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1

A Brief History of Investments

Mesopotamia and the Dawn of Investing

The art of investing has been practiced since the dawn of *Homo economicus*. Investing in its earliest form can be linked to the risk/reward decisions of long-distance trading. During the late Pre-Pottery Neolithic period in the prehistoric Middle East, between 9500 and 8500 BCE, settled village life emerged. Settlers from the Jordan Valley engaged in the long-distance trade of obsidian, domesticated wheat, and sheep with the people of the Central Anatolian Plateau and the Zagros-Taurus arc in what is now modern-day Turkey.[1] The enterprising traders of this period faced significant dangers in these commercial treks, making risk/reward decisions every day they continued in their quest for economic profit. Thanks to some very savvy investment decisions on the part of these merchants, long-distance trade flourished like never before, spanning a distance of fifteen hundred miles and involving a striking variety of raw materials.

If we think of a portfolio in a broad sense, as capital that's saved or invested for a future purpose, then recent evidence suggests that these Pre-Pottery Neolithic settlers treated grain the way we would treat a portfolio today. Food storage is a vital component of economic development. Twenty-first-century excavations near the Dead Sea in Jordan uncovered strong evidence of sophisticated granaries even before the

domestication of plants.[2] This evidence suggests that the settlers were able to reduce seasonal food risks and settle in a particular area for more than one season a year. These storage facilities, a break from earlier periods, represented a critical form of risk management, allowing the settlers to smooth their consumption, ensure against droughts, and plan for the next sowing season.

Investing is also directly linked to the time value of money, the notion that a dollar today is worth more than a dollar tomorrow. Investing is really about moving economic value across time—for instance, providing an entrepreneur with a needed source of cash today in return for a promise to share in future profits. Even before writing was invented, accounting still played an important role, since it was critical to have a record of transactions and contracts between two parties. Evidence for accounting in the form of commodity record keeping may extend back to 7000 BCE, based on the interpretation of the use of tokens—about the size of board game pieces—in the early urban settlements of Mesopotamia.[3] What these tokens were used for wasn't initially clear to archaeologists, but one archaeologist eventually recognized that old Uruk tablets dating back to 3100 BCE, complete with cuneiform writing, also contained pictographs of these very tokens. For example, the symbol for food evolved from a token shaped like a dish. Most pictographs represented everyday commodities such as sheep and loaves of bread. Virtually all of these old tablets were accounting records or contracts presumably used by some kind of central authority, such as a temple, to account for what goods were coming in and going out of the temple.

These tablets also provide us with records of ancient loans. For example, a Sumerian record from around 2400 BCE may be the oldest known personal loan: Ur-garima lent Puzur-Eshrat forty grams of silver and nine hundred liters of barley.[4] Around that time the first known surety bond was issued, with a second party guaranteeing repayment if the first party failed to reimburse the lender. A stone tablet written in cuneiform characters indicates that such a bond, guaranteeing the payment of grain, was issued in Nippur in Mesopotamia. The bond was drawn up by a scribe, included the names of four witnesses, and, typically for its time, was executed in triplicate.[5]

Other ancient records indicate more complex business arrangements, including forerunners to what we think of as modern financial instruments. For example, a type of derivative contract actually dates back to 1900 BCE. Derivatives are named because their prices are derived from some underlying security, such as the price of a commodity. The first known derivatives contracts—what today would be called futures contracts—were written in Mesopotamia in cuneiform script on clay tablets and involved the future delivery of goods, often combined with loans. One such contract was between a merchant, Magrattum Akshak-shemi, and his client, Damqanum, agreeing to the future exchange of thirty planks of wood of specified lengths.[6]

When famed archaeologist Sir Leonard Woolley excavated the Mesopotamian city of Ur, one of his startling discoveries was of the earliest known financial district, along with the possible birth of the bond trading market. Woolley discovered that in 1796 BCE an educated businessman named Dumuzi-gamil along with his partner, Shumi-abiya, borrowed five hundred grams of silver from another businessman, Shumi-abum. Dumuzi-gamil agreed to return his share of the silver in five years—a relatively long-term loan—at an annual rate of interest of 3.8 percent.[7] But rather than simply hold on to the loan, Shumi-abum turned around and sold it to some well-known merchants, who successfully collected it when the loan was due, thus indicating a market for bond trading. The Ur documents suggest that there was a liquid market for such personal promissory notes. Reflecting the principles of time value of money, Dumuzi-gamil likely used the loan as a productive source of immediate cash to finance his entrepreneurial venture as a bread distributor. He also used some of the funds to act as a banker, lending at a monthly interest rate of 20 percent—which works out to an annual compound rate of almost 800 percent!

Not all investments and trades panned out for everyone. Even centuries before social media, reputation mattered, and around 1750 BCE a copper trader in Dilmun named Ea-Nasir certainly didn't have a good one. In fact, what are arguably the world's oldest complaint letters (albeit ones written on tablets) cast him in an unflattering light. His career seemed to have started well, and he was considered a good credit risk

while buying and selling for the palace at Ur. However, many traders' complaints about the quality of his copper were uncovered, etched in stone for all eternity. One man named Nanni was so upset that he covered both sides of an entire tablet with his complaints: "You have offered bad ingots to my messenger. . . . Who am I that you are treating me in this manner—treating me with such contempt? . . . You will learn that here in Ur I will not accept from you copper that is not good." Archaeological evidence suggests that Ea-Nasir's wealth eventually declined, and he was forced to branch out from copper trading into less lucrative markets such as real estate and secondhand clothes trading.[8]

From BCE to CE: Coins, Bonds, Stocks, and More

The lifeblood of any financial system is money. Money acts as a medium of exchange, allowing for a more efficient system than a world of barter. Money also acts as both a unit of account that indicates our wealth level and a store of value that can be saved and used later. To perform these functions, money needs to be durable, interchangeable, portable, and reliable. While barter is thought to have been around for at least one hundred thousand years, the earliest known coins were found by archaeologists in the Temple of Artemis at Ephesus, in present-day Turkey, and thought to be minted in 600 BCE.[9] Made of gold and silver alloy, the coins featured the head of a roaring lion. Comparing value across historical eras is difficult, but it's thought that each coin could buy about ten goats.

Subsequent to the early derivatives in Mesopotamia, another type of derivatives contract, the call option, was used around 600 BCE in ancient Greece. Call options allow the buyer the option to buy a particular asset at an agreed-upon price at a future date. One of the first recorded accounts of such a transaction is related to the underlying price of olive oil presses. At the time, olive oil was used for making soap and for cooking and was also used as fuel for lamps and as a skin softener.[10] After several years of poor harvests, the Greek philosopher and mathematician Thales of Miletus (known as one of the Seven Sages of Greece) used astronomy to predict an upcoming bumper olive crop. During the

winter, he negotiated call options to buy the presses in the spring at their depressed current prices. He bought all the olive presses he could find from discouraged growers and made a fortune when the predicted bumper crop arrived. As recounted later by Aristotle in his famous *Politics*, Thales "succeeded in proving it is easy for philosophers to become rich if they so desire, though it is not the business in which they are really about."[11]

In the fourth century BCE, the well-known Greek orator Demosthenes was grappling with an investment issue. His father, with the same name, had died owning a furniture factory, a weapons factory, several loan investments, and other assets—early evidence of an investment portfolio, believed to be valued at over $11 million today. The estate, however, was mismanaged by his guardians, so when Demosthenes turned twenty-one, he took them to court. In his argument, he sought to establish both the original value of the estate and what it should have been valued at had it been managed properly, performing what today would be called a net present value calculation.[12] He was successful before the court but ultimately only received a fraction of the estate's value.

Since the third century BCE and perhaps earlier, endowment funds had been established in Greece[13] and later in the Roman Empire. The purpose of an endowment is to collect charitable donations and distribute funds generated from the endowment's investments while preserving the capital. Some of the earliest endowments were used to distribute cash awards to various tribes at annual celebrations, to pay teachers' salaries to educate youths, or to fund oxen sacrifices in religious rites. In some cases the principal was lent at a rate of 12 percent, although a rate of 10 percent was common later. As is the case today, there was even a tax angle to donations.[14] Many of the best-known endowments from this period were structured in such a way that elite and wealthy donors could limit their tax liabilities by sheltering real estate from possible tax assessment and perhaps even enhance their private wealth.

Around 221 BCE the standardized bronze coin was introduced to China by its first emperor, Qin Shi Huangdi, as the first currency of the now-unified empire and as its only acceptable currency, although

archaeological records show that similar coins may have been produced hundreds of years earlier.[15] These coins had a standardized weight of half a liang, or about eight grams. The coins were ring-shaped with a square hole in the middle, allowing them to be strung together, and continued to be minted until the end of the empire under Emperor Puyi in 1912. These coins (historically called "cash" in English) are important, because as with present-day money they were fiat currency, not backed by any precious metals such as gold but only having value because of decree and convention.

Once coins became accepted as fiat currency and the weight and type of metal of the coin were no longer important, it was only a matter of time until paper currency became accepted. Banknotes, the most common form of currency today, originated in China during the Tang dynasty (618–907 CE). A banknote or bill is a guaranteed promise to pay the bearer or owner of the note on demand. Chinese merchants invented the first bill around 800 CE.[16] The idea was that a certain amount of currency would be deposited in a local merchant's guild, and the merchant would receive a written receipt. That receipt could then be brought to another town and exchanged for currency through that guild. The different guilds would periodically settle the amounts owed, thus avoiding the danger of transporting a lot of cash. By 841 CE, the government prohibited this custom so as to monopolize the issue of paper money.

During the Song dynasty (960–1279 CE), under Emperor Zhenzong (r. 997–1022), the world's first official paper money was designed. Notes were printed that were worth 1 to 10 guan (or strings) that equaled 1,000 to 10,000 cash equivalents, respectively. Upon redemption, however, only a portion was actually paid in cash. For example, 1 guan could be redeemed for 770 cash. Centuries later European explorers such as Marco Polo introduced the concept of paper money to the Western world. Today, paper money is ubiquitous. On the front of U.S. paper money is the promise "this note is legal tender for all debts, public and private," and on the back is the statement "in God we trust." In fact, you are really trusting the U.S. Treasury and the Federal Reserve to make good on this promise.

The precursor to government bonds—and the first form of public finance—occurred in Venice in 1172.[17] What we think of as bonds today were actually born by accident. The republic of Venice was in a struggle with Byzantium, the eastern successor to the Roman Empire, over control of the Adriatic Sea. On fabricated charges that the Venetians had set fire to a neighborhood in Constantinople, the emperor of Byzantium, Manuel I Komnenos, created a hostage crisis by seizing Venetian merchants, locking them in prison, and taking their goods. The doge of Venice, Vitale II Michiel, needed to quickly build a fleet of ships to wage a war in order to free the hostages and recover the Venetian property. Due to religious usury laws, however, loans were illegal.

To fund the fleet, the doge devised a borrowing scheme (technically not a loan) known as a *prestito*, like a mandatory tax but with a promise to pay 5 percent interest until the debt was retired. The scheme created a lender-borrower relationship between the city and its citizens rather than putting creditor control in the hands of a few investors. The *prestiti* became quite popular and were eventually traded frequently in the Rialto Market. Unfortunately, things failed to go well for the doge. While his fleet of 126 ships was anchored off the coast of Asia Minor, Manuel I Komnenos stalled for time by promising a negotiated resolution. However, the Venetian fleet was suddenly ravaged by plague. Thousands died, with only about a quarter surviving. The mission was cut short, and the survivors returned home in defeat. When the Venetians saw that the doge had survived but so many others had perished, a mob chased him down and executed him. Furthermore, the weakened republic, while continuing to make interest payments, was never able to retire the principal of the loan.

Public finance became very useful to the expanding European powers. The first government bonds were issued in Amsterdam in 1517, long before the Netherlands existed as a country,[18] and the first bonds were issued by a national government in 1694, through the Bank of England, to fund England's war against France.[19] One of the oldest known perpetual bonds, paying a set interest rate in perpetuity to whoever holds the bond, was issued by the Dutch water board of Lekdijk Bovendams in 1648 and written on goatskin; the money raised was used to pay

workers who constructed a series of piers near a bend in the river to prevent erosion.[20] What's unique about the bond is that it still pays interest today. One of five known bondholders is Yale University, where the bond is displayed in the Beinecke Library. In 2015, Timothy Young, the library's curator of modern books and manuscripts, traveled to Amsterdam to collect twelve years of interest, worth €136.20, or $153, while in 2003 the university collected twenty-six years of back interest.

The world's oldest shareholding company dates back to 1369, when a group of French millers formed Société des Moulins de Bazacle.[21] The mill owners who shared a perpetual lease on the river arranged a profit-sharing plan. A few years later, one of the millers was a decade late in a debt repayment to a merchant, and the resolution to the subsequent lawsuit resulted in a new corporate structure that included the now common innovation of an elected board of directors to protect shareholders. The company was considered a distinct legal entity apart from the shareholders. The Société des Moulins de Bazacle survived floods that destroyed the dam, ice floes, famine, plagues, and a revolution while still paying out 100 percent of its profits in dividends. Shares were transferable, and in some years there was turnover of about 20 percent of the shares. There was one noteworthy constraint on share turnover: in addition to paying a large notary fee, new shareholders had to host a dinner for the entire board of directors.

The first "modern" joint-stock companies were the British East India Company (EIC), founded in 1600, and the Dutch East India Company, also known as the Vereenigte Ost-Indische Compagnie (VOC), founded in 1602.[22] The EIC was formed as a monopoly to trade in India and later China, while the VOC was a government-directed amalgamation of several Dutch companies that were granted a monopoly on trade in India. In 1609, the VOC was the first modern joint-stock company to raise a large amount of capital by issuing dividend-paying shares. For over a century, the shares paid dividends of an incredible 22 percent. Of course, these rewards were associated with tremendous risks: the dangers associated with long-distance trading and the uncertainty surrounding the new corporate form itself. Initially, the shareholders could either reinvest in future voyages or receive the

distributed dividends. If shareholders were disappointed, they could demand their share capital back and withdraw. By 1609, however, VOC directors deemed the shares to be nonrefundable. An active secondary market developed for the shares, as there were over one thousand share subscribers in Amsterdam alone. By 1607, one-third of the original shares had changed hands. While the original plan called for the liquidation of its shares in ten years, the company wasn't formally dissolved until 1796.

Early Purported Bubbles

A bubble, in the financial sense, is a sometimes fuzzy word referring to the rapid increase of the price of an asset not explained by fundamental factors. (There will be more on bubbles later in this book.) One of the earliest purported bubbles was alleged to have occurred in the Netherlands in the seventeenth century, was popularized in a nineteenth-century book, and was called into question in the late twentieth century: the infamous tulip bubble. The tulip was originally a Middle Eastern flower that became immensely popular in Dutch gardens. Prior to the 1630s, tulip bulbs were physically traded between growers in the summer, when the bulbs could be pulled from the ground.[23] Subsequently, florists started buying and selling bulbs still in the ground, using promissory notes. Given the lag between the buying and selling of the notes and the actual delivery months later, speculators emerged who were often highly leveraged.

According to Charles Mackay in his 1841 classic *Extraordinary Popular Delusions and the Madness of Crowds*,[24] in 1637 when the mania was at its peak, twelve acres of land were offered for one rare bulb, Semper Augustus. Mackay recounts the anecdote of a sailor who mistakenly ate a rare bulb, at the time worth the cost of feeding an entire ship's crew for a year, that he thought was an onion. However, according to Mackay, in February 1637 the market dried up because traders could no longer find buyers, and prices plummeted. Robert Shiller, recounting the mania in our time, said that "the Dutch referred to it as a 'windhandel,' which, when translated directly, means 'wind trade.' What they meant was that

the prices of those tulips were like the wind; there was nothing to them. So, it's just air."[25]

However, more recent research by Peter Garber has debunked many of the tulipmania myths.[26] Many of the cited prices were based on futures contracts, which were illegal at the time and thus unenforceable. Buyers paid only a fraction of the contract price up front. Many of the purported offers for rare bulbs can be traced to moralistic pamphlets distributed at the time, basing their examples on what it might cost to enter into a futures contract at the peak of speculation rather than actual offers. There were also fundamental reasons for the initial price increases, as it became fashionable in France for women to display fresh tulips at the top of their gowns. There is no evidence of a large inflow of foreign money or lending for speculation. Similarly, there are no reliable price data for just after the purported crash in the price of rare bulbs. Subsequent history suggests that it's natural for the price of rare tulip bulbs to decline dramatically over time. Garber's observation regarding "the implausibility of a Dutch businessman leaving a highly valuable bulb lying about for a loutish sailor to eat for lunch" seems to have escaped Mackay's retelling of the story.[27] Interestingly, Garber does note a quick rise and sudden crash of common, generic tulip bulbs—not part of the tulip lore—that he can't explain.

Another early stock bubble is forever associated with one of the most colorful, innovative, and controversial figures in investment history, the Scotsman John Law, born in 1671.[28] John's father, William, was a goldsmith but successfully moved into the moneylending business. In 1683, shortly before his death, he bought an estate north of Edinburgh, which was to go to his eldest son, John. William's second wife, Jean Campbell, was assigned as John's principal guardian. Mother and son quarreled, and at age sixteen John left home (or perhaps was tossed out). He sued his mother in court for lack of support. In her court testimony, Jean complained of John going out late at night and gambling. The case was eventually settled out of court, and John Law apparently used some of the money to settle his gambling debts.

At age twenty-three, Law killed a man in a duel in Bloomsbury Square and was sentenced to death, but English authorities arranged for his

escape from prison. He traveled to the continent and used his mathematical skills to become a bookmaker. At the same time, he wrote essays on monetary innovation. He submitted many proposals to French authorities for the establishment of a bank in France. After King Louis XIV died in 1715 and France was in a state of bankruptcy, Law was appointed controller general of finances by young King Louis XV's regent, the Duke d'Orleans.

Law, as a friend of the French regent, was able to establish a bank authorized to issue fiat money, or paper notes, as legal tender, the first such full-scale use of fiat currency in Europe. Law also established the Mississippi Company to develop French territory along the Mississippi River in North America. Later he was granted a twenty-five-year monopoly on colonial trade as well as on the beaver fur trade in Canada and the ability to collect French taxes in return for taking over France's public debt, as part of a system or, as some later argued, a scheme. This system had several moving parts but essentially involved converting government debt into a sort of government equity.[29] Law allowed the public to invest in the company, but he also had an incentive to maximize the price in order to entice debtors to convert to equity, thus helping to create hype around the worth of the stock. The Mississippi Company also grew through mergers and acquisitions.

In 1719, a speculative frenzy in Mississippi Company shares occurred in France. In current terminology, the target price-to-earnings (P/E) multiple was around 45, almost three times higher than what would be considered a typical P/E multiple today. In 1720, however, when expected profits were slow to materialize, the stock price plummeted. Law was forced to flee the country and went to live in Venice, where he continued to gamble and traded in paintings.

A parallel bubble was playing out in England around the same time.[30] The South Sea Company was a joint-stock company, founded in England in 1711. The company had monopoly trading rights to much of South America, even though Spain and Portugal had well-established empires there. This trade, however, was of minor importance, since it was established to help the government organize the national debt (much like the Mississippi Company), which was incurring high

borrowing rates after nearly twenty years of expensive warfare. In 1719, the South Sea Company submitted a comprehensive scheme to Parliament to offer its own equity to public creditors in return for their assets (akin to the government bonds they owned). The proposal to Parliament, accompanied by considerable bribery, succeeded. The company was able to lure public creditors with a rising stock price and extended purchase terms. At the beginning of 1720 the share price was at £130, but by June it had risen to almost £1,000. However, confidence in the stock waned as the South Sea Company's future prospects were questioned, and by October the share price had fallen to around £200.

Rising prices by themselves don't imply a bubble. They may reflect increasingly profitable opportunities. Were the rapid stock price increase and subsequent collapse of the Mississippi Company and the South Sea Company true bubbles? Again, Garber disputes this characterization, as does the historian Francois Velde.[31] According to Garber, Law had a plan to revitalize the French economy through financial innovation and reform. As Law gained more power, his chances of economic success grew. The decline in the Mississippi Company share price coincided with the ascension of his enemies, who were bent on dismantling the company. Velde contrasts the common English name of the episode, the Mississippi Bubble, with the original French name, *le système de Law*. Velde notes that the purported bubble didn't arise spontaneously but rather was part of Law's system; according to historian Antoin Murphy, "a grand design."[32] Unlike other purported bubbles, it included only one stock. Velde emphasizes that the stock prices weren't market prices as we think of them today; the values of the prices were influenced (or manipulated) by Law. The real question is whether the price collapse revealed true value. Velde concludes that at the highest point, the price pegged by Law was probably two to three times too high, implying overvaluation not by a "frenzied and irrational market, but by Law himself."[33]

In Britain, the South Sea Company stock declined at the same time as many other stocks, including the so-called bubble companies, perhaps as many as 190 that formed between 1719 and 1720. This decline also occurred when the Bubble Act, passed by Parliament that June to

ban the formation of unauthorized companies, began to be enforced on August 18, 1720. Since many stocks were bought on margin, with only a small down payment, the price declines forced liquidation by many sellers who were required to put up additional margins, thus exacerbating the downward pressure on stocks.

According to Garber, a common thread between all three of these purported early bubbles was the existence of fundamental reasons why prices should have risen in the first place. Even today, many companies have promising business models that don't pan out, but this doesn't imply that investors in these companies were necessarily acting irrationally. The bubble debate continues, as we'll see later in this book.[34]

Early Diversification

While modern portfolio theory didn't emerge until the middle of the twentieth century, the benefits to diversification appear to have been grasped by the late eighteenth century. It began in France with the finance minister to Louis XVI, who wanted to permit the French to take part in the American War of Independence without burdening French taxpayers. Therefore, the finance minister organized a large number of loans from private investors. Repayment of these loans was in the form of life annuities, with a twist: the lender could determine the person on whose life the annuity was issued. As long as that person remained alive, the creditor received an annual payment. There was a stipulation that the creditor needed to present the person before the French authorities, twice a year, to certify that the person was still living. While it seems obvious today that an annuity based on a younger person would be more valuable and hence more expensive, around 1757 the French government abandoned age grading and returned to flat pricing for all annuities. Initially this had little impact, because most life annuity purchasers were adults who bought annuities on their own lives or on the lives of their spouses or servants. However, it didn't take long for clever Swiss bankers to figure out how to game the system.

Thus, in 1771 an investment scheme, referred to as "Trente demoiselles de Geneve," was born. This involved a number of Genevan banks

developing investment trusts that represented pools of life annuities issued by the French government. The banks created a list of young Genevan girls, typically aged five to ten, who were carefully selected and, after surviving smallpox, were named as the contingent lives. Most of the annuity pools involved thirty young girls, hence the name "Trente demoiselles." The girls, also known as "the immortals," became like rock stars in their communities because so much wealth was riding on their lives. Genevans from all walks of life invested in the scheme, and an estimated 90 percent of Geneva's wealth was invested in these annuities, as was money from abroad. Banks resold fractions of these pools to individual investors, just like the modern securitization of mortgages, a major cause of the 2007–2009 financial crisis. Everything was going well until the unexpected bankruptcy of the French treasury, when annuity payments slowed and thousands of investors lost money.

When we think of a diversified security today, we often think of a mutual fund. The first mutual fund, Eendragt Maakt Magt, was actually created centuries ago, in 1774, by an Amsterdam broker named Abraham van Ketwich. Funds were invested in foreign government bonds, bank bonds, and loans to plantations in the West Indies. The fund promised a dividend of 4 percent, with a planned liquidation and return of proceeds after twenty-five years. The offering of two thousand subscriptions sold out, and a secondary market developed for those wishing to sell their subscription. This investment vehicle was similar to today's closed-end mutual funds. Like a modern mutual fund, one of the articles in the prospectus listed the categories of potential investments. The articles also specified that the fund needed to be diversified at all times with twenty classes of investments, each of which consisted of at least twenty to twenty-five securities.

After its initial success, in 1779 van Ketwich introduced a second mutual fund, named Concordia Res Parvae Crescunt.[35] While similar to the first fund, a major difference in this fund was that its investment policy was more liberal, only specifying that the fund invest in "solid securities and those based on decline in their prices would merit speculation and could be purchased below their intrinsic value . . . of which

one has every reason to expect an important benefit." This strategy sounds much like today's value investing, pioneered by Ben Graham and his most famous disciple, Warren Buffett.

While these types of investment trusts or closed-end mutual funds eventually spread outside of the Netherlands, first to London in 1868 and then to the United States in the 1890s, a new investment concept eventually developed. In 1924, Massachusetts Investors Trust became the first U.S. open-end mutual fund.[36] Such open-end funds allowed for the continuous issuance or redemption of shares at a fair price to the underlying securities. Coincidentally, it was a *Fortune* magazine article a quarter century later featuring the Massachusetts Investors Trust that caught the eye of a young Princeton undergrad, Jack Bogle, who was to revolutionize the mutual fund industry—but there will be more about Bogle later in this book.

The Science of Investing in the Twentieth Century

While the *art* of investing has been practiced for centuries, the *science* of investing is a thoroughly modern invention, the brainchild of money and mathematics. Although mathematical models of gambling emerged in the 1500s thanks to Girolamo Cardano's famous 1565 tract *Liber de Ludo Aleae* (*The Book on Games of Chance*), it wasn't until the 1900s that serious investment theories were formulated.

Following the stock market crash of 1929, the Great Depression created the ideal, if unfortunate, circumstances for four major academic treatises on investing. Between 1930 and 1939, Irving Fisher's *The Theory of Interest, as Determined by Impatience to Spend Income and Opportunity to Invest It* (1930), John Maynard Keynes's *The General Theory of Employment, Interest, and Money* (1936), John Burr Williams's *The Theory of Investment Value* (1938), and John Hicks's *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory* (1939) were published. Meant primarily for economists, these tomes had little impact on the investment industry and even less impact among individual investors. In fact, Fisher's now infamous proclamation that the stock market had reached a "permanently high plateau," made just three days

before the stock market crashed in October 1929, did little to enhance the reputation of financial economists among practitioners.

However, the investment theories of the 1930s were surprisingly sophisticated, even from a contemporary perspective, and included such ideas as net present value, the dividend discount model, arbitrage pricing, and a precursor to the famous Modigliani-Miller theorems on the irrelevance of capital structure. None was more sophisticated or ambitious than Keynes's *The General Theory of Employment, Interest, and Money*, which attempted to integrate investment theory with macroeconomic policy and subsequently served as the user manual for most central banks until the late twentieth century. However, even Keynes had to punt when it came to describing the behavior of financial markets: he likened the stock market to beauty contests and attributed price fluctuations to "animal spirits."

Nevertheless, as an investor, Keynes performed spectacularly. He managed the endowment of his alma mater, Cambridge University, from 1921 until his death in 1946, and a recent study by David Chambers, Elroy Dimson, and Justin Foo has painstakingly reconstructed the investment returns of Keynes's portfolio.[37] From the end of August 1921 to the end of August 1946, the annual compound return on his discretionary portfolio was 14.41 percent, versus 8.96 percent for the equally weighted UK equity market index during the same period. But Chambers and Dimson discovered a fact far more remarkable than Keynes's overall performance: Keynes made a sharp improvement in his investment approach in 1932. From 1921 to 1931 he generated a compound rate of return of only 8.06 percent, only marginally better than the equally weighted UK equity market index return of 6.67 percent. But from 1931 to 1946 Keynes produced a compound return of 18.84 percent, far outstripping the equally weighted UK index return of 10.52 percent during this fifteen-year interval. What did he change?

According to Chambers and Dimson, Keynes discovered the benefits of long-term investing, switching his investment philosophy from a top-down macro-driven trading style to a bottom-up fundamental stock-picking value investor style. This striking shift in portfolio strategy was no doubt precipitated by the disappointing returns Keynes experienced

during the first half of his tenure as bursar of the Cambridge endowment. When he was criticized for flip-flopping on his position with respect to the gold standard, he purportedly replied, "When the facts change, sir, I change my mind. What do you do?"[38] The same could be said for his investment theories.

Unfortunately, none of this learning made its way into Keynes's *The General Theory of Employment, Interest, and Money* or any of his subsequent writings. Therefore, apart from Cambridge University and its happy alumni, few others have benefited from the insight Keynes developed during his career as an investor. Despite his enormous impact on macroeconomics and government policy, he had surprisingly limited impact on investing, even as he succeeded beyond all expectations as an investor. Give people a fish, and you feed them for a day; teach people to fish, and you feed them for a lifetime. Keynes provided Cambridge with many fish, but when he died in 1946, he took his rod and reel with him.

This state of affairs changed permanently in 1952.

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