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## THE PROBLEM OF MONEY AND TIME

Why do you need so much money to be rich nowadays? It's a question that historians and readers of history have always found difficult to answer.

by *John Steele Gordon*

L.P. Hartley began his masterly novel *The Go-between* with the words "The past is a foreign country: they do things differently there." No-where is this difference with the past more apparent than in the realm of getting and spending, for like most foreign countries, the past uses a money different from ours, and the historian must somehow translate its value into modern terms.

This seemingly simple imperative turns out to be one of the most intractable problems a historian faces. Indeed, there is no simple solution. But there are some helpful rules to guide the way. Let's begin by considering a famous New York real estate deal.

In 1917 Morton F. Plant—a man who got off to a brisk start in life by inheriting his father's railroad fortune—sold his Fifth Avenue mansion to the jewelry firm of Cartier for \$1,200,000. Instead of taking the money, however, Mr. Plant took it out in trade, exchanging his house for a "two-strand, Oriental pearl necklace."

By economic definition, the house and the necklace were of equal value at the time of the transaction, at least as far as Mr. Plant and Cartier were concerned. But today, seventy-two years later, the value of each has changed very considerably.

The mansion, located on the southeast corner of Fifth Avenue and Fifty-second Street and now an official New York City landmark, remains to this day both Cartier's premier American store and one of the most desirable pieces of commercial real estate in the world. While no firm figures are possible since the building has not been sold recently, the value of Cartier's property is certainly in excess of \$20,000,000, and the firm has already sold the air rights for a very considerable sum.

Meanwhile, fate has not been nearly so kind to the value of Oriental pearls. The whereabouts of the Cartier necklace is currently unknown (at least to Cartier), but today a comparable necklace would not be worth more than \$200,000. Morton Plant's mansion, in other words, is now worth at least a hundred times that much. (Before shedding a tear for Mr. Plant, be assured that he died in bed at his new Fifth Avenue mansion the following year.)

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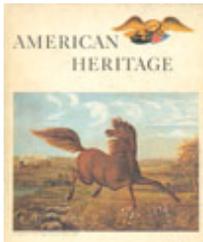
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Obviously the value of a million dollars has changed since 1917. What did \$1,000,000 mean to the people living in the second decade of this century, and how can we express it in terms of today's money? Certainly, in 1917, a man who possessed \$1,000,000 was thought to be very rich indeed (Mr. Plant, worth perhaps \$25,000,000, was one of the wealthiest people in the country). Today, while a million will keep the wolf comfortably away from the door, it is, alas, only garden-variety riches. There are today in America one million millionaires, and the minimum price of admission to the *Forbes* list of the four hundred richest Americans was no less than \$225,000,000 in 1988.

One reason for this glut of millionaires is that money itself is one commodity that has markedly declined in value in recent years. Because money is a very special sort of commodity, we have a special term for its decline in value. We call it inflation.

Inflation occurs when the supply of money rises faster than the supply of goods and services that can be bought with it. In the sixteenth century the Spanish conquest of the New World caused a flood of gold and silver (the only sort of money at that time) to flow into Europe, and prices quadrupled in a hundred years. Inflation is also closely associated with war, for war usually forces governments into expedient financing schemes. To raise money, the Roman emperors retained the face value of coins while lowering the content of precious metal in them. Needless to say, it did not take long before ordinary Romans caught on to this dodge and began to demand more coins for the same amount of goods and services. Today governments just print additional paper money or flood the banking system with government-backed debt. The effect is the same: The value of money falls and prices rise.

Inflation has ebbed and flowed over the last two thousand years. In the nineteenth century, a relatively peaceful period in world history, there were only temporary bouts of it, and indeed, prices fell on balance between 1800 and 1900. The twentieth century, on the other hand, has been ravaged by both war and inflation.

The decline in the value of money over the years can be measured with some degree of precision, especially in more recent times, when accurate and extensive statistics have been kept and a larger percentage of the population has lived in what economists call the cash economy. The usual method is to track the total price of a basket of commodities. The Consumer Price Index (CPI), prepared every month by the Department of Labor, measures inflation in the U.S. economy in this way today. In the table on this page we can see that a basket of goods that cost \$100 in 1967 would, in theory, have cost \$25 in 1900 and \$328 in 1986.

Perhaps because inflation can be measured with some accuracy and an index of apparent precision created, historians have often acted as though inflation were the sole problem involved in translating the value of money over time. Readers are told simply to multiply antique monetary sums by a given factor in order to convert them to a modern economic idiom.

**Rule No. 1  
Inflation is seldom the whole answer.**

First, the goods that people actually buy change significantly over time. (In 1900 we bought a lot of oats to feed horses; in 1986 we bought a lot of gasoline to run automobiles. The per capita consumption of electricity in the United States has multiplied more than 135 times in this century.) Therefore, the more separated in time two dates are, the less meaningful in realworld terms is any relationship between them that is based on the CPI.

Second, inflation is by no means the only factor to affect prices over time, as a quick look at the mansion and the necklace again will demonstrate. Between 1917 and ) 1986 prices inflated about 8.5 times in dollar terms. Morton Plant's mansion and Cartier's necklace should ' then each be worth about \$10,000,000 today. But they are not. The mansion is worth much more, the necklace much less.

To put it another way, in 1917 \$1,200,000 would have bought a fabulous mansion on Fifth Avenue or an equally fabulous pearl necklace. Today that much money will buy only a rather modest apartment on Fifth, but it will buy half a dozen fabulous pearl necklaces. The difference is caused by supply and demand.

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## Rule No. 2

### The law of supply and demand is always in operation.

The law of supply and demand is one of the great natural forces of the universe, as ineluctable as gravity. Unhappily for the world, the law—like Rodney Dangerfield and unlike gravity—gets no respect. Nobody would jump out a tenth-story window without intending to die. But a great many people, from historians to elected officials, ignore the law of supply and demand or simply declare it null and void to suit their purposes. Regardless, the law works its way inexorably.

In the case of the necklace and the mansion, the supply of mid-Manhattan land is fixed. There is just so much of it, and that is that. The Dutch made the greatest real estate deal in history when they bought the whole island for trinkets and blankets valued at sixty Dutch gulden. (An excellent example, by the way, of the difficulty of translating the value of money over time: What are sixty Dutch gulden of 1626 worth in today's dollars? Tradition has said twenty-four for many generations.) Because the demand for Manhattan real estate has been rising ever since that time, the price has been rising steadily as well.

The supply of quality pearls, on the other hand, has increased manyfold since cultured pearls were developed at the close of the nineteenth century and widely promoted after the First World War. At the same time, the demand for them has decreased since the end of the Gilded Age, when *grandes dames* favored wearing pearls by the yard. Because of increasing supply and diminishing demand, the price of pearls peaked in 1929 and has been in decline ever since.

The law of supply and demand is so fundamental to understanding why things cost what they do that it even explains the most significant economic event since the invention of agriculture: the Industrial Revolution. Before the coming of the steam engine, it was difficult for the economy to put energy to work. There was plenty of energy, with wood and coal in abundance, but it couldn't be used for anything much beyond producing heat. Real work—even in the strict physical sense of transferred motion—could be done only by wind, falling water, animals, and human beings. But wind and falling water are erratic and often are not found where they are needed. Animals and people require expensive fuel and maintenance.

Then James Watt's rotary steam engine converted the heat energy of coal and wood into a higher form that could do work. Suddenly there was a way to add massive amounts of energy to the economic system very cheaply. The price of work-doing energy collapsed with the vastly increased supply, and demand soared as the price fell. Entrepreneurs unleashed a flood of inventions to make use of the newly available resource.

Because energy is one of the fundamental inputs of any economic system, the price of nearly all commodities, especially manufactured ones, declined significantly with the decline in the cost of energy. The economic universe was turned upside down in only two generations.

The consequences of the Industrial Revolution continue to work themselves out in the marketplace to this day. Among these consequences are some that the historian must deal with in trying to translate the value of money over time.

The first of these is rapidly rising real wealth. Before the rotary steam engine, economies necessarily grew slowly, only about 1 percent a year. Without powered mechanical equipment, physical capital—such as new fields and pastures for agriculture, new factories and mills for industry, and new roads and canals for transportation—could be created only very slowly. Virtually all products for consumption were handmade as well. Once the Industrial Revolution had begun, however, economies affected by it grew much more rapidly, averaging about 4 percent a year.

This accelerated growth has had profound consequences for simple arithmetical reasons. Growing at 1 percent a year, an economy will double its production in seventy-two years. At a 4 percent growth rate, however, an economy will be *sixteen times* as productive in seventy-two years. Such is the magic of compounding. (See "The Rule of 72" on page 62.)

Inflation, therefore, is by no means the only reason you need so much money to be rich nowadays. Equally important, real wealth and income—not just the illusion of them produced by inflation—have been rising very steeply for all levels of society since the Industrial Revolution. Many things that were once thought the distinguishing privileges of the rich, such as ample living space, fine clothes, private transportation,

education, and professional entertainment, are now regarded as the ordinary prerequisites of middle-class life.

### **Rule No. 3**

**It's not the dollar cost that's important, it's the percentage of income.**

Because of rising real wealth, even if the price of a commodity stays the same, net of inflation, its price as a percentage of per capita annual income drops. In 1939, the first year of commercial television transmission in this country, a television set cost about five hundred dollars. But in 1939 that amounted to fully one-third of the average annual per capita income in this country, and very few people can afford to spend that much of a year's pay on a luxury. Today five hundred dollars represents only about 3 percent of average annual per capita income. The luxury of 1939 has become the commonplace of 1989.

(Obviously this ignores inflation, but inflation would only change the numbers; it would not significantly affect the relationships. Also ignored is the fact that a 1939 television set was the size of a chest of drawers, had a tiny screen, could display only black-and-white images, and broke down.)

The television set's short journey from the exceptional to the ordinary reveals clearly the way people actually perceive what is expensive and what is cheap in the economic universe in which they live. In reality, we don't care what something costs in dollar terms at all, as long as we are getting fair value. (Indeed, there is a word for a person who cares only about the dollar price of things: *miser*.) What we need to worry about is what something costs as a percentage of our personal income. That is why the rich eat caviar and the rest of us don't. The rich can afford to because, steep as the price of caviar is, it is only a small part of a rich man's income.

### **Rule No. 4**

**Money isn't everything, even in economics.**

A second complication is that while some commodities have risen in price along with inflation since the Industrial Revolution, they have become much cheaper in some other economically significant term, such as time.

In 1870 a round-trip, second-class passage from New York to London could be purchased for about \$150. This price would have been in the reach of many middle-class families. But in 1870 the passage took about ten days in each direction, and paid vacations were unknown. Therefore, while many Americans in 1870 could afford the money cost of a trip to England, very few could afford what it cost in time. Today the Atlantic can be crossed in a few hours and paid vacations are the norm. Thanks to jet travel and more enlightened labor policies, Europe now swarms with American tourists (and vice versa).

### **Rule No. 5**

**One technology replaces another only because it is cheaper or better or both.**

A third complication caused by the Industrial Revolution is that technologies that serve the same function at different times often cannot be readily compared in economic terms.

In the nineteenth century housework was done by hand or by servants (hired hands). Today washing machines, food processors, dryers, Scotchgard, dishwashers, vacuum cleaners, wash-and-wear clothes, and a host of other inventions have changed matters completely. Although the real cost of a maid has increased greatly over the last hundred years, the need to have one has drastically diminished.

A hundred years ago private transportation was by horse and carriage; today the

automobile fills that role. Both are expensive in terms of the percentage of average annual per capita income required to buy them, although the automobile much less so. But a horse and carriage is very much more expensive to run than a car. A car can be parked on the street, but a horse must be stabled and cared for. A car burns gasoline only when it is running; a horse burns oats day in and day out. Furthermore, a horseless carriage's capacities are so much greater, its comforts so much more extensive, and the skills required to operate it safely so much less difficult to master, that the two means of transportation can hardly be compared at all in money terms.

Consider an extreme example of technology on the march, for here, really, is the most difficult problem faced by the historian in translating money over time in the modern era. In the mid-eighteenth century Prince Nikolaus Esterhazy, a Hungarian nobleman, had a passion for music. Being one of the richest men in Europe, he could afford to indulge this passion with a state-of-the-art music reproduction system, and indulge it he did. He maintained his own private orchestra, chorus, and five-hundred-seat theater. Presiding over this vast musical establishment was the great composer Haydn.

While Esterhazy still lived, however, the mechanization of music reproduction began with the invention of the music box, and today anyone with the price of a portable cassette player can possess a system that would astound Esterhazy. The two systems are not the same, of course. The fidelity of Esterhazy's was, by definition, perfect, while that of the Walkman is only superb. And Esterhazy's system could compose original masterpieces on request, no mean feature. But the Walkman has advantages of its own that Esterhazy would have greatly admired. It is a lot easier to take to the beach; it does not need to be fed, clothed, and housed; and one needn't worry about its getting the upstairs maid pregnant.

And the Walkman has one capacity that would boggle Esterhazy's mind: It can summon the dead. Do you want to hear Judy Garland sing "Over the Rainbow"? Just insert a cassette, push a button, and the voice of an artist who has been dust for twenty years fills your head with music.

In economic terms, Esterhazy's music-reproduction system and today's portable cassette player are incommensurable. But no one would argue with the idea that while Esterhazy's system might, in a sense, be "better" than the Walkman, it is certainly much more unwieldy and millions of times more expensive on a per note basis.

To add to the burdens placed on historians by the Industrial Revolution, there is a new revolution sweeping the world economy today, and it has already had consequences equal to those of the collapse of the price of work-doing energy two hundred years ago. This is the revolution caused by the collapse in the price of moving and manipulating information.

Until the invention of the digital computer in the 1940s, information could be handled only by human beings. People had to write the letters, push the telegraph keys, add the columns of figures, file and retrieve the data. Just as human beings are an expensive means of putting energy into the economic system, they are a very expensive way to manipulate information. Still, until the computer they were the only way.

Since the invention of the transistor in 1947, the cost of using a computer to make calculations has been declining very rapidly indeed, at about 25 percent per year on average. So great has been the drop in the cost of calculation, and thus so great has been the increase in demand, that one recent scientific experiment using a computer to create a model of the history of the solar system is estimated to have required more calculations than had been performed in the entire history of the human race up to the year 1940.

To give just one example of how this drop has affected other prices, consider the cost of a three-minute telephone call between London and New York. Before 1926 all the money in the world would not buy a phone call to London. That year it became possible, but at a price that precluded anyone but the very rich from making use of the service. The price declined as the phone company added more capacity, but with the advent of the computer, which eliminated the need for many operators and manual switchboards, and the integrated circuit, which eliminated the need for much manual wiring, the price plummeted.

The law of supply and demand, of course, immediately got to work on this price drop. In the years between 1960 and 1985, for example, the number of overseas phone calls originating in the United States increased fully one hundred and

twenty-fivefold. In 1950 a long-distance call was a bit of an event in most American households, and an overseas call was virtually a state occasion. Today they are commonplace. The futurist Arthur C. Clarke has predicted that the very idea of long distance will disappear by the year 2000. By then, he thinks, it will be a local call both to the house next door and to a house on the other side of the globe.

## **Rule No. 6**

### **The real cost of human labor has risen steadily since the Industrial Revolution.**

One very important consequence of both the Industrial Revolution and the Information Revolution has been the steady increase in the value of human labor. Between 1900 and 1970 the average annual wage of American workers, net of inflation, rose by a factor of three. Again, there is more than one reason. The first is that as machines have taken over more and more of the physical work and routine calculations, humans have been able to concentrate on other, more wealth-creating tasks. (Of course, that is a long-term trend. In the short term, there are often severe dislocations as machines compete with and replace human beings in the old jobs.)

The second is that as physical capital has been built up, the productivity of workers has increased. More goods and services are produced for every hour of human labor utilized, and the workers have gotten a share of this. Needless to say, the owners of the physical capital did not volunteer this sharing. The rise of the union movement was another factor in the increase in real wages.

Because of this rising price, those commodities requiring large inputs of human labor in order to be produced have risen greatly in price as well. This goes a long way in explaining such phenomena as changes in architectural style in the twentieth century that are usually attributed to other causes. In the first decade of the 1900s New York City built its magnificent public library for about \$10,000,000. To reproduce this building today with its seeming acres of carved marble, its intricate wood and brasswork, its majestic ceilings, would cost in the billions. No city on earth could afford it. The New York Public Library, the greatest Beaux-Arts style building in the country, perhaps the world, is today as irreplaceable as its contents.

So where does all this leave the historian and the reader of history? As we have seen, there is no Rosetta stone, no all-purpose index or formula that can convert the economic universe of, say, 1917 into modern terms at a stroke. Both the past and the present are far too complex for that. In 1917 servants, Fifth Avenue mansions, and live entertainment were, at least compared with today, cheap. Pearl necklaces, European vacations, and private transportation were expensive. Phone calls to London, heart transplants, and the determination of the value of pi to a hundred million decimal places were, in an economic sense, infinitely expensive. For each of these examples, there are a million others that the people living in 1917 had to take into account in deciding what to buy and what to sell.

Because the money of a past era cannot be meaningfully translated into a modern economic idiom by simple statistical manipulation, historians, to do their job, must learn to understand the economic language of the past. A novelist creates the emotional universe that allows the reader to make sense of the characters and their actions. Historians need to re-create the economic universe of the eras about which they write for exactly the same reason. That is not nearly so difficult a job as it may seem, for both the novelist and the historian can rely on the reader's grasp of human nature.

Once readers gain a sense of the prevailing wage scale and the prices of basic commodities, they will begin to grasp the economic essence of the era under discussion. Human beings, after all, are very intuitive about human situations, whether the situation be economic or emotional.

And just as it is human nature to laugh and to love and to wonder, it is equally human nature to seek the patterns in things, to pursue one's self-interest, to buy cheap, and to sell dear. The law of supply and demand is inescapable because it is rooted in the very bedrock of what it means to be human.

*John Steele Gordon writes the "Business of America" column in this magazine.*

## The Rule of 72

There is a quick way to determine approximately how much time is required for anything that is compounding to double, whether it be a national economy, a sum of money in a bank account, or even, theoretically, rabbits in a hutch. Simply divide the annual percentage of increase into 72. Thus something that is growing at 10 percent a year will double in 7.2 years.

## Moving the Freight

In a free market, if the price of a commodity, such as sugar, drops substantially, the price of everything made with that commodity—candy, bakery products, soft drinks—will drop as well, and the effects of the new price will ripple through the economy. If the price of something used in every commodity plunges, however, a tidal wave of change may result and a new economic universe be created.

The collapse in the prices of transportation in the first half of the nineteenth century produced just such a fundamental transformation. Cheap transportation created an integrated, worldwide economy out of a myriad of local ones. Writing in the 1880s, the American economist Arthur T. Hadley noted that “two generations ago, the expense of cartage was such that wheat had to be consumed within two hundred miles of where it was grown. Today, the wheat of Dakota, the wheat of Russia, and the wheat of India come into direct competition. The supply at Odessa is an element in determining the price in Chicago.”

Before the Erie Canal was completed in 1825, it took three weeks to get a ton of wheat in Buffalo—worth only \$40—to New York City, at a cost of fully \$120. Once the canal opened, a ton of wheat could be shipped between the two points in eight days at a cost of \$6—in other words, in one-third the time and at one-twentieth the cost. Little wonder that the canal contributed so powerfully to New York City’s explosive growth as a port.

But canals were expensive to build and maintain. They were suited only to flat and well-watered country. And they could not operate in winter. It was the railroad that brought cheap transportation to the whole world. As the railroad industry matured, the price of transportation dropped still more. Hadley noted that between 1850 and 1880 railroad rates “were reduced on an average to about one half their former figures, in spite of the advance in price of labor and of many articles of consumption.” Hadley, of course, was referring to the trunk routes, where competition among the railroads was fierce. Where a railroad had a monopoly, it charged what the traffic would bear, a fact that profoundly affected the politics of late-nineteenth-century America.

## Status Symbols Are Never Cheap

There would seem to be little disagreement that “rich is better,” and since the end of World War II the world economy has been generating enormous private wealth. In the last two decades especially, as Germany and Japan recovered from the war and turned into economic superpowers, the numbers of the very, very rich have grown by leaps and bounds. In 1988 *Fortune* magazine listed 129 billionaires in the world and didn’t even bother to list those who possess mere tens and hundreds of millions of dollars.

Being rich, of course, is supposed to allow you to have not only the necessities of life but its luxuries as well. Unfortunately, the supply of some luxuries is fixed, and as the numbers of rich people grow, the price of these luxuries soars. Mercedes, presumably, will always be willing to roll out one more 560 SL to satisfy demand, but the sturgeon of the Caspian Sea are not so accommodating. The amount of top-grade caviar is strictly, ineluctably limited.

So is the number of paintings by world-class artists. While more and more of them are painted every year, there is usually a considerable time-lag before the masterwork status of new paintings is generally recognized. At the same time, museums remove old masters from the marketplace constantly.

As a result the prices of both caviar and great art have reached staggering levels

in the last few decades. That's why they remain status symbols, whereas the perfect baked potato is just a manifestation (and incarnation) of good taste.

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