

## The Online Auction Phenomenon

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### Introduction: Efficient Markets

I'd like to begin this lecture with a story that is just over a hundred years old. In 1903, a young man of about 25 years named Louis Bachelier was studying in Paris for his doctorate in economics. He was studying the movements of the stock market (by the way, there is a very good restaurant across the street from the Paris Stock Exchange named *Vaudeville*). He wanted to see whether there was any pattern to the movements of the stock market (for example, whether they followed "cycles"), or whether certain types of movements predicted other ones (for example, if a series of large upward movements meant that the market was about to "pull back" soon).

After due consideration, he finally made the following announcement: the movements of the stock market are entirely random.

The general response to this announcement was deafening ... silence. It was such a patently ridiculous statement that nobody took it seriously for even a second. The stock market was obviously *not* subject to the rules of pure chance, everybody knew. It was clearly subject to the rules of commerce, of supply and demand, of mergers and acquisitions, profits and losses. *These* were the laws that governed the behavior of the stock market, not the roll of the dice.

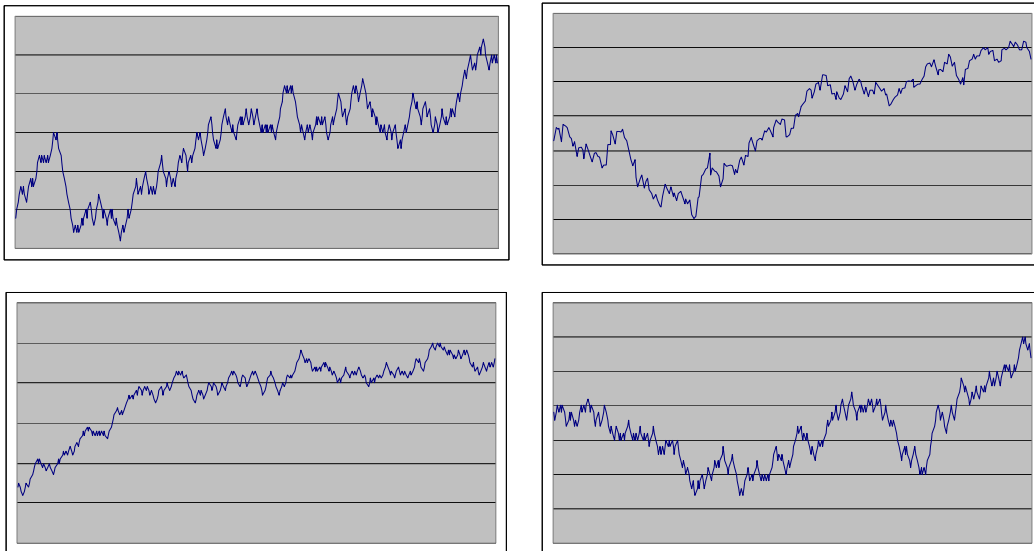
And so Mr. Bachelier and his silly ideas were forgotten, for half a century.

Then, in 1953, a British gentleman named Kendall was doing a study for the Royal Statistical Society. Lo and behold, he was studying the same thing that Louis Bachelier had been studying: like Bachelier, he wanted to count the number of patterns he found in the movements of the stock market, and then make a grand classification of all the different kinds of patterns he found. This he did, and when he was finished, he made a final report on how many patterns he had managed to discover:

Zero.

Fifty years after Bachelier, then, someone else had indeed come to the very same conclusion – and this time it was harder to ignore, coming from a researcher like Kendall working for the venerable Royal Statistical Society. I imagine that many of you will also find this hard to believe, so I'll offer a little demonstration.

In Figure 1 there are four stock charts – the kind that show the movement of the markets. Only one of them is a real stock chart, showing the real movements of a real stock market. The rest are fake – I made them myself. I used the computer to generate the movements, entirely at random. Can you tell me which is the real chart?



**Figure 1: Which is the real chart of stock prices?**

If you're honest, you'll admit that you can't tell which is the real one – they all look alike. (If you want to know the answer, it's at the end of this article.)

Nowadays it is accepted by most serious economists that the movements of the stock market are indeed random. In official jargon, the stock market follows a *random walk* (another colloquial term for this is *drunkard's walk*, for obvious reasons). But even if we also accept this idea, the question remains: why?

The answer to the question arrived in the early 1960s, from a young Italo-American researcher in Chicago named Eugene Fama, and its official name was the Efficient Markets Hypothesis. This is what Fama said:

In an efficient market, information travels freely and quickly among the large number of intelligent, motivated participants (as the economist Burton Malkiel says, “money attracts brains”). As soon as any bit of information becomes available, investors pounce upon it, and its implications are quickly incorporated into the prices of stocks. As a result, the market is always completely “up-to-date” – it reflects all information that is currently available to investors.

Most importantly: not only does an efficient market reflect everything that has happened in the *past*, it also reflects anything that can currently be said about what might happen in the *future*. Legions of investors scrutinize, discuss, and analyze any new information over and over until every useful conclusion from that information has been drawn – *and also acted upon*. After all, if you think you know what's going to happen tomorrow, you act today. If you somehow know the price of some stock is going to double next week, why wait? Just buy it today!

This is the key insight in understanding the puzzle of random stock price movements. In an efficient market, the incessant activity (motivated by greed and fear) of investors assures that any information that clearly points the way to the future is acted upon without delay. Afterwards, only one type of information remains: *that which does not yet exist*. Its arrival must come as a genuine surprise. But the timing of unexpected new information is *by definition* unpredictable (it would have been extremely strange to have

seen a newspaper headline in 1954 exclaiming “Only ten years until the Beatles!”). And therefore, each *new* step by the stock market is taken in response to new information whose timing and impact are necessarily unknown beforehand – a random walk.

Now, what does this incessant buying and selling of investors mean for stock prices? It means that they converge very quickly to a common understanding of what is the “correct” price. If investors think a stock is underpriced, they quickly buy it up; if they think it is overpriced, they get rid of it. So you arrive very quickly and efficiently at a commonly agreed estimate of what the stock is worth.

Today, economists are all in agreement that the stock market is at least *mostly* efficient – and they certainly agree that in a large, open, competitive market with thousands or even millions of participants, the price of any stock cannot diverge from its true value forever. Sooner or later it will fetch the price it deserves.

### **The birth of eBay**

Now let’s fast-forward from the first years of the twentieth century, of young Louis Bachelier in Paris, to the last years of the twentieth century, in California, where another young Frenchman was about to make history again, by setting out to create the largest efficient market the world has ever seen. The young man’s name was Pierre Omidyar.

Many articles retell the mythical story how it all started in 1995: Omidyar’s fiancée Pam (who later became his wife) was a collector of Pez dispensers. Many of you may not know what these are. I used to buy them when I was a child in California. “Pez” is the brand name of a kind of candy, something like a small mint. It was first marketed as a compressed peppermint candy in Vienna, over 70 years ago. In fact, the name “Pez” is derived from the German word for peppermint: **pfefferminz**. Pez arrived in the United States in the early 1950s, right about when I was a child.

What was so fun about Pez was that those little mints came in a little plastic dispenser with a head on it. The head might be a clown’s head, or a sea captain, or a policeman, or something like that. You would push the head back, and it would dispense a Pez for you. Today over 3 billion Pez are consumed annually in the United States alone, and the Pez dispensers have become a hot collector’s item. The Pez manufacturers continue to produce new Pez dispensers and there are Pez clubs all over the world.

Pam was complaining about how hard it was to get in touch with other Pez collectors, so Omidyar had the idea to start an online Internet site where they could get together “virtually” and trade Pez dispensers with each other. In effect, he wanted to create an **online auction house**, where people could bid for and sell Pez dispensers. At the time he had a consultancy company called Echo Bay Technology Group, so he tried to call his new site “www.echobay.com.” It turned out that the name “echobay” was already taken, and so he had to find another name. And that is how he selected the name for his new online auction house: eBay.

(Omidyar now says this is a “romanticized” version of events – the first item he traded on eBay was not a Pez dispenser at all, but a broken laser pointer!)

Today eBay has somewhere around 125 million users around the world. In 2004, goods worth \$34.2 billion were sold through eBay.

## **How does an online auction work?**

So what actually happens in an online auction on eBay? Suppose you want to buy a guitar. You turn on your computer and go to the eBay site, and find the section on musical instruments, where you are likely to find a large number of guitars for sale. You find the one you want, and you enter the maximum amount you are willing to pay (which must be at least the minimum bid specified by the seller). Your bid remains a secret to other bidders while eBay's computers monitor the bidding. Higher offers are accepted until the end of the auction, typically after seven days. Suppose you are outbid at some point along the way. Then you can come back with a higher offer. If you win, then you and the seller contact each other, then you pay and the seller ships the guitar. The terms of the transaction, including shipping costs, are usually listed with the auction. In 2002, eBay spent \$1.5 billion to buy PayPal, an online-payments company that now has 45 million account holders, and many eBay buyers and sellers now use PayPal.

Now suppose that instead of buying a guitar, you would like to *sell* your guitar. First you register as a seller. Then you complete the details of the guitar's description online and you usually add a few photos. You then set an opening price for the guitar, and perhaps a reserve price, and also the length of the auction (e.g. a week). Then the bidding is on. Now, in the previous case while you were trying to buy a guitar, you were only able to see the current highest offer and the number of previous bids. But as a seller, you can see the value of *all* the bids that have been submitted.

So, what do they sell on eBay? Books, cameras, furniture, watches, antiques – you name it, they sell it. But what about used cars? Who would want to buy, sight unseen, a secondhand car from a stranger in an online auction? Yet in 2005 eBay Motors is expected to sell more than \$8 *billion* worth of vehicles and parts, making it the company's most valuable category of business. A friend of mine in Los Angeles had a car accident a couple of years ago and took her car to have the left rear wheel replaced at a garage. She didn't like the price they named at the garage, and so she turned to eBay and found exactly that type of wheel for that type of car, for one-tenth the price.

## **eBay around the world**

Although eBay started in the United States and it's probably fair to say that it is still the largest eBay market, it won't be long before half the company's revenue comes from affiliates in the rest of the world. In fact, some of these are growing much faster than eBay in America.

One example is China, whose eBay site is known as EachNet. It started out growing rather slowly, but recently it has taken off like a rocket, and is now China's biggest e-commerce site of all.

Another prominent example is Germany, which has gone mad over eBay. In fact, the inspiration for giving my lecture this year on eBay was the visit last spring of a friend from Germany. At one point late in the evening, after a nice glass of wine with me and my wife, she suddenly said, "Can I use your computer? I have to check something."

She then explained that she had several eBay auctions going at once, and she had to see how they were progressing. For the entire week that she stayed with us, she checked two or three times a day with eBay.

eBay has also been quite successful in Italy. Just last month, the family was at a friend's house where they were throwing a birthday party for their 5-year-old daughter. At one point during the height of the festivities, the host murmured, "I'll be right back," and disappeared into his home office. He reappeared a few minutes later with a wan look on his face. "I lost the auction." He had been outbid for a model train set (for himself, not his daughter).

But one country where eBay has really been a phenomenon is Great Britain. eBay UK calculates that up to ten thousand people may be either earning a living in the UK selling second-hand goods on eBay, or at least earning a second income. "eBay" has even become a verb in Britain. That is, you might hear somebody say, "I eBayed the old cupboard last night" – meaning, of course, that he sold the old cupboard on eBay.

What got it all started in the UK? The managing director of eBay UK says that one big boost to its reputation was when Cherie Blair, the wife of the Prime Minister, purchased an alarm clock on eBay for one of her sons. That really made a huge impression on the public.

But it isn't only the fact of celebrities like Cherie Blair using eBay that accounts for the phenomenon in the UK. Like Americans with their yard sales, and French with their flea markets, the Brits love to buy and sell used stuff in so-called "car boot" sales, or go to the charity shops on the local High Street. There are also many television programs that cater to this habit, with names like "Bargain Hunt", "Cash in the Attic" and "Bootsale Challenge." "I think it's because British people are shopkeepers at heart," one woman remarked in an interview on British television.

Have you ever noticed how MacDonald's tailors its hamburger restaurants to local tastes? When I lived in Germany, I used to enjoy having a fresh Munich beer on tap with my hamburger. Similarly, eBay tailors itself to local customs. For example, in France, there are wine sales. In South Korea, there are auctions of a fermented cabbage known as *kimchi*.

In India, eBay is quite popular, and it was there that local customs clashed with eBay to create a scandal of national dimensions just last December. On the eBay affiliate in India known as Baazee.com, a video was offered for sale showing explicit sexual acts between two teenage classmates. This led to the arrest of the Chief Executive Officer of Baazee.com, which brought many accusations against the government for overreacting and violating civil rights. When an Indian friend (who lives right here in Viareggio!) told me about the scandal, she commented, "India is the home of a great erotic tradition, of course, the home of the *Kama Sutra* – but in reality the government is very, very conservative, even prudish. This scandal brought it out in the open."

### **Fraud in online auctions**

As you have probably already imagined by now, there is an enormous opportunity for fraud on eBay. How? Let me count the ways ...

Let's start with the simplest way: *buying* fraud. A seller puts up, say, his guitar on eBay for sale. The bidding process begins, and eventually there is a winner. The seller packs up his guitar and sends it off to the lucky buyer, and sits back to wait for his money to arrive. And wait ... and wait ...

And the money never comes. Now let's move on to the next case, which is simply the mirror image: *selling* fraud. A buyer sees that a nice guitar is up for sale on eBay, just the guitar he always wanted. He bids and bids, counters other bids, and finally, success! He sends off his payment to the seller, and sits back to wait for his guitar to arrive. And wait ... and wait ...

And the guitar never arrives. As the popular humorist Dave Barry says, "I am not making this up." In recent months there was *exactly* this scam on eBay, unmasked by an astute aficionado on the Usenet classical guitar list. He noticed that a guitar that had been auctioned on eBay some time earlier was being auctioned yet *again*. There were exactly the same photos, exactly the same description. Somebody had simply taken the photos and tried to auction off the (now non-existent) guitar once again.

The basic approach to combating such cases of buying and selling fraud is really the same as in normal commercial transactions: get yourself a reputation for honesty and reliability (consider, for example, the Better Business Bureau in the United States, which serves that kind of function for normal "bricks and mortar" businesses). If you are a regular seller, you can establish for yourself a reputation for good quality, reliable delivery, and general honesty through a rating and comment system that allows customers to give their feedback. It is the most basic and effective method in existence.

But the imagination of fraudsters is seemingly unlimited. One practice used sometimes is one that has been around for millennia, and used with great effect in games ranging from poker to the venerable "three card monte." In "three card monte" – or the "shell game" when a pea and three walnut shells are used – the victim is deceived into thinking that the game is easy to win by the presence of a so-called "shill." A shill is a confederate of the person offering the game, and he seems to win often, so that finally the victim is convinced to try his luck – and loses, of course. In poker, the shill is a confederate who keeps raising the bid so that the victim must keep also raising his bid, only to lose. On eBay, a similar phenomenon occurs: the seller himself secretly places bids on his own merchandise in order to drive up the price! (By the way, something analogous happens on Amazon.com, the online bookseller, where authors anonymously send in favorable reviews of their own books in order to drive up sales.)

Yet another approach to fraud on eBay is known as "phishing" – which I suppose must come from the idea of "fishing" for information. E-mail messages that *seem* to come from eBay itself are sent to eBay users, under some sort of pretense such as a claim that their account needs updating and they should verify their credit card numbers. These messages provide an Internet address, which takes the victims to a site where they can supply the requested information. The problem is that the site is fraudulent – it exists only to capture the credit card information of the victim.

The fraudsters have become very sophisticated in disguising their messages and fake sites, and eBay has recently realized that it needs to do something. One measure they

have offered is an “eBay toolbar” that a user may associate with his browser. This toolbar monitors attempts to direct the browser at sites that are known to be fraudulent.

### **In the news: A panorama of recent eBay stories**

Perhaps the best way to convey the amazing phenomenon of online auctions – and to have a good time along the way – is simply to offer to you now a panorama over a number of eBay stories that have happened in only the last year.

#### **Selling a decommissioned British aircraft carrier**

In January 2004 a shipbroker tried to sell a decommissioned British aircraft carrier on the American site, but the former *HMS Vengeance* was withdrawn because it was judged to be an armament, and arms sales are banned.

#### **Selling the Queen's pudding**

Last December, right before the Christmas holiday, a worker at Buckingham Palace was sacked for trying to sell a Christmas pudding gift from Queen Elizabeth on eBay. It is a tradition of the Queen to give every member of the staff a pudding as a Christmas present. Ben Church worked there as a property administrator, but had not actually been given a Christmas pudding because he hadn't worked there yet long enough. But he managed to acquire a leftover one anyway, and put it up for sale on eBay for 20 pounds. When it came to light, he was fired. What I find most interesting is that the official reason giving for having sacked him was that he had committed “a security breach.”

#### **The nuclear bomber**

Last November there was a news item on CNN that somebody was selling ... a nuclear bomber. That's right: an Avro Vulcan nuclear bomber aircraft – in its heyday, the maximum armament was up to over 9000 kilograms of conventional or nuclear bombs. And they were selling it legally, too. The reason is that the aircraft no longer flies and is incapable of carrying armaments any more. In other words, it is now a museum piece. The starting offer was 6000 British pounds, and went up well over a million.

#### **Anti bush tattoo for sale**

In October of last year, right before the U.S. elections, Kerra Fowler, a mother of four, decided to show her opposition to the re-election of George Bush in a novel way. She offered on eBay to *shave her head*, and rent out that space (on her skull) to the highest bidder for an anti-Bush tattoo. Somebody indeed bid \$103.50, and Kerra ended up with a tattoo of a large “W”, complete with a cowboy hat, with a red slash across it.

As we now know, Bush won the election anyway. I have no idea what happened to the tattoo.

#### **World Bank auctioned off on eBay**

Last October there was an interesting story in the news: “World Bank for sale on eBay.” What was that all about? An activist group called the Center for Economic Justice, which aims to minimize the negative effects of globalization, posted a desktop globe on

the site with a coin slot cut in the top. The headline said “World Bank – Antiquated (does not work).”

It went on to say that the bank “will do a lot less harm to the world gathering dust in your attic.” This is becoming an increasingly popular method of protesting for various reasons. Don’t like something? Sell it on eBay, whether it’s the World Bank or your mother-in-law. Obviously, these sales are rather more symbolic than real.

So how well did the World Bank auction do? With a starting bid of 30 cents, or, according to the product description, the hourly minimum wage under World Bank policies in Haiti, the site had received 49 visitors by early afternoon. The bid, however, had not risen above 30 cents.

### **A potpourri of bizarre eBay auctions**

And finally, I’ll end up with a collection of oddball eBay stories. Let’s start with some real auction titles:

- “One soul! Get it before the devil does.”
- “Young man's virginity, Please Look.”
- “Fully functional kidney for donation.” (eBay stopped that – it is not allowed)
- “The Internet for 1 million dollars” (His excuse: “it’s worth a trillion!”)

One fellow offered on eBay a “ghost in a jar.” This was a black mist he had discovered coming out of a jar and figured he could sell it.

Another fellow in Great Britain offered his *friendship* for bid on eBay last September. If you were the lucky winner, then for an entire month, he would send you weekly e-mails, plus two letters written by hand, and would always be ready to listen to your troubles via his cellular telephone. He only received one bid, for about 15 Euros.

Yet another fellow in the United States sold everything he owned on eBay, and traveled around the country visiting his possessions. He then wrote a book about these travels, where his possessions had ended up, and who had bought them. The book is entitled *All My Life for Sale*.

And last but not least, a story from only three days ago (March 30, 2005): A woman sold her name on eBay. That’s right, her *identity*. Her name is (or, I should say, was) Terri Iligan, a mother of five from Tennessee. She recounts, “I was driving one day and I told my husband, I don’t think anyone’s tried to sell their name on eBay yet. So I put it up for auction and I got all kinds of responses within 24 hours of being listed.” The winner of the auction, who paid just over fifteen thousand dollars, acquired the right to legally change her name for the rest of her life. And who was that winner? An Internet gambling site. Her new name – once again, as Dave Barry would say, “I am not making this up” – will be “golden-palace-dot-com.”

## **Auctions in history and context**

It's fun to talk about all of the amazing things that are happening in the world of online auctions today, but now I'd like to take a step back and try to make some sense of it all. Is something big and important happening here, or is it just a passing fad?

Auctions have been around for millennia, of course. Roman soldiers were known to auction off the booty they acquired in wars. And auctions have always been popular in certain areas, like art, with legendary houses like Sotheby's and Christie's. Livestock is generally sold through auctions, and recently certain kinds of financial securities have also been sold through auctions. But it isn't the only possibility, of course, and traditionally not even the most dominant one. There are at least two other important ways of setting prices. The first is face-to-face bargaining, or "haggling," as it is also popularly known. (Go to a bazaar in Tunisia and you'll find out what haggling is all about.) The second model for pricing is the one we see most often in our daily lives, commonly called "menu pricing" – simply a list of fixed prices of goods that you find in normal retail stores, for example.

Each of these forms of setting prices has its advantages and drawbacks. Let's look at haggling first. The advantage is that there is dialogue and interaction, and that increases the chances of arriving at a mutually agreed price. But consider this: you can't be sure whether you're dealing with the best person for your interests. If you're selling, maybe you're not dealing with the person who would be willing to pay the most. Vice versa, if you're buying, maybe somebody else might have been willing to sell it to you for even less. You just don't know, because you only have that one person in front of you.

Now let's look at the "price list" form. For items where the exact cost of production is known (like a pair of pants), it's generally straightforward to set a price, accounting for a certain margin of profit. But consider this: since there is no real interaction between buyer and seller in this form, the seller actually receives very little information from the buyer – basically, an implicit Yes or No. But if the buyer says Yes (for example, by buying the item), the seller doesn't know whether he might have been willing to pay *even more*. Similarly, if the buyer says No (for example, by simply walking out of the store), the seller doesn't know whether he might have been willing to buy at a lower price.

Auctions offer an alternative model of setting prices that fixes some of the problems in the other two models. By bringing thousands, even millions of people together, the seller has a guarantee of exposing his wares to a large audience and finding the person willing to pay the most. Conversely, a buyer can start with a low bid and raise it until he reaches the threshold of what he is willing to pay, offering a certain amount of interaction.

So will auctions actually replace the other two methods of setting prices? That's unlikely. For most items we find today on the market, the price list approach is usually the most efficient way to organize the buying and selling process. Where auctions are really useful is for finding the prices of goods whose value is unclear (like a used nuclear bomber aircraft). This is where the "efficient market" works its magic. Meg Whitman, the chief executive officer of eBay, likes to put it this way: an item's life generally has a beginning, middle, and end. At the beginning, the item is brand new. If

it's really "hot" and everybody wants to have it (like one of those fancy portable music players they're selling now or some popular kid's toy), then they might become so hard to find that people are willing to pay more than the listed price for them. That's where eBay comes in and allows that to happen. Then, during the long middle part of an item's life, the price list approach works just fine and can be left to the normal retailing mechanisms. But toward the end of the product's life, it is no longer manufactured and becomes a second-hand or even a collector's item. This is where eBay steps in again. Some of the most profound effects of online auctions, in fact, are likely to be felt in your own home. I asked an old pro on eBay about this and he replied:

The downside of eBay is that many things that antiques dealers used to believe were "rare" are now readily available. On the other hand, eBay is a great place to find out if the old stuff you have *is* worth anything. My Grandmother never understood why I wanted her old china, because it wasn't the good stuff. It was just stuff they used to sell at the dime store. But it sells very well on eBay today. Not worth a million dollars, but too much money to throw in the garbage can, which is what she would have done with it. (eBay also made it easy and affordable to add to the set she left me!) Many old people might have some similar items in their homes, and eBay makes it easy to put a value on their belongings, which is handy for estate planning. Also, it keeps unscrupulous antique dealers from making low offers to unsuspecting senior citizens.

Will you ever be able to throw anything away again?

## **Conclusion**

It's only fair to note in closing that the online auction revolution is in many ways more a cultural than an economic revolution. The economic value of online auctions is estimated in the tens of billion dollars every year. That is certainly impressive. But the total value of goods bought and sold in the United States alone every year is in the *trillions* of dollars. So it is not as though the auction model were completely replacing the traditional model by any means. Nevertheless, I think that even Louis Bachelier, who started us on the road to understanding efficient markets over a hundred years ago, would be amazed at all that has happened since then. As TIME Magazine wrote recently, "The full effects of eBay's hyper-efficient, banish-the-middleman revolution haven't yet been felt, but one thing is clear: the pre-Internet model of buying and selling is going, going..."

P.S. The real chart in Figure 1 is in the upper right-hand corner: it is the chart of the so-called S&P500 Index from November 2002 to November 2003.

## **Resources**

- If you are interested in knowing more about "efficient markets," then try reading *A Random Walk Down Wall Street*, by Burton Malkiel. An even more entertaining treatment of this topic can be found in *A Mathematician Plays the Stock Market* by John Allen Paulos.
- If you want to become an expert on eBay, try *The Official eBay Bible* by eBay's own Jim Griffith. It is one of literally hundreds of books on the subject.