

## Introduction

### Financial Innovations in History

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The essays in this volume are written by a distinguished and adventurous set of historians and economists who have been willing, in many cases, to step beyond their typical field of inquiry and explore the historical foundations of financial innovation. First and foremost, the essays are motivated by the need to place our current age of financial revolution in historical perspective. Innovations in the modern world of finance have come to be almost expected, financial instruments spring from the mind of investment bankers almost overnight, and then are analyzed, valued, traded, saved, and hedged themselves-sometimes to be replaced by new financial instruments, and other times to be part of the permanent toolkit of financial engineers and investors. This continuing process of innovation, as sophisticated as it may seem to most of the modern world, is in fact built on surprisingly few basic principles.

This book traces the evolution of these basic principles of finance through 4,000 years of history-to the dawn of writing. Financial technology is based upon the ability to record agreements-whether on clay tablets, notched sticks, sealed parchment, printed paper, or electronic files. This book focuses, for the most part, on these primary documents of finance-financial instruments and contracts that have survived through history. Although the roots of finance undoubtedly extend into pre history, and many of the historical practices we study were part of a larger system that has only survived in pieces, these documents tell a remarkable story of invention.

The motivation for using primary documents is also, in part, a methodological one. Historians and economists both approach the past with a set of preconceptions that inevitably color their interpretations. Historians have long been aware of this retrospective bias in analysis and have either embraced it as part of the self-conscious process of writing history, or have sought to mitigate it through conceptual exercises. The former has led to history through personal association-for example, Simon Schama's beautiful narratives that begin with self-reflection, while a particularly intriguing example of the latter can be found in Niall Ferguson's *Virtual History*, which argues that the past has limited meaning without consideration of the counter positive-the "what-if.!" In the case of modern financial economics, the current mathematical models of financial markets and assets are so powerful that when we cast our attention back to history it is all too easy to recognize the modern security in the ancient contract. In doing so, it is also easy to ignore the social and historical context in which these tools came to be, a context that could help us understand, appreciate, and learn from the subtle distinctions that separate them from modern financial technology.

Thus, the use of original documents is a means for economists to focus on the primary text, to begin with an analysis of an object and to move outward from there to an interpretation and understanding of its relationship to historical and modern financial instruments and markets. This book is not meant to be a series of "just-so" stories about how stocks and bonds and options came to be, but a set of essays about episodes in the process of financial discovery. Understanding the process itself will ultimately prove more useful to financial market participants and analysts than charting the "birthdays" of modern financial assets. After all, given the rate of financial innovation today, such a study would soon be obsolete.

#### Elements of Financial Innovation

So what are these basic principles on which modern finance is based? We would argue that finance has three key foundations: the intertemporal transfer of value through time, the ability to contract on future outcomes, and the negotiability of claims. While there are a number of other important features of modern and historical finance, these are the essential elements that run as themes through the essays in this book. Put a financial engineer on a desert island (or an emerging market!) and give him only a few tools, such as the means to calculate the time value of

money, the ability to contract on random outcomes, and a legal structure that allows the transferability of financial claims, and most of today's financial instruments could be reconstructed. Let us take a closer look at each of them.

### Time Is Money

The simplest financial arrangement is an intertemporal value transfer-in plain language, a loan. This disarmingly simple contract has some remarkable properties. One person lends something to another with the promise that it will be repaid in the future. A borrower who comes to the arrangement without any money suddenly has wealth. On the other hand, the lender takes current wealth, places it in the contractual equivalent of a time machine, and transfers it to a future date, when he might better use it. For doing so, he is typically compensated with interest that makes him better off than in the present. In chapter 1 Marc Van De Mieroop identifies written loan contracts from Mesopotamia that are more than 3,000 years old. Thus, the roots of finance can be traced back to the roots of civilization itself

Civilization has long had an ambiguous attitude toward lending and interest. It is particularly ironic that usury laws in the Roman Catholic Church frowned upon the taking of interest during the thirteenth through eighteenth centuries in Europe-the period of greatest dynamism and invention in finance. Islamic *Sharia* still proscribes against lending, despite the fact that the mathematics of compound interest almost certainly entered Europe from the Middle East. Perhaps the clash of finance and religion is due to the seeming parallels between the term of a loan and the term of a life. The word "finance" in English comes from Old French, and shares a common root with the word "finish." It was used in the fourteenth century to imply a final settlement, and used most colorfully in Chaucer's *Lamentation of Mary Magdelene* who proclaims: "dethe is my Finaunce,"<sup>2</sup> a metaphor suggesting that life itself is a loan from God and death is the completion, or repayment. This similarity between life's course and a financial contract was apparently more than just a poetic conceit in medieval times. French theologians recognized the fundamental role played by time in financial contracting and used it to justify the Church's centuries-long ban on interest. According to William of Auxerre (ca. 1220) "The usurer acts contrary to natural law, for he 'sells time, which is common to all creatures.'"<sup>3</sup> Thus, for at least a millennium, finance has been viewed as an almost unnatural leap into the fourth dimension, a technology deemed so remarkable as to be contrary to divine plan. The underlying premise of this book is that something with such unholy power must be an important topic. Most of the financial innovations studied in this book have, as their basis, an intertemporal transfer of value.

### Contingent Claims

The second foundation of finance is the ability to contract on future chance outcomes. This, coupled with intertemporal wealth transfer, is largely responsible throughout financial history for creative innovation. A contingent claim is nothing more than a bet, in which one side pays the other depending upon the outcome of some event. Life insurance is the classic example-the insurer pays the beneficiary when the insured party dies. Once the contractual framework for life insurance is established, however, there is no limit to the range of things that can be contracted upon. Homeowners can bet on whether or not their homes catch fire. Merchants can bet on whether a voyage is successful or not, investors can bet on whether the market goes up or down, chocolate manufacturers can bet on whether the price of cocoa is high or low. Like loan documents, the earliest written contingent contracts are Mesopotamian cuneiform records; however, some of the most exciting developments in contingent contracting took place in Holland in the seventeenth century with the creation of option contracts on shares-puts and calls that allowed speculators and hedgers to buy or sell stocks at a pre-specified price if they went up or down.

In chapter 11, Oscar Gelderblom and Joost Jonker document the early development of these contingent financial claims in Amsterdam. The early Dutch options are the direct precursors to the worldwide derivatives markets of today. The broader context of the development and analysis of insurance contracts and risk hedging demonstrates why contingent claims are fundamental to innovation. For example, in chapter 14 Robert Shiller writes about the invention of inflation-indexed securities in the early United States. Here, the value of a contract is contingent upon the price of consumer goods-it thus becomes a tool for protecting consumers against the ravages of government's

inflationary policies. It also provides a nice historical precursor to Professor Shiller's personal quest to stimulate the development of contingent contracts that would allow citizens all over the world to protect themselves against crashes in their national economies, inflation shocks, unemployment shocks, and even housing price declines.<sup>4</sup> These visionary contracts proposed by Professor Shiller are based on the principle that contingent claims can allow people to hedge themselves against the risk of an unknown future.

Contingent claims technology not only allows society to address immediate, foreseeable risks, but it also allows society to deal with the "meta-uncertainty" of an evolving future. What worries one generation about the future may not be what concerns the next. The principle of contingent claims is flexible enough to adapt to these changing concerns. As new risks appear, new insurance contracts are written to allow counterparties to limit and define their exposure. A modern example of this is Fannie Mae, the mortgage insurance agency. Fannie Mae issues bonds that are essentially repackaged monthly mortgage checks mailed in by U.S. homeowners. When interest rates change, Fannie Mae's business is dramatically affected. A rate drop brings mortgage refinancings and demand for new issuance. A rate increase causes the value of the bonds to decline. Fannie Mae hedges against interest rate fluctuations through the use of interest rate derivative contracts. In principle, these contracts will increase in value when the profits from the agency's underlying business decline, smoothing out the shock to the firm due to a change in the macroeconomy. This, in turn, keeps the agency operating. Years ago there was no Fannie Mae, no mortgage-backed securities market, and virtually no interest rate derivatives market. Now it is hard to imagine the U.S. economy and the U.S. household operating without them.

Chapter 19, written by Timothy Guinnane, is an in-depth study of one of the most innovative contingent contracts ever used in the context of modern international finance.

The 1953 London Debt Agreement represented the final step in the restructuring of Germany's debt from the First World War, and used a contingent claim to solve a longstanding problem in European politics. By the mid-twentieth century, as a result of the Cold War, West Germany was effectively burdened with the obligations of the entirety of the nation's earlier war reparations. In recognition of the de facto split between East and West Germany, the international community limited the scale of these payments until such time as Germany was once again reunified. Securities were issued at that time which were truly "state-dependent"-that is, their value as bonds were conditional upon the structure of the modern German state. The fall of the Berlin Wall triggered a change in the loan terms, as envisioned for decades before by the negotiators in London. This contingent claim was, in a logical sense, the practical resolution to the long-term question of the German war debt posed so forcefully by John Maynard Keynes in *The Economic Consequences of the Peace*. It created terms by which Germany could finance industrial reconstruction and growth, and yet it did not necessitate debt forgiveness. As such, it allowed the German economy to develop vigorously following the Second World War, but without the all-or-nothing repudiation versus repayment framework that proved so economically disastrous in the 1920s. What innovations in contingent claims will the current century bring? It is hard to tell, but the technology of derivatives will almost certainly allow future risks to be parsed, hedged, and traded, and may yet be used to address some of the most complex challenges of the evolving global financial architecture.

## Negotiability

To borrow a phrase, negotiability does not make finance, it makes finance easier. Loans and contingent claims are certainly feasible without a secondary market, but the ability to trade contractual claims to a third party dramatically enhances the power of financial technology. Suppose, for example, that you have loaned someone \$1,000 and will not get it back for a year. However, you suddenly need the cash. You could, of course, become a borrower yourself. Another possibility is for you to sell the loan contract to another person. In effect, to tell your borrower to repay the money to someone else. It saves the trouble of a second contract and effectively turns your first loan into money. Why? Because the person you sold the loan to could hold it himself to maturity, or can sell it himself in turn.

Negotiability is the defining characteristic of a capital market-it allows investors to transfer financial claims. A

capital market like the modern New York Stock Exchange is an institution that brings together buyers and sellers to trade financial contracts. The power of such a market is that it simultaneously allows thousands, perhaps even millions of anonymous investors each day to rebalance their holdings of financial claims to suit the need for savings versus short-term cash use, as well as allowing them to speculate on or hedge against future events. As Richard Sylla, in chapter 17, and Ned Downing, in chapter 16, demonstrate, the liquidity of the NYSE was something that developed in response to historical forces and events. Its current preeminence was not preordained, but evolved along with the institutional framework of the U.S. financial, legal, and regulatory systems.

Can the framework be adopted without the institutional developmental process? The recent privatizations in Russia and China, and the dramatic emergence of equity markets in Moscow and Shanghai are a real-time test of this proposition. The near-collapse of the Russian equity market in the late 1990s and the tiny "float" of Russian equities compared to the size of the economy suggest that liquidity may result from process, not framework. Russia rewrote all the rules of the economy after the fall of Communism, and in so doing "shocked" society from one framework to another. In the new regulatory regime, the much hoped for liquidity of Russian shares is still elusive, although the active merger and acquisition market suggests that firm ownership-at some level-has become negotiable. In contrast, the gradualism and process-orientation of the Chinese experiment with capital markets has led to a huge volume of trade in Chinese shares, despite the fact that most companies are still majority state-owned. For both experiments the historical experience may provide some guidance.

While many of the financial innovations in this volume occurred in Western Europe, true negotiability first developed in China and reached its most dramatic expression in the eleventh century in the form of paper money. Indeed, the Chinese not only invented paper money, they invented fiat money-that is, cash that is negotiable just because the government says so. Chapter 4, by Richard von Glahn, is the first truly comprehensive study of the development of paper money in China. In it, he not only documents the series of public and private sector innovations that evolved into fully negotiable paper bills serving as currency, but also highlights the military, social, and fiscal problems that led to this new financial technology. Paper money in China was an experiment that lasted for approximately four hundred years. Ironically, it disappeared in the fifteenth century, just as financial markets were developing in western Europe. In chapter 5, William Goetzmann and Elisabeth K6ll focus on a specific Chinese document from the Song dynasty that represented a special form of paper claim to value-a type of early traveler's check that co-existed with paper money of the era and demonstrates a richer financial context for the development of what we interpret now as currency.

Negotiability is a somewhat ambiguous term, because it can be used to describe everything from the legal transferability of a contract, to the existence of a "bearer" security like a dollar bill. In these subtle differences, the ease of transfer can be important. Frictions and difficulties in trade sometimes cause markets to break down. They also can motivate important insights and invention. In chapter 15 Geert Rouwenhorst shows how the first mutual funds in Holland developed in part as a means of providing smaller investors access to financial securities that would otherwise be difficult to obtain. A striking example is the Russian government bond fund shares issued by Hope and Company in the early nineteenth century. Dutch investment bankers effectively created a market in Holland for Russian government debt by going to Moscow and subscribing directly to a set of loans, and then issuing loan-backed bonds themselves in Amsterdam. This saved investors from a similar trip halfway across the continent and consequently created an international market for Russian paper. These same bankers, incidentally, repackaged the early loans of the young United States as well. In both cases, they effectively turned cumbersome, illiquid financial contracts with governments into liquid instruments of smaller denomination that could be easily bought and sold in a capital market. Today, this process is called *securitization*. In this manner, nonnegotiable claims can be made negotiable through a repackaging process. The Fannie Mae example is again instructive. The process of packaging individual home mortgages into pools and selling the package as a bond has turned the U.S. mortgage market into a highly liquid set of negotiable securities that are bought and sold and held by investors all over the world. The ultimate beneficiary of some part of a personal mortgage check might be a retiree in London, a

bond speculator in Greenwich, Connecticut, a university endowment in Florida, or even the homeowner-if the homeowner holds money in a bond mutual fund that in turn invests in mortgage backed securities.

The financial architecture needed to create improvements in market liquidity depends as much upon individual insight and even fortuitous events as it does upon the forces of supply and demand that ensure its success. There are a few moments in financial history where it is possible to identify how a particular innovation came to be. In chapter 18 Niall Ferguson studies the birth of the first Eurobonds-loans issued in Europe's money center markets by countries promising to repay in a currency not their own. The Prussian loan underwritten in London in 1818 by the house of Rothschild, and the even more ambitious Russian loan floated in multiple European currencies by the Rothschilds in 1822, profoundly changed the nature of international relations. These sovereign debts demonstrated that liquidity was a transnational phenomenon-that government funding need not be constrained by borders-but the cost of such freedom was that obligations must be denominated in a coin of a different realm. This introduced a level of interlocking monetary dependency among European nations and their allies which arguably led to the global adoption of the gold standard decades later, as well as a redefinition of national power based upon the ability to tap global money markets for financing military adventures. As a historian, Ferguson focuses on the process by which this innovation came to be-the confluence of personalities, politics, and world events that led to a major innovation in the global financial architecture of the nineteenth century. There are many other factors that make financial innovation possible; however, intertemporal transfer, contingent claims, and negotiability are the fundamental building blocks. Their interplay throughout financial history underpins all the essays in this volume. An equally important theme in this volume is the multicultural origins of finance. For most of us accustomed to thinking of modern corporate capitalism as a product of Western Europe, the roots of finance in the ancient Near East, and its early development in China and central Asia, may come as a surprise. The broad scope of the work by the scholars in this book provides a chance to explore the development of finance from the widest possible perspective. The following pages are an overview of the development of finance, based on the essays in this volume.

## Origins

The Old Babylonian loan tablets analyzed in chapter 1 are the earliest extant examples of financial instruments, but contracts themselves had a prehistory. Another scholar of the ancient Near East, Denise Schmandt-Besserat, has suggested that the origins of contracts might be found as early as 3000 B.C. in the form of clay balls, called *bullae*. These fist-sized, hollow envelopes, common in Mesopotamian sites from the third millennium, contained small clay tokens that appear to represent some form of an economic agreement. Schmandt-Besserat argues that the tokens were tiny models of commodities: cloth, honey, bread, oil, sheep, goats, beer, milk, and even more abstract things such as days of work. She suggests that signs punched into the surface of the *bullae*, representing the tokens inside, evolved into the earliest cuneiform script. We will never know whether the *bullae* were the first "bonds" physically representing promises of future delivery of goods-but they could have been, and they reflect what was undoubtedly a culture that relied upon contracts and quantitative records.

An important parallel to the development of financial contracts was the mathematical capability of analyzing them. Babylonian mathematics was surprisingly sophisticated. It was based initially on a sexagesimal (base 60) system that made ratios and multiples easy to calculate and typically used linear interpolations to approximate such nonlinear phenomena as the motions of the planets and compound interest. Among the many mathematical texts that survive from the Old Babylonian period (1800-1600 B.C.) are study texts working out the solution to the accrual of interest. For example, a tablet in the Berlin Museum analyzed by the historian of science Otto Neugebauer asks how long it would take for a unit of silver to grow to 64 times its value if it doubled every five years-by any measure a long-term investment. This corresponded to a 20 percent annual interest rate that only compounds every five years.

Although Old Babylonian mathematics allowed calculation of long-term loan values, Marc Van De Mieroop points out that most loans in ancient Mesopotamia were short-term advances to farmers allowing them to meet tax obligations. He argues that interest rates associated with these distress-related loans should not be regarded as annual

rates, but interest due at time of harvest-regardless of the intervening time period. This is consistent with the notion that the technology for investment growth was based upon agricultural cycles. Wealth available at intermediate intervals could not be put to alternative productive use.

In chapter 3 Valerie Hansen and Ana Mata-Fink present some examples of similar "retail" loans in Han dynasty (206 B.c.-220 A.D.) China in the city of Chang-an-the eastern anchor of the Silk Road. While the interest rates to these pawnshop loans are not recorded, it is evident that the basics of small loans to individuals in China broadly resembled those of the ancient Near East. The Chinese loans they study suggest the widespread use of portable assets as loan security-an innovation in itself

Financial contracts in China have a long history. Bronze vessels from the Zhou period (1027-221 B.C.) describe written land contracts that were divided between the two parties? As early as the third century B.C. money-lending had become a road to riches. The most famous money-lender of the Warring States period (403-221 B.C.) was Lord Mengchang of Qi, whose annual income from lending was reported to be one hundred thousand strings of coin. The tale we have of him, recorded by the historian Sima Qian in the Han dynasty, describes exactly how his loans were collected and verified-and how he sometimes failed to collect.

There was a man of Qi named Feng Xuan who was so poor he could not maintain himself. He sent a servant to ask that he himself be placed under Lord Mengchang. He wished to be lodged and fed as one of the lord's retainers. . . . Later Lord Mengchang put out a request among his retainers asking which of them could keep records, and thus was able to collect his debts in Bi. Feng Xuan said that he could do so Thereupon Feng secured a chariot, and rode off carrying the tallies of indebtedness. . . . Feng hurried to Bi, where he had the clerks assemble all those people who owed debts, so that his tallies might be matched against theirs. When the tallies had been matched, Feng brought forth a false order to forgive those debts, and so he burned the tallies. The people all cheered.

The grand historian's account suggests that, regardless of whether lending actually began in the ancient Near East or whether we just think it did because clay tablets survive in the archaeological record, it appears that by two thousand years ago the practice of lending and indebtedness extended from Rome to China. In fact, in Rome, not only was banking and debt finance practiced, but Ulrike Malmendier argues in chapter 2 that Rome effectively had an active equity market, in which shares of organizations called *societas publicanorum* were negotiable, or at least transferable as a result of public auction in the Roman forum.

## **Continental Polarities**

Ifloans first appeared in the Middle East and fully negotiable paper instruments appeared first in Song dynasty China, why is modern capitalism overwhelmingly associated with Western Europe? Why, for example, didn't capital markets in Shanghai and Guangdong instead of London and Amsterdam-finance the development of international trading companies and related colonial expansion? This question has been posed many times in many ways-most often it is termed the Needham Qestion, after Joseph Needham, author of the multivolume *Science and Civilization in China*, which documents in extraordinary detail the level of scientific advancement in Chinese history. More recently, Kenneth Pommeranz has termed it *The Great Divergence* and argued that geographical determinism is the answer to the puzzle. A striking feature that emerges from the essays in this volume is a clearly identifiable point of financial divergence between East and West.

That salient period was the twelfth and thirteenth centuries, when both China and Europe were engaged in large-scale warfare. Song China at the time was fighting an exhausting and all-encompassing battle against central Asian invaders all along her northern frontier. China lost her northern capital to invaders in 1127 A.D. but the armies of the Southern Song battled on until the Mongols finally defeated them in 1279 A.D., founding the Yuan dynasty. As chapter 4 demonstrates, this crisis was the catalyst for the invention of inflation financing. When the Mongols seized power, they also adopted China's fiscal structure, and they, in their turn, drove down the value of paper money through inflationary policies. The Ming dynasty (1368-1644 A.D.) followed suit, putting a virtual end to the use of paper money in China until the modern era.

In Europe, the Crusades became a catalyst for a different sort of wartime finance. In Chapter 8 Luciano Pezzolo focuses on the origins and development of liquid bond markets in the early Italian republics in the twelfth and thirteenth centuries, and the contrasting role that the bond markets played in the political fortunes of rival city-states in the Italian Renaissance. He points out that in 1171 Venice levied a forced loan on her wealthy citizens to finance the construction of a fleet against the Byzantine emperor. The loan was necessary because Venice had neither the financial resources to construct the war fleet nor a paper currency it could inflate. Over the next century, while China was fighting Mongols and issuing paper money, Venice and her rival city-states continued to refine the process of debt issuance. In fact, the city-states found that, properly structured, there was actually a demand for governmental loans as investment vehicles. European governments thus figured out how to turn a fundamental economic need to their advantage while China's government did not, although it may be argued that China used paper money as an instrument of monetary policy as well as simply a tool of wartime finance. Europe eventually discovered paper money and inflation financing, and China learned how to float loans; however, their respective financial technologies in the late Middle Ages may have created conditions which sustained an institutional separation between two highly civilized societies for centuries.

Some of the earliest financial tools used by Western governments were perpetuitiesbonds that pay interest forever and never return the principal. In effect, perpetuities exchange a finite amount of cash for an infinite future flow. In chapter 10 William Goetzmann and Geert Rouwenhorst explain in detail just how these perpetual Euro pean borrowings worked and describe a still-surviving perpetuity from the Dutch Age of Reason-an instrument that has been paying interest since the mid-seventeenth century. This particular bond was issued in 1648 to finance the repair of a section of the dyke containing the river Lek, near the city of Utrecht. The buyer of the bond was promised by the issuer-a quasi-governmental water authority-a stream of fixed payments that would last forever, presumably matching the permanent future benefits that the dyke represented to the citizens of Utrecht. While preparing the chapter, Rouwenhorst collected the current and back coupons for the bond, an act that represents a modern, living connection with the origins of European finance. The obligation was paid by the modern descendent of the seventeenth century authority established in Holland to build and repair the same dyke. China had its own great infrastructure projects, some of which virtually dwarfed the Dutch dykes and land reclamation initiatives. Construction of the Great Wall began in the third century B.C., and the Sui dynasty saw the completion of a great inland waterway linking China's two largest river systems. Despite the massive financing demands of such projects, there is little evidence that China developed an analogous structural system of government debt financing. This is not because China lacked a history of lending or of legal certification of financial claims. Indeed, as chapter 3 indicates, China not only possessed a sophisticated mercantile court system but also an early securitized retail lending tradition based upon pawnshops. However, the twelfth century seems to have been a fork in the road for finance, and Europe learned first how to exploit the dimension of time.

Chapter 7 examines the role of mathematical knowledge in the growth of European capitalism by looking at the work of Fibonacci of Pisa. Fibonacci was a financial advisor to the Pisan government and an educator. As an early financial analyst he developed a mathematical framework for evaluating the complexities of different financial contracts in particular, he devised an early form of the modern present value criterion. Fibonacci's mathematics of money became the foundation for later developments in western European finance.

It is remarkable how mathematically sophisticated this technology eventually became. In chapter 12 James Poterba traces the development of annuity contracts in early modern Europe. Annuities, like bonds, are promises of future cash flows but with a key difference. Standard annuities kept paying for the life of the beneficiary but would stop or change upon death. Thus, a simple present value criterion was not sufficient to calculate the economic cost of an annuity. This dependency in value upon the human lifespan challenged the greatest mathematical minds of the seventeenth and eighteenth centuries, including Jan de Witt, Edmund Halley, Abraham de Moivre, and Nicholas Bernoulli. Indeed, the problem of annuity valuation contributed significantly to the development of the mathematics

of probability-still a key tool used by modern financial engineers.

While China absorbed mathematical knowledge from the West, at least from the seventeenth century onward, when Jesuit Matteo Ricci began to translate mathematical classics into Chinese, the economic context for Western financial mathematics was lacking in China. Western market forces drove the quest for valuation of financial instruments like perpetuities and annuities, and the development of probability methods, accounting practices, and discounting. These, in turn, led to further developments in financial instruments and markets. Although the basics of finance and financial analysis were present in China before the late nineteenth century, the same dynamic relationship between mathematical knowledge and market innovation that characterized European markets was not.

Whether the divergence between East and West explains, or is explained by, cultural, geographical, or even mathematical factors is open to speculation. However, the historical divergence is important to study and understand in its own right. It suggests that the history of finance cannot focus on the singular strand that led to Western corporate capitalism. The story of financial technology in China would seem to imply that there are multiple, plausible evolutionary paths for economic systems. The differences in development between East and West suggest that Western capitalist economies were not the inevitable product, or the sole equilibrium outcome, of a set of common factors. It is worth considering whether the current financial architecture may simply have been due to the accident of history. If the last millennium of history were rewound, government bond markets might have developed in China and the Venetians might have invented inflation. Any economic or social theories that purport to explain the development of financial instruments and markets also should be robust enough to explain their failure to evolve in the rich social, economic, and intellectual context of Song China.

If capitalism is the confluence of fortuitous social, economic, and intellectual events over the past few centuries, then we should consider two troubling implications. The first is that we may not know how to re-create it. Given the serious attempts to develop capital markets underway in Russia and China, it would be useful to know whether capitalism is "path-dependent." Will it work without the evolutionary process that brought it to fruition in Europe and North America over centuries, or will Russia and China be forced to perpetually exist as emerging markets on the periphery of the world's core capital markets? Can capitalism re-create itself, or must it continually expand from its legal and economic core?

The second implication of a "capitalism as an accident of history" interpretation is that the system may not be as robust as it now appears. Our view of history, when confined solely to the roots of capitalism and the current financial system, may be colored by our trajectory of success. A broader historical look at the world economy and its experimentation with financial instruments and markets reveals that continued linear development of markets is not inevitable.

### **Corporations as Financial Innovations**

One could argue that corporate capitalism was the defining economic institution of the twentieth century. Its widespread growth in the early part of the century culminated in the first great age of globalization—a fluorescence of markets, enterprise, infrastructure, and modernization that touched virtually every corner of the world. By midcentury, however, the social and political backlash against the juggernaut of capitalism had divided the world in half, created the context for a Cold War, and polarized the popular visions of corporations—as either the solution to all problems or the source of all evil. Given the corporation's central role in modern world history, no volume on financial history would be complete without consideration of this entity.

The corporate form is a financial innovation in one key respect. It is an entity that is not human. That is, it has legal standing in many respects like that of an individual, with rights of ownership and the capacity to contract with others, and yet it is really a fiction—a useful trope that turns an association of people into a business unit. How corporations evolved as legal entities is one of the most fascinating and long-standing questions in legal history and one of the essays in this volume makes an important contribution to this question.

In chapter 2 Ulrike Malmendier, a financial economist and legal scholar, brings a combination of these two

perspectives to her analysis of the evidence for the existence of corporations in the Roman Republic. These companies are known through extant documents describing their performance of service to the state, including revenue collection, public works, and military procurement. Although entities like *societas publicanorum* may have existed to do nons tate business, most extant records characterize them, in effect, as state leaseholders. Malmendier argues that the *societas publicanorum* had the essential feature of the corporation-that is, legal standing as an entity, equivalent to that of a natural persona. In addition, shares (*partes*) in these firms were widely held by Roman investors and they traded regularly in the public marketplace. Thus, by the second century B.C., Rome had developed some form of equity finance that resembles the modern equityshare corporation.

With the fall of the Republic, the emperors nationalized many of the functions performed by the *societas publicanorum* and they disappeared from the documentary record. Did the basic structure of these companies persist in the European economy through the Dark Ages? Or was the technology of share capitalism lost and then reinvented a millennium and a half later? Without historical records it is difficult to do more than speculate about whether the corporate form is something that survived or was rediscovered in Europe. This is of more than academic interest, because it is important to understand whether a technology like the corporation needs to be passed along or diffused through culture, or whether it arises naturally as an equilibrium solution to an economic problem. Given sufficient freedom for development in an emerging market, will economic nature take its course, or does that market need a transfer of corporate "genetic code"?

Two chapters address a key episode in the early development of the first modern corporation-the Dutch East India Company, *Verenigde Oostindische Compagnie* or VOC. A major financial innovation introduced with the VOC was limiting the liability of shareholders. No matter how large the loss incurred by the company, its shareholders would be liable for no more than the value of their initial investment. In chapter 9 Larry Neal points out that the concept and basic structure of the first modern corporation lay in earlier Dutch practices of selling shares for single maritime ventures, and that the early history of the firm was the story of an evolution from the temporary venture structure into a permanent institution. Neal embeds the account of the VOC in the context of the market for trading its shares on an exchange. By the date of the firm's founding in 1602, securities markets in Europe had already existed for centuries. In Holland, in particular, there was a widespread market for rentes and similar municipal debt instruments, and this market extended beyond the monied classes to the trade and professional classes. Thus, a market context already existed for the active trading of shares and debt in a private entity.

Chapter 11 focuses on the development of the derivatives markets in Holland at this time. The authors show that, from the very beginning of trade in VOC shares, there were demands by investors to hedge against the risk in the fluctuations in share value, as well as demands for more sophisticated "side bets" on company share prices. They document evidence, for example, of forward contracting on VOC shares within a decade of their first appearance, and argue that there are earlier European precedents for these contingent claims. Viewed in the context of financial practice at the time of its appearance, the Dutch East India Company and the public market for its shares was an important innovation, but perhaps not a radical one. It grew out of the public demand for investments and the pre-existence of a market medium.

The great import of the Dutch East India Company lies in the novel mechanism it offered for financing the exploration and commercial expansion of European business ventures around the globe. Chapter 9 quantifies the extraordinary financial payoff to investors in the VOC over its lifetime, and this as much as anything else must have motivated imitators. In the century and a half after the founding of the Dutch East India Company, similar share-financed trading companies appeared in England, France, Belgium, Holland, Russia, Sweden, Italy, and Portugal. These companies envisioned vast profits in the exploitation of trade routes to Africa, Asia, and the Americas and the establishment of valuable settlements in all of these far-flung regions that would allow the acquisition or agricultural development of commodities in demand by European markets. In the founding of the VOC lay the seeds of European colonial empires that would remake the globe over the next three centuries and become the catalyst for some of the greatest, as well as some of the most notorious, distinctions of capitalism.

The *Compagnie de l'Occident*—more popularly known as the Mississippi Company—was founded in 1717 to settle and exploit the vast Louisiana territory owned by France. The company's founder, John Law, a Scottish-born banker and advisor to the French crown, had an even grander vision for the company. It became one of a set of private corporations created by the financier to revive the French economy and deliver it from its overwhelming indebtedness. Within a few short years, Law's company would demonstrate to the world how corporate structures and their securities could be used to revolutionize government finance. Chapter 13, by Antoin Murphy, focuses on John Law as a theorist who sought to put into practice a scheme to rescue France from financial collapse through the creation of an interlocking set of corporations that collected her taxes, managed her colonies, and rationalized her currency. Law's radical vision exceeds any financial scheme proposed since, and it came close to success. Its downfall was due in part to a failure to control this new money supply, and a collapse in confidence in the new corporate entity. The resulting crash of 1720 is often regarded as the bursting of the world's first stock market bubble. In the now-fashionable environment of criticism of stock market excess, Law's brilliance as a financial engineer, and his intention to use innovative financial architecture to solve real economic problems, are often overlooked. Murphy points out that before the crash, Law's scheme managed to revive the real economy of France and even after the crash, it had the potential to become a permanent solution to her fiscal problems. Thus, Law is not the villain as he has been portrayed in widely read books such as Charles Mackay's *Extraordinary Popular Delusions and the Madness of Crowds*, in which the Scotsman plays a large role as willing instigator of stock market speculations and frenzies. His scheme is a historical foray into the potential of corporate finance to address the large-scale macroeconomic problems of society. Rather than hold Law up as an example of failure, his plans for creating equity ownership in government perhaps should be studied a bit more carefully.

There is a real villain in our volume, however—King Leopold of Belgium, a rapacious capitalist who took corporate finance to its most extreme, inhumane boundaries. In chapter 20 Robert Harms tells the story of how the monarch turned the Congo into a privately held corporation, outside of the legal and geographical boundaries of any organized state. For decades, until it was acquired by Belgium at great expense from the king, the Congo served only the financial whim of its owner. Harms explains how Leopold sold off concessions for the exploitation of the Congo basin to firms that eagerly and mercilessly extracted ivory and then rubber from its native inhabitants. As these resources diminished, managers employed legendarily cruel tactics to motivate workers, including mutilation and infanticide. As Harms points out, Leopold paid for the initial development of the Congo through the age-old method of corporate finance—the issuance of debt. The tale of Leopold's bonds and the corporate roots of the Independent State of the Congo are important parts of the story of corporate financial innovation. Markets are powerful but amoral. The invisible hand steers them toward efficient but not necessarily humane outcomes. In the case of Leopold, it took a combination of bold investigative journalism and the world's first campaign for corporate responsibility to wrest control of the Congo from the king. The message perhaps is that financial innovation has the power to solve large-scale economic problems but needs to be used wisely—or at least transparently. Today, we find ourselves once again in a period of globalization of the world's markets, but one with a fundamentally different financial architecture. Despite the existence of a modern set of international financial institutions such as the International Monetary Fund and the World Bank, it is worth reflecting occasionally on the past failures and excesses in world financial history.

This volume is by no means a comprehensive history of financial innovation. Its goal is considerably more modest. It represents the reflection and analysis by a number of scholars on particular episodes in financial history. There are important benefits to the episodic nature of this volume, however. Given the underdeveloped nature of the field of financial history, its scholarship is arguably still in the dominant mode of data collection and a search for meaningful developmental models rather than in a period of synthetic interpretation. While a few comprehensive studies in the field stand out—most notably works such as *A History of Interest Rates*, by Sidney Homer and Richard Sylla, and *The Rise of Financial Capitalism: International Capital Markets in the Age of Reason*, by Larry Neal, the great excitement of our discipline lies in the process of investigation and discovery. Our hope is that this volume

will create a framework for future study and interpretation of financial innovations through history, and a wider recognition that history has a lot to teach us about the modern processes of financial development.

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