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# 1

## Contingent Expectations

MOST ECONOMIC theories explain decision-making with reference to a single model of expectation formation. This approach suffers from analytical limitations, especially when it is applied to different economic situations and historical circumstances. We therefore propose an alternative concept: Instead of denying the diversity of observable strategies of expectation formation, we employ this diversity analytically to explain the complex behavior of actors in different decision-making situations. We refer to this approach as “contingent expectations” and argue that economic agents can and do choose among different ways of forming expectations.<sup>1</sup> In a given decision situation, it is the interplay of several factors that determine the choice of an appropriate expectation formation strategy: the actors’ previous experiences, the cost of acquiring and processing additional information, the variation in possible outcomes of the decision, and the degree of irreducible uncertainty.

### A Toolbox of Expectation Models

Whenever economic actors are about to make decisions with long-term consequences, they have to form and factor in expectations about how relevant economic, technological, and social variables might develop in the future. Take, for example, a high school graduate who faces a choice among different university programs: To gauge her future job prospects and earnings potential, she would have to estimate the demand for her academic skill set that would exist in the labor market by the time of her graduation. A family looking to purchase a home will try to assess how property prices, mortgage interest rates, and their own earnings are likely to change over the next few decades. A prudent entrepreneur will carefully weigh potential risks and rewards before embarking on a costly investment project. Hence, economists who wish to

predict how economic actors will behave in such decision-making situations must make assumptions about how their expectations are formed.

In the first half of the twentieth century, economists tended to take a rather simplistic approach by assuming that economic actors believed that the current conditions would also apply in the future. In the late 1950s, this assumption was replaced by the more sophisticated concept of adaptive expectations, based on the idea that actors form their expectations based on a weighted average of their historical experiences (Nerlove 1958). This backward-looking approach does not imply that actors stubbornly stick to their original expectations in the face of surprising developments. Instead, they are capable of learning. Whenever a variable deviates from the expected value, actors update their expectations. Only a few years later, however, adaptive expectations came under increasing pressure from John Muth's seminal paper (1961) on rational expectations. Muth's concept was a groundbreaking methodological innovation. In contrast to adaptive expectations, the rational expectations theory acknowledges that forward-looking agents are capable of responding quickly to exogenous shocks or unexpected policy changes by fittingly adjusting their expectations to the new information set (Lucas 1976). Importantly, the speed of adjustment of rational expectations, unlike adaptive expectations, is not slowed by the baggage of past experiences. Regardless of their past experiences, agents use appropriate models to predict how a surprising change in relevant parameters may affect the future development of certain target variables. It was mainly due to the influence of Robert E. Lucas that rational expectations theory subsequently superseded the theory of adaptive expectations in mainstream economics. This paradigm shift was facilitated decisively by the events of the time: Many economists agreed that the stagflation of the 1970s could be explained more accurately by rational expectations than by adaptive expectations.

To date, many macroeconomic studies still rely on rational expectations and assume that all agents have full information, which includes knowledge of the econometric model needed to estimate the future impact of an unexpected change in certain parameters. In particular, fully informed agents are thought to use the same models as the economists who seek to explain their ways of expectation formation. Thus, the assumption of full-information rational expectations (FIRE) allows economists to predict actors' expectations "that tend to be distributed, for the same information set, about the prediction of the theory" (Muth 1961, 316). That is why FIRE has long formed the undisputed foundation of modern macroeconomics.

The Great Recession from late 2007 to 2009 has cast doubt on many old certainties. Since then, economists have increasingly experimented with models of expectation formation that dispense with the assumption of either full information or rational expectations. In reality, actors often have diverse and incomplete information because they either receive private signals or deliberately choose to ignore or only irregularly update certain public information (Mankiw and Reis 2002; Sims 2003). Diverse information will lead to heterogeneous expectations, which are slow to adapt to surprising news compared to FIRE (Angeletos and Lian 2023). The assumption of rational expectations is refuted, for example, when actors fail to fully take into account the influence of their own expectations on the expectations (and behaviors) of other market participants. The formation of iterative higher beliefs about the expectations of others presupposes that the actors are capable of calculating as game theorists do—which is certainly not the case (Farhi and Werning 2019). On the contrary, behavioral economists have found that people frequently use simple rules of thumb and other practical yardsticks to make decisions; furthermore, the process of expectation formation has been shown to be distorted in many ways by cognitive biases (Tversky and Kahneman 1974). In light of so much contradictory evidence, Gennaioli and Shleifer (2018, 204–5) have argued that the model of rational expectations is doomed. They have suggested that more evidence-based models of expectation formation should be developed “so [that] the inaccurate though aesthetically attractive ones can be honorably retired.” At the moment, a whole range of alternative expectation models are available. These include, for example, epidemiological expectations (Carroll and Wang 2023), diagnostic expectations (Bordalo, Gennaioli, and Shleifer 2018), fictional expectations (Beckert 2016), biases in expectations due to personal experience (Malmendier and Nagel 2016), and myopia (Gabaix 2020). To date, however, all attempts to bring about a paradigm shift and establish a new dominant theory of expectation formation have failed. The resulting wilderness of competing expectation models is currently causing palpable uncertainty among many social scientists. If it is impossible to reliably predict which expectation model actors will use, it follows that it is also impossible to forecast their expectations and subsequent actions.

In this book, we will argue that it is misleading to look for a single optimal model of expectation formation that can be applied to each and every decision situation. Instead, we will suggest that economic agents have at their disposal a toolbox of various methods of expectation formation from which they usually select the most appropriate one for a particular decision situation. We refer

to this approach as “contingent expectations.”<sup>2</sup> By defining the concept as “contingent,” we wish to emphasize that the choice of expectation models depends on context. We need to know the particular circumstances of a given decision-making situation to assess which expectation formation model is most likely to be selected by a given actor.

Our concept of contingent expectations is supported by research in experimental psychology suggesting that, during human evolution, individuals developed the cognitive skills to choose among different methods to achieve a given goal. Gert Gigerenzer (2008), for example, has argued that individuals draw on different techniques to optimize their decision-making. With the concept of the “adaptive toolbox,” he introduced a metaphor that describes the “rational ecology” of human decision-making, which is very often based on simple heuristics instead of complex probability calculations or algorithms (Gigerenzer, 2001, 245). Other studies have confirmed this interpretation (Spiliopoulos and Hertwig 2020). Especially in affect-rich situations when circumstances have strong personal or emotional implications, actors often neglect information gathering and make their decisions spontaneously (Suter, Pachur, and Hertwig 2016). The concept of the adaptive toolbox—even though not developed specifically for historical analysis—provides an interesting reference for our model of contingent expectations, as it points to the trade-off between optimal decisions with comparatively high information cost and less elaborate and “only” satisfactory decisions that often allow for higher marginal net returns.

In this chapter, we will develop our argument in four main steps. First, we show that the contradictions among competing methods of expectation formation can be resolved by a concept that does justice to the complexity of decision-making situations and yet remains simple, clear, and generally applicable. To meet this requirement, we develop the idea of contingent expectations. Second, we elaborate the theoretical structure of contingent expectations, which can be represented in the form of a flowchart (see figure 1.1). We assume that the choice of expectation formation methods that actors find suitable for the specific constellation in a given decision-making situation depends on the degree of uncertainty, personal experience, the influence of third parties, and the level of information costs. Third, we provide preliminary empirical evidence from a few historical case studies to substantiate the premise that actors choose among different methods of forming expectations in real-life decision-making situations *as if* they were following our flowchart of contingent expectations. Fourth, we will explain the selection and sequence of the historical case studies

that we will analyze in the following chapters with the help of a road map (see figure 1.2). In the course of the book, our empirical analysis will lead to the insight that the model of contingent expectations describes historical practices of expectation formation better than the competing concepts.

## Restoring Order in the Toolbox

To develop our model of contingent expectations, we must first understand why mainstream economists have persistently defended the concept of FIRE and refused to use other, more complex models of expectation formation. For this purpose, it is worth remembering the older debate about the assumption of profit maximization as the sole objective of all entrepreneurial activity. This idea has often been challenged by economists and other social scientists, who have usually pointed out that, in reality, many entrepreneurs and managers also pursue other goals. Moreover, it has been argued that maximizing profits is no easy task: Entrepreneurs often fail to accomplish their goals because they lack sufficient information to identify the most suitable profit-maximizing strategy in a world of irreducible uncertainty (Alchian 1950). Despite these criticisms, however, the assumption of profit maximization has remained a core element of economic theories to this day. A justification for this persistence was provided by Milton Friedman in his influential essay “The Methodology of Positive Economics” (Friedman 1953). Herein, he reminds his readers of a principle known as “Occam’s razor,” which contends that an essential feature of any good theory is the simplicity, parsimony, and clarity of its basic assumptions. In other words, an economic model should not seek to represent the real world in all its complexity, which would render the model just as unmanageable as the reality. Instead, economic models should concentrate only on those aspects of human behavior from which plausible hypotheses can be derived with regard to the questions at hand. Friedman (1953, 23) has claimed that the assumption of profit maximization met these requirements and was proved right in the long run: “Yet the continued use and acceptance of the hypothesis over a long period, and the failure of any coherent, self-consistent alternative to be developed and widely accepted, is strong indirect testimony to its worth.” To strengthen his point of view, Friedman has also referred to arguments from evolutionary economics: Only those companies survive competition in the long run that regularly achieve above-average profits, and from this empirical observation, it can be concluded that entrepreneurs act *as if* they were pursuing the goal of profit maximization (1953, 21–22).

In economic models, the assumptions about actors' expectation formation have a similar fundamental importance as the assumptions about their fundamental objectives. Therefore, it could be helpful to adopt the conclusions from the debate about profit maximization to our discussion about expectation formation and assume that actors act *as if* they had formed FIRE. This analogy would help explain why behavioral economists have so far failed to establish a new generally accepted theory of expectation formation. Admittedly, this task poses many challenges. To begin with, the list of cognitive biases that can distort perceptions and lead to erroneous expectations encompasses dozens of different types. Any economic model attempting to account for all these biases could hardly meet the criteria of simplicity, parsimony, or clarity—it would certainly not lend itself to application as a general workhorse model in the way that FIRE has been used. Therefore, it is understandable if scholars such as Thomas Sargent (1999, 9) have argued with conviction that we should hold on to the concept of rational expectations: “I adhere to the rational expectations benchmark and economize on free parameters. I embrace minimalism to discipline my venture into the wilderness of bounded rationality.”

In this book, we argue that it is not necessary to opt for or against particular concepts of expectation formation. Instead, we will try to fit the competing approaches into the overarching framework of contingent expectations. To achieve this goal, it is useful to analyze when specific models of expectation formation emerged, under what circumstances they were considered to be viable, and why they sometimes failed or were discarded.

At first glance, such a historical approach seems to lead to a teleological narrative of continuous progress in expectation theory. Indeed, there is no denying that advances first in mathematics, especially in probability theory, and later in the social sciences and information technologies have significantly improved human capacities to form accurate expectations about the future. At the beginning of this development were, among others, the attempts of Italian insurance entrepreneurs in the late Middle Ages to assess the risks of maritime trade by collecting the latest information on weather conditions or pirate activities (Ceccarelli 2007). Today, the world has moved to complex computer-based forecasting models that are routinely used to predict macroeconomic trends or fluctuations in stock market prices. Thus, we can observe a long-term trend of scientization and professionalization in the formation of expectations, apparently culminating in the FIRE theory, which places the highest demands on the gathering and processing of information by decision-makers.

However, recent events and historical evidence cast doubt on this success story. First, the history of past financial crises has provided many lessons (Kindleberger and Aliber 2005) that should have enabled fully informed rational actors to correctly predict the financial collapse of the Great Recession of late 2007–2009. Instead, most investors, bank managers, and forecasters overlooked all the ominous parallels with previous financial crises, a fact that has undermined the adequacy and usefulness of FIRE. For the same reason, the experience of the Great Recession has given rise to a new variety of competing models of expectation formation, inspired by behavioral economics and with a renewed focus on experience. Second, a more detailed look at economic history reveals that the practice of economic actors of choosing deliberately among different methods of expectation formation can be traced back as far as the Middle Ages. Furthermore, there is no neat distinction between a “premodern” and a “modern” mode of predicting the future, as Reinhart Koselleck (1985) has argued. Instead of a linear evolution toward an optimal model of expectation formation, we find a more complex, contingent, and at times cyclical progression of various guiding concepts.

Exploring the tensions and competition between methods of expectation formation will help us to elaborate our concept of contingent expectations. The concept is premised on three different but related observations. First, historical processes are open and often accidental by nature, which makes predicting the future extremely difficult and uncertain. Gathering all relevant information is often impossible for individual households, managers, or investors, and it usually involves high information costs. Second, the specific form of making predictions is highly variable, as changing historical contexts require different forecasting strategies. Third, predictions and decisions are embedded in complex processes in which agents must revise their information and beliefs on a regular basis. Updating one’s knowledge is again costly and requires cognitive effort. That is why economic learning is itself a dynamic—and highly contingent—process (for different learning technologies assumed in economics, see Baley and Veldkamp 2023).

The term “contingent expectations” has been used only sporadically in the literature, and in a different sense than in our approach. Roman Frydman and Michael D. Goldberg (2013) have referred to this concept as a model that combines rational forecasting strategies in financial markets with insights from behavioral economics. From a sociological viewpoint, Jens Beckert (2013) has argued that the contingent nature of evolution in capitalist societies requires narrative strategies to cope with uncertainty.

In our book, we aim to provide a complex concept of contingent expectations that combines economic approaches with historical perspectives. The challenge lies in achieving two difficult objectives at the same time: doing justice to the empirical complexity of history *and* meeting the demand for a clear-cut model that avoids the wilderness feared by scholars such as Sargent (1999). To meet this challenge, we draw inspiration from the theory of rational inattention (Sims 2003; Wiederholt 2018).

The theory of rational inattention is based on the observation that processing information requires time and attention. These are limited resources that economic actors must allocate selectively to a range of activities. The scarcity of time and attention means that, in practice, no actor can process all available information in any given decision situation. Instead, actors try to make their decisions based on a limited selection of data. Importantly, this technique is conceptualized as a rational process: Actors are well aware that ignoring some available facts may increase the likelihood of making a wrong decision. However, they may be willing to accept this risk if it leaves them with more time and attention that can be devoted to other activities. The decision-making process thus proceeds in two distinct steps. In the first step, economic actors decide which information they will use and what can be neglected in a particular situation. In the second step, they acquire and process the selected information to reach a decision.

The basic idea can be illustrated by the example of student admissions. University administrators are required to decide which of the many applicants should be given places in their program. To assess the quality of applicants, administrators have a plethora of information at their disposal. However, certain forms of information, such as conducting selection interviews or reading long letters of motivation, are very time-consuming to collect and process. Therefore, university faculties may decide to dispense with this information and spend the time saved on research. In this case, rational inattention may lead administrators to use school grades as the only selection criterion. This procedure may lead to minor errors, such as selecting a less suitable candidate over one who is more talented but might not excel in school. However, major errors are unlikely to occur because poor school grades rarely conceal very good students and brilliant school records rarely predict academic failure.

Bartosz Maćkowiak et al. (2023) have systematized the economic implications of the theory of rational inattention. Two insights seem particularly relevant to our context. First, agents will draw on more information in high-stakes decision situations than in situations where they have little to lose.

Second, actors will focus their attention on economic variables that display high volatility because large fluctuations can mean that bad decisions lead to large losses.

## The Model of Contingent Expectations

From what has been said so far, it should be clear that expectation formation can be interpreted as a practical implementation of the theory of rational inattention. We assume that, in the first step, economic agents decide on the method of expectation formation that is suitable for a particular decision situation. Based on the selected method, they form the expectations in a second step that subsequently guide their actions.

Any economic actor who wants to form realistic expectations about the future must engage in intelligence-gathering. They may read newspapers, economic textbooks, or academic journals, seek personal advice from knowledgeable friends, follow the columns of famous economists, or browse the depths of the internet to get a better idea of how relevant economic variables might develop in the future. Researching and processing this information consume time, money, and attention and thus entail considerable opportunity costs. Economic agents have to weigh the benefits of such information costs. In conventional economic reasoning, the optimum is reached when the marginal cost of obtaining and processing information roughly equals the marginal benefit.

In some decision situations, actors may not value information acquisition at all because their stakes are low relative to their income or wealth. We observe this behavior, for example, in lottery players who, even if they are not addicted to gambling, ignore the well-known minuscule probabilities of winning. Another example is offered by the many German savers, who held on to their savings accounts even when the real interest rates on this form of investment were negative for many years, as was the case during the stagflation period of the 1970s (Knake 2023). Instead of updating their expectations on the basis of easily obtainable information on nominal interest and inflation rates and then searching for better investment opportunities, many German savers clung stubbornly to routines and traditions such as “in our family, we have always relied on a savings book to accumulate some wealth.” The conclusion seems obvious that actors bother to think about information acquisition and the choice of an appropriate expectation model only when they believe that the stakes are high. The problem, however, is how to determine what the stakes

are. For a low-income person, the loss of a certain amount of money may cause dramatic damage, while the same event may go unnoticed by a wealthy person. For this reason, our model avoids the subjective concept of high or low stakes. Instead, we compare the benefits and costs of obtaining information.

The marginal benefit of information acquisition depends on one factor in particular. It hinges on a fundamental epistemological question: To what extent can any additional information improve the accuracy of a given estimate? To explore this issue further, Frank Knight's (1921) clear distinction between calculable risk and incalculable uncertainty is helpful. In the latter case, where the possible future consequences of a present action cannot be predicted, let alone expressed in probabilistic terms, it is impossible to calculate reliable forecasts for any specific variable. Hence, it makes little sense for decision-makers to invest in the acquisition of further, possibly useless information—they will have to find other ways of dealing with the irreducible uncertainty.

To understand and structure the considerations that may run through a particular agent's mind when choosing his strategy of expectation formation, it is helpful to formalize the decision situation in a simple way. We assume that the future outcome of a present decision is affected by the future state of the world. To make the analysis easier, we assume that there are only a good scenario and a bad scenario to take into account. In the good scenario, the future returns will be high ( $\bar{X}$ ); in the bad scenario, the future returns will be low ( $\underline{X}$ ). If the actor is able to assign probability  $p$  to the good scenario, he can calculate the expected value of the returns  $E(X)$ :

$$E(X) = p\bar{X} + (1-p)\underline{X} \quad (1.1)$$

A risk-neutral actor will decide to take the economic action today if the expected value of the future return is at least as large as the reservation value  $X_0$  that he would realize if he refrained from this action:

$$E(X) \geq X_0 \quad (1.2)$$

To perform these calculations, an actor needs to know the probabilities of the good scenario and the bad scenario (and the returns occurring in both cases). In practice, this necessary precondition is not given in many real-life decision-making situations. In a situation of Knightian uncertainty, an actor might not be able to predict either the alternative returns or the probabilities of their occurrence. Hypothetically, this would apply, for example, to an

entrepreneur who is trying to develop a basic innovation, about which she knows neither the technical properties nor the viability and profitability. In this case, incomplete information is not to be confused with a conscious decision as presumed in the theory of rational inattention; instead, it appears as an unavoidable fact due to the unpredictability of things that do not yet exist. Under such kind of uncertainty, the simple decision-making model as described in equations (1.1) and (1.2) would not work, and we will have to find other ways to explain how the actor would remain capable of deciding under these circumstances.

However, let us first consider expectation formation under risk when the alternative returns are known and the probabilities of both scenarios can be estimated in advance. It is unlikely that a given actor knows the true probabilities of occurrence from the beginning. However, he will have a preliminary idea of their value, which we denote by  $\tilde{p}$ . This prior belief may result from experiences that the actor had made in similar situations in the past or from assessments that are derived from the actions or narratives of third parties. The actor can either place his trust in the truthfulness of his prior belief or try to get closer to the true probability of occurrence by seeking new information. This process is called “Bayesian learning” in honor of the Presbyterian minister Thomas Bayes (1701–1761), who was the first to point out that the speed and direction of our approximation process to an event’s true probability  $p$  is determined by our initial beliefs (Bernstein 2012, 129–33).

To illustrate the dynamics of Bayesian learning, Nate Silver (2020) uses the terrorist attacks of September 11, 2001, as an example. Like many other people on this day, one of the two authors of this book was glued to the television watching the footage of the first plane crashing into the Twin Towers. How did this event change the expectations of a typical television viewer about the likelihood of such an act of terrorism? To answer this question, we must first determine our typical television viewer’s prior beliefs. Let us assume that on the morning of September 11, she estimated the possibility of a terrorist attack with airplanes on the World Trade Center to be very low, at only 0.5 percent. Second, we need to assess whether the actual observation that an airplane crashed into one of the towers confirmed the hypothesis of a terrorist attack. The incident in itself was not indisputable proof of a terrorist attack because we also have to consider the case of a “false positive”: It could have “only” been an accident, the probability of which we put at 0.8 percent based on historical accident statistics. In this example, a “false negative” cannot happen: If there is a terror attack, the plane crash will indicate it with a probability of

TABLE 1.1. Bayes's Theorem: Attack on the First Tower of the World Trade Center

<b>Prior probability of a terrorist attack</b>		
Initial belief about how likely it is that terrorists would crash planes into the World Trade Center	$\tilde{p}$	0.005
<b>First plane hits the World Trade Center</b>		
Probability of plane hitting if terrorists are attacking	$y$	1
Probability of plane hitting if terrorists are not attacking (i.e., an accident)	$z$	0.008
<b>Posteriori probability of a terrorist attack</b>		
Revised belief about how likely it is that terrorists would crash planes into the World Trade Center, given that the first plane had hit	$\frac{\tilde{p}y}{\tilde{p}y + (1 - \tilde{p})z}$	0.38

Source: Silver (2020, 247)

100 percent. Based on these assumptions, we can now calculate the posteriori probability of a terrorist attack after observing the flight into the first tower. Table 1.1 shows the result of this calculation.

After the first plane crashed into the World Trade Center, our typical television viewer now estimated the probability of a terrorist attack at 38 percent. This posteriori probability was still relatively low, though, because she had originally considered such an event to be extremely unlikely. However, her learning process continued. After the second plane hit, the posteriori probability increased to almost 100 percent (see table 1.2), which approximates the true value.

The concept of Bayesian learning can be applied to many problems of expectation formation. In this context, it is important to note that not all actors have the same prior beliefs and will therefore approach the true probability of an event at different speeds and from different directions. For example, stock market investors who firmly believe in a continuing bull market will be slower to adjust their expectations to a “Black Friday” than those who already feared that the speculative bubble will burst soon.

With these insights into Bayesian learning in mind, we will now return to the discussion of the decision-making process. Let us assume a situation with an actor who is aware that his prior belief  $\tilde{p}$  may still be far from the true value of the probability  $p$  of the good scenario; therefore, he will be open to gathering and processing additional information. However, identifying and processing this information incur costs  $C$ , the amount of which also depends on

TABLE 1.2. Bayes's Theorem: Attack on the Second Tower of the World Trade Center

<b>Prior probability of a terrorist attack</b>		
Revised belief about how likely it is that terrorists would crash planes into the World Trade Center, given that the first plane had hit	$\tilde{p}$	0.38
<b>Second plane hits World Trade Center</b>		
Probability of plane hitting if terrorists are attacking	$y$	1
Probability of plane hitting if terrorists are not attacking (i.e., an accident)	$z$	0.008
<b>Posteriori probability of a terrorist attack</b>		
Revised belief about how likely it is that terrorists would crash planes into the World Trade Center, given that the second plane had hit	$\frac{\tilde{p}y}{\tilde{p}y + (1 - \tilde{p})z}$	0.99

Source: Silver (2020, 248)

the actor's personal characteristics such as education, professional experience, or economic literacy. For example, it may be very difficult for a financial illiterate to interpret readily available data on inflation and interest rates, even if this is easy for a trained economist. Therefore, it will not be worthwhile for the actor to use additional information under all circumstances. Regardless of the true probabilities of the good and the bad scenarios, the worst thing that can happen to an actor would be the occurrence of  $\underline{X}$  instead of  $\bar{X}$ . It therefore makes no sense to accept information costs that are greater than the difference of  $\Delta X$ .

Figure 1.1 shows the options available to a given actor when it comes to selecting her strategy of expectation formation from the menu of contingent expectations. When information costs are higher than the maximum difference in outcomes, most actors will rely on past experiences to determine the probabilities of occurrence. If the information costs are lower, it is reasonable for actors to supplement the experiential knowledge with further information from external sources. In this situation, agents gravitate toward the information-based expectation models, which in some extreme cases might also lead to FIRE. In contrast, an actor who has no experience of his own and is also reluctant to gather information from other sources in light of high information costs will often use heuristics or simply follow the behavior of other agents. We observe such herd effects, for example, during a speculative bubble.

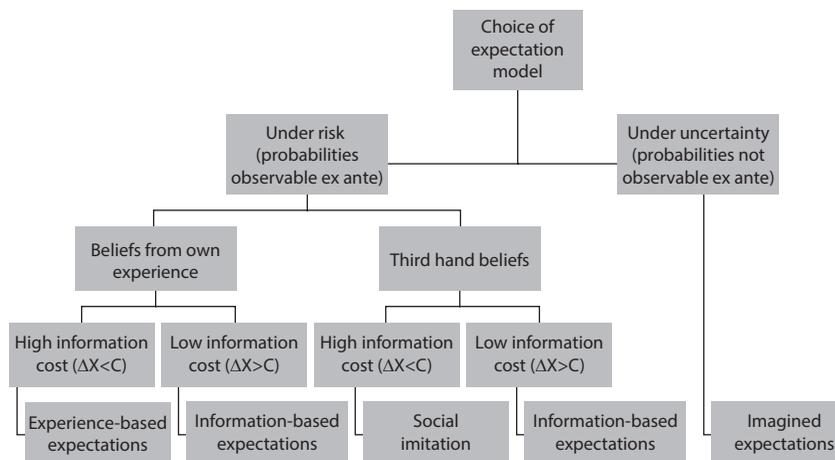


FIGURE 1.1. The menu of contingent expectations

Source: Author's visualization

Inexperienced investors enter the market because they follow the lead of their peers or trust the enthusiastic narratives that may circulate in the public. In summary, these strategies of expectation formation can be called “social imitation.” Of course, even those actors with no experience of their own may want to improve their knowledge of future outcomes by processing more information. This may happen if such information is easily accessible (i.e., if the cost of obtaining information is low).

By contrast, actors who must make important decisions under uncertainty have no possibility of gathering reliable information and assessing the probabilities of future outcomes. What will actors do in such a precarious situation? According to Gilboa and Schmeidler (1989) (see also Hansen and Sargent 2021), actors who cannot determine the probabilities of the good and bad states of the world will instead consider a whole set of probability distributions. To predict which decision actors with such multiple beliefs will reach, Gilboa and Schmeidler assume uncertainty aversion. Actors with uncertainty aversion are primarily concerned about the possibility of a bad scenario. That is why uncertainty-averse actors apply the *maximin principle*: They first identify the particular probability distribution across all conceivable probability distributions in which the bad scenario is most likely to occur and then act in a way that maximizes their own expected payoff in this worst-case situation. In practice, uncertainty aversion often leads to excessive caution, inaction, and

inertia (Ilut and Schneider 2023). Therefore, this concept is usually not particularly helpful in explaining why actors remain capable of acting despite uncertain expectations.

The notion of imagined expectations, on the other hand, meets this requirement. This concept of expectation formation assumes that uncertain actors tend to form expectations based on fictions and narratives of an imagined future that transcend factual knowledge. Sociologist Jens Beckert's idea of "fictional expectations" (2016) provides an example of this kind of expectation model. The starting point of Beckert's argument is the observation that people in modern capitalist societies share a basic sense of empowerment: They feel entitled to take their destiny into their own hands and create a better future for themselves and others. This optimism certainly figures most strongly in the American Dream, which is supposed to instill the hope in Americans that they can climb the social ladder through hard work (Beckert 2016, 26, 87). This positive attitude, combined with people's inherent creativity, causes economic actors to dream up future achievements and thereby fill the void of an uncertain future. In the absence of reliable quantitative data on outcomes or probability distributions, these fictional expectations usually take the form of a believable story that foretells the longed-for course of future events without precise quantification.

Dreaming of a positive outcome in the future may seem like an irrational form of motivation from today's perspective. In fact, such dreams usually lead to failure. Not everyone who dreams of a high-flying career will become a successful inventor, company founder, or artist. Many must realize that their expectations of themselves were too high and settle for less. Without these dreams of success, however, nobody would even try. In the rare cases of success, it can be attributed precisely to these imagined expectations that progress could be made in a world of uncertainty.

To avoid an overly complicated model, we assume that actors choose their strategy of expectation formation *as if* they were following the flowchart shown in figure 1.1. This assumption gives us the ability to predict this choice depending on the particular circumstances of the decision-making situation and to take this prediction into account when designing macroeconomic and microeconomic theories. The precondition for this approach is to give up the view that there is an optimal expectation model that fits all circumstances. It is important to note that contingent expectations do not require actors to have complete information. Contingent expectations are based on the idea that average people try to form expectations in a way that best fits their current

decision-making situation. This, of course, does not preclude mistakes that can occur when decisions are based on wrong assumptions and information assessments. Actors may misjudge future returns. Also, they may miscalculate the information costs needed to estimate more precise probabilities and therefore select an inadequate expectation model. If they recognize these mistakes, this might lead to learning effects in the sense that they may choose a different mode of expectation formation in the event of a similar decision-making scenario in the future. This openness to error and learning processes makes contingent expectations a suitable approach for the study of historical expectation formation. To substantiate this hypothesis, we will discuss some instructive examples in the following section.

Our model of contingent expectations corresponds to what Philip Tetlock and Dan Gardner (2015, 228) call “intellectual humility,” which they believe characterizes people who form better expectations than most other people. These “superforecasters” understand that the world is far too complex to hope to make error-free predictions, especially if they extend more than a few years into the future. Superforecasters acknowledge the uncertainty that they face, and they are willing to learn and constantly question the methods and findings of their expectation formation. People who form their expectations *as if* they were following the model of contingent expectations have the same epistemic humility. They understand that there is no one method of forming expectations that fits all decision situations, and they will therefore always reflect openly on which method they should use in a particular case.

## Contingent Expectations in Practice

After the triumph of FIRE in the course of the debate about the Phillips curve in the 1970s (see chapter 7 of this book), experience-based expectation models were discredited for a long time. More recently, however, Ulrike Malmendier and Stefan Nagel (2011, 2016) have contributed much to the renaissance of this class of expectation models by showing that actors’ risk aversion and inflation expectations both depend on their personal experiences in the past. This observation holds true even for experts who should know better. Malmendier et al. (2021), for example, demonstrate that personal experiences can trump independent information even for the inflation expectations of well-advised central bankers.

An illuminating example of how personal experience affects people’s expectations has been provided by Justin Gallagher (2014) using an example from

the American insurance industry. In the late twentieth century, any American homeowner who considered insuring her home against flooding had extensive statistics at her disposal to estimate the likelihood of flooding in her geographical region. We can therefore safely assume that it was possible for homeowners to determine the true probability of a flood event at low information cost and to use this knowledge to decide whether to take out flood insurance. Current events with no impact on the long-term probability of flooding should not change this decision. Gallagher (2014), however, has pointed to the case of affected American communities where the number of flood insurance policies per capita increased by up to 9 percent after a flooding had occurred. Homeowners who endured flooding or saw it happening to their neighbors obviously rated the likelihood of this negative event occurring again in the future as significantly higher than before the recent disaster. After about a decade, the effects of this personal experience faded, so the average number of insurance policies per capita between flood-affected and unaffected communities of the same risk class converged again.

How can these observations be explained? It is possible that the firsthand experience of a flood changed the probability that homeowners assigned to this kind of disaster. Homeowners with recent flood experience might have adjusted the probability of the bad scenario ( $1 - \tilde{p}$ ) upward because they either underestimated the true probability ( $1 - p$ ) of flood events until they were proved wrong by events, or, after witnessing the disaster, they now believed that the probability of the bad scenario was even higher than the statistically correct value. Either case would emphasize the empirical relevance of experience-based expectation models in the insurance business.

To complicate matters further, an alternative interpretation of Gallagher's observations is conceivable. The personal experience of a flood may have reminded homeowners that they had a great deal to lose in the event of a disaster—namely, their house and their possessions—and it was therefore prudent to take out flood insurance. This interpretation would mean that it was only through personal experience of the flood that homeowners understood the importance of forming information-based expectations about the likelihood of such an event and then responded accordingly. In this case, we should not think of personal experience and external information as opposites or as complementary, but as causally related. The perceived need to gather information to better predict the future would have been triggered by personal experience.

In the economic life cycle of a typical household, the purchase of a house represents one of the most important decisions, which can be associated with

considerable losses if, for example, buyers overlook major defects of the house or overestimate their financial abilities to pay the mortgage. The comparatively large difference between owning and losing a good home—implying that potential losses are higher than any reasonable information cost ( $\Delta X > C$ )—makes home-buying a scenario in which buyers should form their expectations based on the most accurate information possible. Predicting the development of property prices, however, is extremely difficult. Real estate markets are often characterized by long cycles due to migration effects, local regulations, and low supply elasticity. Land speculation often increases price fluctuations, with the danger of a bubble. Based on data from the United States, Theresa Kuchler and Basit Zafar (2019) have suggested that actors simplify the problem by building their expectations about house price developments on local market experience. In the case of such a lifetime investment, however, expectations about future house prices are not enough. Actors also must consider the long-term development of general inflation and interest rates, as mortgage loans play an important role in financing home purchases.

Anyone who cannot rely on personal experience to assess a particular decision-making situation often looks to the example of other contemporaries. To explain this form of herd behavior, Shiller (2005, 160) has pointed to the instructive analogy of choosing between restaurants. Let us imagine that two new restaurants have opened on Main Street, and little is known about the quality of either one. The first customer, Ann, has no choice but to select one of the two empty restaurants based on external appearances. The second diner, Bob, on the other hand, has another piece of information—a glance through the window shows him that one of the two restaurants already has a customer: Ann. Bob might now assume that Ann knows more than he does and therefore has a good reason to prefer one restaurant over the other. It is therefore likely that Bob will follow the example set by Ann. In this case, a third visitor, Charles, will observe one restaurant with two customers and one without, and he will therefore be even more inclined than Bob to follow his predecessors' lead. The result is an information cascade that can end with a crowded restaurant and an empty one, although there is no known difference in quality between the two.

Provided that actors have good reasons to believe that third parties may have better private information than they do, herd behavior is perfectly rational. This also applies to financial markets, where inexperienced investors will tend to follow the lead of those who are considered better informed (Bikhchandani and Sharma 2001). The problem is that the inexperienced investors

often cannot tell whether they are following the lead of experts or other newcomers. In the first case, the resulting information cascade may not cause major damage. In the second case, on the other hand, there is a risk that a speculative bubble will be created by the unidirectional transactions of many clueless people. As early as the mid-nineteenth century, Charles Mackay (1841) interpreted the tulip mania of 1636–1637 as the result of inexperienced speculators following the misleading example of their neighbors and friends, who were buying tulip bulbs because they hoped for further price increases.<sup>3</sup> Since then, every speculative bubble has probably contained an element of herd behavior. It is often only after the bursting of a speculative bubble that inexperienced investors realize that it would have been wiser to inform themselves about the fundamentals of the assets that they were feverishly buying. The question remains why this insight usually comes too late. The contingent expectations model suggests that inexperienced investors consider the information costs to be too high. This seems to be a valid point: Many participants in a speculative bubble lack the necessary economic knowledge to estimate the future performance of assets, be they tulip bulbs or stocks, with sufficient accuracy.

Furthermore, not only the example of their peers, but also the influence of popular narratives, lead many poorly informed investors to buy certain assets. A striking example of this effect is the digital currency Bitcoin, as only a small minority of buyers really understand the technological properties of this product. What made people buy Bitcoin nevertheless were the numerous newspaper articles that appeared in the 2010s about this mysterious innovation and emphasized the anarchistic character of this currency and its supposedly outstanding stability in value (Shiller 2020). As with the tulip bulbs centuries earlier, the rising value of this speculative object came about partly because many people were seduced by these narratives and demanded Bitcoin on a large scale. The narratives functioned as a self-fulfilling prophecy, insofar as they triggered the very investor behavior that led to the realization of Bitcoin's imagined future.

In many cases, such narratives are used to challenge consumers' preexisting experiential knowledge. Many investors are aware that speculative bubbles, like other economic crises, are a regular phenomenon of capitalist economies. To prevent this knowledge from leading to cautious behavior in times when a bull market may tip into a speculative bubble, storytellers with vested interests try to convince market participants that the current situation cannot be compared to the past. To emphasize the uniqueness of the economic development

at hand, these storytellers often use the adjective “new.” For example, in the run-up to the Great Depression, the American economy was ostensibly in a new era of continued economic growth. Similarly, before the dotcom bubble burst in March 2000, it was claimed that a new economy had emerged. The purpose of this rhetorical trick is clear. If a situation is new, it cannot be explained with reference to past experience. Hence the ironic title of Carmen Reinhart and Kenneth Rogoff’s 2009 book on the frequent recurrence of crises: *This Time Is Different*.

These examples illustrate that it will not always end well if actors heed popular narratives. However, this is a retrospective insight. Without the benefit of hindsight, it will seem sensible to some actors to rely on existing narratives rather than on an information-based model of expectations, considering the high information cost. Making this selection comprehensible is the purpose of the concept of contingent expectations that we propose in this book.

Finally, let us now turn to expectation formation under irreducible uncertainty. In business administration, many decision-making models work only if the decision-maker knows what will happen in the future. Popular investment models, for example, suggest that an investment project should be undertaken only if the discounted present value of all future net returns is greater than the initial expenditure. According to this theory, correctly predicted future events determine the decisions made in the present. In practice, however, company owners and managers are rarely in a position to reliably predict the development of their business over several years because this would require them to know exactly how competitors, suppliers, and customers will behave in the future, how technological progress will develop, what exogenous crisis will occur, and how politicians will react to all these changes.

How can we explain the fact that in everyday business practices, managers ignore their irreducible uncertainty and feed naive investment models with inadequate data? The answer is that this kind of approach enables decision-makers to act. Setting out into an uncertain future requires courage and confidence, and even naive investment models produce seemingly objective numbers that can instill such confidence, whether they are right or wrong. This is particularly true for ambitious innovation projects when neither the future characteristics of a new product or process nor its future profitability can be predicted at the start.

Many innovation projects will turn out to be a failure. This bitter truth is illustrated, for example, by German patent statistics from the late nineteenth century, a time when German companies worked their way into global

leadership, with numerous innovations in the technologies of the Second Industrial Revolution (i.e., chemistry, electrical engineering, and mechanical engineering). Acquiring a patent testified to an inventor's optimism that he would be able to turn his invention into a commercial success in the foreseeable future. However, the German Patent Act of 1877 stipulated that a patent holder had to pay an annual renewal fee to keep his patent in force. Moreover, the fee increased over time: Starting at 50 marks at the beginning of the second year, it was raised in stages up to 700 marks at the beginning of the fifteenth year, the longest possible patent term. Any patent-holder who no longer wanted to pay this annual renewal fee because his patent did not turn out to be as profitable as he had initially imagined could abandon it prematurely. For this reason, we can infer from the distribution of the life spans of the historical patents how many of the inventors were originally too optimistic about the future profitability of their inventions. The result is unambiguous. Streb and coauthors (2006) have found that about 70 percent of all German patents granted between 1891 and 1907 were canceled after just five years. After the fifth year, the speed of patent cancellation slowed. About 10 percent of all patents were still in force after ten years, but only about 5 percent reached the maximum age of 15 years. Even contemporaries in the late nineteenth century were probably aware of the fact that only a small proportion of all patents would generate high profits. At the time of the patent grant, however, all patent holders were united by the hope that their invention would belong to this elite group, and only this optimistic imagination drove the inventors, both the successful and the unsuccessful ones, to develop inventions and seek patents.

We refer to expectation models that enable people to act under great uncertainty as imagined expectations (see figure 1.1). Forming imagined expectations can be regarded as a necessary precondition for venturing into the unknown, and we can assume that it takes individuals with a high level of confidence in their own abilities or a high degree of enthusiasm for their innovative projects to use this kind of expectation formation model. What is needed are Schumpeterian entrepreneurs (1912), who are willing to venture into the realm of the uncertain and incalculable despite the high danger of failure.

The story of German entrepreneur Berthold Leibinger offers a fitting example of a typical Schumpeterian entrepreneur. He decided in the late 1970s to first develop and then produce in his own company, Trumpf, the novel laser cutters that he had previously purchased in the United States for installation in his sheet-metal-cutting machines (Streb 2019, chap. 4). The medium-sized company Trumpf, which had previously been involved in the production of

run-of-the-mill machine tools, did not actually have the technological expertise for such a groundbreaking innovation. In the run-up to the ambitious project, it must have seemed very likely that it would fail. Leibinger, who was driven by the vision of making his company a world market leader, nevertheless ventured into this innovation project and, contrary to expectations, was successful. Today, Trumpf is one of the largest manufacturers of industrial lasers in the world.

In this context, it is interesting to note that cognitive biases are usually described in economics as an inadequacy of economic actors. At least in the case of Schumpeterian entrepreneurs, this assessment is misleading because overconfidence or belief in grandiose visions sometimes enables action in the first place and, in this sense, can be regarded as prerequisites for innovation and growth.

It should be clear from what has been said so far that the case studies presented in this book are by no means merely illustrative. Rather, they allow us to examine the practices of expectation formation in a specific historical context and how these practices have changed over time. Moreover, many of the historical situations analyzed in our book have served social scientists as a starting point for developing new methods of economic expectations. In the following nine chapters, we will revisit these considerations and discuss the interplay among historical practices and theoretical concepts in chronological order. To this end, we will compare the theory and practice of expectation formation on the basis of the selected historical case studies, moving from the perspective of the social scientists to that of the economic actors and back again.

## Outline of the Book

To clarify the structure of our book, let us take a closer look at figure 1.2. Column 2 of this figure illustrates our general chronological approach. Starting with the preindustrial era in chapter 2, we look in the following chapters at various historical periods when social scientists changed their ideas about how people form their expectations. These include periods of crisis such as during and between the two world wars (chapters 4 and 5), during the stagflation and growing environmental awareness of the 1970s (chapters 7 and 8), and during the Great Recession (chapter 10), as well as periods of economic progress, such as during globalization in the nineteenth century (chapter 3), the Golden Age of economic growth in the decades following World War II (chapter 6), and the Great Moderation of the 1990s (chapter 9).

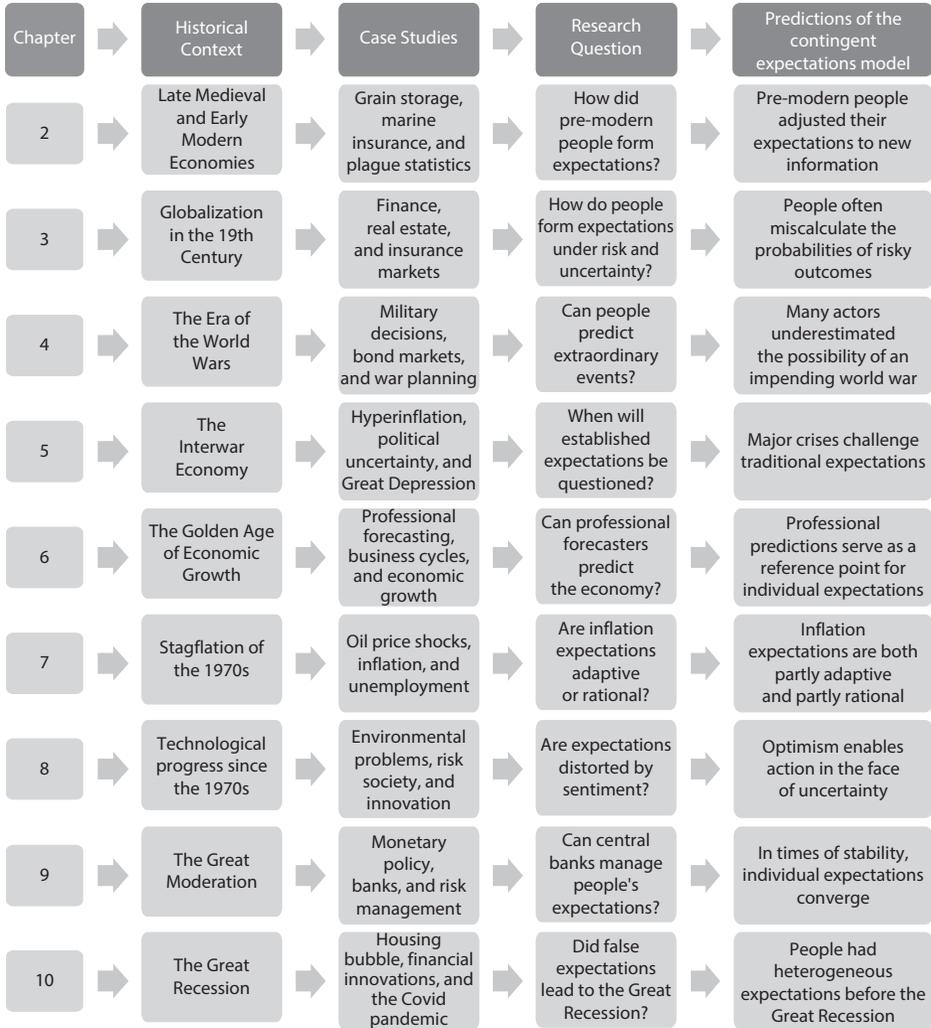


FIGURE 1.2. The road map of the book  
 Source: Author's visualization

Column 3 of figure 1.2 shows which historical case studies we will examine in each chapter. Unlike most of the existing literature on economic expectations, we do not limit ourselves to financial markets or monetary policy. Instead, we take a much broader empirical approach, also looking at the expectations of consumers, farmers, entrepreneurs, inventors, politicians, the military, and professional forecasters. In each chapter, our analysis will be motivated by a

specific research question that addresses important aspects of expectation formation (see column 4). By answering these research questions, we will prove time and again that historical expectations are better explained by our model of contingent expectations than by other concepts. Column 5 shows the insights that we gain by relying on the predictions of the contingent expectations model.

We will begin our discussion of economic expectations with a quick run through preindustrial time. Exploring the case studies of grain storage, maritime insurance, and plague statistics, we will ask in chapter 2 whether premodern agents formed their expectations differently from modern people. In agreement with Angela Huang and Mark Spoerer (2025), we will answer this question in the negative. Before the Industrial Revolution, people's standards of living, health, and lives were constantly threatened by catastrophic events such as famines, pandemics, and violence. To anticipate and, at best, avert these catastrophes, premodern agents formed their expectations in a surprisingly complex way, based on both personal experience and newly acquired information. It is remarkable that even the premodern actors did not rely on their experience alone but tried to update their expectations by acquiring new information.

The Industrial Revolution, in combination with a spurt in globalization, led to a new kind of economic insecurity that was unknown to most preindustrial actors. Contemporaries realized that the future was open and malleable, an insight that certainly had its downsides. The possibility of permanent change not only promised innovations, sustained growth, and higher living standards, but also posed the threat of severe economic fluctuations, financial bubbles, increased competition, and structural breaks, all developments often associated with unemployment and misery. We will discuss in chapter 3 how the rising insecurity during the globalization of the nineteenth century affected expectation formation of households, companies, and investors. Therefore, we will first discuss the scholarly debates about the differences between risk and uncertainty in economic theory and then explore the relevant historical macroeconomic trends that motivated these conceptual debates. To shed light on the historical practices of this period, we will analyze how economic agents—banks, real estate brokers, insurance companies, and private households—adopted new techniques of expectation formation when dealing with risk and uncertainty in their day-to-day decision-making. Despite the widespread belief in the nineteenth century that investing in securities and other assets was not a pure game of chance, but rather a calculable endeavor

(Preda 2009; Knight 2016), our case studies show that historical actors in the financial, real estate, and insurance markets regularly made mistakes in correctly assessing the probabilities of risky outcomes. Limited information and different levels of expertise inevitably led to heterogeneous expectations among different actors.

World War I was the seminal catastrophe of the twentieth century. In chapter 4, we will discuss whether contemporaries could have foreseen and prevented this extraordinary event. To do so, we will draw on two economic methods that can help us to analyze contemporaneous political expectations at greater detail (namely, game theory and historical capital market analysis). Our analysis will lead us to conclude that people regularly underestimate the probability of unusual events occurring outside their own horizon of experience. Sometimes the possibility of a major negative event such as war is even completely discounted because what should not be true must not be true. But people can also learn from negative experiences. We will address learning effects by exploring how the experience of World War I influenced the way that policymakers approached economic planning for World War II. For this purpose, we will analyze historical investment contracts and learning curves.

In the decades before World War I, contemporaries may have been under the impression that things were steadily improving, a sense of progress that was widespread at least among the elites in the globalized Atlantic world. This hopeful outlook was considerably dampened by the rapid succession of severe crises in the interwar period, beginning with hyperinflation in some countries and culminating internationally in the Great Depression. In chapter 5, we will use case studies from the interwar period to examine the causal relationship between expectations and crises. We begin with a closer look at hyperinflation. Our main focus will then be on the Great Depression, which we will approach from three perspectives. First, we will look for empirical evidence for the hypothesis that incorrect expectations helped to trigger the Great Depression, for example in the form of exaggerated optimism during the 1920s. Second, we will ask whether the crisis-induced change in expectations among consumers and investors worsened the economic situation after the onset of the crisis, for example in that they were now driven by pessimistic emotions and anxieties that led to panic reactions. A case in point is the demographic paralysis into which many households fell when, faced with the severe crisis, they postponed pregnancies, marriages, and divorces into the future (Guinnane and Streb 2025). Third, we will explore whether the Great Depression had an effect on expectation formation as such. Did the experience of the crisis change the

patterns of expectation formation, both in the short and in the long run? And how was this change reflected by debates and research within economic sciences? The answers to this last set of questions boil down to the observation that major crises challenge the prevailing methods of forming expectations. Crises are times of heightened uncertainty in which people often seek new ways of predicting the future.

In chapter 6, we focus on the role of professional forecasters from the interwar period to the end of the postwar Golden Age of capitalism. Whereas in the 1920s and 1930s the business cycle with its short-term macroeconomic fluctuations dominated research and policy practice, the rise of the growth and productivity paradigm in the postwar period brought a much longer time horizon to the fore, a shift that was mostly based on national income accounts. Macroeconomic forecasting, target-setting, and policymaking became increasingly intertwined in this period. While the results of such efforts often fell short of expectations, the critical debate that began in the late 1960s did not question economic forecasting as such. On the contrary, forecasting became much more complex, covering much longer time horizons, including many indicators, and transcending national boundaries. Globalization not only extended to the economy itself, but also to professional forecasting. In our discussion, the question of whether professional forecasters are better at predicting the future than the average market participant will increasingly fade into the background. The value of a professional forecast may lie less in its accuracy than in its signaling effect. Whether accurate or wrong, published professional forecasts can serve as third-hand beliefs (see figure 1.1) through which market participants coordinate their individual expectations.

In chapter 7, we show that in the 1970s, the new phenomenon of stagflation, which disproved the promises of the Phillips curve, led to the rise of rational expectations over the competing concept of adaptive expectations until the former eventually became the standard assumption of macroeconomic models. More recently, however, adaptive expectations have experienced a renaissance. Empirical studies suggest that economic agents form their personal inflation expectations at least partly on the basis of heterogeneous experiences and different information sources. The question of whether actors' expectations are adaptive or rational, which has been hotly debated by economists since the 1970s, cannot be answered clearly on the basis of such contradictory empirical evidence. Obviously, depending on the specific circumstances, people form their expectations sometimes on the basis of

experience and sometimes on the basis of information. This corresponds to the predictions of contingent expectations.

In chapter 8, we take a closer look at uncertain future events whose characteristics and probabilities are unknown today and which are therefore usually ignored by conventional concepts of economic expectation formation. We argue that uncertainty can trigger emotions, and these emotions sometimes help people to act in the face of uncertainty. We will explore these relationships through two case studies. First, we look at the fears that arose in the late 1960s as Western societies became increasingly aware of the disastrous consequences that energy-intensive economic growth could have for their environment, health, and prosperity in the long run. Despite these fears, it remained difficult to implement appropriate measures to prevent future environmental disasters such as global warming. This was because not everyone had pessimistic expectations. Irreducible uncertainty about long-term future developments left room for the more optimistic expectation that humanity would develop new technologies that would allow environmental problems to be adequately managed. The disagreement between optimists and pessimists blocked more far-reaching interventions, especially in democratic states where collective decision-making is required. In our second case study in this chapter, the problem of collective decision-making does not arise because we are dealing with individuals such as entrepreneurs or inventors who can make forward-looking decisions independent of the views of others. In the case of business start-ups and innovations, we will show that the ability of economic agents to act despite uncertain expectations often comes down to optimism fueled by narratives and other forms of imagined expectations (see figure 1.1 again).

In chapter 9, we will examine the role of expectations during the Great Moderation. After years of macroeconomic instability and high inflation in the 1970s and early 1980s, the industrialized world experienced a long period of relatively low volatility in the 1990s and early 2000s. The observation that individual expectations converged during the Great Moderation raised hopes that economic actors had finally learned to form consistent expectations. In particular, it was believed that central banks had succeeded in managing the inflation expectations of market participants with the help of efficient communication. We argue that these hopes were premature. Individual expectations probably converged only because growth or inflation rates hardly changed during the Great Moderation. A second reason speaks against an overly naive view of the Great Moderation. Analyzing commercial banks' risk

management, we will show that the Great Moderation was accompanied by the emergence of new problems with respect to expectation formation, as macroeconomic stability prompted actors to search for higher-yielding forms of investment whose risk they did not always fully understand.

The Great Recession of 2007–2009 put an end to a period of macroeconomic stability that lasted for a good quarter of a century. Many commentators were quick to point their fingers at economists who stood accused of having failed to predict the crisis. Much criticism was leveled, in particular, at the concept of rational expectations that still informed analytical models in mainstream economics. In chapter 10, we will examine whether inconsistent expectations led to the Great Recession. We will find that market participants generally had no prior knowledge of the exact probability of the impending financial crisis and therefore formed different expectations about the likelihood of such a crisis. While some did foresee the crisis, others denied (against better judgment) that it was possible, while others still optimistically held on to the belief that available basic data promised continued economic growth. Measured against the yardstick of FIRE, this was a case of heterogeneous expectations under uncertainty, a constellation that contributed to the emergence and bursting of the housing bubble. The heterogeneity of empirical expectations becomes theoretically comprehensible if we abandon the belief in a universally valid model of expectation formation.

We would like to conclude this overview of the structure of our book with a few remarks on the geographical origin of our case studies. In the twentieth and early twenty-first centuries, new concepts of expectations were developed mainly by scholars at American universities, drawing primarily on empirical studies from the American and, to some extent, the North Atlantic regions. As our book will show, John F. Muth (1930–2005), Marc Nerlove (1933–2024), Robert E. Lucas (1937–2023), Christopher Sims (b. 1942), Thomas John Sargent (b. 1943), and Robert James Shiller (b. 1946) played a prominent role in these studies. Furthermore, we will mainly rely on historical examples from our own research expertise, which is central and Western Europe. In our book, empirical observations from the United States or the United Kingdom are frequently contrasted with those from Germany, France, or Italy. An attractive side effect of this comparison is that it allows us to look at the formation of expectations in both liberal market economies and coordinated market economies (Hall and Soskice 2001). Wherever possible, we have also drawn on examples from continents other than Europe and North America.

## Key Points

We have argued in this chapter that a universal model of expectation formation that accurately describes the behavior of managers, investors, and households in all historical decision situations is inconceivable. Instead, we have suggested that actors usually choose among different models of expectation formation to predict future outcomes, according to their experience, the costs of acquiring and processing additional information, the variation in possible outcomes, and the degree of irreducible uncertainty. That is why we suggest that both social scientists and historians should consider this high variability in expectation practices when explaining or predicting individual decisions and their economic effects.

To provide a tidy toolbox of the various strategies of expectation formation, we have developed the idea of contingent expectations. The simplicity and the level of abstraction in the historically informed concept of contingent expectation formation constitute an important desideratum, even though it may not fully reflect all the details of individual decisions in a given historical moment. We are more interested in historical *ideal types* than in explaining all nuances of human behavior. We are not interested, for example, in the personal shortcomings that may have caused a particular investor not to foresee the bursting of the speculative bubble in the New York stock market in the run-up to Black Thursday in 1929, leading to the Great Depression. Our ambition is to find out what kind of expectations are formed by the *average* or *typical* investor and how this behavior might lead to speculative bubbles.

Moreover, the model of contingent expectations allows us to identify situations in which the basic assumptions of rational expectations or other versions of information-based strategies of expectation formation are plausible. Despite all criticism, the FIRE hypothesis should not be banned from historical and economic research altogether because it provides a theoretical “best practice” benchmark that is needed to assess the results of more realistic concepts of expectation formation. A final implication of contingent expectations is that, at any point in time, different people will choose different strategies of expectation formation depending on their individual experiences and the information costs that they face. The different strategies almost automatically lead to heterogeneous expectations. Contingent expectations thus offer the opportunity to do justice to the empirical diversity of expectation models in historical reality without losing sight of the broader picture.

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