3/4	5 1/2	0.044444444
July 1899	69	75	0.083333333	5 13/16	5 5/8	0.032786885
August 1899	69	74	0.06993007	5 15/16	5 3/4	0.032085561
September 1899	69	75	0.083333333	6 1/2	5 3/4	0.12244898
October 1899	68	75	0.097902098	6 15/16	6 3/4	0.02739726
November 1899	65	71	0.088235294	7 7/16	6 7/8	0.07860262
December 1899	64	69	0.07518797	7 1/2	7 3/16	0.042553191
January 1900	61	67	0.09375	7 3/4	7 1/4	0.066666667
February 1900	64	67	0.045801527	9	7 7/8	0.133333333
March 1900	64	67	0.045801527	9 7/16	9	0.047457627
April 1900	65	68	0.045112782	9 1/2	9 1/8	0.040268456
May 1900	64	67	0.045801527	9 1/2	8 13/16	0.075085324
June 1900	65	87	0.289473684	9 13/16	8 13/16	0.10738255
July 1900	74	80	0.077922078	10 1/4	9 7/8	0.037267081
August 1900	72	76	0.054054054	10 1/4	9 3/8	0.089171975
September 1900	72	79	0.092715232	11 1/8	9 3/8	0.170731707
October 1900	72	77	0.067114094	10 3/8	8 13/16	0.16286645
November 1900	70	74	0.055555556	9 7/8	9	0.092715232
December 1900	69	75	0.083333333	9 13/16	9 1/4	0.059016393

January	1901	71	76	0.068027211	9 11/16	9 5/16	0.039473684
February	1901	72	75	0.040816327	9 5/16	9 1/16	0.027210884
March	1901	73	76	0.040268456	9 1/16	7 15/16	0.132352941
April	1901	69	74	0.06993007	8 5/16	8	0.038314176
May	1901	70	75	0.068965517	8	7 9/16	0.0562249
June	1901	66	77	0.153846154	8 7/16	7 3/4	0.084942085
July	1901	63	71	0.119402985	8 7/16	8 1/8	0.037735849
August	1901	67	77	0.138888889	8 15/16	8	0.110701107
September	1901	68	71	0.043165468	8 5/8	7 15/16	0.083018868
October	1901	67	71	0.057971014	8 5/16	7 7/16	0.111111111
November	1901	70	74	0.055555556	7 7/16	7 1/4	0.025531915
December	1901	73	79	0.078947368	8 1/16	7 3/8	0.089068826
January	1902	74	80	0.077922078	8	7 13/16	0.023715415
February	1902	73	76	0.040268456	8 3/16	7 13/16	0.044444444
March	1902	70	76	0.082191781	8 5/8	8 1/4	0.129692833
April	1902	70	77	0.095238095	9 3/4	8 9/16	0.066225166
May	1902	72	76	0.054054054	9 3/4	9 1/8	0.04109589
June	1902	71	76	0.068027211	9 5/16	8 15/16	0.049469965
July	1902	71	78	0.093959732	9 1/16	8 5/8	0.036900369
August	1902	68	76	0.111111111	8 5/8	8 5/16	0.05204461
September	1902	70	95	0.303030303	8 5/8	8 3/16	0.045801527
October	1902	67	75	0.112676056	8 3/8	8	0.045801527
November	1902	70	77	0.095238095	8	7 5/8	0.048
December	1902	72	77	0.067114094	8 3/8	7 15/16	0.053639847
January	1903	71	79	0.106666667	8 7/8	8 7/16	0.050541516
February	1903	74	80	0.077922078	9 7/8	8 7/8	0.106666667
March	1903	70	76	0.082191781	9 7/8	9 9/16	0.032154341
April	1903	72	79	0.092715232	10 3/16	9 3/4	0.043887147
May	1903	75	81	0.076923077	11 11/16	10 3/16	0.137142857
June	1903	74	86	0.15	13 5/8	11 11/16	0.15308642
July	1903	75	84	0.113207547	13 5/8	12 5/8	0.076190476
August	1903	77	90	0.155688623	13 1/4	12 1/2	0.058252427
September	1903	74	93	0.22754491	12 3/8	9 3/4	0.237288136
October	1903	77	88	0.133333333	10 1/4	9 1/8	0.116129032
November	1903	76	85	0.111801242	11 3/16	9 7/8	0.12462908
December	1903	78	87	0.109090909	13 5/8	11 1/2	0.169154229
January	1904	81	93	0.137931034	15 15/16	13	0.203023758
February	1904	86	110	0.244897959	16 7/16	13 1/4	0.214736842
March	1904	90	103	0.134715026	16	14 3/8	0.106995885
April	1904	93	102	0.092307692	15 5/16	13 7/8	0.098501071
May	1904	100	106	0.058252427	13 7/8	12 5/8	0.094339623

June 1904	98	106	0.078431373	12 3/8	10 11/16	0.146341463
July 1904	94	112	0.174757282	11 1/8	10 1/2	0.057803468
August 1904	94	113	0.183574879	11 3/8	10 1/4	0.104046243
September 1904	105	119	0.125	11 3/16	10	0.112094395
October 1904	110	119	0.07860262	10 3/16	9 1/2	0.06984127
November 1904	110	118	0.070175439	9 3/4	8 7/8	0.093959732
December 1904	109	119	0.087719298	8 9/16	6 1/2	0.273858921
January 1905	115	121	0.050847458	7	6 5/8	0.055045872
February 1905	113	123	0.084745763	7 3/4	7	0.101694915
March 1905	111	118	0.061135371	7 11/16	7 3/16	0.067226891
April 1905	86	120	0.330097087	7 1/2	7 3/16	0.042553191
May 1905	87	111	0.242424242	8 3/4	7 7/16	0.162162162
June 1905	94	107	0.129353234	9 3/4	8 3/16	0.174216028
July 1905	86	105	0.19895288	11 1/8	9 3/4	0.131736527
August 1905	78	87	0.109090909	10 5/8	10 5/16	0.029850746
September 1905	79	86	0.084848485	10 1/2	10 1/16	0.042553191
October 1905	83	91	0.091954023	10 11/16	9 3/4	0.091743119
November 1905	83	90	0.080924855	11 5/8	10 3/4	0.078212291
December 1905	85	89	0.045977011	12 1/8	11 3/8	0.063829787
January 1906	85	90	0.057142857	11 3/4	11 3/16	0.049046322
February 1906	83	87	0.047058824	10 7/8	10 9/16	0.029154519
March 1906	78	85	0.085889571	11 1/4	10 1/2	0.068965517
April 1906	84	91	0.08	11 7/16	11 1/8	0.027700831
May 1906	86	97	0.120218579	11 7/16	11	0.038997214
June 1906	83	89	0.069767442	11 1/8	10 13/16	0.028490028
July 1906	72	85	0.165605096	11 1/8	10 5/8	0.045977011
August 1906	69	73	0.056338028	10 5/8	9 3/16	0.14511041
September 1906	69	74	0.06993007	9 3/8	9 1/8	0.027027027
October 1906	71	74	0.04137931	11 3/8	9 11/16	0.160237389
November 1906	72	74	0.02739726	11 3/8	9 5/8	0.166666667
December 1906	73	75	0.027027027	11 3/8	10 1/8	0.11627907
January 1907	71	75	0.054794521	10 9/16	10 1/4	0.03003003
February 1907	73	77	0.053333333	10 5/8	10 7/16	0.017804154
March 1907	72	76	0.054054054	11 1/16	10 5/8	0.040345821
April 1907	74	81	0.090322581	11 3/8	10 1/2	0.08
May 1907	79	100	0.234636872	12 1/2	11 1/2	0.083333333
June 1907	87	98	0.118918919	13	12 1/2	0.039215686
July 1907	89	97	0.086021505	13 1/8	12 5/8	0.038834951
August 1907	82	92	0.114942529	13 9/16	12 3/4	0.06175772
September 1907	91	98	0.074074074	13 9/16	11 1/2	0.164588529
October 1907	91	105	0.142857143	11 5/8	10 5/16	0.11965812

November 1907	88	97	0.097297297	11 3/8	10 5/8	0.068181818
December 1907	92	101	0.093264249	11 7/8	11 1/8	0.065217391
January 1908	91	102	0.113989637	12 1/4	11 3/8	0.074074074
February 1908	89	100	0.116402116	11 7/8	11 3/8	0.043010753
March 1908	92	101	0.093264249	11 3/8	10 1/2	0.08
April 1908	89	100	0.116402116	10 1/2	9 13/16	0.067692308
May 1908	99	111	0.114285714	11 1/2	9 15/16	0.145772595
June 1908	89	100	0.116402116	11 7/8	11 3/8	0.043010753
July 1908	84	92	0.090909091	11 3/8	10 3/8	0.091954023
August 1908	90	96	0.064516129	10 3/8	9 1/8	0.128205128
September 1908	95	102	0.07106599	9 3/16	9	0.020618557
October 1908	97	102	0.050251256	9	8 3/4	0.028169014
November 1908	99	106	0.068292683	9 1/16	8 7/8	0.020905923
December 1908	99	107	0.077669903	8 15/16	8 11/16	0.028368794
January 1909	103	108	0.047393365	9 5/8	8 7/8	0.081081081
February 1909	107	124	0.147186147	9 1/2	9 5/16	0.019933555
March 1909	117	126	0.074074074	9 1/2	9 1/4	0.026666667
April 1909	125	145	0.148148148	10 5/16	9 7/16	0.088607595
May 1909	142	154	0.081081081	11	10 3/16	0.076696165
June 1909	150	160	0.064516129	11 1/2	10 7/8	0.055865922
July 1909	106	124	0.156521739	12 3/8	11 1/2	0.073298429
August 1909	99	106	0.068292683	12 1/2	12 1/8	0.030456853
September 1909	100	115	0.139534884	13 3/16	12 3/16	0.078817734
October 1909	116	121	0.042194093	14 7/16	13	0.104783599
November 1909	115	121	0.050847458	14 11/16	14 1/8	0.039045553
December 1909	116	128	0.098360656	15 3/4	14 1/4	0.1
January 1910	121	127	0.048387097	15 3/4	14 7/8	0.057142857
February 1910	118	127	0.073469388	15 1/16	14 5/8	0.029473684
March 1910	115	125	0.083333333	14 13/16	14 9/16	0.017021277
April 1910	106	121	0.13215859	14 13/16	14 9/16	0.017021277
May 1910	98	118	0.185185185	15 1/8	14 5/8	0.033613445
June 1910	98	104	0.059405941	15	14 1/2	0.033898305
July 1910	98	112	0.133333333	15 3/16	14 5/8	0.037735849
August 1910	99	104	0.049261084	15 1/4	14 5/8	0.041841004
September 1910	95	101	0.06122449	14 1/4	13 1/4	0.072727273
October 1910	91	99	0.084210526	15 5/8	13 9/16	0.141327623
November 1910	89	94	0.054644809	14 3/4	14 3/16	0.03887689
December 1910	90	96	0.064516129	14 15/16	14 11/16	0.016877637
January 1911	92	101	0.093264249	15	14 15/16	0.004175365
February 1911	86	96	0.10989011	14 15/16	14 1/2	0.029723992
March 1911	84	92	0.090909091	14 5/8	14 3/8	0.017241379

April 1911	83	92	0.102857143	15 1/4	14 3/8	0.05907173
May 1911	90	104	0.144329897	15 11/16	15 1/4	0.028282828
June 1911	86	96	0.10989011	15 7/16	15	0.028747433
July 1911	83	91	0.091954023	15 1/16	12 3/8	0.195899772
August 1911	87	92	0.055865922	12 1/8	11 1/2	0.052910053
September 1911	89	97	0.086021505	11 7/8	10 9/16	0.116991643
October 1911	94	103	0.091370558	10 3/16	9 3/8	0.083067093
November 1911	90	99	0.095238095	9 1/2	9 1/4	0.026666667
December 1911	91	98	0.074074074	9 1/4	9 1/16	0.020477816
January 1912	93	102	0.092307692	9 13/16	9 3/16	0.065789474
February 1912	95	103	0.080808081	10 1/2	9 7/8	0.061349693
March 1912	98	105	0.068965517	10 15/16	10 3/8	0.052785924
April 1912	99	117	0.166666667	12	11	0.086956522
May 1912	105	120	0.133333333	11 15/16	11 1/2	0.037333333
June 1912	106	113	0.063926941	12 1/4	11 5/8	0.052356021
July 1912	97	110	0.125603865	13 1/4	12 3/8	0.068292683
August 1912	100	108	0.076923077	13	11 3/16	0.149870801
September 1912	101	107	0.057692308	11 1/2	11 3/16	0.027548209
October 1912	102	111	0.084507042	11 7/16	10 11/16	0.06779661
November 1912	99	107	0.077669903	12 3/4	11 7/16	0.108527132
December 1912	99	112	0.123222749	13	12 5/8	0.029268293
January 1913	107	115	0.072072072	13	12 1/4	0.059405941
February 1913	102	112	0.093457944	12 3/4	12 3/8	0.029850746
March 1913	101	108	0.066985646	12 1/2	12 3/8	0.010050251
April 1913	102	109	0.066350711	12 9/16	12 3/16	0.03030303
May 1913	99	109	0.096153846	12 7/16	12 1/8	0.025445293
June 1913	93	108	0.149253731	12 5/8	12 3/16	0.035264484
July 1913	84	96	0.133333333	12 5/8	12 3/16	0.035264484
August 1913	84	90	0.068965517	12 5/16	11 7/8	0.036175711

## References

- New Orleans Cotton Exchange Records, Manuscripts Collection 652, Louisiana Research Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans, LA 70118.
- Chicago Board of Trade collection, Special Collections & University Archives, University of Illinois at Chicago Library, Chicago, IL 60607.
- Abolafia, M. 1996. *Making Markets: Opportunism and Restraint on Wall Street*. Cambridge, MA: London.
- Akerlof, G. A. 1970. "The market for" lemons": Quality uncertainty and the market mechanism." *The Quarterly Journal of Economics*, 488-500.
- Appadurai, A. 1986. *The Social Life of Things: Commodities in Cultural Perspective*.
- Aspers, P. 2009. "Knowledge and Valuation in Markets." *Theory and Society* 38 (2): 111–31.
- Aspers, P. and J. Beckert. 2011. "Value in Markets." In J. Beckert & P. Aspers (eds) *The Worth of Goods: Valuation and Pricing in the Economy*, Oxford, Oxford University Press.
- Baker, W. E. 1984. "The Social Structure of a National Securities Market." *American Journal of Sociology*, 89(4), 775–811.
- Barnes, B. 1983 "Social Life as Bootstrapped Induction." *Sociology* 17(4): 524-545.
- Baron, J.N. 2004. "Employing Identities in Organizational Ecology." *Industrial and Corporate Change* 13 (1): 3–32.
- Barry, A. 2001. *Political Machines: Governing a Technological Society*. London, UK: The Athlone Press.
- Beckert, J. 1996. "What Is Sociological about Economic Sociology? Uncertainty and the Embeddedness of Economic Action." *Theory and Society* 25 (6): 803–40.
- Beckert, J. 2003. "Economic Sociology and Embeddedness: How Shall We Conceptualize Economic Action?" *Journal of Economic Issues* 37 (3): 769–87.
- Beckert, J. 2007. "The Great Transformation of Embeddedness: Karl Polanyi and the New Economic Sociology." MPIfG Discussion Paper 07/1. Max Planck Institute for the Study of Societies, Cologne.
- Beckert, J. 2009. "The Social Order of Markets." *Theory and Society* 38 (3): 245–69.



- Beunza, D. and D. Stark. 2004. "Tools of the Trade: The Socio-technology of Arbitrage in a Wall Street Trading Room." *Industrial and Corporate Change* 13 (2): 369–400.
- Beunza, D. and R. Garud. 2007. "Calculators, Lemmings or Frame-makers? The Intermediary Role of Securities Analysts." *The Sociological Review* 55: 13–39.
- Beunza, D., I. Hardie, and D. MacKenzie. 2006. "A Price is a Social Thing: Towards a Material Sociology of Arbitrage." *Organization Studies* 27 (5): 721–45.
- Biernacki, R. 1995. *The Fabrication of Labor: Germany and Britain, 1640-1914*. Berkeley: University of California Press.
- Bijker, W.E., T.P. Hughes and T.J. Pinch. 1987. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.
- Bloor, D. 1997. *Wittgenstein, Rules and Institutions*. New York: Routledge Press.
- Boltanski, L. and L. Thévenot. [1991] 2006. *On Justification: Economies of Worth*. Princeton, NJ: Princeton University Press.
- Bouilly, R. 1975. "The Development of American Cotton Exchanges, 1870-1916." (Unpublished doctoral dissertation). University of Missouri, Columbia, MO.
- Bowker, G. 1994. "Information Mythology and Infrastructure." In L. Bud-Frierman (ed.) *Information Acumen: The Understanding and Use of Knowledge in Modern Business*, London, UK: Routledge.
- Bowker, G. and S.L. Star. 1999. *Sorting Things out: Classification and Its Consequences*. Cambridge, MA: MIT Press.
- Boyle, J. 1922. *Chicago Wheat Prices for Eighty-One Years: Daily, Monthly and Yearly Fluctuations and Their Causes*. Ithaca, NY: Cornell University Press.
- Boyle, J. 1934. *Cotton and the New Orleans Cotton Exchange: A Century of Commercial Evolution*. Garden City, NY: Country Life Press.
- Burt, R. 1992. *Structural Holes: The Social Structure of Competition*. Harvard University Press.
- Busch, L. 2000. "The Moral Economy of Grades and Standards." *Journal of Rural Studies* 16 (3): 273–83.
- Caldwell, S.A. 1980. *A Banking History of Louisiana*. Baton Rouge, LA: Ayer Publishing.
- Çalışkan, K. and M. Callon. 2010. "Economization, Part 2: A Research Programme for the Study of Markets." *Economy and Society* 39 (1): 1–32.

- Callon, M. 1986. "Some Elements of a Sociology of Translation." In J. Law (ed.) *Power, Action and Belief: A New Sociology of Knowledge*, London: Routledge.
- Callon, M. 1998a. "The Embeddedness of Economic Markets in Economics." In M. Callon (ed.) *The Laws of the Markets*, Oxford: Blackwell.
- Callon, M. 1998b. "An Essay on Framing and Overflowing: Economic Externalities Revisited by Sociology." In M. Callon (ed.) *The Laws of the Markets*, Oxford: Blackwell.
- Callon, M. 2007. "What Does It Mean to Say That Economics Is Performative?" In *Do Economists Make Markets?: On the Performativity of Economics*. MacKenzie, D.A., F. Muniesa, and L. Siu, eds. Princeton University Press.
- Callon, M. 2008. "Economic Markets and the Rise of Interactive Agencements: From Prosthetic Agencies to Habilitated Agencies." In T.J. Pinch and R. Swedberg (eds) *Living in a Material World: Economic Sociology Meets Science and Technology Studies*, Boston: MIT Press.
- Callon, M., and B. Latour. 1992. "Don't Throw the Baby out with the Bath School! A Reply to Collins and Yearley." In S. Pickering (ed.) *Science as Practice and Culture*, Chicago: University of Chicago Press.
- Callon, M., C. Méadel, and V. Rabeharisoa. 2002. "The Economy of Qualities." *Economy and Society* 31 (2): 194–217.
- Carruthers, B.G., and S. Babb. 1996. "The Color of Money and the Nature of Value: Greenbacks and Gold in Postbellum America." *American Journal of Sociology*, 1556–91.
- Carruthers, Bruce G. 1996. *City of Capital*. Princeton, NJ: Princeton University Press.
- Cowing, C.B. 1965. *Populists, Plungers, and Progressives: A Social History of Stock and Commodity Speculation, 1890-1936*. Princeton, NJ: Princeton University Press.
- Cronon, W. 1992. *Nature's Metropolis: Chicago and the Great West*. New York: WW Norton & Company.
- DeGoede, M. 2005. *Virtue, Fortune, and Faith: A Genealogy of Finance*. Minneapolis, MN: University of Minnesota Press.
- Didier, E. 2007. "Do Statistics 'perform' the Economy?" In D. MacKenzie, F. Muniesa and L. Siu (eds) *Do Economists Make Markets*, Princeton, NJ: Princeton University Press.
- DiMaggio, P. 1994. "Economy and Culture." In N.J. Smelser and R. Swedberg (eds) *Handbook of Economic Sociology*, Princeton, NJ: Princeton University Press.

- DiMaggio, P. and W.W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review*, 147–60.
- Duhem, P. [1894] 1996. "Some Reflections on the Subject of Experimental Physics." In *Pierre Duhem: Essays in History and Philosophy of Science*. Trans. Roger Ariew and Peter Barker. Hackett Pub Co Inc.
- Edwards, P. 2010. *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming*. Cambridge: MIT Press.
- Edwards, P.N., G.C. Bowker, S.J. Jackson, and R. Williams 2009. "Introduction: An Agenda for Infrastructure Studies." *Journal of the Association for Information Systems*, 10(5): 364-374.
- Ellis, L.T. 1973. "The New Orleans Cotton Exchange: The Formative Years, 1871-1880." *The Journal of Southern History* 39 (4): 545–64.
- Espeland, W.N. 1998. *The Struggle for Water: Politics, Rationality and Identity in the American Southwest*. Chicago: University of Chicago Press.
- Espeland, W.N. and M. Sauder. 2007. "Rankings and Reactivity: How Public Measures Recreate Social Worlds." *American Journal of Sociology* 113(1): 1-40.
- Espeland, W.N., and M.L. Stevens. 1998. "Commensuration as a Social Process." *Annual Review of Sociology*, 313–43.
- Fabian, A. 1990. *Card Sharps, Dream Books, and Bucket Shops: Gambling in 19<sup>th</sup>-century America*. Ithaca, NY: Cornell University Press.
- Fama, E.F. 1970. "Efficient capital markets: A review of theory and empirical work." *The Journal of Finance* 25(2): 383-417.
- Ferris, W. 1988. *The Grain Traders*. East Lansing: Michigan State University Press.
- Fleck, L. 1979. *Genesis and Development of a Scientific Fact*. Chicago: University of Chicago Press.
- Fligstein, Neil. 1990. *The Transformation of Corporate Control*. Cambridge: Harvard University Press.
- . 2001. *The Architecture of Markets: An Economic Sociology of Twenty-First-Century Capitalist Societies*. Princeton, NJ: Princeton University Press.
- Foucault, M. 1970. *The Order Of Things: An Archaeology Of the Human Sciences*. London: Tavistock.
- Foucault, M. 1982. *The Archaeology of Knowledge*. New York: Pantheon Books.

- Fourcade, M. 2011. "Price and Prejudice: On Economics, and the Enchantment/Disenchantment of Nature." In J. Beckert & P. Aspers (eds) *The Worth of Goods: Valuation and Pricing in the Economy*, Oxford, Oxford University Press.
- Fourcade, M. and K. Healy. 2013. "Classification Situations: Life-chances in the Neoliberal Era." *Accounting, Organizations and Society* 38 (8): 559–72.
- Fourcade, M., and K. Healy. 2007. "Moral Views of Market Society." *Annual Review of Sociology*. 33: 285–311.
- Garcia-Parpet, M-F. 2007. "The Social Construction of a Perfect Market: The Strawberry Auction at Fontaines-En-Sologne." In D. MacKenzie, F. Muniesa and L. Siu (eds) *Do Economists Make Markets*, Princeton, NJ: Princeton University Press.
- Garside, A. 1935. *Cotton Goes to Market: a Graphic Description of a Great Industry*. New York: Frederick A. Stokes Co.
- Goldstein, B. 1928. *Marketing: A Farmer's Problem*. New York: Macmillan.
- Granovetter, M. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology*, 481–510.
- Granovetter, M.S. 1973. "The Strength of Weak Ties." *American Journal of Sociology*, 1360–80.
- . 1974. *Getting a Job: A Study of Contacts and Careers*. Chicago: University of Chicago Press.
- Greif, A. 1989. "Reputation and Coalitions in Medieval Trade: Evidence on the Maghribi Traders." *The Journal of Economic History*, 49 (4): 857-882.
- Guala, F. 2001. "Building Economic Machines: The FCC Auctions." *Studies in History and Philosophy of Science Part A* 32 (3): 453–77.
- . 2007. "How to Do Things with Experimental Economics." In D. MacKenzie, F. Muniesa and L. Siu (eds) *Do Economists Make Markets*, Princeton, NJ: Princeton University Press.
- Guseva, A., and A. Rona-Tas. 2001. "Uncertainty, Risk, and Trust: Russian and American Credit Card Markets Compared." *American Sociological Review*, 623–46.
- Hacking, I. 1992. "'Style' for Historians and Philosophers." *Studies in History and Philosophy of Science Part A* 23 (1): 1–20.
- Hammond, M.B. 1897. "The Cotton Industry: An Essay in American Economic History." *Publications of the American Economic Association*, New Series, No.1. Ithaca, NY.

- Hatherley, D., D. Leung and D. MacKenzie. 2008. "The Finitist Accountant: Classifications, Rules and the Construction of Profits." In Pinch, T. and Swedberg, R. (eds) *Living in a Material World*, Cambridge, MA: MIT Press.
- Hayek, F. A. 1945. "The Use of Knowledge in Society." *The American Economic Review*, 35(4): 519-530.
- Healy, K. 2006. *Last Best Gifts: Altruism and the Market for Human Blood and Organs*. Chicago: University of Chicago Press.
- Hieronimus, T.A. 1977. *Economics of Futures Trading for Commercial and Personal Profit*. New York: Commodity Research Bureau, Inc.
- Hill, L.D. 1990. *Grain Grades and Standards: Historical Issues Shaping the Future*. Urbana, IL: University of Illinois Press.
- Hirschman, A.O. 1977. *The Passions and the Interests*. Princeton, NJ: Princeton University Press.
- Hirschman, D. and E. Popp Berman. 2014. "Do Economists Make Policies? On the Political Effects of Economics." *Socio-Economic Review* 12(4):779-811.
- Hoffman, G.W. 1932. *Futures Trading Upon Organized Commodity Markets in the United States*. Philadelphia: University of Pennsylvania Press.
- Hollingsworth, J.R. and R. Boyer, eds. 1999. *Contemporary Capitalism: The Embeddedness of Institutions*. Cambridge: Cambridge University Press.
- Hughes, T.P. 1987. "The Evolution of Large Technological Systems." In W.E Bijker, T.P. Hughes, and T.J. Pinch (eds) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Cambridge, MA: MIT Press.
- John, R.R. 2010. *Network Nation*. Cambridge: Harvard University Press.
- Jones, F.M. 1935. "Middlemen in the Domestic Trade of the United States, 1800-1860." *Illinois Studies in the Social Sciences*. Vol. xxi, no. 3.
- Karpik, L. 2010. *Valuing the Unique: The Economics of Singularities*. Princeton, NJ: Princeton University Press.
- Kendall, L.T. 1956. "Chicago Board of Trade and the Federal Government." (Unpublished doctoral dissertation). Indiana University, Bloomington, IN.
- Kirk, S.A. and H. Kutchins. 1992. *The Selling of DSM: The Rhetoric of Science in Psychiatry*. Livingston, NJ: Transaction Publishers.
- Knight, F.H. 1921. *Risk, Uncertainty and Profit*. New York: Hart, Schaffner and Marx.

- Knorr Cetina, K. 2003. "From Pipes to Scopes: The Flow Architecture of Financial Markets." *Distinktion: Scandinavian Journal of Social Theory* 4 (2): 7–23.
- Knorr Cetina, K. and B. Grimpe. 2008. "Global Financial Technologies: Scoping Systems That Raise the World." In Pinch, T.J. and Swedberg, R. (eds) *Living in a Material World*, Cambridge, MA: MIT Press.
- Knorr Cetina, K. and U. Bruegger. 2002. "Global Microstructures: The Virtual Societies of Financial markets1." *American Journal of Sociology* 107 (4): 905–50.
- Krippner, G.R. 2001. "The Elusive Market: Embeddedness and the Paradigm of Economic Sociology." *Theory and Society* 30 (6): 775–810.
- Krippner, G.R., and A.S. Alvarez. 2007. "Embeddedness and the Intellectual Projects of Economic Sociology." *Annual Review of Sociology*. 33: 219–40.
- Kuhn, T.S. 1962. *The Structure of Scientific Revolutions*. Chicago: University Of Chicago Press.
- Lampland, M. (2010) 'False numbers as formalizing practices', *Social Studies of Science* 40 (3): 377–404.
- Lampland, M. and S.L. Star. 2009. *Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life*. Ithaca, NY: Cornell University Press.
- Latour, B. 1987. *Science in Action: How to Follow Scientists and Engineers Through Society*. Cambridge: Harvard University Press.
- Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Lawrence, T.B., and N. Phillips. 2004. "From Moby Dick to Free Willy: Macro-Cultural Discourse and Institutional Entrepreneurship in Emerging Institutional Fields." *Organization* 11 (5): 689–711.
- Lea, T. and Pholeros, P. (2010) 'This is not a pipe: the treacheries of indigenous housing', *Public Culture* 22(1): 187-209.
- Lee, G. 1938. "History of the Chicago Grain Elevator Industry, 1840-1890." (Unpublished doctoral dissertation). Harvard University, Cambridge, MA.
- Levy, J.I. 2006. "Contemplating Delivery: Futures Trading and the Problem of Commodity Exchange in the United States, 1875–1905." *The American Historical Review* 111 (2): 307–35.
- Lorrain, F. and H.C. White. 1971. "Structural Equivalence of Individuals in Social Networks." *The Journal of Mathematical Sociology* 1 (1): 49–80.

- Lurie, J. 1979. *The Chicago Board of Trade, 1859-1905: The Dynamics of Self-Regulation*. Chicago: University of Illinois Press.
- MacKenzie, D. 2006. *An Engine, Not a Camera: How Financial Models Shape Markets*. Boston: The MIT Press.
- MacKenzie, D. 2007. "The Material Production of Virtuality: Innovation, Cultural Geography and Facticity in Derivatives Markets." *Economy and Society*, 36(3), 355–376.
- MacKenzie, D. and Y. Millo. 2003. "Constructing a Market, Performing Theory: The Historical Sociology of a Financial Derivatives Exchange." *American Journal of Sociology* 109 (1): 107–45.
- MacKenzie, D., F. Muniesa, and L. Siu. 2007. *Do Economists Make Markets?: On the Performativity of Economics*. Princeton, NJ: Princeton University Press.
- Markham, J.W. 1987. *The History of Commodity Futures Trading and Its Regulation*. Westport, CT: Praeger.
- Markham, J.W. 2002. *A Financial History of the United States: From Christopher Columbus to the Robber Barons (1492-1900)*. Armonk, NY: ME Sharpe.
- Marx, K. 1976. *Capital: Volume 1: A Critique of Political Economy*. New York: Penguin Classics.
- Maurer, B. 2002. "Repressed Futures: Financial Derivatives' Theological Unconscious." *Economy and Society*, 31(1), 15–36.
- Merton, R. K. 1948. *The Sociology of Science: Theoretical and Empirical Investigations*. Chicago: University Of Chicago Press.
- Meyer, J.W., and B. Rowan. 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology*, 340–63.
- Miller, D. 2005. *Materiality*. Durham, NC: Duke University Press.
- Miller, P. 2008. "Calculating Economic Life." *Journal of Cultural Economy* 1 (1): 51–64.
- Miller, P. and T. O'Leary. 1987. "Accounting and the Construction of the Governable Person." *Accounting, Organizations and Society* 12 (3): 235–65.
- Miller, P., and N. Rose. 1990. "Governing Economic Life." *Economy and Society* 19 (1): 1–31.
- Millerand, F. and G. Bowker. 2009. "Metadata Standards: Trajectories and Enactment in the Life of an Ontology." In Lampland, M. and Star, L. (eds) *Standards and Their*

- Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life*, Ithaca, NY: Cornell University Press.
- Millo, Y. 2007. "Making Things Deliverable: The Origins of Index-based Derivatives." In Callon, M., Millo, Y. and Muniesa, F. (eds) *Market Devices*, Oxford, UK: Blackwell Publishing
- Millo, Y., F. Muniesa, N.S. Panourgias and S.V. Scott. 2005. "Organised Detachment: Clearinghouse Mechanisms in Financial Markets." *Information and Organization* 15 (3): 229–46.
- Mirowski, P. and E. Nik-Khah. 2007. "Performativity, and a Problem in Science Studies, Augmented With Consideration of the FCC Auctions." In D. MacKenzie, F. Muniesa and L. Siu (eds) *Do Economists Make Markets*, Princeton, NJ: Princeton University Press.
- Mizruchi, M. S. 1996. "What Do Interlocks Do? An Analysis, Critique, and Assessment of Research on Interlocking Directorates." *Annual review of sociology*, 22(1): 271–298.
- Mizruchi, M.S. and L.B. Stearns. 2001. "Getting Deals Done: The Use of Social Networks in Bank Decision-Making." *American Sociological Review* 66(5):647–71.
- Muniesa, F. 2007. "Market Technologies and the Pragmatics of Prices." *Economy and Society* 36 (3): 377–95.
- Muniesa, F. and M. Callon. 2007. "Economic Experiments and the Construction of Markets." In D. MacKenzie, F. Muniesa and L. Siu (eds) *Do Economists Make Markets*, Princeton, NJ: Princeton University Press.
- O'Malley, M. 1994. "Specie and Species: Race and the Money Question in Nineteenth-Century America." *The American Historical Review* 99 (2): 369–95.
- Padgett, J.F. and C.K. Ansell. 1993. "Robust Action and the Rise of the Medici, 1400–1434." *American Journal of Sociology*, 1259–1319.
- Palmer, D. and B.M. Barber. 2001. "Challengers, Elites, and Owning Families: A Social Class Theory of Corporate Acquisitions in the 1960s." *Administrative Science Quarterly* 46 (1): 87–120.
- Pardo-Guerra, J.P. 2010. "Creating Flows of Interpersonal Bits: The Automation of the London Stock Exchange, c. 1955–90." *Economy and Society* 39 (1): 84–109.
- Pardo-Guerra, J.P. 2014. "Making Markets: Infrastructures, Engineers and the Moral Technologies of Finance." (Unpublished paper), London School of Economics and Political Science, London.



- Peirce, C.S. 1931-1958. *Collected Papers of Charles Sanders Peirce*. (Eds) C. Hartshorne, P. Weiss and A.W. Burks, Cambridge: Harvard University Press.
- Perrow, C. 1984. *Normal Accidents: Living with High Risk Systems*. New York: Basic Books.
- Pietruska, J.L. 2012. “‘Cotton Guessers’: Crop Forecasters and the Rationalizing of Uncertainty in American Cotton Markets, 1890–1905.” In H. Berghoff, P. Scranton and U. Spiekermann (eds) *The Rise of Marketing and Market Research*, London: Palgrave Macmillan.
- Pinch, T. and R. Swedberg. 2008. *Living in a Material World: Economic Sociology Meets Science and Technology Studies*. Boston, MA: MIT Press.
- Pinzur, D. 2016. “Making the Grade: Infrastructural Semiotics and Derivative Market Outcomes on the Chicago Board of Trade and New Orleans Cotton Exchange, 1856-1909.” *Economy & Society* 45 (3-4): 431-453.
- Podolny, J.M. 2001. “Networks as the Pipes and Prisms of the Market.” *American Journal of Sociology* 107 (1): 33–60.
- Polanyi, K. 1957. *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon Press.
- Poon, M. 2009. “From New Deal Institutions to Capital Markets: Commercial Consumer Risk Scores and the Making of Subprime Mortgage Finance.” *Accounting, Organizations and Society* 34 (5): 654–74.
- Powell, W.W., and P.J. DiMaggio. 1991. “Introduction.” In P.J. DiMaggio and W.W. Powell (eds) *The New Institutionalism in Organizational Analysis*, Chicago: University Of Chicago Press.
- Preda, A. 2006. “Socio-technical Agency in Financial Markets.” *Social Studies of Science* 36 (5): 753–82.
- Preda, A. 2009. *Framing Finance: The Boundaries of Markets and Modern Capitalism*. Chicago: University of Chicago Press.
- Pryke, M. and J. Allen. 2000. “Monetized Time-space: Derivatives–money’s ‘New Imaginary’?” *Economy and Society*, 29(2), 264–284.
- Rona-Tas, A. 2014. “The Off-label Use of Consumer Credit Ratings.” Paper presented at the Annual Conference of the Society for the Advancement of Socio-Economics, Chicago, IL.
- Rona-Tas, A. & Hiss, S. 2011. “Forecasting as Valuation: The Role of Ratings and Predictions in the Subprime Mortgage Crisis in the United States.” In Beckert, J. and Aspers, P. (eds) *The Worth of Goods*, Oxford, UK: Oxford University Press.

- Rothstein, M. 1966. "Antebellum Wheat and Cotton Exports: A Contrast in Marketing Organization and Economic Development." *Agricultural History* 40 (2): 91–100.
- Saloutos, T. 1960. *Farmer Movements in the South, 1865-1933*. Berkeley: University of California Press.
- Santos, J. 2002. "Did Futures Markets Stabilise US Grain Prices?" *Journal of Agricultural Economics* 53 (1): 25–36.
- Shannon, F.A. 1945. "The Farmer's Last Frontier." *Soil Science* 60 (3): 263.
- Sherman, A. 1934. *The History of the New Orleans Cotton Exchange, 1871-1914*. (Unpublished masters thesis). Tulane University, New Orleans, LA.
- Simmel, G. 1950. *The Sociology of Georg Simmel*. K. Wolff (ed.) Glencoe, IL: Free Press.
- Smith, C. 2011. "Coping With Contingencies in Equity Option Markets: The 'Rationality' of Pricing." In Beckert, J. and Aspers, P. (eds) *The Worth of Goods*, Oxford, UK: Oxford University Press.
- Smith-Doerr, L., and W.W. Powell. 2005. "Networks and Economic Life." In N.J. Smelser and R. Swedberg (eds) *Handbook of Economic Sociology*, Princeton, NJ: Princeton University Press.
- Star, S. 2002. "Infrastructure and Ethnographic Practice." *Scandinavian Journal of Information Systems*, 14(2): 107-122.
- Star, S. and J. Griesemer. 1989. "Institutional Ecology, Translations and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39", *Social Studies of Science* 19 (3): 387–420.
- Star, S. and K. Ruhleder. 1996. "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces." *Information Systems Research* 7 (1): 111–34.
- Stark, D. 2009. *The Sense of Dissonance: Accounts of Worth in Economic Life*. Princeton, NJ: Princeton University Press.
- Stigler, G. J. 1961. "The Economics of Information." *Journal of Political Economy* 69(3): 213-225.
- Stone, A.H. 1915. "The Cotton Factorage System of the Southern States." *The American Historical Review* 20 (3): 557–65.
- Taylor, C. 1917. *History of the Board of Trade of the City of Chicago*. Chicago: RO Law.
- Thévenot, L. 1984. "Rules and Implements: Investment in Forms." *Social Science Information* 23 (1): 1–45.

- Thévenot, L. M. Moody and C. Lafaye. 2000. "Forms of Valuing Nature: Arguments and Modes of Justification in French and American Environmental Disputes." In M. Lamont and L. Thévenot (eds) *Rethinking Comparative Cultural Sociology: Repertoires of Evaluation in France and the United States*, Cambridge: Cambridge University Press.
- Thompson, R.L. 1972. *Wiring a Continent: The History of the Telegraph Industry in the United States, 1832-1866*. New York: Arno Press.
- Useem, M. 1984. *The Inner Circle: Large Corporations and the Rise of Business Political Activity in the US and UK*. New York: Oxford University Press.
- Uzzi, B. 1997. "Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness." *Administrative Science Quarterly*, 35–67.
- Velthuis, O. 2003. "Symbolic Meanings of Prices: Constructing the Value of Contemporary Art in Amsterdam and New York Galleries." *Theory and Society* 32 (2): 181–215.
- White, H. C., Boorman, S. A., & Breiger, R. L. 1976. "Social Structure from Multiple Networks. Blockmodels of roles and positions." *American Journal of Sociology* 81(4): 730-780.
- Williamson, O.E. 1981. "The Economics of Organization: The Transaction Cost Approach", *American Journal of Sociology*, 548-577.
- Willis, H.P. 1902. "The Adjustment of Crop Statistics." *Journal of Political Economy*, 11(1):1-54.
- Wittgenstein, L. 1967. *Philosophical Investigations*. New York: Blackwell.
- Woodman, H.D. 1963. *King Cotton and His Retainers: Financing and Marketing the Cotton Crop of the South, 1800-1925*. Lexington, KY: University of Kentucky Press.
- Working, H. 1953. "Futures Trading and Hedging." *The American Economic Review*. 43(3): 314-343.
- Wright, E.O., A. Levine, and E. Sober. 1992. *Reconstructing Marxism: Essays on Explanation and the Theory of History*. London: Verso.
- Yenkey, C.B. 2011. "Selling Value in Kenya's Nairobi Stock Exchange." In J. Beckert & P. Aspers (eds) *The Worth of Goods: Valuation and Pricing in the Economy*, Oxford, Oxford University Press.
- Yenkey, C.B. 2015. "Mobilizing a Market Ethnic Segmentation and Investor Recruitment into the Nairobi Securities Exchange." *Administrative Science Quarterly*, 60(4):561-595.

- Zaloom, C. 2004. "Time, Space, and Technology in Financial Networks." In Castells, M (ed.) *The Network Society: A Cross-cultural Perspective*, Northampton, MA: Edgar Elgar Publishing, Inc.
- Zaloom, C. 2006. *Out of the Pits: Traders and Technology from Chicago to London*. Chicago: University of Chicago Press.
- Zelizer, V.A. 1979. *Morals and Markets: The Development of Life Insurance in the United States*. Livingston, NJ: Transaction Publishers.
- Zelizer, V.A. 1985. *Pricing the Priceless Child: The Changing Social Value of Children*. Princeton, NJ: Princeton University Press.
- . 1997. *The Social Meaning of Money: Pin Money, Paychecks, Poor Relief, and Other Currencies*. Princeton, NJ: Princeton University Press.
- Zilber, T.B. 2002. "Institutionalization as an Interplay between Actions, Meanings, and Actors: The Case of a Rape Crisis Center in Israel." *Academy of Management Journal* 45 (1): 234–54.
- Zucker, L.G. 1983. "Organizations as Institutions." *Research in the Sociology of Organizations* 2 (1): 1–47.