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**The World is My Oyster:  
Finance in a Globalizing Society**

Inaugural lecture prof.dr. Remco C.J. Zwinkels, Amsterdam, 21 February 2018.

**1. Welcome**

Mijnheer de rector, collega's, familie, vrienden, studenten, en anderszins geïnteresseerden. Zoals u zich wellicht kunt voorstellen, kan een zichzelf respecterende hoogleraar *internationale* financiële economie zijn oratie niet in het Nederlands uitspreken. Ik zal daarom nu overgaan naar het Engels, maar in het dankwoord kom ik weer even bij u terug in het Nederlands.

Mister Rector, colleagues, friends, family, students, and otherwise interested. Welcome to this inaugural lecture, in which I will formally accept the position of Full Professor of International Finance at the Vrije Universiteit Amsterdam. There are many ways to approach an inaugural lecture. I have chosen to give an overview of what I have learned over the years through my research, the implications of my findings, as well as a discussion of what I want to explore further during my professorship.

**2. Finance – Behavioral finance**

It is an exciting time to be an economist. Over the past decade, we have gone through a period of economic hardship, followed by a strong recovery. The global financial crisis, triggered by the implosion of the sub-prime mortgage market in the United States, climaxed with the bankruptcy of Lehman Brothers. In Europe, the global financial crisis transformed into a sovereign debt crisis, from which we are still recovering today. In Asia, the financial hubs Singapore and Hong Kong experienced tremendous declines in GDP. Hence, what started as a major price drop in the market of one particular product in a single country, developed into a global financial crisis.

Economists have often been criticized for not having foreseen the global financial crisis, or any crisis for that matter. Among the reasons that have been put forward in the literature for this disappointing performance, is that people are assumed to be homo economicus:

rational expectations combined with wealth maximizing preferences. As a result of assuming these personal characteristics, all people will largely behave the same and there is a one-to-one correspondence from the individual investor to the market. In such a setting, the market will be efficient: prices fully reflect underlying value. This is a very elegant and mathematically convenient way of approaching human behavior. In such a setting, however, it is almost impossible to explain crises without large exogenous shocks. As such, forecasting becomes fundamentally impossible.

Whereas this neoclassical approach to economic behavior can be seen as normative, the behavioral finance approach is more positive in nature. It does not prescribe, but rather describes financial economic decision making. Instead of making a number of strong assumptions about individual behavior, the behavioral finance literature empirically studies how people make decisions, and how these decisions affect price formation at financial markets. As a result, markets are not assumed to be efficient ex-ante. Behavioral finance enriches neoclassical finance by introducing aspects from other fields, such as psychology and sociology. The field has come a long way over the past decades, also judging from the Nobel prizes that have been awarded to researchers active in behavioral finance and economics. It has developed itself from a line of research merely criticizing the status quo, to also providing alternative models and approaches. This is perhaps best illustrated by the work of Kahneman and Tversky, who have introduced a novel way to capture the risk attitudes of people.

### **3. Expectation formation**

When making (financial) decision, people use two ingredients: an expectation about possible future outcomes, and an attitude towards risk. When deciding on which stock to invest in, we first determine our expectation of future risk and return of the stock, and then ask ourselves how much risk we want to take with this trade. The traditional approach to expectation formation, is to assume that expectations are rational. That is, all relevant information is taken into account, and this information is used correctly. As a result, people will not make systematic mistakes when forming expectations. Research shows, however, that the expectations of individuals are not consistent with this theory. People make

mistakes, and the mistakes are systematic. It appears that the human mind is not capable of collecting and processing all relevant information.

Whereas the aforementioned Kahneman and Tversky have introduced the Nobel-prize winning concept of Prospect Theory as an alternative approach to risk preferences, behavioral finance has not yet provided a single alternative for the rational expectations hypothesis. Many studies show that the expectation formation process of individuals is not rational. At the same time, a wide range of alternative ad-hoc models have been proposed. There is not, however, a grand unifying theorem.

Let me illustrate this point with an example. To do so, I need your help. Please take your phone to navigate to the website indicated on the screen, and answer the following questions.

1. Which is your favorite football team in the Netherlands?
2. Rank the clubs by probability of becoming champion in 2018, from high to low.

I asked these questions many times to different audiences. Even though this is clearly not a scientifically sound research setup, the results typically do point towards some interesting findings, consistent with the findings of more serious experiments. First of all, we observe that people who prefer that a certain club becomes champion, also have a higher tendency to expect that club to become champion. If I want Feyenoord to become champion, my expectation of the probability of Feyenoord to become champion is relatively high. In other words, there is an interaction between preferences and expectations. This is not consistent with the rational expectations hypothesis. When asking people to motivate their answers, we learn interesting things about expectation formation. When asking for the probability of Feyenoord becoming champion, some people reply “1/18, because there were 18 years between the previous two championships”. Economists would call the model used in this reply “mean reversion”. When asking for the reason why Feyenoord would become champion again in 2018, some people reply “because they became champion last year”. Economists would call the model behind this reply “momentum”. Finally, some people expect Ajax to become champion because they have the largest turnover of the top three

teams in the country. Economists would call the model behind this answer this “fundamentalist”.

#### **4. Heterogeneous agents**

A common denominator in these replies, is that people have a tendency to simplify the expectation formation process. Specifically, people use one single piece of information and base their expectation entirely on this particular piece, ignoring other pieces of information. In other words, people use “heuristics”, or rules of thumb when forming expectations. This makes the decision making process easier, as it requires less information processing. Furthermore, as people use heuristics in expectation formation, it immediately implies that people are no longer necessarily the same. Not everybody uses the same heuristic. Stepping away from the assumption of rationality paves the way for heterogeneity. After all, there is only one way of answering a question correctly, whereas there are infinite ways of making mistakes. People are different, so their expectations are different as well.

In the answers on the football championship, we have already seen a number of well-known heuristics in expectation formation. The question is: which one do we use, and when? It turns out that people have a tendency to switch between heuristics conditional on their past performance. That is, if “momentum” did a relatively good job in predicting outcomes in the recent past, more people will start using the “momentum” heuristic. In other words, if the neighbor makes a lot of money by buying Bitcoin, I want to buy bitcoin as well. Not necessarily because I did a thorough economic analysis of the fundamental value of bitcoin, but because I want to do as least as good as my neighbor.

The question that has always intrigued me, is how the behavior of individual investors aggregates to a market price, and how markets across countries are related. In the football example we just discussed, there is no relation between the individual’s expectations and the outcome: No matter how badly I want Feyenoord to become champion, my actions will not directly affect the outcome. In financial markets, however, my actions do affect the outcome because my buy or sell behavior is part of the price formation process. The question is, then, how the heterogeneity of investors impacts prices. Is it the case that a positive group of investors is matched with a negative group of investors, causing the

resulting market price to be correct? Or does it cause systematic deviations in market prices?

Interestingly, we might be able to find part of the answer in the animal kingdom, as illustrated by the following clip. What we see here, is a flock of starlings (spreeuwen) over the eternal city of Rome. As a group, they form spectacular forms and shapes that change continuously. Interestingly, this type of group behavior by birds can be replicated in a computer simulation by giving individual birds two simple heuristics: Number one: stay close to each other in order to save energy and hide from predators; heuristic number two: do not come too close to each other, as touching wings might cause harm. Birds also switch between these two heuristics, alternating between approaching and distancing; coming closer, but not too close. Combined with some external factors such as wind, a clock tower, or a cat, creates the complex looking shapes as shown in the clip. In other words, individuals applying very simple behavioral rules are able to generate complex shapes as a group.

By the same logic, individual investors applying simple expectation formation heuristics, might as a group generate complex dynamics in market prices. The switching mechanism I just described, implies that the use of a certain heuristic will be the same within a certain group of people. If the group is large enough, the dynamics of the market price will start showing similarities with the heuristic. If many people use the momentum heuristic, the market price will also show momentum dynamics. If a big enough portion of market participants switches to the fundamentalist heuristic, however, the data generating process behind the market price also changes. Financial markets are a dynamic self-referential system. As a result, the movements of markets are characterized by nonlinear or sometimes even chaotic dynamics. In such a system, bubbles and crashes can arise endogenously, so without any large news items. Unfortunately, this implies that also in this approach it is fundamentally impossible to predict crises. Whereas the underlying mechanism is different, the social interaction approach will not yield more accurate predictions than the neoclassical approach. It is not possible to predict how the flock of birds will develop, as there is no masterplan; the changes arise from within. What is possible, however, is to study the stability of the system. That is, based on simulations it is possible to test whether certain measures make a market more or less stable and efficient. Hence, although we are not able

to give a point forecast what a transaction tax would do to the stock price, for example, we are able to say whether market volatility will increase or decrease, on average.

## **5. International capital markets**

Thus far, I have explained how individuals form expectations, and how a group of individual expectations forms a market price. The subsequent question is how markets are connected internationally in this framework. Clearly, the economies of countries are connected through what we call real linkages: imports, exports, and investments cause business cycles across the globe to be correlated. At the same time, liquid capital is flowing across the globe with increasing speed and ease, between an increasing number of financial products. This is sometimes dubbed the financialization of society. Globalization has caused capital controls to go down over the past decades; the number of countries in which it is legally possible to invest directly has been rising steadily. With the creation of the European Union, capital can flow freely between member states. Furthermore, technological progress has caused exchanges to become fully digital. This has major implications for the accessibility of global financial markets. I can buy shares in New Zealand within seconds using my mobile phone. In addition, policymakers have introduced a large number of measures in reaction to the global financial crisis. One of them, is the creation of central clearing platforms in order to mitigate the credit risk arising from over-the-counter trades. The result, however, is that certain financial products, like derivatives, that would otherwise only be tradeable bilaterally, are now traded on a platform that highly resembles a secondary market. Again, this increases the accessibility of financial products as well as the connections between global market participants. As a final example of financialization, we see that financial engineers are building more and more derivative products based on all sorts of assets. Especially commodities, that used to be hard to trade financially, are now also accessible to financial investors.

All in all, the financialization trend implies that capital flows increasingly free between global financial markets. Theoretically speaking, seen from the neoclassical perspective, this is a positive trend as it increases global risk sharing possibilities. Markets are becoming more complete. At the same time, we also observe that markets are becoming more integrated:

the correlation between financial markets has been increasing steadily since the 1950's. The returns of the equity markets of different countries are thus becoming more equal, but also the returns of different asset classes. This implies that it becomes increasingly difficult for the international investor to find diversification benefits from investing in other countries or asset classes. The globalization of finance therefore also causes risks to cluster, and therefore systematic risks to increase.

## **6. Market integration and sentiment contagion**

Ornithologists have shown that starlings have the ability to observe the behavior of approximately seven other birds in their surroundings. Equivalently, in a financial market in which stocks are traded on one physical location, the entire market at a particular moment is given by the group of people surrounding the market maker. The question is, however, what would happen if due to some technological advancement the market would all of a sudden become digital, with an infinite number of participants. When we did the online survey earlier in this lecture, I used a tool that immediately created interaction between the audience and myself, but also between the members of the audience: You directly saw the answers projected on the screen, and perhaps some of you also started discussing with the people in your proximity. It might not have happened consciously, but it is conceivable that the answers given by other members from the audience, who replied quickly, affected your own answer. Most likely not on the first question regarding your preferences, but perhaps on the second question regarding your expectations. In other words, we experienced a technological advancement that created social interaction.

Making the comparison to financial markets, we can conclude that financialization contributes to the jump from a small group to a global population of investors. The question subsequently arises whether the social interaction we discussed before at the market level now also scales up to the global level. To do so, we have studied to what extent the increase in market integration since the second world war is due to the synchronization of business cycles or due to the synchronization of investor sentiment. It turns out that the increase is *fully* driven by the latter: globalization has only caused a limited increase in correlation between business cycles, but a major increase in correlation between sentiment. Interestingly, this synchronization of sentiment does not occur in a linear trend upwards.



During the global financial crisis and its aftermath, for example, we see that the process of market integration partly reversed. Parallel to the political shifts towards more protectionism, we also saw that the social contagion decreased in the past decade.

What makes the contagion of global sentiment even more relevant, is that it is not merely a financial phenomenon. Market sentiment has important real economic effects. An increase in stock prices, whether caused by economic fundamentals or psychological sentiment, decreases the cost of capital for firms. As a result, a positive sentiment could also boost company investments. Hence, social contagion might also have an effect on the investments of firms, and thereby on the hiring and firing of employees as well. Even stronger, we find evidence for the fact that the sentiment in US markets is related to the investments of US firms, both domestically and abroad, and thereby also to the global employment policy of these firms. Furthermore, US sentiment spreads to the sentiment of other countries. As such, the employment policy of local firms is also affected. What begins as interaction between investors on Wall Street, ends with the job security of people on Main Street, worldwide.

## **7. Implications for research**

The framework I sketched out so far is just one possible alternative way of looking at expectation formation in financial markets, and it is certainly not complete yet. Much more work needs to be done before we can come even close to a new paradigm in expectation formation. What we do know, however, is that the approach to financial markets with social interaction requires an extension of the toolbox of the financial economist. Behavioral finance and economics has already introduced tools from the social sciences. Think of surveys and experiments as an addition to quantitative database research. When studying the interaction between a group of individuals, however, we also need to turn to methods that originate from the beta sciences. Think of network analysis, nonlinear dynamics, simulated artificial markets, big data, etcetera. When seeing financial markets as a nonlinear dynamic system, standard econometric techniques are not always applicable. Simulation-based estimation techniques are needed.

What would I like to do with this new toolbox? The current body of evidence on expectation formation is mainly based on rather aggregated assets, such as stock indices or main foreign exchange rates. The typical study tries to explain the movements of something like the Dutch AEX index or the Euro-Dollar exchange rate. Within this chair of International Finance, I would like to extend this line of research in both directions: more micro as well as more macro. In the micro direction, I would like to make use of the increasing availability of granular data. Which types of stocks are dominated by what type of expectation formation model? Can we use the social interaction approach to explain the well-known differences between stocks, such as the size or the value premium? Also, which type of investor is using fundamental data? Are retail investors really only looking at charts to form expectations? Finally, I am intrigued by the FinTech-revolution that is also taking place in markets: more and more trades in all sorts of assets are no longer executed by humans, but by fully automated and self-learning machines. How does this change the interaction between market participants? Can we get a understanding of flash crashes?

Regarding the macro direction, I am interested in looking further into the relationship between multiple markets. The first steps have been taken in this direction, but not nearly enough. Financial markets are becoming more and more interconnected. How does this exactly affect the comovement of these markets? Does the behavior of individuals change when they are active in foreign markets compared to their home market? Do heuristics also synchronize across markets? All these questions are focused on getting a better understanding of the function of modern financial markets, with the ultimate goal of achieving a more efficient capital allocation and thereby contributing to maximize welfare for all global citizens.

## **8. Implications for teaching**

Apart from a researcher, I am also very much an educator. Although it is sometimes forgotten, the main *raison-d'être* of universities, or at least their main source of income, is to spread knowledge. It goes without saying that part of this chair position gives me the responsibility to teach at all levels of the university. The broader question is, however, how my approach to research resonates with the curriculum. I am certainly not saying that we should stop teaching our students about the neo-classical approach to finance. In my view,

the rational expectation hypothesis and market efficiency provide for a benchmark, a normative framework. As such, they are the perfect starting point to any degree in finance and economics. In fact, behavioral finance and economics would not exist without a benchmark to reflect upon. What is important, though, is to give enough space to other schools of thought in our curricula. Even if I as a researcher am not completely convinced by a certain line of reasoning, as an educator I have the responsibility to expose my students to alternative views of the world, to give them the tools to critically assess the alternatives, and to form an educated opinion themselves. The personal opinion of the researcher should not become the norm for the students. Luckily, the programs here at the Vrije Universiteit Amsterdam are becoming increasingly diverse in terms of schools of thought. Behavioral finance and economics is by now a standard component of almost any curriculum. In the VU postgraduate master of risk management for financial institutions, we are able to go a step further, and give behavioral finance, but also nudging, complexity, and scenario analysis, the center stage.

## **9. Implications for practitioners**

Academics have the task to create knowledge, to spread knowledge through their students, but also to try to have a more direct impact on society. Although it is not always easy to make the translation from fundamental research to application, there are several ways to do this. Because finance as a field is relatively close to practice, the financial industry as well as the regulatory institutions are a very natural channel through which to try to have direct impact. Whereas my research is at a relatively high aggregation level, I do believe that we can draw lessons for practitioners. First of all, whereas the behavioral finance literature is good at pointing out mistakes in our decision making process, it increasingly provides solutions on how to improve the decision making process. This is typically called nudging. For example, one way of improving our expectation formation, is not to ask ourselves: “What do I think the price will be?”, but rather, “What do I think that others think the price will be?”. Second, the social interaction in financial markets has the potential to cause extreme returns as well as certain patterns in volatility. This makes the standard toolset of risk managers in financial institutions, including the regulators, less reliable. Like I said before, we should not try to forecast the next crisis. Instead of focusing on probability distributions and potential outcomes, scenario analysis provides for a much better picture of the actual risks a firm is

facing. Hence, banks should ask themselves what to do in times of crisis, rather than trying to calculate the probability of a crisis occurring and making policy based on the average. We have just experience the global financial crisis. As history has shown us, sooner or later, the next crisis will happen. It is better to be prepared than knowing when it will happen and how deep it will be.

## **10. Acknowledgements**

Shakespeare wrote “Why, then, the world’s mine oyster which I with sword will open”. In my research, I look into the interaction between people across the globe, and the implications of these interactions for price formation at markets. Just like the oyster does not give away its pearl easily, research is a continuous puzzle. It is therefore extremely motivating and stimulating that academia as an industry is highly interactive and international. I am indebted to a long list of people across the globe I have met over the years. Without your help, encouragements, and trust, I would not have been where I am now. It is because of you that I am now proud and grateful to be able to call myself professor of finance at the Vrije Universiteit Amsterdam.

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graduate master risk management for financial institutions have joined this group, broadening my view in the financial industry and forcing me to think more in terms of applications rather than abstractions. Let me also thank my colleagues of the sixth floor: Robert Dekker, Michelle Habets, Theo Kocken, Gitty van der Velden, as well as the late Michael Damm for guiding me through this journey.

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Ik heb gezegd.