Chapter 1

FROM "DUMB" BARTER TO INTELLIGENT AGENTS

A Genealogy of Markets

Where did financial markets come from? What distinguishes financial markets from other forms of trade? How do financial markets work? We will briefly address the first two questions in this introduction; answering the third question is the goal of this book.

Markets for the purchase and sale of financial **securities** such as stocks and bonds have existed for hundreds of years. Typically, these markets began with a small group of men (and maybe a few women) who met informally at a coffeehouse or restaurant to act as intermediaries between buyers and sellers of securities (here we're talking pieces of paper). As the volume of their business increased, these loose-knit groups formed associations with rules of conduct. In London, for example, The Stock Exchange was

securities *Paper or computerized documents expressing financial claims to an issuer's assets; abstractly, the claim itself, independent of the form in which it is represented.*

established in 1773 in a room in Sweeting's Alley. The building became known as The Stock Exchange Coffee House, still showing the link to its former home, a coffeehouse named Jonathan's located in Change Alley.

Nineteen years later, in 1792, a small group of New York stockbrokers, who had been trading under an old buttonwood tree on Wall Street since the days following the Revolutionary War, signed a business agreement. Twenty-five years later, in 1817, the Buttonwood Group created an association—The New York Stock and Exchange Board—and arranged to move indoors.

What Is a Security?

Securities are usually thought of as the pieces of paper that prove ownership (stock certificates), ownership-related rights (option or warrant certificate), or a creditor relationship (bond certificates). Most of these pieces of paper, however, no longer exist, having been replaced by book entries in electronic form. Some dictionaries dodge the question neatly, defining *securities* as "financial instruments" and leaving it at that. In the United States, securities are more narrowly defined as a subset of financial instruments that pass what is called the Howey Test. Like Gaul, the Howey Test is divided into three parts: (1) money must be invested in a business; (2) where there is the expectation of a profit; (3) with no effort required on the part of the investor.

This still leaves us in want of a definition of *financial instrument*. We will define financial instruments as *rightful claims to assets represented in some fashion, whether on paper, in a computer's memory, or in any other verifiable way.* Defined in this way, the financial instrument still exists even if the certificate is lost or the computer crashes.

Under the Old Buttonwood Tree: The First Trading Post

The tree that started it all was a buttonwood tree, *Platanus occidentalis*. According to the New York Stock Exchange, the tree was located near the eastern end of Wall Street, on the north side of the street between Pearl and William Streets. How tall a tree was it? Some buttonwood trees grow to

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150 feet. How old a tree was it? It is thought to have been a seedling a century before Columbus's voyage of discovery. Many of its neighbors were felled by British axes when Manhattan was occupied during the Revolutionary War. The buttonwood survived, becoming a popular place for brokers and other traders to gather.

As to the legend itself, did 24 brokers meet beneath this tree on May 17, 1792, to sign the Buttonwood Agreement? The prevailing view is that the agreement was signed indoors, at a local hotel. One thing is certain: Whether the signing under the tree was literally true or a fanciful fable, the agreement has borne plentiful fruit.

What distinguishes financial markets from nonfinancial markets? Financial markets can be seen more clearly if placed in the larger context of markets in general. Markets, in turn, are more easily understood if looked at in the still larger context of forms of trade between individuals and groups.

Both market and nonmarket forms of trade are as old as civilization. Both have existed even in cultures that traded goods without the use of money. Nonmonetary trade has taken many forms, most notably **barter** (i.e., exchange of goods and/or services for other goods and/or services) and various forms of ritualized gift giving. Extensive barter markets existed in Ancient Egypt and in Mesopotamia 5,000 years ago.

An early type of barter trade that required neither money nor even a shared language is mentioned by Herodotus, the Ancient Greek historian known as the Father of History. Writing nearly 2,500 years ago, he tells of Carthaginians engaged in "dumb barter" with tribes from beyond the Pillars of Hercules. Also known as "depot trade," or "silent trade," the widespread custom was practiced at one time or another in such diverse places as northern Russia, western Africa, Sumatra, and India. It worked roughly as follows.

One of the parties to a silent trade went at the appointed time to the traditional spot designated for trading (how these times and places were selected we do not know). The first party set down the goods being offered and then retreated to another location, signaling the other party with a call or other sound. On hearing the signal, the second party went to the spot, placing items considered of equal value alongside the items offered by the first party. Then that individual, too, retreated, allowing the first party to return and look over the wares offered by the second party. At this point the first party either completed the trade by removing the second party's wares or, if not satisfied, left those wares in place until the second party sweetened the offer with additional goods.

Did this type of barter constitute a market? It appears that markets require, at minimum, some goods or services for sale and a means for traders to place bids and make offers on these goods with other traders. Thus "dumb" barter does possess two of the salient features of markets: items for sale and the establishment of a fixed time and place for traders looking to make deals.

But it takes more than fixing a time and a place to constitute a market and to distinguish it from other kinds of trading. It takes only two to trade, but markets need at least three participants. This gives the participants the ability to compare what is being offered (and/or asked for) by one party with what is being offered (and/or asked for) by another. Dumb barter does not provide a means to look for a better deal from a different trader; there are only two parties to the trading. It does not even require a common language. On this reckoning, it falls short of being a true market.

Notice that in the preceding paragraph we studiously avoided the terms *buyer* and *seller*. That is because, in the absence of money, there is no clear distinction between buyers and sellers: Each party is a little bit of both. While this lack of distinction between buyers and sellers might seem to be an artifact of primitive societies, we will see in Chapter Sixteen (on options) that a curious aspect of the Information Age is a form of trading known as *swaps,* in which the distinction between buyers and sellers is once again blurred.

The creation of barter markets was an important development in human history. Even so, its limitations are readily apparent. In a barter market, a potential buyer may not have the item that a potential seller wants. Alice may have almonds that she wants to trade for butter. Bob may have butter but needs chocolate. Charlie, who has chocolate, wants almonds. In order for Alice to get butter, she must first get chocolate (see Table 1–1). In the absence of a medium of exchange, even a simple shopping expedition can require a high degree of knowledge of the marketplace. Furthermore, buyers and sellers find it difficult to calculate prices when restricted to barter.

It is wasteful to have to engage in multiple transactions in order to get a single needed product. Not only can this type of barter be complicated,

Table 1-1 A Comparison of Barter and Money-Based Trading

Barter-Based Trading

	Has	**Wants**	**Owned By**	**Must Sell To**
Alice	Almonds	Butter	Bob	Charlie
Bob	Butter	Chocolate	Charlie	Alice
Charlie	Chocolate	Almonds	Alice	Bob

Alice can exchange her almonds for Charlie's chocolate, then use Charlie's chocolate as a medium of exchange to get Bob's butter.
Bob can exchange his butter for Alice's almonds, then use the almonds as a medium of exchange to get Charlie's chocolate.
Charlie can exchange his chocolate for Bob's butter, then use Bob's butter as a medium of exchange for Alice's almonds.

or

Money-Based Trading

	Has	**Wants**	**Owned By**	**Can Pay Dollars To**
Alice	Almonds, dollars	Butter	Bob	Bob
Bob	Butter, dollars	Chocolate	Charlie	Charlie
Charlie	Chocolate, dollars	Almonds	Alice	Alice
Dave	Dollars	BCA	BCA	BCA

Dave, who distributes the dollars, sits at the center of the money-based system. He makes transactions much easier, as long as his dollars retain the confidence of Alice, Bob, and Charlie. He must not create more money than the market can bear.

but to complete a transaction, a trader may need a great deal of information about price and availability of products he or she doesn't want and about the needs of other traders.

Even with only three people trading three products, barter can be complicated. This complexity increases exponentially with the number of products and services being traded. In a growing economy, with thousands of products and services, barter is a less and less efficient means of trade. At some point along the way, a barter system becomes unworkable. Something has to change. In the language of the theory of complex systems, a critical point has been reached. At that point something new emerges.

That something new is money. Consider Dave the banker. Dave has dollars. Instead of everyone running around in circles trying to complete increasingly labyrinthine transactions, they go to Dave and get dollars in exchange for their goods. Now, with Dave's dollars serving as a universal medium of exchange, Alice can sell her almonds directly to Charlie and buy butter directly from Bob.

Where Do Dollars Come From?

The word *dollar* originally entered the English language as the name of a sixteenth-century Bohemian silver coin, the *taler* or *thaler,* shortened from *Joachimstaler,* named after Joachimsthal, a town in Bohemia. Later, *dollar* was used to refer to the Spanish *peso,* or *piece of eight,* a coin used not only in Spain but in North America, and in widespread use at the time of the American Revolutionary War. From *piece of eight* we get the value of a quarter as *two bits,* long before the word *bit*—a contraction of *binary digit*—became associated with computers.

The emergence of money provides both a medium of exchange and a common denominator that enables traders to compare the various goods (or services) offered. Initially, this was done by selecting one item to be the standard of comparison.

With a universal medium of exchange operating in a market, the ability to discover price emerges. At any given time and place, a unique price is created for items on sale in a market. This price is sometimes called the *equilibrium price*, because it is the price that theoretically equalizes supply and demand. In practice, this equilibrium may not be so obvious or stable. One reason for this is that the exchanges that are supposed to set the equilibrium price are hypothetical, not actual, trades. When real trading commences, it may be affected by influences not taken into account by theory, such as the continual introduction of new products and services that compete with existing wares and the periodic revolutionary changes wrought by the emergence of new forms of trading.

Money simplifies transactions by providing a universal intermediary for goods and services. But it also serves other important purposes. Thousands of years ago, human societies began to move away from prehistoric subsistence economies in which little was produced beyond the bare necessities of life. Cities emerged, and with them came economies that produced a surplus. In these long-ago times, money began to function as a means of representing that surplus.

Money Changes Everything

The word *money* comes from an epithet applied to the Roman goddess Juno. She was referred to as Juno Moneta. In addition to *money*, the words *monetary* and *mint* are also derived from that epithet. In fact, the temple of Juno Moneta *was* the Roman mint.

When the surplus is **invested** (put to use in a productive enterprise), it is known as **capital.** When used as capital, money is not only a convenience for facilitating transactions, but is an essential means of organizing complex projects and enterprises.

capital *Surplus goods and/or money used to create more goods and/or money.*

The ability to invest money gave rise to a multiplicity of new kinds of wealth. The existence of multiple currencies gave rise to a new kind of transaction. Beyond barter, where goods and/or services are exchanged, and beyond the purchase or sale of goods and services, a purely monetary transaction could now take place, with one kind of money being exchanged for another kind—in essence, exchanging symbol for symbol. In these purely financial transactions, we can see the beginnings of the financial markets.

Trade has developed in two independent, yet related, ways. First, it has grown more and more abstract. Second, it has grown to include larger and larger groups of people. The increasingly abstract nature of trading has fed its tendency to include larger and larger groups, while the involvement of larger and larger groups has reinforced the abstract nature of trading.

The details of how potential participants interact with each other varies from market to market, as does the amount and quality of information exchanged. There is also considerable variation in ownership and control of markets.

We can visualize the history of commerce as an increasingly specialized and complex hierarchy of trading. As we have seen, the simplest kind of trade requires neither money nor market, nor even language. Language makes it possible to negotiate over price and terms, leading to the kind of barter arrangements that exist today. When these are organized into a market, pricing is no longer simply a matter of two-way negotiation, but is derived from the interaction of supply and demand on the part of market participants. We can also have nonmarket trades that involve money. The combination of money and markets leads to still more elaborate forms of trading—and thus to the beginnings of financial markets.

Markets have become so widespread and popular that it is becoming hard to imagine a social order without well-developed markets. Yet it is helpful to recall that until very recently, markets were anathema in many parts of the world. In the former Soviet Union, in Communist China, and in other places, many forms of markets were illegal. The official line was that a "command economy" was best, with centralized planning and sharp limits on what could be bought and sold and who could buy and sell it.

Intelligent Agents: Computer Programs as Financial Intermediaries

The evolution of computer networks has given rise to a qualitatively different kind of program usually known as an **intelligent agent** (also referred to as *smart agents* or *bots*, short for robots). These programs operate autonomously, according to guidelines you specify. If you have used an Internet search engine to locate information or a web site, you have already used an early form of this technology. Intelligent agents go one step further than search engines. They do not merely find a piece of information or a web site for you. They negotiate transactions with counterparties, usually other intelligent agents. Still in an early phase of development, intelligent agents hold the promise of allowing investors to specify guidelines and let the software do the negotiating.

Until recently, the use of barter was a very strong component of the Russian economy. Elaborate barter networks operated in a virtual economy, hiding the true extent of Russian economic activity and preventing the government from collecting taxes. By some estimates, as much as two-thirds of that economy was barter-based. In the aftermath of the financial and economic crises of 2008, we may be observing a resurgence of barter on a global scale, to supplement or replace broken financial systems.

Sophisticated commodities trading with future delivery of goods requires that traders develop the capacity to understand the time value of money. From here it is but a short step to the issuance of bonds and other debt securities, and to their trading. This develops both in the open marketplace and behind closed doors. In either case, technology facilitates the creation and distribution of more and more abstract forms of financial instruments. The constant evaluation of these instruments by buyers and sellers exerts a kind of evolutionary pressure on the whole complex system made up of stocks, markets, and the organizations and individuals who use them. Thus the cycle of innovation continues, from the dumb barter of ancient history to the intelligent agents at the cutting edge of today's financial technology.