The Austrian Middle Ground in Finance

In this chapter ideas out of Austrian economics, in particular Israel Kirzner's thoughts on the market process, are applied to the workings of, and theorizing about financial markets. I argue, both theoretically and by using illustrations out of the practice of financial markets, that a descriptive causal process approach such as the Austrian viewpoint provides, can be regarded as complementary to the more normative claims put forward by neoclassical and behavioral finance, actually bridging the divide between these two dominant strands of thought in finance.

4.1 INTRODUCTION

Austrian economics comes in a range of subschools; opinions can vary widely and disagreements amongst them are significant, and sometimes even acerbic. My aim here is not to argue for one subschool or the other or propose an "Austrian" finance theory but rather to focus on some thoughts about markets, originating in the Austrian school of economics, which I claim are relevant for financial markets.

Despite all the differences of opinion and the disagreements among Austrians, however, one of the depictions in mainstream neoclassical economics where almost all Austrian economists take serious issue with, is the "false and misleading picture of real markets" (Kirzner, 1997). In particular Kirzner, one of the more moderate Austrians, has gone to great lengths to develop an account of the market process, which provides a substantive story of how market coordination is achieved, instead of the neoclassical postulation of equilibrium at all times. Kirzner, in his own words, offers a middle ground between the neoclassical view where coordination is already implied by the assumption of perfect knowledge, and a radical subjectivist view[57] that states that the amount of ignorance is so great that it puts coordination beyond reach. "Knowledge is not perfect; but neither is ignorance necessarily invincible. Equilibrium is indeed never attained, yet the market does exhibit powerful tendencies toward it" (Kirzner, 1992, 5).

It is my aim here to build upon this concept of a middle ground using Kirzner's ideas and concepts for finance, in particular the fierce debate that is conducted between neoclassical and behavioral finance regarding market efficiency.

Kirzner's criticism on the false and misleading picture of real markets will be taken as a starting point of analysis. The central notion in my analysis is arbitrage. Arbitrage is the mechanism that should make markets (in general, but in this case specifically financial markets) function well. It is a crucial concept in virtually any account of financial markets. Theory and practice of financial markets are characterized by a close proximity and entwinement: concepts, methods and tools travel back and forth (see Bernstein, 1992). Likewise arbitrage as a theoretical concept has its neighbour in the real realm of the financial markets. By means of examples from the practice I will show that what actually goes on in financial markets arbitrage displays an uncanny resemblance to the Austrian theory of market process. Real-life arbitrage is characterized by alertness, search, discovery, entrepreneurship, group interaction, learning and imitation, all in the presence of uncertainty and facilitated but also constrained by language.

57 Kizner specifically mentions Ludwig Lachmann and George Schackle as representatives of this view.

Having established the descriptive relevance of Austrian market process theory gives rise to reconsider some of the hot issues in the neoclassical versus behavioral debate. The first such issue is market efficiency. It would make sense to decouple this notion from the concept of equilibrium, in the light of a dynamic market process. Equilibrium ultimately means that supply and demand meet, leading to markets clearing. Financial markets continuously clear: every transaction has a buyer and a seller. Whether it is a trade at the market equilibrium is a separate matter. What really matters socially is that financial markets perform their allocative function and provide a level playing field, that there is some tendency towards optimality. Only then can they perform their function in society.

The second issue is that of rationality. The debate in finance can also be looked upon as a question about economic agents. Who prevails in financial markets: the few hyper-rational arbitrageurs or the herds of irrational "noise-traders"? In the spirit of Fritz Machlup, we should pay attention to semantics here: what do we mean by those typologies? In a world where dealing with radical (Knightian) uncertainty is manifest and the possibility of error is acknowledged, these are not pictures of actual individuals. I would rather suggest that terms like "arbitrageur", "noise-trader", but also "the entrepreneur" and "the labourer" are properties of all individuals. Actual people embody all these economic properties, granted to varying extents and in combination with varying skills, dispositions, and preferences (see also Knight, 1921). That is to say: each one of us all can turn out to be more or less rational in various instances in grappling with the uncertain world.

Thus there is a true middle ground to be established by using the Austrian insights. Neoclassical finance would need to restate its idea about what it means for a market to be efficient. The equilibrium can be an excellent concept for theorizing but need not be a relevant actual state, is a notion we already know from physics. Moreover, explicitly giving up the concept of equilibrium is a thought already entertained by quite a few prominent finance scholars. On the other hand, behavioral finance should reconsider to what extent its claims, based to a large extent on psychology and experiments, are relevant for the outcomes of the market process, especially in a world characterized by radical uncertainty. Methodological individualism need not go so far as to derive market outcomes out of a realistic picture of an actual living individual, whatever that may be. Both those in the neoclassical and behavioral corner would do well to take into account the insights of Kirzner, Mises and Hayek, of Knight and Machlup. At the same time, this discussion, being an applied account of Austrian economics may present challenges and issues for Austrian economics itself.

4.2 FINANCE & ARBITRAGE

Several authors (Bernstein, 1992, Varian, 1992) have argued that finance has been one of the success stories in post-World War II economics, in particular where it regards quantitative economics This is evidenced by a disproportionate number of Nobel Prizes and other awards obtained for finance endeavours, the large numbers of journals, congresses and the like, and in general by the firmly established and significant place it has within departments of economics and business sciences in academia. Its success also shows in everyday life: financial markets are an inextricable part of modern society. Advances in finance theory certainly have played a role in the acceptance and legitimatizing of financial markets[58].

Where does this success stem from? Especially given that finance has only developed into a distinct field of research since the 1950s and thus is a relatively young discipline. The proximity and entwining of theory and practice is probably important. On the one hand financial markets provide scientists with an extraordinary amount of data to work with. On the other hand theoretical tools and concepts have found their way, largely unmodified, into the equipment box of the practitioners. Option pricing theory, which is used every day by derivatives traders and bankers, is probably the best example but only one of many that can be given (see Bernstein, 1992; MacKenzie, 2006).

Another factor in the success of finance could lie in its multidisciplinary background. Up to the 1950s finance was hardly recognized and regarded as a subject of economics. And indeed many of those who would become leading scholars in finance did not have a background in economics; they came for example from mathematics, physics, engineering, French, law, statistics, and astronomy (ibid.) Also, much of the ground-breaking work was done outside of the economics faculties, in business schools, and even outside the university, at think-thanks such as the RAND Corporation, consulting firms such as Arthur D. Little, and banks, for instance Wells Fargo Bank (ibid.).

Still, I would deem finance as an economic sub-discipline because its subject matter is economic: the coordination of inter-temporal consumption and saving. And indeed academic economics has had a profound impact on finance. Finance theory has largely been the result of getting the best out of two traditional powerhouses in economics: the empirically inclined Chicago School and the theoreticians out of MIT.

58 MacKenzie (2006) goes so far in this respect to claim that some parts of finance theory have had a performative role: shaping and creating the reality it intends to describe; see chapter five for an elaborate analysis of his arguments.

Consider the achievements then: the finance theories that have made headlines. Following various historical accounts (Bernstein, 1992; Mehrling, 2005; MacKenzie, 2006), five strands jump out[59]. In more or less chronological order:

- The work on portfolio theory by Harry Markowitz (and to some extent James Tobin), delivering crucial insights on risk and return, resulting in the now familiar mean-variance analysis;
- William Sharpe's (an others') contribution resulting in the capital asset pricing model (CAPM)[60], extending Markowitz's results to a coherent account of asset prices in relation to the market as a whole;
- The propositions of Franco Modigliani and Merton Miller, telling the theoretical story that the capital structure of a firm is irrelevant for its market value;
- The efficient market hypothesis, linked to the names of Eugene Fama and Paul Samuelson, which states that one cannot beat the market;
- Option pricing theory, conceived by Fischer Black, Myron Scholes, and Robert C. Merton, which enables one to put a meaningful value on pretty much any financial asset.

What these theories have in common is that they are about financial instruments and financial markets[61]. They all assume that these markets function well and they do so for one reason: the arbitrage principle.

Stephen Ross sets off his 2005 book on neoclassical finance as follows: "(Chapter) One: No Arbitrage, The Fundamental Theorem of Finance". Arbitrage is a crucial concept in finance. It is the key assumption which underlies all the various parts of established theory. Arbitrage can be defined as "the simultaneous purchase and sale of the same, or essentially similar security in two different markets for advantageously different prices" (Sharpe and Alexander, 1990). The classical illustration of arbitrage is that one doesn't find $20 bills lying on the pavement, because somebody else would have picked them up already. Now arbitrage as such is as old as economics itself: one can encounter it in the writings of Adam Smith and Alfred Marshall. The Law of One Price, Purchasing Power Parity—these are all variations on the same theme (see also Harrison, 1997).

But the treatment of arbitrage in finance is a bit different. As Bernstein (1992) has noted, instead of it being a common feature of competitive markets, it has been elevated to the level of a driving force. Arbitrage is not absent because markets are competitive. Rather, it is the

59 As any historian of finance will tell, much of this work was preceded by Louis Bachelier's dissertation from 1900 "Theorie de la Speculation", which contained important pieces of what would later become established finance theory. His accomplishments, however would only be recognized some fifty years later. See Jovanovic, 2008 & 2018.

60 Jack Treynor and John Lintner need mentioning as well, when talking about CAPM.

61 There exist important interrelations between all these theories.

other way around: arbitrage enforces competitiveness on the market. Modigliani and Miller used this "novel application" (Varian, 1993) to prove their propositions. It has become known as the arbitrage-proof, and it has played a critical role in all subsequent theorizing in finance (see Varian, 1987, for a more elaborate discussion, including a formal exposition). As Harrison (1997) puts it: "The successful application of economic theory in finance must be attributed to the notion of arbitrage. Not only could something "scientific" be said about speculative market prices, but also the economics theory seemed able to explain reality. This made finance all the more palatable to economists. Arbitrage was the theoretical force behind each of the major economics innovations in finance". And in the words of sociologist of science Donald MacKenzie (2003): "Arbitrage is the key theoretical mechanism in financial economics. A whole set of central propositions have been demonstrated by 'arbitrage-proof – the demonstration that if the proposition did not hold, then an arbitrage opportunity would open up".

This has certain implications, which makes finance distinct from (neoclassical) economics in general[62]. As Ross (2005) said: "with its emphasis on the absence of arbitrage, neoclassical finance takes a step back from the requirement that the markets be in full equilibrium". The No Arbitrage theorem gives an explanation how equilibrium will come about. While that may be regarded as a positive, it also raises new questions. Where does arbitrage come from, and how does it work?

Ross provided an answer to the first question: the no arbitrage assumption is based on "the most basic beliefs about human behavior, namely that there is someone who prefers having more wealth to having less" (ibid.). Behavioral finance has challenged this axiom. Not the fact that in general there is someone who prefers more to less, but based on insights from individual and social psychology, they take offense to the simplistic, rational picture of human agency is rejected, resulting in doubts about market efficiency.

The second question –how does arbitrage actually take place—is neither answered by neoclassical finance nor by the behavioral variety. MacKenzie (2003) remarked correctly that arbitrage in finance is a black box. I propose a substantive content for that black box by using the insights of Austrian Market Process Theory and looking at the practice of financial markets.

62 See also chapter 2.

4.3 MARKET PROCESS THEORY

Austrians may applaud Ross's "step back". In the words of Kirzner (1997): "At the market level, Austrians have rebelled against a microeconomics which can find coherence in markets and can explain market phenomena only by asserting that markets are, at all times, to be treated as if already in the attained state of equilibrium". But it is a hollow victory if equilibrium is still the unavoidable outcome of the assumption of no arbitrage, based on such a simplistic portrayal of human behavior. Indeed, according to Kirzner (ibid.), the second part of Austrian criticism of the unrealistic character of neoclassical economics is that "Austrians have taken sharp exception to the manner in which neoclassical theory has portrayed the individual decision as a mechanical exercise in constrained maximization. Such portrayal robs human choice of its essentially open-ended character, in which imagination and boldness must inevitably play a role".

The reason for that open-ended character lies in the fundamental uncertain nature of the economic domain; a point raised by Frank Knight (1921) that has been acknowledged by most of the Austrian economists[63]. Knight makes a threefold distinction (1921, pp. 224-225). First, there exist a priori probabilities: absolute objective chances like those in throwing a fair die. Second, there are statistical probabilities: objective, empirical evaluations of frequency of association. And third, there are estimates: subjective, more or less educated guesses, liable to error. The first two fall under the heading of risk. When we speak of risk, the distribution is known, either a priori or through empirical work, and we can obtain objective, measurable numbers. The third category is that of true radical, non-measurable uncertainty.

According to Knight, it is this third category which characterizes the economic domain in reality ("business" in his own words) and which gives rise to the phenomenon of profit (and loss). The reason is imperfect knowledge of the future. Knight also takes issue with the omniscient approach to agency in classical economics. What we can say about knowledge and behavior is that consciousness or awareness gives us the possibility of anticipating an image of the future. This image is always subjective: "We perceive the world before we react to it, and we react not to what we perceive, but always to what we infer" (1921, p. 201). Given this subjective character, it makes sense that this process is not infallible: "we do not perceive as it is, nor do we infer precisely, nor do we act knowing the consequences, nor do we execute perfectly" (1921, p. 202).

It is important to stress that acknowledging the existence of Knightian uncertainty does not imply that we are constantly subjected to the whims of chance. There is nothing mysterious

63 Nonetheless Kirzner (2000) has pointed out important differences between Knight and his ("Old") Chicago School disciples and the Austrian School.

or metaphysical about it, nor does it imply some utter wild randomness. Uncertainty simply is a consequence of the dynamics of real life, subject to change, disturbances, and surprises, and human nature, with its cognitive limitations and non-rational factors such as emotions and intuitions. Moreover, there are ways to deal with uncertainty: it can be reduced, which is the goal of rational conduct, but not eliminated (Knight, 1921, p. 238). Put differently by Kirzner (1992), our future is unpredictable because it is not a simple extrapolation of the past, but partially constructed by our present decisions and the decisions of others. In the words of Knight: "The existence of the problem of knowledge depends on the future being different from the past, but the possibility of the solution depends on the future being like the past" (1921 p. 313).

The key to dealing with uncertainty in the economic domain lies in the process of entrepreneurial discovery. Kirzner (1997) explicitly roots entrepreneurial discovery in the ideas of the great Austrian economists Ludwig von Mises and Friedrich Hayek. Specifically, Mises provides the view of the market as an entrepreneurially driven process, while Hayek provides insights into the role of knowledge and the coordinating role of the market in spreading and enhancing knowledge. Ignorance and discovery are the central characteristics of the market process. Ignorance—or differently put a lack of omniscience—will prevent equilibrium, while discovery will give rise to a tendency towards equilibrium.

Ignorance is not fully remediable by deliberate search and learning. Ignorance is an essential part of a world in which we have to deal with radical uncertainty, in the Knightian sense. Often we are hardly aware of our ignorance. Likewise, discovery is not to be equated with deliberate search and learning; there is always an element of surprise in it. Moreover, all real discovery is unplanned and thus to a large extent unintended. Not only has discovery an unpredictable element and is it somehow accidental, the results and consequences of it are also not fully predictable. Our future is partly constructed and determined by the choices we make. That renders the market process indeterminate and the market certainly not in a state of equilibrium at all times. But neither is it entirely directionless, in Kirzner's opinion, because of entrepreneurship[64].

Entrepreneurs are constantly on the lookout for potential profit opportunities. Their alertness to such opportunities leads them to action in order to grasp such opportunities. Results of such action are by no means assured, as is to be expected in a dynamic context of radical uncertainty: fallibility is acknowledged, errors are possible[65]. If, however, the entrepreneur succeeds in grasping a pure profit opportunity, dynamic competition will ensure that it is short-lived. Thus the power of the equilibrating process can vary greatly, as does the time

64 Radical subjectivists argue that uncertainty is so omnipresent that it is in fact directionless.
65 Joseph Schumpeter's "creative destruction" is illustrative of this line of thinking.

period it takes for an equilibrating move to appear. Empirically, though, it would seem that the equilibrating tendency is somehow there, even in extreme cases such as the 2007-2008 crisis.

When Peter Bernstein (1992) talked about arbitrage as the driving force of the market, one who is familiar with Austrian economics cannot fail to notice the resemblance to Kirzner's work, in particular his 2000 collection of essays, titled "The Driving Force of the Market". Austrians have typically limited their applied work to cases such as welfare economics and policy issues. Thinking of the market as a process would seem to be more like a state of mind or a broad conceptual frame than an actual description. But in the case of the workings of financial markets a quite narrow application seems possible: Austrian market process theory as a blueprint for arbitrage in financial markets.

A note of caution is in order here. Kirzner himself has said that "entrepreneurship cannot be reduced to any kind of arbitrage, because alertness does not remove all ignorance" (1979). That means that unnoticed profit opportunities will remain. It should be obvious that when Kirzner mentions "arbitrage" here, he means the academic variety: the instantaneous working of the universal Law of One Price. My comparison is about the actual arbitrage process in financial markets and Austrian market process theory. Indeed, Kirzner later states that "alertness is a concept, sufficiently elastic to cover not only the existence of existing arbitrage opportunities, but also the perception of inter-temporal speculative opportunities" (quoted by Binenbaum, 1995).

4.4 ARBITRAGE IN REAL LIFE

Arbitrage as a theoretical construct is by definition risk free. In reality there is no such thing. Practical arbitrage in financial markets always involves some degree of risk or uncertainty in the form of inter-temporality and a less than hundred percent similarity between securities. To illustrate what the process in financial markets entails, let me provide an example out of actual practice, which will bring a number of aspects of arbitrage to the front. The example is probably the most risk-free arbitrage opportunity that I have encountered in my own experience in the markets[66].

66 The only alteration from the deal as it happened is the stock symbol.

Example 1: real-life arbitrage

EIPE is a huge, publicly traded company, a global player with one of the biggest market capitalizations in the world. Its shares are primarily listed on the New York Stock Exchange. Options on EIPE shares are one of the most traded option classes in the United States: liquidity is extremely high and the bid-ask spread is minimal.

Securities markets, while widely accessible for people all over the world, are still characterized by certain barriers to transactions. For instance, foreigners often have to go through certain formalities, and incur costs to be able to trade overseas. With this in mind, the Amsterdam Option Exchange in 2000 decides that there might be interest amongst its clients and investors to trade options on EIPE shares on the Amsterdam exchange. Options on EIPE shares are listed in the Netherlands and a market is continually made in the securities[67]. Attention from the investing public, however, turns out being almost non-existent.

In December 2002 a professional trader takes a peek at these options and decides to compare the prices with those quoted in the US markets[68]. She is quite surprised to observe the following (all quotes in US $): [69]

	EIPE NL	EIPE US
C apr 45	1.60-1.90	1.20-1.30
C apr 50	1.00-1.30	0.70-0.80
C apr 55	0.60-0.90	0.40-0.50
C jul 45	2.50-3.00	2.00-2.10
C jul 50	1.40-1.90	1.10-1.20
C jul 55	0.90-1.20	0.80-0.90

She could purchase an EIPE C apr 45 in the US for $1.30 and sell it in the Netherlands for $1.60, creating an immediate profit of $30 per option contract[70]. How is this possible: two seemingly identical objects having vastly different prices? Perhaps, she pondered, they are not identical. A thorough inspection was done, including analysis by the risk management

67 A market being made means that there are continuous pricing quotes on which one can trade.

68 Overseas arbitrage is common practice in the financial markets: many shares have multiple listings on various exchanges in the world and simple algorithms are usually utilized to monitor price differences. In option markets this is less common and much more complicated.

69 C apr 45 denotes a call option on 100 shares of EIPE, expiring in April. 1.60-1.90 means that one will have to pay $1.90 to purchase the option and one will receive $1.60 to sell the option.

70 One call option gives the owner the right to purchase 100 shares, so the gain would be $0.30 multiplied by 100.

department, but nothing could be found; both securities had exactly the same specifications. So, was this a risk-free arbitrage opportunity?

One caveat showed up: exchanges are linked to clearing organizations. A clearing organization is essentially the warehouse of an exchange. It facilitates trading, arranging administrative matters such as transfers of money and securities between parties. In order to trade securities one needs to put up capital at the clearing organization, both for transaction purposes (liquidity) and as a guarantee against possible losses (solvency). Different exchanges have different clearing organizations, which usually are not linked to each other. In this case that meant that, even while the trade itself was entirely risk-free, capital had to be deposited at both the Dutch and the American clearing organizations until the position would unwind on the expiration date of the options. This has an important implication: because costs are incurred in setting up the position, certain trades are not profitable enough, given cost of capital and return on investment requirements. For instance, the $0.10 gain on EIPE C apr 55 and the $0.20 gain on EIPE C jul 50 were not enough to offset these constraints[71].

But other trades could be executed with enough profitability and so it was done. In three days 5000 options were bought and sold for an average net gain of $0.20, resulting in a $100,000 profit. After three days the opportunities disappeared; prices in the Netherlands and the United States now were in line with each other again.

What does this example tell us about the arbitrage mechanism? First of all, arbitrage opportunities are not obvious or easy to spot and execute. One has to be alert on spotting them, digging in the vast universe of financial products. Moreover, finding such an opportunity is indeed surprising, especially given the extremely high degree of similarity between the two securities in the example.

Secondly, arbitrage takes time: time for search and investigating the opportunity, time for execution, but also time until the gain is realized[72]. In fact it is entirely possible that the opportunity becomes even more advantageous. So the process is not only dynamic instead of static with instantaneous adjustments, but it is also to some extent indeterminate.

Thirdly, capital is required. As in textbook arbitrage—risk-free by definition—nothing needs to be said about risk attitudes or preferences in the example. A form of uncertainty presents

71 July options, because of their later date of expiration, require a higher return in order to produce the same annualized return on investment.

72 In this example, the full gain was ultimately realized when the options expired.

itself in the capital constraint: one might be forced for some reason to prematurely liquidate a position before the gain can be realized[73].

Fourthly, this is clearly a specialized activity, not accessible to just any economic agent. Access to information, means of execution, and capital (see the previous point) make such transactions the domain of a relatively small group of experts[74].

Fifthly, prices in this case are evidently subjective. It is not about one or the other price being too high or too low. Nothing needs to be said about the fair or fundamental value of the two securities except that they should be equal to one other.

And finally, in the process, over time, information can be revealed by the transaction. Other market participants, in particular the counterparties, will become aware of the differences in prices. This will tend to eliminate the arbitrage opportunity.

All in all, this example of real world arbitrage would seem to follow the depiction of the market process of entrepreneurial discovery quite closely. We have the trader in the role of entrepreneur looking for potential profit opportunities. Discovery of such an opportunity indeed lies "midway between that of the deliberately produced information in standard search theory, and that of sheer windfall gain generated by pure chance" (Kirzner, 1997, p.72). And finally, in the process, driven by dynamic competition between entrepreneurs/arbitrageurs, information is revealed and propagated through the market, which leads to exhaustion of existing opportunities but perhaps also to the discovery of new ones.

What also becomes apparent is that real arbitrage is not like the story of the $20 bills lying on the pavement. There are constraints, the opportunity is clouded by uncertainty, and it is not a matter of pure chance that can befall just anyone.

4.5 THE POSSIBILITY OF A MIDDLE GROUND

Now, it is nice to have a descriptive account of the arbitrage mechanism, but what are the implications for established finance theory? Does the Austrian perspective change the way we should think and theorize about what actually goes on in financial markets and the debate between neoclassical finance and behavioral finance? I assert that it can do in an important

73 Shleifer and Vishny (1997) provide an excellent illustration of how capital constraints and a limited number of agents can influence arbitrage.

74 MacKenzie has made the point, that, since the actors are a selective community, processes of social interaction, for instance imitation, might play an important role in financial markets (in Knorr-Cetina and Preda, 2005).

way. It alters how we should reflect on market efficiency, the domain where neoclassical finance has made its strongest claims. And it also helps to get a better, more realistic picture, a deeper insight in what agency in financial markets entails, an issue typically emphasized in behavioral finance. Moreover, there is no need to plainly reject the typical neoclassical and behavioral claims in full.

But before I foray in the specifics of reconciling the various accounts a question should be asked. Aren't these theories so fundamentally opposed to each other and essentially different that they are mutually excluding? Efficient contra inefficient, rational versus irrational/bounded rational, these appear to be deep and profound differences of opinion. However, if we take a close look at the kinds of theories that we are dealing with, and see what essentially is claimed, it will become apparent that these apparent rivals can coexist.

Mäki (1992a) has argued that Austrian market process theory has the structure of a causal process theory in that it, first, provides an account of a process as a sequence of events, and, second, that it depicts the driving forces that set and keep the process in motion, i.e. the causes of the motion[75]. Entrepreneurship represents a form of causal agency. Alertness acts as a causal power in that, ignited by the possibility of profit, entrepreneurs perceive opportunities (which may or may not turn out to be real) and act with purpose on those perceptions[76]. But that only provides an account of the emergence of a process. We also need to specify what is produced and how the process is sustained. Mäki answers that question as well. In the Austrian market process the obvious candidate for the stuff that is produced and propagated is information –the Hayekian part of the market process in addition to the Misean part of entrepreneurship. Information is reflected in disequilibrium market prices which function as imperfect signals.

Causal process theories can be distinguished from ideal type theories. The latter are not so much concerned with realistic descriptions of the workings of the world but rather take the form of what the world would be like if certain conditions are fulfilled. These conditions can be axioms, assumptions, theorems and the like. In this regard Mäki contrasts Austrian theory with Walrasian general equilibrium theory where the assumption of complete information results in one equilibrium price which clears all markets. Neoclassical finance has a similar ideal type structure: given the absence of arbitrage, financial markets will turn out to be efficient. And likewise for behavorial finance: given the cognitive limitations of human agents, their behavior will not be in line with what rational choice theory dictates and will display systematic biases. But the fact that Austrian market process theory is a different kind of

75 For Mäki's writings on Austrian economics in connection to philosophy of science and methodology, see Mäki 1991a, 1991b, 1992a.

76 That can also mean not acting, i.e. declining the opportunity because of doubts about the feasibility.

theory then neoclassical and behavioral finance does not suffice for complementarity of the former with the latter two.

To establish complementarity we need another insight on economic theories. Mäki (1992a) also argues that Austrian theory is an isolative theory in that it only is concerned with a particular slice of economic reality; in this case the essence of the functioning of the market as a process of entrepreneurial discovery. It aims to depict "the fundamental driving forces or the causal powers and the tendencies they give rise to" (ibid.). Elsewhere Mäki has argued extensively that the method of isolation is ubiquitous in economics (in particular Mäki1992b) and that appears to apply to neoclassical and behavioral finance as well.

The earlier remarks about neoclassical and behavioral finance can serve to formulate an essence for both of them. Neoclassical finance is about the (supposedly efficient) equilibrium outcome of the market process as the result of the No Arbitrage theorem and the interaction of economic agents. It hasn't any specific claims to make about how that process actually takes place, or about the agents that are engaged in the process (cf. Ross, 2005). Similarly for behavioral finance where claims are made on the decision making of individual agents in financial matters. It is neither about the process which is comprised of multiple agents, nor about the aggregate outcomes of the interaction between those agents. These theories focus on distinct slices of economic reality. There is a theory about individual agents and there is another theory about market outcomes. And, as I propose, there is yet another theory which tells us something about how market outcomes come about: Austrian market process theory. However, there are tensions which need to be addressed.

4.6 AUSTRIAN VERSUS NEOCLASSICAL

The main tension between the neoclassical and Austrian point of view would appear to be situated around the concept of equilibrium. Equilibrium is an important aspect in finance: it plays an explicit role in a number of theories. It becomes truly apparent in the work of Modigliani and Miller on the capital structure of the firm. They use an arbitrage proof for their theorem that—under certain assumptions—the choice between debt and equity financing is irrelevant to the value of a firm. Profit-seeking investors will ensure that the risk/return trade-off of debt and equity instruments will be equal: an equilibrium situation. In the words of Merton Miller (1999) himself: "The M&M propositions… are about equilibrium in capital markets—what equilibrium looks like". And indeed, given the assumptions for frictionless, competitive markets, the arbitrage principle will enforce equilibrium in such markets.

Where equilibrium really takes centre stage is in asset pricing models, beginning with the Capital Asset Pricing Model (CAPM). CAPM tells what asset prices should be in relation to the market as a whole, i.e. their equilibrium value, depending only on an asset's covariance with the market (Varian, 1993). That covariance has become known as beta. In its original conception CAPM is a so-called partial equilibrium model: it only pertains to one specific market[77]. But a general equilibrium derivation is also possible[78].

In later developments more factors besides beta were incorporated leading to the so-called multifactor models where more state variables can enter the equation[79]. Stephen Ross, explicitly starting from a no-arbitrage argument, developed Arbitrage Pricing Theory, which is a partial equilibrium approach. Robert C. Merton at MIT came up with an intertemporal capital asset pricing model, using the concepts of continuous time analysis (see Merton, 1975). His approach has been labelled a full general equilibrium model, having its roots in the work of Kenneth Arrow and Gerard Debreu (Bernstein, 1992, Miller, 1999a).

For the purpose of this discussion the difference is best expressed in terms of relative and absolute prices. General equilibrium is a form of absolute pricing, while partial equilibrium can be interpreted as more of a relative pricing approach[80]. The latter would clearly sit better with the subjectivism of Austrian economics, dating back to the Marginalist revolution and Carl Menger. So the semantics, what we mean by equilibrium, matters. A general equilibrium portrayal with all markets at all times in a state of equilibrium seems less realistic—and even more objectionable for an Austrian—than the assumption of one market being in equilibrium.

But even when we look at a single market, say a market for one particular stock, characterized by thousands of transactions each day, what does "equilibrium" mean? The only notion that makes sense is that each and every one of the single transaction prices is an equilibrium price, bringing together supply and demand at that point in time. The formulation makes something abundantly clear: there is invariable change, equilibrium is virtually constantly shifting. Clearly then an aggregate analysis for the stock market as a whole in terms of static equilibrium is problematic.

That is admitted by almost everybody. Yet such a description of capital markets is a keystone of finance. The Efficient Market Hypothesis comes in many guises (Lo and MacKinlay, 1999) but essentially, in Eugene Fama's own words (1970), it boils down to the idea that

77 Conform the Marshallian stance of the Chicago School.
78 Much depends on what one comprises under the phrase "market portfolio".
79 See for instance Cochrane (2001), for an exhaustive survey of asset pricing.
80 Although there are partial equilibrium models which provide absolute prices, like the Consumption Capital Asset Pricing Model (CCAPM).

"prices fully reflect all available information". That means that there is no possibility of outperforming the market, that there is instantaneous adjustment to new information, that there exist no arbitrage opportunities. In other words: a state of equilibrium and the omission of a process that would lead to such a state.

Finance, in the words of Perry Mehrling (2005), is about time, risk, and uncertainty: matching assets and liabilities to deal with the various hands that we are dealt with in life. The distinction between risk (quantifiable) and uncertainty (unquantifiable) is an important one. Most finance scholars, and economists in general, seem to be aware of the distinction, if we go by some of their words. But after acknowledging the existence of uncertainty, not much is said about it anymore. Through simplifying assumptions the emphasis in the analysis typically shifts to a quantifiable approach of the problem (see for example Merton, 1975).

The simplification is not a problem per se; in fact, that is part of doing science. But that does not make uncertainty disappear. In the social sciences in general, and in financial markets in particular, we would be well advised not to forget about it. Bernstein (1996) notes that "Knight's ideas are particularly relevant to financial markets where all decisions reflect a forecast of the future and where surprise occurs regularly". For Austrians the main reason for rejecting equilibrium reasoning lies in the recognition of radical, Knightian uncertainty.

Example 2: radical uncertainty within markets

Until approximately fifteen years ago Royal Dutch/Shell and Unilever were so-called Anglo-Dutch companies. Half of their shares were listed on the London Stock Exchange in the United Kingdom and half on the Amsterdam Stock Exchange in the Netherlands. A naïve account would suggest that both stocks represent the same value, of course adjusted for the different currencies. After all they represent the same piece of ownership, the same claim on future discounted cash flows. But in reality they never trade at the same prices. Now there are plenty of good reasons why they don't: fiscal regimes, market liquidity, institutional investment structures all differ between the United Kingdom and the Netherlands. Still, for trading purposes the dual shares should share a great degree of similarity. And they usually do. The way most arbitrageurs would trade on this similarity is by watching the spread between the Dutch and the British shares and apply statistics to decide which share to buy and which to sell short. The moving average would serve as point of reference and the spread would be put on and taken of according to the number of standard deviations that the spread was moving away from the mean. Note that use of a moving average provides a built-in safeguard for making sure that the position cannot easily get out of hand when the spread keeps widening and liquidity constraints force elimination of the position. It implicitly assumes a form of continuity in the price movement of both shares: gradual movements.

Because of the fundamental relationship and its supposed logical predictability, the position could be quite large, using considerable leverage as is usual in arbitrage trading.

Being among the largest companies in the world the Dutch shares of Royal Dutch/Shell and Unilever were also included in Standards & Poor's 500 Index, the leading American index for large cap stocks. In July of 2002 Standards & Poor's decided it wanted the S&P 500 index to consist only of American companies: the non-US companies Royal Dutch/Shell and Unilever would be replaced by domestic ones. The announcement came as a surprise to the market and led to mayhem. The share prices of both Dutch shares gapped (a discontinuous jump) and this set the spread with the British shares suddenly up to unprecedented levels. The S&P 500 was the leading index and as such the leading benchmark for many fund managers. Their performance is measured by comparison to the index and in many cases their investment policy was, or had to be, investing by following the index. The consequence of removal of the Dutch shares was that fund managers had to remove them as well from their portfolios: enormous amounts of Dutch shares had to be sold by the mutual funds. Moreover, they had to be sold quickly in order to keep tracking the index. While some may have gotten lucky by being short Dutch shares and long British ones, many arbitrageurs were caught in a trap. Moreover, with the spread getting so far out of line and leverage being used, some were forced to liquidate their positions at the most negative of points, exacerbating the situation[81]. A situation arose where at the same time while people were liquidating their positions taking huge losses, the profit opportunity was unprecedented. This can hardly be regarded as a stable, equilibrium situation. In time, the spread gradually moved back to more normal levels (which is only logical if the trading strategy remained somewhat identical)[82].

Could the arbitrage traders have foreseen the decision to remove the shares from the S&P 500, a decision taken by policy makers and which had nothing to do with (beliefs about) the underlying performance of the companies? Judging from the market reactions the market hadn't anticipated such an event. So it did neither enter the trading model, nor the risk management models.

Acknowledging uncertainty sheds light on various issues in finance. If we accept Knight's claim that economic life, "business", is characterized by uncertainty, then so should asset prices. Market prices are estimates. Covariances of assets with the market portfolio are estimates as well for the simple reason that the market portfolio is not a well-defined concept[83]. Furthermore, covariances are about past behavior and as Harry Markowitz already noted

81 Along the lines of what Shleifer and Vishny (1997) show.
82 This arbitrage trade is actually still employed by hedge funds.
83 This is the point of the so-called Roll critique: the market portfolio is an ambiguous concept because theoretically it should comprise any asset that has value, including such non-measurable items as human capital and goodwill (Roll, 1977).

in the 1950s, past experience is unlikely to be a very good guide to future performance (Bernstein, 1992, p.63).

In a sense the Efficient Market Hypothesis does justice to the consequences of uncertainty: the current price is the best estimate, rendering prediction useless. The Efficient Market Hypothesis, also known as the Random Walk, is what has given rise to the big question of financial markets: can one, consistently, beat the market? The evidence is mixed, depending on method, time-frame, data massaging and some insurmountable methodological issues[84] [85]. Fama himself acknowledges that "like all models, market efficiency…is a faulty description of price information" (1998) and in time he has adjusted and refined his opinion somewhat. His claim, however, remains that in general nothing fits better –in terms of statistical significance—and that critics, mostly coming from behavioral finance, have not been able to come up with a more convincing model.

But in a way the efficient markets argument excludes the possibility of error and denies the dynamic character of price formation in financial markets. The point becomes sharply clear when a translation is made from the Efficient Market Hypothesis into the assumption of a lognormal distribution for asset prices, which is quasi-universal in theorizing in finance. It is a perfect example of transforming uncertainty into risk. When the distribution is known, either a priori or through empirical results, we speak of risk, just like Knight meant it. But the lognormal distribution is not the distribution that is observed empirically (see Bernstein, 1992). Real distributions typically display so-called fat tails, i.e. a higher frequency of extreme values. These types of distribution are problematic in theorizing and model building, which makes it convenient to use the lognormal distribution[86]. The step of transforming uncertainty into risk can be defended and is common in other areas of economics and abstraction and idealization are part of doing economics and science in general (see Mäki, 1992b). But by adding subjective estimates to objective risk, the meaning of "risk" changes and is no longer in line with Knight's definition. In making claims about the real world we should keep in mind that we are also dealing with uncertainty, besides objectifiable risk, and that what is actually empirically observed is a distribution with fat tails.

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84 There is an extensive amount of empirical work on market efficiency, see for example Jensen (1978), Malkiel (2003), Shiller (2003).

85 The Efficient Market Hypothesis is a joint hypothesis. Tests of market efficiency always imply simultaneously the test of an asset pricing model such as CAPM.

86 "Fat tails" are characteristic of infinite variance distributions. These distributions prohibit the mean-variance analysis which is so typical for much economic and econometric work. The possible accuracy of infinite variance distributions, as put forward by Benoit Mandelbrot, raised widespread concerns amongst economists over the validity of their results, which were based on normal distributions. The issue was settled in a rather pragmatic way by deciding that the assumption of normality was the best workable hypothesis (Mehrling, 2005; MacKenzie, 2006).

Something similar applies to Option Pricing Theory. Option Pricing Theory is a theory that actually deals with the open-endedness which is typical of many situations in the real world. Black, Scholes, and Merton developed tools to put a price tag on uncertainty. Derivatives derive their value from another asset: they are contingent claims. It is obvious that derivatives can only have value if there is uncertainty surrounding the underlying asset. The key to Option Pricing Theory is the volatility of the underlying asset, measured by its standard deviation. Unfortunately, volatility is an unpredictable entity: we can only determine afterwards how much movement has occurred. That means that volatility is uncertain, as has been acknowledged by Black: "I am unwilling to write down any definitive model of the general process by which volatilities change, and then use statistical methods to estimate the numbers that appear in the model" (in Mehrling, 2005). In other words, Black refused to transform volatility from an uncertain entity into a risky one and recognized the difference between the two.

The problem in finance is also methodological. As was shown in chapter 2, the method of argumentation in finance, in both the neoclassical and behavioral varieties is usually a narrow statistical treatment of empirical data. Methodologically it is positivist in the particular sense of Milton Friedman's 1953 essay "The Methodology of Positive Economics" (Miller, 1999b). Now there is nothing wrong with good empirical work and proper use of statistics therein[87]. But there is a sharp distinction between objective probabilities and subjective estimates. The former is not subjected to uncertainty and applies to the future as it does to the present and has done to the past. The latter is tentative; an educated guess for present and future, based, among others, on past experience but not exclusively so. Most finance research clearly is concerned with the domain of subjective estimates, but is not explicitly presented as such.[88]

In this regard, one may sympathize with the Austrians in their distrust of quantitative methods and formal modelling. Because those methods do not justice to the substantive content of the market process, and because of the frequent inappropriateness of an exclusively quantitative approach. The Austrian School has been commended for its attention to methodology, compared to other strands of economics (see Hands, 2001). Finance never has been bothered too much by methodological considerations. In chapter two Merton Miller was quoted: "the profession, from the outset, wholeheartedly adopted the Friedman positivist view: that what counts is not the literal accuracy of the assumptions but the predictions of the model" (1999b). Predictions are either borne out by the facts or not. But in the face of radical uncertainty awareness of this and some modesty about predictions should be advisable.

87 see McCloskey, 1994, 1998, and especially 1996 and McCloskey & Ziliak, 2008
88 This applies as well to much of mainstream economics, when using Savage's expected utility theory.

I propose that the Austrian market process account, which tells a story of price discovery, knowledge, and information and how people deal with those things, can supplement the claim made by the Efficient Market Hypothesis. The equilibrating tendency of the market process is a better description of what is going on in actual markets. Indeed, many of the finest finance scholars have acknowledged this. Fischer Black again serves as an excellent example. Black was a firm admirer and believer of the equilibrium concept as there ever was one; reportedly he even tried to apply CAPM to various aspects of his life (Mehrling, 2005). But he recognized the difference between value and price and he admitted that what actually happens in markets is a different story[89]:

> An efficient market is one in which price is within a factor 2 of value, i.e. the price is more than half of value and less than twice value… The factor of 2 is arbitrary, of course. Intuitively, though, it seems reasonable to me, in the light of sources of uncertainty about value and the strength of the forces tending to cause price to return to value. By this definition, I think almost all markets are efficient almost all of the time. 'Almost all' means at least 90%" (Black, 1986).

And further back in time, for James Tobin it was his discomfort with the highly restrictive assumption of complete equilibrium at all times that led him towards the Separation Theorem[90].

More recently, others have explicitly suggested leaving the equilibrium concept behind us (for instance Campbell, 2000). Interesting in this regard from an Austrian point of view is the work of Harald Benink et al. (Benink and Bossaerts (2001), Benink, Gordillo, Pardo and Stephens, (2010)). They label their approach Neo-Austrian, referring to Hayek's insight on knowledge and learning, and Kirzner's entrepreneurial discovery process. At the same point Benink et al. apply familiar tools of finance theorizing: formal model building, simulation, statistics. This might be objectionable to some in the Austrian School, but it does provide an illustrative way of comparing an Austrian-type perspective to the neoclassical one: it shows what disequilibrium—with an equilibrating tendency—looks like.

What it looks like is a "process…stable yet continuously featuring inefficiencies, keeping the market from reaching its fully efficient equilibrium" (2001). Investors are not completely ignorant, but their knowledge is limited: "(they) are unable to exploit all inefficiencies because they cannot make reliable inferences" (2001). Their conclusion is that "if inefficiencies

89 Fischer Black, of course, was not solely an academic, having spent a considerable part of his career on Wall Street at Goldman Sachs.

90 Tobin's Separation Theorem states that the selection process for a risky efficient portfolio is completely separate from the portfolio allocation decision between risky and risk-free assets (Tobin, 1958).

are of the neo-Austrian kind, not much can be said beyond admitting that inefficiencies exist". Benink and Bossaerts present this as a paradox, but is it really? It is not when one acknowledges the existence and presence of radical uncertainty, the kind of uncertainty that causes disturbances and forces us to grapple with reality.

That is exactly what an Austrian would argue. Thus the findings of Benink and Bossaerts could be regarded as evidence of the validity of Austrian insights in the market process. They are also of importance for the debate between neoclassical and behavioral finance in that they show that market inefficiency is not necessarily to be equated with opportunities to beat the market in a consistent fashion. The keyword here is "consistent". It is one thing to state that a market is not fully efficient and another thing to claim that there exist systematic tendencies in that market which can be regularly exploited.

That takes a bite out of some of the behavioral criticism, in particular from Richard Thaler and his followers who claim that there is money to be made from the so-called anomalies (see for instance DeBondt and Thaler, 1986 and the previous chapter)[91]. Others, like Robert Shiller (1989) and Stephen LeRoy (1989), seem to claim only inefficiency, not opportunities to make money. The market displays too much volatility to be deemed efficient, but is also too volatile and unpredictable to make easy money. The latter position seems reconcilable with the Austrian perspective of disequilibrium.

On the other side one cannot fail to notice the similarities between the Efficient Market Hypothesis and Hayek's thought on knowledge and learning. Both are about information and price formation, about discovery and dispersal of knowledge through the market. The Efficient Market Hypothesis as such is clearly not a realistic proposition. It highlights the link between information and price formation but supposes that people translate information unambiguously and instantaneously in prices. The Hayekian insights take a step back from the idealized and unrealistic picture of efficient markets, but can be regarded as complementary, providing content to the process. Hayek and the Austrians give us a handle on how actual prices come about, what they accomplish, and in general provide an account of the coordinating properties of the market.

Quite a bit has been written on the links between Hayek and neoclassical economics, in particular the Chicago School. Recently Colin-Jaeger & Delcey (2019) took this one step further towards finance by investigating the similarities between Hayek and Eugene Fama. They conclude that, despite methodological differences, the theory of prices, based on information, of Fama and Hayek is epistemologically similar, as is their conception of efficiency.

91 See chapter 3 for a performance test of neoclassical and behavioral investing.

In other words, they share common understanding of how markets, competition and prices work based on a common understanding of the notion of information. "This common understanding reveals a common representation of the interaction between individuals and then an answer to the problem of coordination" and "rationality is consequently not a hypothesis but the result of competition", according to Colin-Jaeger and Delcey (ibid.). Furthermore, they contend that Hayek underlines the entrepreneurial process of the competition, with reference to Kirzner and that traders may be seen as (Hayekian) entrepreneurs.

Finally, as was shown in the example, the market process, with its focus on alert entrepreneurs looking for potential profit opportunities provides an account of the dynamics that drive the market towards efficiency, towards equilibrium. One of the attractions of equilibrium theorizing is the identification of optima: states where some criterion is maximized. But not much is sacrificed if we take an Austrian non-equilibrium stance. The outcome from the preceding analysis is still a preferable one from a social perspective: a fair, reasonably well functioning market, tending towards optimality.

Does this render the equilibrium concept entirely useless, as is claimed, for instance, by Ludwig Lachmann? I don't think so, and neither do Kirzner and Hayek (see Kirzner, 1992). It is clear that in finance equilibrium theorizing has produced impressive results[92]. Neoclassical and Austrian analysis, both rooted in the Marginalist Revolution, analysis can coexist, depending on the questions asked and what it is that we want to explain –the explananda.

4.7 AUSTRIAN VERSUS BEHAVIORAL

It would appear that behavioral finance would be in a better position to deal with uncertainty. After all, their starting point is decision making under uncertainty. Behavioral economists have in common an emphasis on cognitive limitations and the role of perception, intuition, reflexivity, and the use of heuristics in complex situations. They do recognize the troubles of individuals finding their way in an uncertain world. However, the way behavioral economists treat decision making does not differ much from their neoclassical colleagues by the transformation of (Knightean) uncertainty into risk.

Behavioral finance commonly backs up its claims with experiments. Typically in experiments the environment is controlled, the goal being to isolate certain aspects. Which is common practice in science. But what is the value of the outcomes of such experiments, done in a closed setting, for the open reality? The question, also known as the problem of external

92 Perhaps we should think of an analogy with the Second Law of Thermodynamics, which defines the equilibrium condition, yet also states that it will never hold.

validity, is particularly relevant when uncertainty is considered. After all, it is precisely the dynamic, complex character of real life that causes uncertainty in the first place. Experiments are typically framed as choices between cut-and-dried alternatives. Let's suppose it involves the choice between receiving $20 today or $25 tomorrow. The idea is that we can infer something about time-preference here. It would seem like a good idea to wait for a day and receive $5 more. But who is to say that, when I choose the first option of $20 today, I won't receive some other amount tomorrow? Those kinds of possibilities are typically excluded. Experiments might not be very appropriate for situations where uncertainty is prevalent, as for instance in financial markets.

Another issue is the claim that there exist systematic anomalies in financial markets caused by less than rational investor behavior, that there are irrational acts we all commit. For instance, in one of the earlier contributions in behavioral finance, "Does the Stock Market Overreact?" (1985) DeBondt and Thaler claim that stock prices systematically overshoot (both up and down) upon the arrival of new information. This is due to investors updating their beliefs in a non-Bayesian manner: more recent information is overweighed. From an Austrian point of view, that result is perfectly defensible. Kirzner has repeatedly (1992, 1997, 2000) pointed out that, in the face of the imperfection of knowledge and the element of surprise, people are frequently overly optimistic or pessimistic. Such perceptions and the resulting mistakes are essential parts of the make-up of human agents, entrepreneurs in particular. But "although entrepreneurs make errors, there is no tendency for entrepreneurial errors to be made" (Kirzner, 1997). That leaves the behavioral claim just as deficient as the standard neoclassical picture of the omniscient rational maximizer. Uncertainty entails that every situation is unique and that people's actions and reactions are not uniform (Knight, 1921). Any grand claim about systematic behavior therefore denies the indeterminateness of life caused by uncertainty.

Still, one of the biggest issues in the debate between neoclassical and behavioral finance concerns the rationality of investors. Most of us simply do not behave according to the normative model of rational decision-making, as has been made abundantly clear by Daniel Kahneman, Amos Tversky, Richard Thaler and others. They take issue with the assumption that "only rational behavior can survive in a competitive environment" (Kahneman and Tversky, 1979).

Financial markets are (or are supposed to be) vigorously competitive. So is the irrationality, which belongs to our psychological make-up present and visible in the market, as has been suggested by Thaler but also much earlier by Keynes (see Raines and Leathers, 2000)? The neoclassical reply is the idea of "a few good men": "neoclassical finance is a theory of sharks (i.e. arbitrageurs), not of rational homo economicus" (Ross, 2005). As was said before:

arbitrage is the driving force in financial markets and for arbitrage to work there only need to be someone who prefers more over less. In other words, there is no need for a universal rationality assumption. In the words of Ross: "I, for one, never thought that people—myself included—are all that rational in their behavior. To the contrary, I am always amazed at what people do. But that was never the point of financial theory" (ibid.).

The point is that in a highly competitive market environment suboptimal behavior should be weeded out. Despite people constantly behaving "irrational", the market outcome can be pretty efficient, as has been forcefully argued by many, for instance Merton Miller (1987) and Vernon Smith (1989). That is also a conclusion of the Kirznerian Austrians. In general, Hayek (1967) notes, "that the systems of rules of individual conduct and the order of actions which results from the individuals acting in accordance with them are not the same thing". For Austrians the economic issue par excellence is the aggregation and coordination question. Despite the method of praxeology, their focus lies not so much on the actions of individuals, but on the consequences of the interaction between individuals.

One important question remains: who are these arbitrageurs/entrepreneurs who make it right? What is this "smart money"? If we are all subject to uncertainty and an open-ended future with which we have to deal with our cognitive limitations and "irrational" inhibitions, how can we expect that there are people who constantly make optimal decisions? I believe it rather unlikely to encounter such people; in fact I'll posit that there aren't any such living persons.

The answer to the question lies in separating real human individuals from agents in financial markets. There is no such thing as someone being a one hundred percent entrepreneur or a one hundred percent speculator. Both aspects are present in real people. Heterogeneity of agents resides within actors, not between them. Mises has said it correctly: "in any real and living economy, every actor is always an entrepreneur and a speculator" (quoted by Wubben, 1995). In finance a similar distinction has been made between informed traders, arbitrageurs who make the most out of information, and noise traders, who might believe they act on genuine information but are actually not doing so (see Black, 1986).

Noise can actually be regarded as the main reason why we observe so much trading in financial markets: people having different opinions and acting on those varying opinions. However, it is not so easy to distinguish between noise and "true" information. It is only ex-post that we can determine who had it right. In fact, an investor can be both noise trader and informed trader at the same time: he can be right about one investment idea while being wrong on another count. He can be noisy one day, informed the next. We simply cannot tell in advance. It is only in the dynamic market process that true information is revealed, that

noise is filtered out and that we can determine whether one has been a successful entrepreneur or a speculator.

The actual practice of professional investing is an effective illustration of this. There aren't any investment managers with a track record of consistent outperformance. Even highly successful and well-known names, such as George Soros and Warren Buffett, have taken their lumps occasionally. In fact, there is evidence that the performance of money managers is mean-reverting: outperformance in one time period increases the likelihood of underperformance in the next period (Bernstein, 1992).

That does shred some doubt on the behavioral claim. If investment performance is not traceable to individual human behavior, but rather the result of "pervasive market forces" (Miller, 1987), how much do individual characteristics matter? Moreover, if all our behavior is tentative, while still being deliberate and purposeful, an element of randomness enters the equation inevitably. In this way speculation, so often considered as undesirable and damaging to society, loses that negative connotation, as it also does in the writings of Mises and Knight. Speculation is an inextinguishable part of the discovery process.

Methodological individualism and attention for so-called microfoundations are hallmarks of the great majority of approaches in economics, including the Austrian School with Mises at the forefront (Hands, 2001). But Mises was aware that entrepreneurship is a property of individuals, not a typology or class of individuals. There is no use or need for a fully reductionist account of what goes on in financial markets.

4.8 CONCLUSION

Austrian market process theory can bridge some of the schism in finance between neoclassical and behavioral finance. It shouldn't come as a surprise that the Austrian School has interesting things to say about finance and financial markets. On the neoclassical side, Hayek, whose influence goes far beyond Austrian thinking (or economics) alone, spent a substantial part of his academic life in Chicago. Fritz Machlup, himself a student of Mises, was the teacher at Johns Hopkins of Merton Miller who has had a profound influence on later scholars of neoclassical finance. Mehrling (2005), while dismissing it in the end, entertains the idea that Fischer Black somehow belonged to the Austrian School. Black's view that financial markets may not be fully economically efficient, but that they are to a large extent financially efficient, is shared by many today, amongst whom Fama and Malkiel. The

Austrian and Chicago School share a preference for, and belief in, markets as coordinating institutions[93].

With the more Keynesian oriented programs Austrians share, among other things, the acknowledgement of uncertainty; in the case of the post-Keynesians even very explicitly. What they do not share, however, is the Keynesian scepticism on the working of markets. Keynes, despite being an avid investor and speculator himself, considered the stock market a beauty contest: "a game of Snap, of Old Maid, of Musical Chairs" (quoted in Bernstein, 1992). But that scepticism doesn't seem fully warranted, it appears. "The dark forces of time and uncertainty" are not so sinister through Austrian eyes. With behavioral school the Austrians share recognition of error and the faltering nature of human behavior, despite differences about how these affect aggregated outcomes.

Some Austrians may have issues with the foregoing analysis. They may object to the use of quantitative and statistical methods by Benink et al. And, as pointed out by Colin-Jaeger & Delcey (2019), despite the epistemological similarities between the ideas of Fama and Hayek, their methods were profoundly different: the analytical quantitative rigor of neoclassical finance versus the descriptive causal process approach of the Austrians. They may also object to the real world examples, used as illustrations here. But the empirical material does fit in with Hayek's more permissive methodological stance of discovering patterns.

Austrian economics can provide a bridge between the behavioral and neoclassical approaches to finance. What is more, it also provides a descriptive bridge between practice and theory, between academic finance and the real events in financial markets. That is important because it would seem that the various roles of theory and models are frequently conflated[94]. One can often encounter the idea that finance, following Milton Friedman's adage, is about meaningful predictions. At the same time, the Efficient Market Hypothesis can be interpreted as stating that there is no meaningful prediction possible. Finance theory, despite that most academic work has been and is empirical (see chapter two), is essentially a normative, prescriptive theory; not how it actually is but how it ought to be. The practical value of a descriptive account, such as proposed here, resides in identification of deeper causal processes, finding potentially relevant tendencies. Austrian market process theory can deliver those for financial markets.

The dangers of indiscriminately applying normative theory in the practice have become painfully obvious in the notorious demise of LTCM, a hedge fund that pursued an extreme

93 Quite a few prominent Chicago School economists appear to have been labeled "Hayekian" by certain authors (Colin-Jaeger & Delcey, 2019).

94 See Mäki (2001, 2006) for a broad outline of the various properties and purposes of models and theory.

arbitrage strategy (see Lowenstein, 2000; Mehrling, 2005; MacKenzie, 2006). Nobel Prize winners Scholes and Merton were actively involved in LTCM, somehow believing that the world had started resembling their model world more and more, implicitly assuming that uncertainty had become negligible or that it was transformed correctly into quantifiable risk.

It is precisely that uncertainty that has become one of the main concerns of regulators and policy makers with regard to financial markets, and rightfully so after the events of 2007-2009. Today's financial system is a global sphere with uncountable links and connections. Capital is, together with information, the fastest moving resource in modern society. It is practically impossible to attach meaningful, objective probabilities on potential dangers. But that doesn't mean that we should forget about those dangers: a system is as strong as its weakest link.

Even when the weakest link seems to give way the Austrian account of the market process provides explanation –and perhaps consolation. "Crashes" seem a lot less formidable when one regards the market as a dynamic process. It is not simply that "what goes up, must come down". Rather financial markets are a dynamic environment where, through trial and error, participants learn and discover while at the same time being put on the wrong foot again by a new sequence of events. In a way financial markets, despite all the turmoil, have proven to be quite robust and resilient institutions of society, even after the events of 2007 and 2008; the Austrian account provides a possible explanation for that.