are randomly distributed according to a normal distribution, then one might expect wealth to be symmetrically distributed in the same way – most people would be in the middle, and there would be only a few who are very poor or very rich. The reality in most countries is obviously very different, so either our financial elites are incredibly talented, or something else is going on.

As discussed in Chapter 4, one prevailing economyth is that the economy is inherently stable and at equilibrium – i.e., it is symmetrical in time – and so history doesn't matter. However, there is the old saying that 'the rich get richer', and it certainly seems that to make a lot of money, it helps to have some in the first place.

Imagine as a thought experiment that a city-sized group of people are given a windfall of $100 each, under the condition that they must keep it invested in a rather volatile and unproductive stockmarket. Each person makes their own investments, with an average real return of 0 per cent and a standard deviation of 5 per cent.

After one year, most people's nest eggs will be in the range $90 to $110, and will be distributed according to the bell curve with a peak at 100 and a standard deviation of 5. As time goes on, though, the distribution becomes increasingly skewed. If we follow the worth of the investments as they are passed down through generations for 150 years (about the age of economics), then the resulting wealth distribution looks like Figure 15, which is quite similar to the actual wealth distribution in Figure 14.

Obviously this is not a serious model of how wealth changes with time. It only tracks the value of imaginary investment portfolios, and ignores other kinds of economic transactions (more realistic agent-based models can be constructed, if desired). However, it does demonstrate the simple fact that, left to their own devices, investments will tend to concentrate themselves in

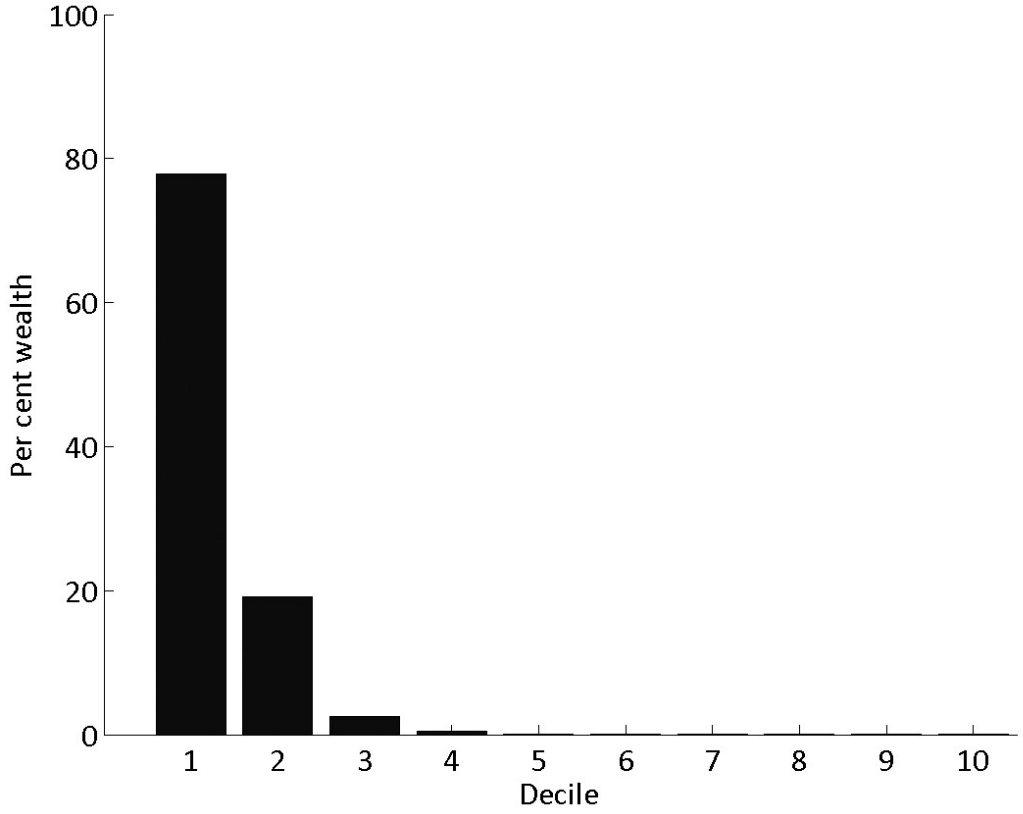

Figure 15. Bar graph showing the result from the computer simulation of the evolving wealth distribution described in the text. The skewed distribution is an example of symmetry breaking.

fewer and fewer hands. To use the physics term, it is an example of symmetry breaking. At the start of the simulation, everything is perfectly symmetrical. Each person has exactly the same initial amount of money. They also have identical chances of success with their investments – no one is assumed to be more talented at picking stocks. But over a period of time, some start to pull ahead of the pack. The reason is that there is a positive feedback effect at work. A person whose sum has grown already from the initial $100 to $1,000 can hope to make another $100 in the coming year. They might instead lose that much, but at least they have the opportunity. Someone whose savings fund has shrunk to $10 can only hope to make another dollar.

As the simulation is run for more years, the wealth becomes increasingly concentrated, until eventually only a few people are left gambling with the entire wealth of the community. If a person were born at random into such a population, their chance of being in the elite would be negligibly small. So even though the laws that govern this toy economy are symmetrical and non-discriminatory, the system tends to evolve towards an increasingly skewed state. Time matters.

Indeed, while we think of the current high degree of inequality as being a permanent feature of the human condition, it is actually relatively recent. For over 90 per cent of our existence, up until the development of agriculture, humans lived in highly egalitarian societies. For reasons discussed further below, the last few decades have seen a particularly large increase in inequality in many countries, even as the total number of people living in extreme poverty has declined globally. Pareto's power law was known as the 80–20 rule because he estimated that 20 per cent of the population owned 80 per cent of the wealth. In 2000, the share of wealth owned by the top 20 per cent of the world population was measured as 93.9 per cent. It is therefore impossible to assume, as mainstream economic theories do, that we are all on a uniform playing field, or that history can be ignored. It isn't just symmetries that have broken; it is an entire economic worldview.

CEO-nomics

While investment growth is a major factor in determining both income and wealth distribution, at least for those with investments, an equally important determinant is employment income. Here again we see marked differences within societies, between countries, and over time.

A typical measure of income inequality is the ratio of CEO compensation to the average worker's pay. This is currently highest