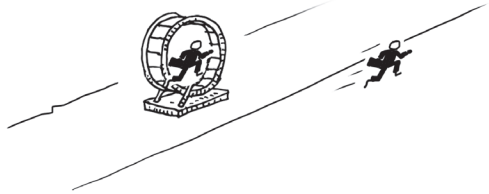

PREFACE

Why did I, an evolutionary biologist, write a book about economics and investing? It seems quite a jump, and many people are understandably surprised and skeptical. But interestingly, none of those skeptics are economists or evolutionary biologists. These two are actually sister disciplines, closer than people think. Both study competition, and both study how individuals hedge their bets in an uncertain world. Both study the flow of information, and how individuals try to manipulate those flows. Both study what happens in the past, while struggling to perform experiments in the present. Because many important questions cannot be addressed directly by experiments, both often rely on mathematical models instead. But don't worry; you don't need to know any math to read this book.

I was busy doing biology research, starting on a new project, when parallels between that project and economics jumped out at me. The implications of these parallels were too important to ignore. With a sabbatical coming up, I postponed my biology research, made a big career leap, and started writing this book.

That biology project was and is about the difference between relative and absolute competitions in evolution. To see the difference, think about a running race. An absolute competition pits each runner against the clock. Anyone who finishes the race in less than a certain time is allowed to have children. Those with stumpy legs and flat feet eventually die out, and are replaced by the children of the fast runners. So in the next generation, the average person runs faster.

In a relative competition, competitors race in pairs against one another instead of against the clock. In this cutthroat contest, there are no rules. One competitor is super fast. Unfortunately, he gets tackled from behind. In the ensuing brawl, he receives a solid blow to the head and passes out. The slower guy then wins. In each generation, the competition gets tougher, but not necessarily because the new generation runs faster. Strictly speaking, this relative competition does not favor being fast. What it favors is crossing the finish line before your competitor. Running fast is one way of crossing the finish line first. But evolution is a creative process, and there are many different ways of achieving the same goal. It is hard to predict which of the many solutions will triumph, and not all of the solutions are ones that we like.

There's an old joke about this. Two men are hiking in the woods, and come across a bear, which lunges after them. One man takes out a pair of running shoes. "What are you doing?" says the other, "Don't you know that bears can run thirty miles per hour? There is no way you can outrun it!" "I don't need to outrun the bear," replies the man, slipping on his second shoe, "I only need to outrun you."

Many people want to "get ahead" in life. The question is, what sort of race are they running? In particular, is saving for retirement like running

an orderly race against a clock, where everybody can improve their time? Or is the single most important thing about retirement saving simply to do better than the competition?

Most biological competitions are relative. Imagine a mutation that makes a tree produce twice as many seeds. There are already far more seeds than there are places for them to grow into trees. Finding a good spot to grow is like winning the lottery. More seeds means more lottery tickets, and so mutant trees win the lottery more often, become more common, and take over the forest. Now there are twice as many seeds, but each seed is only half as likely to win the lottery and grow into a new tree. The forest as a whole is no better off; it has no more trees than it did before. Nor is the average mutant tree in the mutant forest any better off than the average non-mutant tree in the pre-mutation forest. But in either forest, any individual tree is always better off having the mutation and producing more seeds.

"The mutation is good" is a true statement at the level of the individual, because producing twice as many seeds makes a tree into an effective competitor. But "the mutation is good" is not true at the level of the group. If a mutation were to let trees colonize toxic soil where nothing could formerly grow, then evolution by natural selection would make the group better off as a whole. But in the more usual case of a relative competition for fixed real estate, nothing improves for the group.

Relative competitions can even make things worse for the group. Producing twice as many seeds probably doesn't come for free. Let's assume instead that the extra seeds cost energy, and so a typical mutant tree needs a slightly bigger patch of soil and sunlight to survive. Producing twice as many seeds helps the plant a lot, while needing slightly more space

hurts it a bit. Putting the two together, the mutant does better than the original, and will take over. But after it wins, there will be fewer trees than there were before.

My research project studies how "arms race" competitions that occur on a relative scale can interfere with competitions that play out on an absolute scale. In the process of doing it, I became attuned to thinking carefully about whether statements were true at the level of individuals or at the level of groups. Once attuned, I heard discordant statements everywhere. In particular, policy makers are keen to encourage people to save more money for retirement. This is great advice for individuals; the more money an individual saves, the more comfortable their retirement. But is it also a good idea for society as a whole? What happens when everybody tries to save money at the same time? After all, you can't eat money. Is all the extra money being invested in things that will make people's retirements more comfortable? Or are all the savers in a relative competition, an arms race to stake a claim to a larger share of society's relatively inflexible amount of wealth?

Each tree also "saves" its energy and "invests" those savings in seeds to provide for its genetic future. The more a tree saves and invests, the better its future. But the more the forest saves and invests, the worse its future. Biology may have something to teach us here.

These distinctions between relative and absolute competitions, and between the good of each individual and the good of the group, apply to both biology and economics. Absolute competitions bring us absolute increases in prosperity in economics, while in biology they bring an absolute increase in the total amount of living things on the planet. Over the course of both biological and economic history, we began with very little

and have a lot more now. In contrast, relative competitions, in both fields, bring us ornaments and arms races rather than true advances.

During my training in biology, I learned to use a standard mathematical model in which competition was relative. In contrast, economists learn standard mathematical models that are based on absolute competitions. These default assumptions, built into the curriculum, can shape the way someone approaches a problem for the rest of their career. As a result, economists are biased towards assuming that competitions increase prosperity. Evolutionary biologists are trained to have the opposite bias, instead assuming that competitions are arms races, where the population grows no larger. In both cases, the truth is probably somewhere in between, but how we are trained affects which situations we see as "normal" and which as "special".

My training in biology gives me a fresh perspective on economics, one that helps correct for the prevailing bias towards assuming that competitions are absolute and always improve prosperity. That's a good reason for a biologist to write a book about economics, and for you to read it. What is more, unlike most people who may give you advice about economics and investing, I have no vested interests. Not only do I have no personal conflict of interest, I do not even move in economics or finance circles where I could pick up attitudes influenced by the conflicts of interests of my peers. I approach these questions as a concerned scientist trying to figure out what is going on.

I'm not the first person ever to propose most of the ideas in this book. To avoid a footnote-packed academic style, I will not detail exactly who has said what before, although I will provide a few references for key facts. Nonetheless, I do want to acknowledge my intellectual debt to two previous books that stand out above the others I have read and learned

from. First, while *The General Theory of Employment, Interest and Money* (1936) by John Maynard Keynes is arguably the most influential book in economics, it is still, I believe, underrated. It is mostly remembered for its analysis of the business cycle of boom and bust, but it also contains a wealth of other insights, many of which inform my argument here. The second economics book that I want to single out is the *Social Limits to Growth* (1976) by Fred Hirsch. This underread book details the importance of relative competitions in economics.

Both of these books are rather scholarly, and not easy for a general audience to read. What is more, they focus on understanding how economies work and how policy makers can manipulate them, and offer little or no advice for individual readers to use in their own lives. Like Keynes and Hirsch, I also want to shed light on how economies work. But in addition to this, I will also give practical advice to individuals, explaining what these grand ideas mean for individual investors concerned about a comfortable retirement.

When faced with a relative competition, the path to a comfortable retirement is straightforward. It doesn't matter how much money you save; what matters is that you save until you have more money than other people do. You can achieve financial success by gambling with your savings, but if you are more concerned with the worst-case scenario than the best-case scenario, then you should invest those savings sensibly and conservatively. Save as much as possible and preserve the value of those savings. By saving more and so accumulating a bigger nest egg than others, you can "get ahead" in any relative arms race.

This may be a recipe for a comfortable retirement, but I don't think it is good enough. While I want a comfortable retirement, I don't want

my comfort to come at somebody else's expense. In the kind of capitalist system I believe in, if everybody works hard, and if everybody saves a good proportion of their income, then everybody should be well-off, not just those who save even more than the others. I hope that you, my reader, feel the same way.

For this reason, this book does not simply observe that competitions are often relative. Instead, it asks *which* investment choices succeed in creating new wealth in an absolute sense, and which choices simply contribute to an arms race. How can we invest in such a way as to make the pie bigger, rather than compete to own a larger share of a pie of fixed size?

I'll assume that most readers either have money to invest or are at least planning to have money to invest one day. Individual circumstances do make a difference, and so I'll consider a range of investment scenarios at various points in the book, in order to give practical suggestions. That said, I will mostly focus on one, embodied by a character I'll call Jen, who is designed to make some general points.

Jen is 49 years old, earns $80,000 per year, owes $100,000 on the mortgage on her home worth $350,000, and has $250,000 in her retirement account. All this makes Jen a fairly typical middle-class American. To keep things simple, Jen has no living partner, children, or parents. Jen's retirement account gives her a limited range of investment options. As we'll see later, these restrictions are a problem, and the book will go on to give advice to policy makers (to lift the restrictions) as well as individual investors (to take advantage of unconventional options). Meantime, to give Jen a freer hand to make investment choices, we'll give her more money. She inherits another $550,000 from her parents' estate. With this inheritance, symbolizing the transfer of wealth from one generation to

another, we give Jen what she needs to enter the world of investing. It turns out that Jen will need this extra money in order to be confident of a comfortable retirement.

Now let's begin the book in earnest, led by Jen's "problem" of figuring out what to do with her newly inherited wealth.