INTRODUCTION

Finance is often regarded as an abstract, mathematical subject that occasionally calls attention to itself by dramatic crises or as a symbol of excess. In fact, finance has been an integral part of the development of human society over the past 5,000 years. Finance played a key role in the development of the first cities, the emergence of classical empires, and the exploration of the world.

The history of finance is an exciting story. For example, writing was invented in the ancient Near East specifically for recording financial contracts. Finance was integral to the first complex models of time and risk. The golden age of Athens owes as much to financial litigation as it does to Socrates. Rome’s legendary wealth could not have sustained itself over the centuries without complex financial organization. Ancient Chinese civilization developed its own financial tradition that enabled rulers to hold together a vast empire.

In modern Europe, finance stimulated a novel mathematical tradition that quantified and analyzed risk and made possible an unprecedented era of exploration and discovery. A new financial structure—the corporation—emerged as a means to aggregate capital for trade with Asia and the Americas. Finance was an important co-factor in the Industrial Revolution. In the twentieth century, capital markets democratized investing and stimulated novel solutions to major social problems: social security, sovereign funds, and personal savings accounts are all mechanisms intended to reduce household economic risk. They have deep roots in the history of finance.

Along with these important contributions to humankind, finance has also created problems: debt, market bubbles, devastating crises and crashes, exploitative corporations, imperialism, income inequality—to name only a few. The story of finance is the story of a technology: a way of doing things. Like other technologies, it developed through innovations that improved efficiency. It is not intrinsically good or bad.
TIME AND MONEY

The power of finance to effect such important transitions in world history is that it moves economic value forward and backward through time. Think about a mortgage. It converts a homebuyer’s promise of thirty years of future monthly payments into a lump sum of money in the present. A mortgage is so commonplace that it is hard to fully appreciate it. A homebuyer can suddenly conjure up a fortune he or she does not have. Where did this great power come from? Why does it work? What can go wrong? These are some of the key issues explored in this book.

A mortgage shifts money to the present, but, for the lender it also moves money into the future. By the same token, a person worried about retirement can actually buy future living money today—usually at a significant discount. The ability to solve the fundamental problem of taking care of your future self is incredibly empowering. It rests on a sophisticated technological structure that is able to express and enforce commitments that extend over decades and in some cases over centuries. In essence, financial technology is a time machine we have built ourselves. It can’t move people through time, but it can move their money. As a result, it alters the economic position of our current and future selves. It also changes the way we think. Finance has stretched the ability of humans to imagine and calculate the future. It has also demanded a deeper understanding and quantification of the past, because history is the fundamental basis for making future predictions. Finance has increasingly made us creatures of time. Financial architecture exists in—and shapes—the possibilities of the temporal dimension.

This book explores key steps in the evolution of finance in world history. My fundamental premise is that civilizations demand sophisticated tools for managing the economics of time and risk. Finance emerged with the first civilizations of the ancient Near East and since then has played a key role in many cultures we recognize as complex societies. Civilizations over the past 5,000 years have faced a common set of problems, and they have either borrowed or invented a similar set of financial tools to solve them.

China is an important part of this book precisely because it faced civilization’s complex challenges of economic time and space in its own
way. Although certain financial tools and methods diffused across the Eurasian continent by trade and faith, China’s financial development took its own course; China developed its own monetary economy, its own accounting and financial control systems, and the first paper securities—printed money that Marco Polo saw and used in China centuries before printing emerged in Europe. The resonance and dissonance between Chinese and European financial development reflects alternative historical paths. From it we learn what is common in the technologies of finance; how parallel innovations can arise; and how new ideas are adopted, altered, and embedded into broader social, political, and cultural frameworks. The comparison between financial developments in China and Europe reflects my personal research interest over the past two decades. With great regret I’ve left out evidence from many other civilizations.

The extraordinary expansion of humanity and urban society over the five millennia is testimony to the fact that finance has vastly improved our species’ ability to reduce existential risks and to allocate resources through time to foster growth. However, civilization’s growth has engendered its own problems. The biggest of these is whether the intertemporal balance—the trade-off between current and future generations—can be preserved.

This book is a somewhat personal narrative about the people, places, and things that, in my view, shaped the history of finance as a technology of civilization. It does not pretend to be a comprehensive financial history of the world. That is a vast task that, to some extent is currently under way as a result of collective scholarly efforts. The book reflects not only the specific themes that linked finance and civilization but also my personal, idiosyncratic experiences—both as a financial economist and as a former participant in the worlds of archaeology and filmmaking; both of which provided a different frame of reference with respect to the role of finance in society. These prior experiences took me to some extraordinary locations in the history of finance. I hope the reader will forgive me for personalizing some of them. A “place where” frame of reference sometimes evokes a richer context for discovery. Before launching into the story, however, an overview of financial technology, some definitions of civilization, and the logic of the connection between the two are in order.
Finance has four key elements:

1. It reallocates economic value through time;
2. It reallocates risk;
3. It reallocates capital; and
4. It expands the access to, and the complexity of, these reallocations.

Let me explain each of these.

The example of the mortgage above demonstrates the first key element: reallocation of economic value through time. A mortgage is one kind of financial contract, but there are many others. All of them are promises today about a future action. The contract ties the present and future together in a way that can benefit the contracting parties.

Second, finance reallocates risk. Reallocation through time means that financial contracts must cross the barrier of uncertainty that separates present and future. Some risks we must simply live with—such as the risk of a meteorite striking the earth. Other risks we can take steps to reduce or to restructure. Financial contracts take the exposure to risk that is inherent in the dimension of time, and they allocate it among various parties. For example, life insurance contracts can shift the risk of mortality from a single household to a large institution, which, in turn, can diversify by pooling it together with many other contracts.

Third, finance reallocates capital. The stock market, for example, allows the flow of investment into productive enterprises. Banks, for example, make loans to businesses with the potential for profits. In this way finance is a technology for facilitating economic growth.

Fourth, finance expands the access to and complexity of these reallocations. As it developed through history, finance provided an increasingly richer set of intertemporal contracting possibilities. This richness and complexity mirrored the complexity of the society that engendered it. At times, this complexity challenged the very boundaries of written language’s ability to specify them. A modern mortgage-backed securitization contract, for example, can be 900 pages long and can detail an enormous variety of conditions, rights, and responsibilities. The virtue of such complexity is that it expands the contracting “space” between parties—that is, the number of dimensions along which they can negotiate. When you do this, you are able to arrive at agreements that simpler systems might not. The very richness and complexity of the intertemporal...
ral agreements finance allows is itself an important contribution of the technology. Without this multidimensional freedom, some fundamental activities of civilization would not be possible.

**REALLOCATION THROUGH TIME**

Financial contracts are typically struck between someone who wants to shift value to the present and someone who wants to shift value to the future. There are two broad reasons for shifting money to the present: consumption and production. The consumption motive is the need for cash to cover current expenses, to buy food, to pay medical bills, or to deal with some other unforeseen cost.

Consumption loans can be used to reduce risk. In an uncertain world, sudden expenses arise. Financial contracts allow you to borrow or pledge against the future to mitigate negative shocks today. In extreme circumstances, such as crop failure or a sudden illness, an emergency loan is a way to put food on the table and provide medicine to the sick—it smooths out the difference between good times and bad times. Financial contracts can be essential tools for survival. They provide the same potential benefits to governments, by the way. Governments borrow to pay for military defense or a sudden calamity, and then repay the loan with future tax revenues. The economic term for this financial function is “intertemporal smoothing of consumption.”

Productive loans are different from consumption loans. They play a special role in the economy, because they are based on the notion of growth. They do not simply smooth economic shocks between the present and future; they make a different kind of future possible. Finance can bring capital together to create an enterprise that will generate higher future value. For example, a farmer can borrow to buy seeds to plant, and the harvest can yield a bounty well beyond the original cost of the seeds. If a farmer could not borrow, the land would not be used productively.

By the same token, finance allows productive use of human ingenuity. Without finance, the only people who could start a business would be those who already had money to do so. Finance removes the prerequisite of wealth from entrepreneurship. It feeds capital to potentially productive projects regardless of whether or not the entrepreneur is
rich. In this sense, finance broadly disseminates the economic advantages of wealth—it democratizes access to productive capital and removes the natural constraints to funding productive projects. This is the basic logic connecting finance and economic growth.

The use of finance for consumption and production also has potential problems. Consumption loans have been criticized as promoting profligate behavior and exploiting desperate borrowers. Productive loans can lead capital astray; easy money can fuel foolish projects just as it can fund profitable enterprise.

Shifting money to the present for reasons of consumption and production can be done through different kinds of financial contracts. The simplest is the loan, but there are other kinds of financial promises. A share of stock or a partnership share offers an ownership stake in an enterprise rather than a fixed future payment. Insurance and option contracts offer a future payment depending on the occurrence of a particular event or condition. Throughout history, people have come up with various forms of contracts that allow for broader participation in productive enterprise. We will explore some of these in detail in this book.

INVESTMENT

Consumption and production use current capital; investment provides that capital. It is the basic technology for saving for the future. That is why pension funds hold stocks and bonds and other financial assets.

Investing money rather than spending it requires delaying gratification. No one likes to delay gratification without a good reason. For investors, a key incentive is the expectation of higher future consumption. In the simplest form of a financial contract—a loan—the lender expects to get back the money lent plus some extra amount: interest. The longer the loan is made for, the longer the investor delays personal consumption and thus, typically, the more interest is promised in compensation.

The rate of return on the investment can be thought of as the price of time. It equilibrates the intertemporal supply and demand for money. It balances the needs of investors against those of consumers and producers. For example, if the interest rate is too low, investors may prefer
to spend their cash now rather than save it. If the interest rate is too high, producers may forgo projects, because their expected return on borrowed capital is insufficient to repay the loan.

While these trade-offs seem simple, they have global implications. The productivity of capital investment intermediates between the world’s consumers, producers, and investors. Investors are connected to today’s consumers and producers through financial institutions and markets. The balance is a delicate one. When financial markets crash, investors can curtail the flow of capital to enterprise. Demographics are fundamental to the equation. As the world’s life expectancy grows, the need to save grows as well. As the world population ages, the ratio of producers to consumers declines. Finance not only intermediates the present and the future, it also intermediates between the young and the old.

By the same token, the financial equation between the present and the future only works if there is genuine economic growth. This is fine in a world of low-hanging entrepreneurial opportunities, but as the growth of emerging economies slows down to the pace of mature economies, the question of where future growth will come from looms large. The specter of the limits to growth—and the consequent breakdown between present and future economic value—has long concerned economists and planners.

**CULTURE VERSUS FINANCE**

It is easy to think about finance as an abstraction—after all, the notion of transcending time is fundamentally abstract. However, finance is embedded in human culture and behavior. Society has long struggled with placing finance in a moral and cultural context. While finance can solve great problems, it also can threaten the status quo. It changes who turns to whom in an emergency. It reallocates wealth; it creates the potential for social mobility and social disruption.

In some sense, the most basic intertemporal economic institution is the family. A social compact in which children take care of aging parents, for example, is a retirement plan. Likewise, a reciprocal gifting commitment among family, friends, or members of a community fulfills the same function as a financial loan. Unlike a loan, however,
the compensation is a future social obligation rather than interest payments—tightening a social network rather than loosening it.

These arrangements long preceded formal financial contracts. Finance emerged in a cultural context that already addressed intertemporal problems to some extent. In this sense, financial contracts were not entirely new. Rather they substituted for, and often improved upon, traditional intertemporal mechanisms. As such they represented a challenge to the status quo.

At times, culture has lashed back at finance—particularly around financial crises. This response may in part be due to the threat finance poses to tradition social, economic, and political institutions. For example, some of the earliest ad hominem attacks on financiers were by Babylonian political leaders consolidating authority. The first stock market boom in eighteenth-century Britain was criticized in part because female investors were making money in a traditionally male-dominated realm.

Because finance is a potentially destabilizing force, society has often sought to place bounds on it. These constraints are sometimes couched in moral terms. Usury laws were introduced under the guise of protecting borrowers. Britain’s Bubble Act restricted the creation of business corporations under the guise of stopping immoral speculation. The Securities and Exchange Commission was created in the 1930s in the United States to regulate the potential misuse of financial techniques and tools. Behind these and other restrictions on financial contracting is the implicit—and reasonable—supposition that rules are needed to prevent the financially adept from exploiting those less sophisticated—and underlying this is the fact that finance reorganizes power. A financially adept mind that can think through trade-offs between present and future is an extraordinary asset in a world with financial instruments and markets—but it can also represent a danger. Finance has the potential for great social change, which is inherently risky.

**FINANCE AND CIVILIZATION**

Finance offers a rich variety of ways to reconfigure human relationships, particularly because it expands the domain of interaction through time. It can focus economic power, shifting it quickly from place to place. It
can be both a weapon of war and an instrument of peace. This complexity and potentiality makes finance a particular tool of civilization. In this book I argue that there are reasons finance emerged in the first civilizations; reasons complex financial instruments are less frequently part of the toolkit of traditional cultures.

The hallmarks of civilization are urbanism; social specialization; sophisticated symbol systems; and complex, multidimensional interactions. Civilizations are also open systems that absorb and synthesize knowledge. As my father, the late historian W. H. Goetzmann once put it:

Cultures are structures of interrelated institutions, language, ideas, values, myths and symbols. They tend to be exclusive, even tribal. Civilizations, on the other hand, are open to new customs and ideas. They are syncretistic, chaotic, and often confusing societal information systems. They continue to grow in the richness, variety and complexity of societal experience.¹

Financial systems expand the scope and nature of these social relationships into the realm of time and across both great and very close distances. A dense, urban society creates relationships of all kinds. In a city you not only interact with family and long-term acquaintances. You also interact with people for whom traditional reciprocal relationships do not work. Urban life may demand one-off interactions with foreign visitors or repeated interactions with tradespeople who cannot reciprocate in ways you require.

Such financial tools as coins, loans, and partnership agreements expanded the set of economic interactions to people who may not willingly interact otherwise. Financial markets allow strangers to exchange value through time more efficiently than traditional reciprocity arrangements do. They do not require shared belief systems or cultural norms, simply a structure for documentation and enforcement. Financial instruments expanded the dimensions over which individuals could come to agreements, and this expansion uniquely fits the needs of a complex, multidimensional urban society.

Civilization not only requires contracting among many different types of economic agents, but it also requires flexibility to respond to complex, multidimensional problems. Financial contracts allow
an enormous variety of novel payoffs and promises. Even the very first financiers operated in a sophisticated nexus of institutions and commitments; they had deals with institutions such as temples and palaces; with farmers and other producers; and with long-distance traders, who in turn interacted economically with other cultures and civilizations. These first financiers depended on a variety of outcomes and events: political decisions, agricultural output, the fortunes of overseas trade ventures, the fluctuating price of commodities, and the honesty of employees. Complicated lives require interaction, planning, and commitment in many different dimensions over a variety of unknown future outcomes. The development of finance was driven by the demands of civilization's social and economic complexity.

FINANCE AND KNOWLEDGE

Finance also played a role in another key aspect of civilization: the development of knowledge. One important way that humankind learned about the boundaries of the world was through merchant voyages requiring money and time—underwritten by investors hopeful of a future profit. In this way, finance has been a cofactor in civilization's expansion and outreach. Trade routes linked societies from distant parts of the world. These distant connections were not only spatial, they were also temporal. From the outset, long-distance trade created long gaps of time: intervals between investment and return separated by the veil of uncertainty. Columbus had to wait patiently for the funding of his first transatlantic voyage, and then he had to promise the future unknown profits to his benefactors. His contract with the Spanish crown was extraordinarily complex: he received not only political favors but also 10% of future revenues from transatlantic trade. He also negotiated an option to invest up to 1/8 share of any commercial enterprise organized to exploit his discoveries. Without this intertemporal contracting, he might never have set sail.

I will also show how finance has changed the tools humanity uses to develop and preserve knowledge. Financial problems stimulated the development of writing, recording, calculation, and printing. It also directly spurred some of humanity’s most important mathematical in-
novations, including the discovery of logarithms, the mathematics of probability and uncertainty, and the ability of mathematics to express an infinitely long series and to divide time and the process of change into infinitesimally small intervals.

Finance stimulated the development of quantitative models of the future and the maintenance of deep records about the past. Markets taught people about such things as the limitations of the capacity for reason and the dangers of miscalculation. These complex conceptual frameworks augmented and stimulated the development of problem solving, but they also set up a conflict between traditional and quantitative modes of thought. This conflict is heightened during periods of financial innovation and financial disaster. Not only did financial architecture challenge traditional institutions, it also challenged traditional conceptual frameworks for dealing with the unknown. Cultural notions of chance and fortune are embedded in a rich set of symbols, myths, and moral valences. Understanding and managing this conflict remain important challenges to modern society.

HARDWARE AND SOFTWARE

Finance has two different dimensions—what might be thought of as hardware and software. The hardware is constituted by such things as financial contracts, corporations, banks, markets, and monetary and legal systems. I generally refer to this as financial architecture. Finance is also a system of analysis that incorporates counting; recording; algorithmic calculation; and advanced mathematical methods, such as calculus and probability theory. On an even deeper level, finance is a system of thought; a means of framing and solving complex problems about money, time, and value. In essence, this is the software of the technology.

This book highlights historical episodes in the development of both financial hardware and software. Both dimensions are embedded in the broader structures of society. As they evolved, not only did they draw from other fields of work and other technologies, but other technologies also have drawn from finance.
INTRODUCTION

THE OTHER SIDE OF THE COIN

With each advance in the hardware or software of finance, a problem was solved, but new problems appeared. Financial solutions improved the capability of humankind to create cities, to explore new worlds, to expand and equalize economic opportunity, to control risk, and to provide for an uncertain future. But at times financial innovation has created serious disequilibria in and across societies; disruptions that have defined the fundamental conflicts in the modern world and that will continue to shape the development of the world to come. I hope to explore both faces of finance: its capacity to solve problems and its tendency to create them.

PERSPECTIVES

This book is told from a number of perspectives. The first is that of the inventors and users of financial tools. Sometimes we know these people, but often they are anonymous. The invention of the first loan was a great idea, but no one knows who had it. Financiers are not historians; capital markets are not libraries—financial techniques were invented to make money, not to make their inventors famous. In fact, usually when we know a lot about financial innovators, it is due to a disaster. For example, the visionary banker John Law is still known for the collapse of his innovative Mississippi Company designed to rescue France from bankruptcy in the years leading up to the bubble of 1720. However famous, anonymous, or infamous its inventors, keep in mind that finance is by, for, and about people’s lives. Each shareholder in John Law’s Mississippi Company bought shares for personal reasons—maybe to take a flyer on a risky venture, maybe he or she trusted John Law’s scheme, or perhaps just because others were doing it. Whatever the reason, the only way to figure out how a financial tool works is to ask why someone might need it in the first place. Ultimately, finance is personal and concrete, not abstract and theoretical. It is not only about money but also about people and how they use money.

The second perspective is that of the researcher. History is discovery, and historians are explorers. Much of this book unfolds from research by archaeologists, classicists, historians, economists, and mathematicians.
Just as important, however, are those who are devoted to preserving the past—librarians, collectors, and dealers—all of whom treasure the documentary evidence of history. I hope to convey the excitement of all their quests. Some of their views are sparks of insight mixed with years of careful research. For example, we would not understand the birth of finance in the ancient Near East without Professor Denise Schmandt-Besserat of the University of Texas, who discovered the origins of cuneiform writing—along with the origins of financial contracts. We owe a lot to the Shanghai financier and monetary historian Peng Xinwei 彭信威, who devoted his life to Chinese financial history before disappearing in the Cultural Revolution. We might never understand the first inflation-indexed security if not for economist Robert Shiller’s personal mission to help people insure themselves against everyday economic risks.

A third perspective is empirical: the world of things and places. Technology requires actual tools and locations. For finance, this means coins, documents, correspondence, and places where these things were made and exchanged. Objects like coins and stock certificates functioned as tools, because they solved such problems as the storing and conveyance of value and the transmission of value through time. They have been made of many different things—clay, metal, and papyrus—and printed on vellum, bark, or paper. It is important to understand the material culture of finance to appreciate how it worked as a technology.

Yet another perspective is cultural. Although this book is not a cultural history of finance—in many instances, artists, writers, moral philosophers, dramatists, and even comedians have interpreted financial markets, and this in turn has influenced the course of these markets’ development. The criticism of finance as a tool of exploitation on moral grounds goes back to Babylonian times. The discomfort that society has felt with the complexity and abstraction of financial tools has stimulated rich artistic interpretations that in turn shaped cultural attitudes. We sometimes turn to art for a perspective, and artists’ views on finance—from seventeenth-century tulip mania prints to the twentieth-century murals about commerce in New York’s Rockefeller Center—depict finance in the context of familiar cultural symbols. The artist’s vision is an integral part of the narrative of this book.

Much of my research in finance has been directed toward a scholarly audience; however, one motivation for writing this book is the hope
that a broader audience will be curious about the origins of a toolkit that we all share and a mindset that seems at times difficult and perhaps unnatural. As important as it is to live every day in the present, finance challenges us to think hard about the future.

My personal view is that the trajectory of technological innovation has been mostly upward and will continue to be so. The financial solutions we have in the world today are generally life improving. The problems they created have been serious at times, but as a global society, we seem to make progress in dealing with them. Would the world have been a better place without the discovery of loans, banks, bonds, stocks, options, capital markets, insurance, and corporations? Perhaps, but I doubt it. The argument in this book is that financial technology allowed for more complex political institutions, enhanced social mobility, and greater economic growth—in short, all the major indicators of complex society we call civilization. Ultimately, financial relationships have become important means by which economies are knit together into a complex global civilization. As a global civilization, we must continue to face the basic problem posed by finance: how to equilibrate between the needs of the present and those of the future; and how to make the benefits of finance broadly available to everyone in society, wealthy and poor. The historical trajectory of financial innovation may just provide a useful guide.