Financial Market Dynamics and Human Behavior

This course develops a new perspective on the dynamics of financial markets and the roles that human behavior and the business environment play in determining the evolution of behavior and institutions. Although neoclassical economic theories such as expected utility maximization, rational expectations, general equilibrium, and efficient markets have dominated the literature on economic behavior and market structure, recent advances in the cognitive neurosciences, artificial intelligence, computational social science, and evolutionary biology provide a number of new insights into market dynamics. We draw on these diverse disciplines to develop a more complete understanding of human behavior in the specific context of financial markets and other industries and businesses, known as the Adaptive Markets Hypothesis. Academic research will serve as the foundation of the course, but the main focus will be practical applications of these ideas drawn from the finance, insurance, biotech, pharmaceutical, and other industries, as well as government regulation and policy making initiatives. Using this new perspective, we formulate several new hypotheses regarding recent challenges to traditional financial thinking, including: how financial crises are formed and whether or not they can ever be eliminated; why certain investment strategies seem to wax and wane; where business cycles come from; what role ethics and culture play in financial intermediation; whether capitalism is more sustainable than other political systems; impact investing, and how we can maximize impact by applying financial engineering to some of society’s biggest challenges such as cancer, climate change, poverty, and renewable energy.

Class Schedule
The class meets once per week: T 4:30–7:30pm, E62–276. The TA will hold recitation once per week: F 2:00–3:00pm, E51–315.

Prerequisites
The only prerequisite for this course is 15.401 (Managerial Finance) or by permission of instructor.

Recitations
The TA, Zied Ben Chaouch (ziedbc@mit.edu), will hold recitations where class material will be reviewed and additional applications and exercises presented. Recitation sessions will be announced on the course website.
Course Website

The course website is on Canvas at https://canvas.mit.edu/courses/1822, and all teaching materials will be posted on this site. Office hours, project data, and additional teaching material will be posted on this site.

Office Hours and Course Administrator

The TA and course instructor will hold office hours. The times and locations will be announced on the course website. The course administrator is Crystal Myler, E62–611, (617) 715–4840, cmyler@mit.edu.

Course Requirements and Grading

Course requirements include regular attendance and participation in class which requires having read the assigned articles prior to coming to class and being prepared to discuss them (10%), three group-based projects (20% each), one conventional case study (10%) and one extended case study (20%). There is no final examination for the class. The projects and case studies are:

1. Efficient Markets Revisited
2. The Psychology of Choice
3. The Power of Selection
4. AQR Case Study
5. Financing Innovation

The extended case study involves applying the principles developed in this course to specific business contexts in which traditional sources of funding are not available. You will be given guidelines for how to write such a case study, but will have considerable latitude in choosing a topic that is most relevant to your interests and career objectives.

Course Materials


- **Class and Recitation Notes, and Research Articles.** Notes and research articles will be available on the course website.

Additional Readings (not required)

- This best-selling introduction to investing is now in its 9th edition and is as popular as ever because of its entertaining style and sage advice. This is a great way to ease into financial markets, particularly for those who are not financially inclined.

- Bernstein was one of the most well-respected and influential practitioners in the financial industry, and the founding editor of the *Journal of Portfolio Management*. This
is a lively and beautifully written account of the most important ideas in academic finance, many of which were developed at MIT in the 1960's and 1970's.

Sloan Values
You are responsible for upholding Sloan's code of conduct, which mandates zero tolerance for cheating and plagiarism. For more details on Sloan's academic policies, please read the document “Classroom Values in Practice” which is available on the course website.

Course Outline

<table>
<thead>
<tr>
<th>Class</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1: 2/4</td>
<td>Introduction and Financial Orthodoxy</td>
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<tr>
<td></td>
<td>Origins of neoclassical economics and finance</td>
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<td>Expected utility theory, general equilibrium models, rational expectations, and market efficiency</td>
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<td>The rise of <em>Homo economicus</em></td>
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<td>2: 2/11</td>
<td>Rejecting the Random Walk and Efficient Markets</td>
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<td>Early evidence and the sociology of efficient markets</td>
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<td>Variance ratio tests, mean reversion, and contrarian trading strategies</td>
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<td>2/8</td>
<td>President’s Day weekend: Monday Classes</td>
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<td>3: 2/25</td>
<td>Behavioral Biases and Psychology</td>
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<td>Differences between psychology and economics</td>
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<td>Probability matching, loss aversion, overconfidence, risk vs. uncertainty</td>
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<td>Bayesian learning models</td>
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<td>4: 3/3</td>
<td>The Neuroscience of Decision-Making</td>
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<td>Basic neuroanatomy; fear, greed, pleasure, pain, and emotion</td>
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<td></td>
<td>Language, logic, theory of mind, abstraction, and executive function</td>
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<td>The psychology and psychophysiology of proprietary trading</td>
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<td>5: 3/10</td>
<td>Evolution and the Origin of Behavior</td>
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<td>Sociobiology, evolutionary psychology, and bounded rationality</td>
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<td>The binary choice model and evolutionary origins of risk aversion, loss aversion, probability matching, and mixed strategies</td>
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<td>Deriving bounded rationality, collective intelligence, and group selection</td>
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<tr>
<td>3/17, 3/24</td>
<td>SIP Week and Spring Break: No Classes</td>
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<tr>
<td>6: 3/31</td>
<td>The Adaptive Markets Hypothesis</td>
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</table>
- Economic mechanisms as adaptive traits
- How markets adapt to stochastic environments
- The importance of systematic vs. idiosyncratic risk

7: 4/7 Hedge Funds: The Galapagos Islands of Finance
- DE Shaw, Renaissance, and a brief history of the hedge-fund industry
- The dynamics of risk and return in hedge-fund strategies
- August 1998, August 2007, and May 2010

8: 4/14 Applications of Adaptive Markets
- Hedge-fund beta replication, strategy indexes, and structured products
- The evolution of quantitative trading strategies
- Dynamic asset allocation and risk-budgeting

9: 4/21 The Financial Crisis
- Establishing the phenomena and the importance of the scientific method
- The role of fear, greed, and complexity in economic bubbles and crashes
- Homeostasis, the NTSB, and adaptive regulation

10: 4/28 Impact Investing
- What is impact and why does it matter?
- A quantitative framework for measuring the impact of impact investing
- Mission-driven organizations, venture philanthropy, and how to maximize impact

11: 5/5 Ethics and Adaptive Markets
- Brief review of the origin ethics and moral reasoning
- The neuroscience of ethics applied to financial transactions
- Ayn Rand, Karl Marx, and neocapitalism

12: 5/12 The Finance of the Future and the Future of Finance
- Why the Efficient Markets Hypothesis is still relevant for practice
- How career opportunities are created
- Can financial engineering cure cancer, stop global warming, and solve the energy crisis?
Readings*

1: 2/4  Introduction and Financial Orthodoxy

2: 2/11  Rejecting the Random Walk and Efficient Markets
1. *AM, Chapter 2.

3: 2/25  Behavioral Biases and Psychology
1. *AM, Chapter 3.

*Asterisks (*) indicate required readings, daggers (†) indicate articles that should be skimmed, and “AM” refers to the required text Adaptive Markets.


### 4: 3/3 The Neuroscience of Decision-Making


### 5: 3/10 Evolution and the Origin of Behavior


**6: 3/31  The Adaptive Markets Hypothesis**

1. *AM, Chapter 6.


**7: 4/7  Hedge Funds: The Galapagos Islands of Finance**

1. *AM, Chapter 7.


**8: 4/14  Applications of Adaptive Markets**

1. *AM, Chapter 8.


**9: 4/21 The Financial Crisis**

1. *AM, Chapter 9.


**10: 4/28 Impact Investing**

1. *AM, Chapters 10 and 11.


**11: 5/5 Ethics and Adaptive Markets**

1. *AM, Chapters 10 and 11.


12: 5/12  The Finance of the Future and the Future of Finance

1. *AM, Chapter 12.


