



Q2-2022

**The Old Adage,
In a New Era**

MARCH 31, 2022

The McConachie Team – Educational Update

The Old Adage:

“History Doesn’t Repeat Itself, but It Often Rhymes”

Foreword:

In our last educational update, we discussed heuristics, or psychological “rules of thumb”. Humans tend to rely on heuristics to make decisions in today’s fast pace and demanding world. In this Q2-2022 educational update, we will discuss a connection between an *Old Adage*, that “history doesn’t repeat itself, but it often rhymes”, and the complexities of making decisions in relation to other agents.

The McConachie Team strives to understand more about “why” we act the way we do and the rationality spectrum of daily decision-making. The human mind is a fascinating machine, with complex neural networks that drive rapid decision-making processes. This machine, while in a state of constant flux, quickly stores memories, feelings, outcomes, and emotional responses. While taking in and storing new complex information, the mind is expected to make efficient and rational decisions. Often the brain takes short cuts to cope with this level of information, and rational decisions are not always the result. Simply put, this type of system can be overwhelmed, stressed, emotional, and far less than rational from time to time.

In this piece, we will introduce the concept of Game Theory, which studies complex decision-making processes through thought experiments, or mental games. These games involve multiple agents (or players), a set of specific circumstances, and an opportunity for optimization. Understanding these games and how the mind works can help us stay appropriately invested.

The overarching principles of investing tend to stay the same over time, while the details are different for each repetition, or event. History does not repeat, but rhymes. History will once again rhyme as we bring forward a new educational piece to further enlighten and inform the everyday investor on the rationality spectrum.

Additional volatility has arrived through multiple cross currents, testing the resolve of our rationality. This creates uncertainty that could potentially cause serious market gyrations and may lead to myopic investment tendencies. The presently known ‘unknowns’ in focus are: High inflation on a YOY basis (will this continue?), Federal Reserve being less accommodative (rate raises; fears of stagflation), reduction in quantitative easing, and complicated geo-political issues.

Game Theory

Game theory is a study of how interacting choices amongst multiple agents affects other agents within the game, often in an “economic” environment. Broadly, it can be seen as the study of human decision making. More specifically, game theory analyzes strategies in competitive situations where the outcome of one participant’s actions depends upon the actions of other participants. This is a broad topic and covers many different strategies and applications. It is important to note that all the agents, or players, in the game seek to optimize utility and economic gain.

Game theory posits that two main environments can occur within a game. The game is either in a Cooperative or a Non-cooperative environment. Non-cooperative games may produce winners and losers. In these games you should choose what is best for you no matter what the other parties decide to do. Cooperative games take place when all participants have agreed to work together towards a common goal. The controversy in a cooperative game arises when it comes time to split the resources, or benefits, from the coalition.

We will be focusing on non-cooperative environments, as they more closely resemble the personal investment world. In these games, we do not have insight into our counterparts’ future actions, and we currently need to make the best decisions for ourselves. Although we act in our own interest, this still often produces the most optimal outcome for all parties, which is known as the Nash Equilibrium.

Game theory often reduces the agents’ choices and outcomes down to a payoff matrix, also known as a gain loss paradigm. This payoff matrix shows how the outcome changes based on either participant’s actions which can be seen in the image below. Note that the action of one participant can influence the outcome for the other participant.

		Participant 1	
		Decision 1	Decision 2
Participant 2	Decision A	Outcome if Decisions A and 1 are made	Outcome if Decisions A and 2 are made
	Decision B	Outcome if Decisions B and 1 are made	Outcome if Decisions B and 2 are made

We will discuss more cases that reference the payoff matrix, and a basic example using this matrix can be found in the appendix.

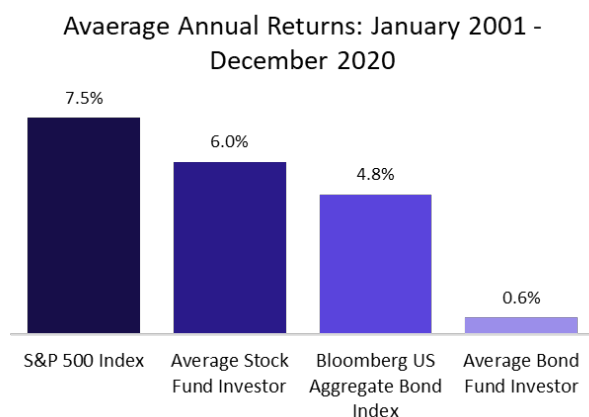
Ready Player 1

Game theory consists of a series of decisional options that take place under a certain set of conditions. These decisions and conditions are tied to a payoff matrix, which forecasts the possible outcomes for each decision. Financial markets are a great domain to apply game theory, as we can hypothetically test impacts of our moves alongside our counterparts.

With the advent of technology, it is fair to assume that all participants have perfect

information in the game. The one exception is not knowing how the other player will act, who is also given the same information. Of course, if Player 2 has the same information as Player 1, they should think likewise and evaluate the payoff matrix to find a desired strategy to optimize their outcome. In our investment journey, **WE** are a set of **Agents** in the game. As agents, we continually evaluate our situations and make decisions intended for our best-self-interest.

Investors seek to gain reasonable returns, that help them achieve their financial goals over their investment time horizon. However, history shows that outperformance-seeking investors dramatically trail benchmark returns. For instance, Dalbar, a financial services market research firm, publishes a Quantitative Analysis of Investor Behavior report every year, which shows below that average stock fund investors have materially underperformed the S&P 500 over a 20-year period.



Source: Dalbar, Quantitative Analysis of Investor Behavior, December 2020

Note that historic performance does not guarantee or indicate future returns, but this comparison does shed light on how futile

actively competing against the market can be, even by the smartest minds.

The market is a playing field with countless game participants, and each participant acts in their own alleged or believed best interest. One agent acting in their own best interest often benefits other agents. Think of a bull market; when other players buy, this pushes up the value of the assets we already hold. But the inverse is also true; agents selling a security could push the price down and lower the return for other participants.

There are often more players in the game than we expect as well. The Federal Reserve is a player who directly affects many other participants, same goes for the President of the United States, or CEOs of Fortune 500 companies. We must weigh the potential actions of our market counterparts to best decide how to position ourselves. The McConachie Team considers the potential actions of many market agents and always puts our clients first when making investment decisions.

Overtime we see the ebbs and flows of market cycles, while agents move capital from one asset class to another. These cycles are often caused by different events, but a pattern can be found when we stand back and evaluate from a broader perspective. The cycles don't exactly mimic each other, but there are aspects that are similar in each iteration. You could say that the market isn't repeating a historic event, but rather rhyming along with it.

A great example of these “rhymes” is the movement of market indicators we reference. Take for instance: inflation metrics, gas prices, federal reserve policy, government spending, unemployment, GDP, manufacturing reports, etc. With each iteration of a new cycle (or a specific point in the cycle; like recession) we see many of these metrics move in a similar way as they did in past cycles. We have seen things such as GDP slowing (or declining), manufacturing slowing, or inflation rising. Not every metric moves as one would expect in each cycle, but if we layer many of these metrics together and interpret them as a whole, we can gain a well-rounded perspective on where we currently are in the cycle. As always, we need to leave the future open to the possibility that past trends won’t continue, but nevertheless these metrics give us a good economic road map to see if we are rhyming with previous cycles.

In our investment journey, we use these “rhymes” and mental games to best evaluate where we are and where we should go from here.

World War III & Game Theory

Many of us have heard the term “World War III” thrown around when referencing the Ukraine and Russian controversy. Although only two countries are directly caught up in combat for now, both have made pleas for help from neighboring nations. Ukraine sought both the financial and military aid of the North Atlantic Treaty Organization (NATO), while Russia asked

China to support their side of the invasion. The current geopolitical schism is bad enough without getting two larger powers involved.

When looking at possible outcomes of this tenuous scenario, we can apply Game Theory and run through hypothetical thought experiments to better shape our perspective. In the following thought experiment, we will evaluate potential actions of the NATO allies and China, and whether they should further involve themselves in the war.

First, let’s set out the context of the game. We have our two participants: NATO allies and China. Both have robust information on the current events, but neither know what the other participant will do. We can lay out the potential actions below with the option of either getting involved or abstaining. Bear in mind that these hypothetical examples are for illustrative purposes only. They are not a prediction or guarantee of actual results.

- Both NATO allies and China can get involved which will dramatically escalate the war, increasing their overall risk, lives lost, and a heavy financial burden.
- NATO allies could get involved and China stays abstinent, creating a scenario that increases the chances of Ukraine/NATO’s victory with less resources needed than if China was involved; and China capitalizes on the opportunity of economic expansion as NATO is focused on war.
- China can get involved and NATO stays abstinent, creating a scenario where Russia/China is more likely to succeed against Ukraine while incurring less of a toll than if NATO was involved; and NATO

expands their capabilities to de-risk from relying on China.

- Both NATO and China can abstain from the conflict which lowers risk, death toll, financial burden, and both continue to grow their economies more optimally.

We will prescribe numeric values to reflect the utility of NATO or China getting involved in the conflict. We will measure in ‘utils’ as a proxy for an amount of utility gained by each action. We will say that if both countries get involved then they experience -100 utils each, if only one is involved they experience -50 utils while the other experiences 150 utils, and if neither is involved then both experience 100 utils. These values can be seen in the matrix below:

		NATO Allies	
		Get Involved	Abstain
China	Get Involved	-100 / -100	-50 / 150
	Abstain	150 / -50	100 / 100

We can see from the matrix that if both countries were involved, that would produce the lowest amount of utility, or utils. If NATO gets involved, then China is best off on the sidelines, and vice versa. If NATO abstains from the war, then China is best off abstaining as well, and vice versa. Either way, abstaining is the optimal strategy. When both countries have an optimal strategy that coincides with the other country’s optimal strategy, they are in Nash Equilibrium. If needed, more discussion on Nash equilibrium can be found in the appendix.

This thought experiment concludes that we would rationally expect both parties to abstain from the conflict. It is important to remember that we are only playing through a thought experiment, and the world is often an irrational place as previously discussed. Time will always tell.

The McConachie Team Educational Update is a quarterly piece that will be published on our website at <http://www.mcconachie.com> with intent to be timely and relevant. We look forward to providing valuable educational content to our community of clients that we believe will be impactful in assisting with prudent decision making.

Kindest regards,

The McConachie Team

This piece was written by Michael McConachie and Lucas Ciabattoni

Appendix:

The Dilemma (also known as Prisoner’s Dilemma) is a game theory thought experiment. The context for one version of this thought experiment is as follows:

- Two stores have no allegiance and cannot communicate to one another
- Both stores are debating whether to keep their prices the same, or lower their prices
- If both stores keep their prices the same, then they will increase sales by \$100 next week
- If one store lowers prices, and the other keeps prices the same, the lower prices will bring in \$750 of sales next week, and vice versa
- If both stores lower prices, then each store will increase sales by \$400 next week

The outcomes can be shown in the matrix below, which shows additional sales in each scenario:

		Store 1	
		Keep Prices	Lower Prices
Store 2	Keep Prices	100 / 100	0 / 750
	Lower Prices	750 / 0	400 / 400

If Store 1 lowers prices, Store 2 is looking at either a \$400 (best case) or a \$0 (worst case) payout. But if Store 1 keeps prices the same, Store 2 is looking at a \$750 (best case) or a \$100 (worst case) payout. In both cases, Store 2 is better off lowering prices, as that leads to either the \$750 or \$400 payout scenarios, which were the best-case scenarios in response to either of Store 1’s actions. They are best off lowering prices either way. It is important to note that Store 1 has the same potential payouts and optimized strategy as Store 2. Each store performs best by sticking to the strategy that benefits them, despite what the other is doing. When all parties act in their own interest and it creates the optimal scenario for everyone, this is called the **Nash Equilibrium**.

Nash Equilibrium occurs when both parties act in their own best interest, and the optimal outcome will be achieved. This is not always the case, but it is a possible outcome. Just like when the Federal Reserve and the people holding USD both want their currency not to depreciate at a rapid rate, or NATO and China don’t want to incur an unreasonable amount of cost and lost utility.

Sources:

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