

SCH-MGMT 650: Statistics for Business

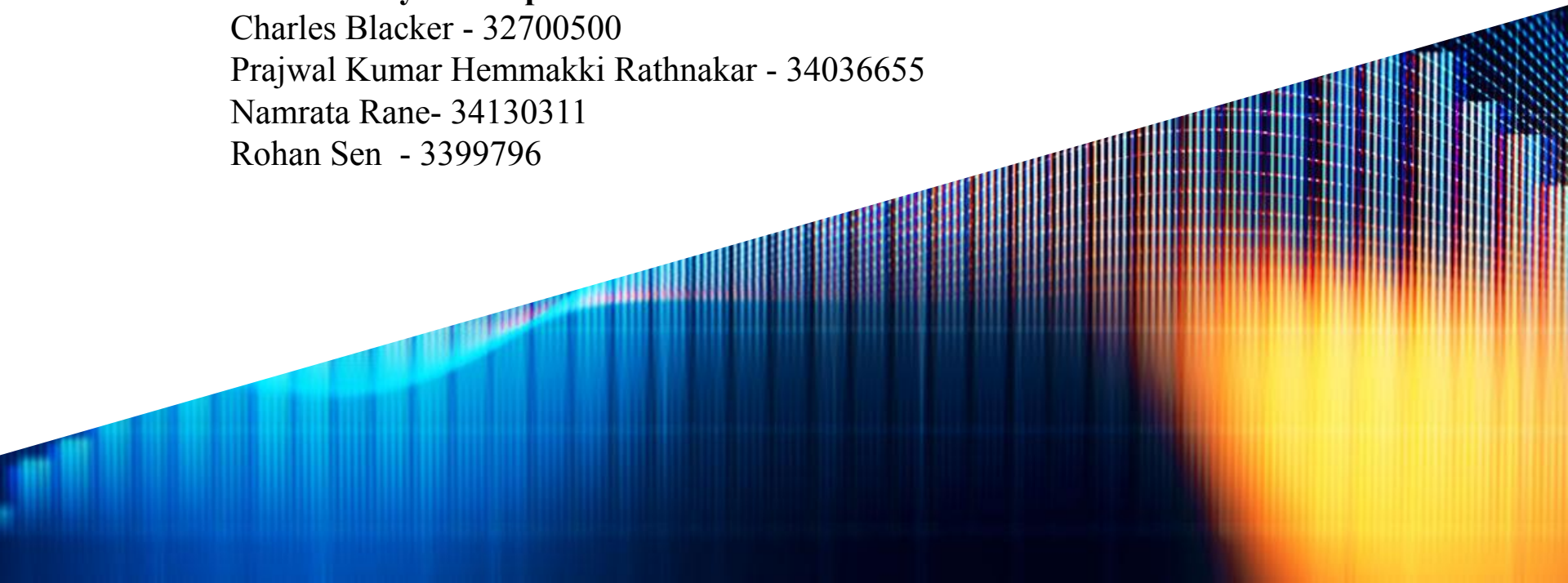
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Question in hand?



"England National Football Team." *Wikipedia*, Wikimedia Foundation, 4 Dec. 2023, en.wikipedia.org/wiki/England_national_football_team.

**How far will England
advance in the 2024
European Football
Championship?**

Bayesian Prior considering historic data/events



Mark Ogden, Senior Writer. "No More Excuses: England Are the Team to Beat at Euro 2024." *ESPN*, ESPN Internet Ventures, www.espn.com/soccer/story/_/id/38670783/no-more-excuses-england-team-beat-euro-2024. Accessed 4 Dec. 2023.

❖ England's National Team History and Culture

- England has a rich history and deep football culture with young players joining development programs to eventually end up on the National Team
- England has never won the UEFA European Cup
- England has won the World Cup once in 1966

❖ Previous Finishes

- In 2019, England finished third in the European Nations League Cup
- In the 2020 UEFA European Football Championship, England lost to Italy in shootouts after a 1-1 draw after final time
- In the 2022 World Cup, England made it to the quarter-finals before losing to France 2-1

❖ The Tournament

- 24 Teams
- England placed in Group C with Slovenia, Denmark, and Serbia
- 16 Teams make the tournament stage, 4 Games to win the final

Bayesian Question Clustering



Westwood, James. "England Euro 2024 Squad Power Rankings: Harry Kane Is Unstoppable - but There Appears to Be No Way Back for Raheem Sterling." *Goal.Com US*, Goal.com, 21 Nov. 2023, www.goal.com/en-us/lists/england-squad-power-rankings-three-lions-euro-2024/blte9eb5c767bbe133e.

Events that might affect our data:

- ❖ **Recent English Match Finishes:** Their last five finishes have been three wins and two draws.
- ❖ **Recent movements of personnel:** No major players have left the team since their previous finish in the UEFA Euros. They are still captained by Harry Kane and have influential playmakers like Grealish, Rashford, and Maguire. Younger players like Saka, have developed further and They are also still coached by Southgate.
- ❖ **Fifa Index:** According to the 2023 Fifa index, their attack is rated 85, midfield 83, and defence 83. Their overall is an 84. Tied with Spain, Italy, & Portugal. They only trail France and Germany in the Fifa index as their overalls are 85. No one in their group compares.
- ❖ **Odds Predictions:** Current betting odds have England and France as co-leaders in betting odds. They are tied according to the sportsbooks at +350. That means that if someone bets \$10 on England to win the tournament, they would win \$45 if their bet hits

"Fifa Index." *Team Stats Database - FIFA 22 - FIFA Index*, www.fifaindex.com/teams/fifa22_555/?type=1. Accessed 4 Dec. 2023.

Assign The Weights

Assign weights according to **Sherman Kent's Chart of Certainty of England to win the European Championship**



Certainty	The General Area of Possibility
Around 15-20%	Probably Not

- ❖ The outcomes of football matches are based on skill with luck mixed into the equation. 16 Teams make the tournament, 4 wins are required to win the cup.
- ❖ As England's 2023 Fifa Index is an 84 and their competitors in France and Germany having an index of 85, it would be safe to assume that they mirror each other's overall skill level and a game between these teams would be a toss-up we will say a game between these teams could be 50/50 for an outcome in these games based on the index
- ❖ As England was runners up for the previous UEFA Euros, giving them an advantage with their experience through this tournament
- ❖ With experts that make the sports odds giving England +350 odds, we can assume that those that study enough football believe that England has about a $\frac{1}{4}$ to $\frac{1}{5}$ chance of winning the championship. Using these odds we can estimate their odds to win the championship to be around 20%.

Question in hand?

Will there be a lethal confrontation between the national military forces of Russia and the United States before December 31, 2024?



Russia



United States

Bayesian Prior considering historic data/events



❖ Geopolitical relation:

- After the end of the Cold War and the dissolution of the Soviet Union in 1991, the U.S.-Russia relationship initially showed signs of improvement.
- Tensions arose with the expansion of NATO into Eastern Europe where Russia expressed concerns about NATO's proximity to its borders and perceived it as a security threat.

❖ Economic Ties:

- The US suspended bilateral engagement with the Russian government on most economic issues after Russia's ongoing violations of Ukraine's sovereignty and territorial integrity.
- In response to Russia's actions in Ukraine, the sanctions restricted access to international financial markets, limited the ability of certain Russian entities to do business abroad, and had broader economic consequences.

Cited: U.S. Relations With Russia." U.S. Department of State, U.S. Department of State, 23 Feb. 2022,
<https://www.state.gov/u-s-relations-with-russia/>.

Bayesian Prior considering historic data/events



Cited: [Russia Cyber Threat Overview and Advisories](#)

❖ Historical Alliance:

- In the early 2000s, following the 9/11 attacks, there was a brief period of increased cooperation between the U.S. and Russia in the global fight against terrorism.
- Since 2014, the United States and our European and G-7 partners have imposed sanctions on Russia for its aggressive actions in eastern Ukraine, occupation of Crimea, etc...

❖ Arms race and Cyber warfare:

- The U.S. and Russia continue to hold joint military exercises like Northern Eagle and Vigilant Eagle, with the aim of improving joint cooperation against terrorism and piracy.
- The Director of NIA statement: *Russia is focused on improving its ability to target critical infrastructure, including underwater cables and industrial control systems, in the United States as well as in allied and partner countries, because compromising such infrastructure improves and demonstrates its ability to damage infrastructure during a crisis.*

Bayesian Question Clustering



Events that might affect our historical data:

- ❖ **Current war between Russia and Ukraine?:** If the conflict triggers NATO involvement, it could have implications for the U.S. as a NATO member, potentially leading to increased military and diplomatic engagements.
- ❖ **Future war between USA and China?:** Statement by Jayati Ghosh: *“The US attempts to stop the Chinese from acquiring and developing superior technology was one of the main reasons behind the start of the still ongoing “US-China Trade War”*
- ❖ **Expert Opinions?:** The general consensus is that while tensions between them are high, the likelihood of a direct lethal confrontation is relatively low due to the risks associated with such a conflict.

Cited: Dec 3rd, 2023

https://en.wikipedia.org/wiki/Russia%E2%80%93United_States_relations#Russian_and_U.S._intelligence_operations

Assign The Weights

Assign weights according to **Sherman Kent's Chart of Certainty**



Certainty	The General Area of Possibility
0-7%	Impossible

- ❖ The geopolitical relations between Russia and the United States have been complex and characterized by a mix of cooperation, competition, and periods of tension. It's important to note that geopolitical dynamics are subject to change.
- ❖ We can establish a base rate for the probability of nuclear war by looking at the number of times nuclear weapons have been used during a war: one time since they were developed 74 years ago. This could be interpreted to mean that the likelihood of nuclear war is around 1.4% per year
- ❖ As per the survey: The median view of the experts was that the probability of a war exchange between the US and Russia in the next 20 years is around 4.72%, or 0.24% per year, that mean the probability by the end of 2024 would be negligible

Cited: Jun 19, 2019

<https://forum.effectivealtruism.org/posts/PAYa6on5gJKwAywrF/how-likely-is-a-nuclear-exchange-between-the-us-and-russia>

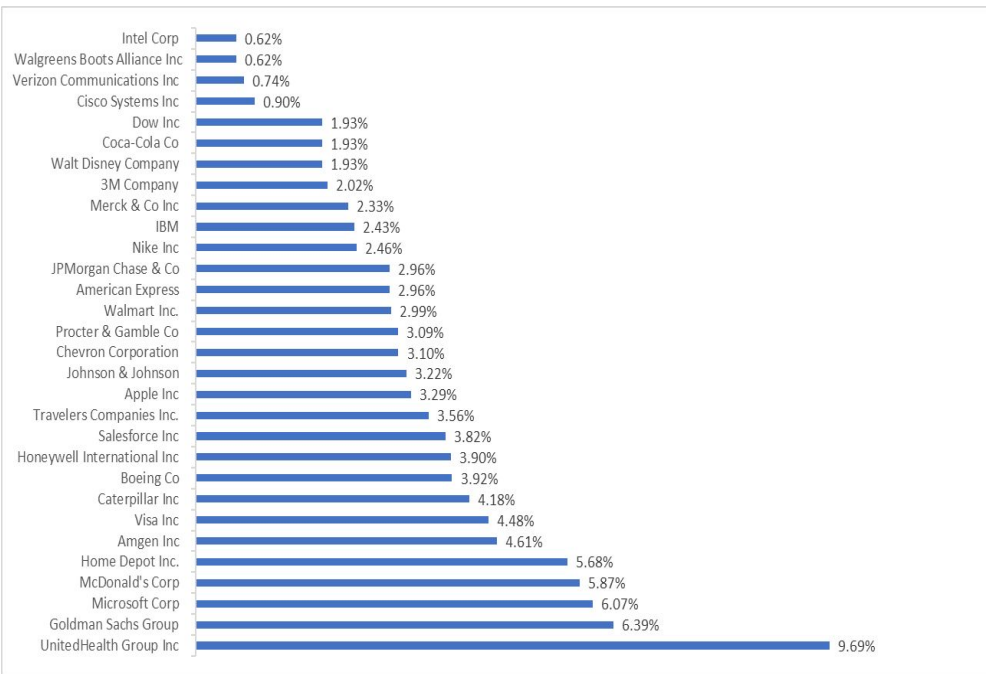
Question at hand?

Will the Dow Jones Industrial
Average finish 2024 **higher than
43,000?**

Hmm, DJIA???

- ❖ The DJIA, or Dow Jones Industrial Average, is a stock market index that measures the performance of 30 large, publicly-owned companies trading on the New York Stock Exchange (NYSE) and the NASDAQ.
- ❖ It is one of the oldest and most widely followed stock market indices in the world, and created by Charles Dow and first calculated on May 26, 1896.
- ❖ The DJIA is a price-weighted index, which means that stocks with higher share prices have a greater influence on the index's value. The 30 companies included in the DJIA are considered representative of the overall health of the U.S. stock market and the broader economy.

DJIA Companies by Weight



Criteria to be met as a company to be enlisted in DJIA

- Must be incorporated and headquartered in the USA.
- Derive a plurality of revenues from the US
- Help make the Dow representative of the overall US economy (less transportation and utilities)
- Attract a large number of investors
- Demonstrate sustained growth
- Have an excellent reputation

Key Indicators to take a Note of

- ❖ **Economic Indicators:** Economic data, such as GDP growth, employment figures, inflation rates, and consumer sentiment, can significantly impact the performance of the DJIA.
- ❖ **Corporate Earnings:** The financial performance of the individual companies within the DJIA is crucial.
- ❖ **Interest Rates:** Changes in interest rates set by central banks, such as the Federal Reserve in the United States, can affect the DJIA.
- ❖ **Geopolitical Events:** Political and geopolitical events, such as elections, trade tensions, conflicts, and policy changes, can create uncertainty in the markets and impact the DJIA.
- ❖ **Market Sentiment:** Investor sentiment and perception of the overall market conditions play a significant role.

Key Indicators to take a Note of

- ❖ **Global Events:** Events occurring globally, including economic developments in other countries, like International trade relations, currency fluctuations, and global economic trends can influence the DJIA.
- ❖ **Technological Advancements:** Advances in technology and innovation can impact companies' competitiveness and profitability.
- ❖ **Market Speculation:** Speculative activities and trading trends, driven by market participants seeking short-term gains, can contribute to volatility in the DJIA.
- ❖ **Regulatory Changes:** Changes in government regulations and policies, particularly taxation, industry-specific regulations.
- ❖ **Natural Disasters and Pandemics:** Unforeseen events such as natural disasters or pandemics (as witnessed with COVID-19) can disrupt global markets, by impacting business operations, supply chains, and investor confidence.

Few Factors currently in Play

Powder Keg in the Middle East- The Geopolitical conflict Israel vs Hamas

U.S. policymakers are busy with diplomatic efforts to contain the damage and avoid all-out war in the region, but the clock is ticking.

Negative Consumer Sentiment

While U.S. consumers may take a downbeat view of the economy, due to four years of pandemic, wars, inflation and high interest rates, among other financial disruptors.

Overpriced Stocks, Inflated AI Shares

Stock market results have been skewed by artificial intelligence-related stocks, while bonds have repriced to higher rates.

High Interest Rates

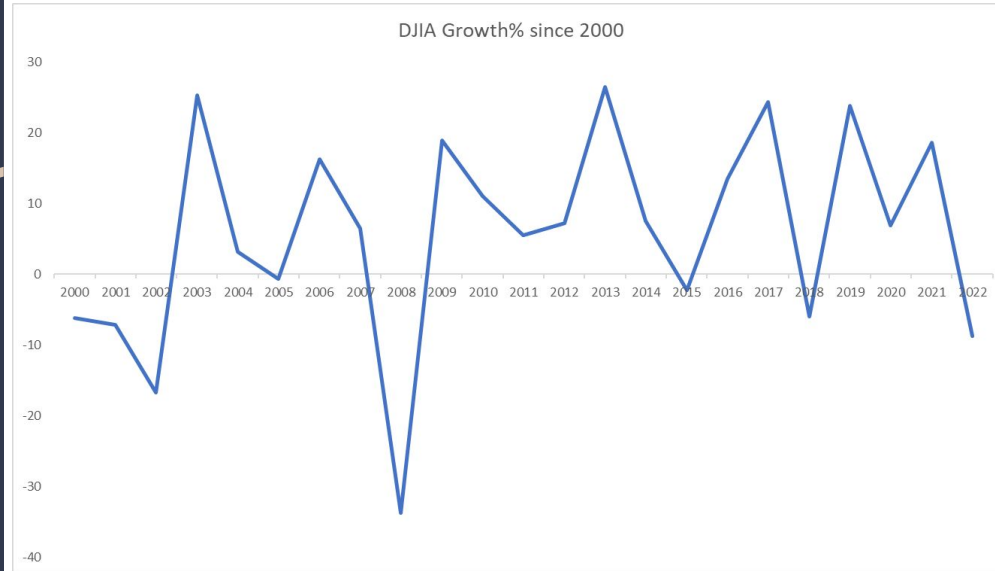
High interest rates are here to stay, a scenario that should negatively impact the U.S. economy and is likely to do the same with domestic stocks, and the Federal Reserve is very unpredictable with its rate-hiking.

2024, what's on the table?

- ❖ **US Presidential Elections** to be held on November 5.
- ❖ **2024 Copa América**, the 48th edition, a quadrennial international men's soccer championship. This is only the second time when USA is hosting the championship.
- ❖ **2024 ICC Men's T20 World Cup**. It will be the first ICC World Cup tournament to feature matches played in the United States.
- ❖ Works published in **1928 moving into public domain** as of Jan. 1 2024. One of it includes, Mickey Mouse in "Steamboat Willie" and "The Gallopin' Gaucho."

DJIA Growth Pattern

From 2000 to 2022, the DJIA had witnessed several notable events, including the dot-com bubble burst in the early 2000s, the global financial crisis in 2008, and the subsequent recovery. Despite these challenges, the index generally trended upward over the years, reflecting the overall resilience and growth of the U.S. economy. The implementation of monetary policies, fiscal measures, and economic recovery efforts contributed to the positive trajectory of the DJIA during the later part of 2010, and it has seen a steady growth since except for the Covid impact.



Bayesian Question Cluster

1. What has been the historical YoY growth of Dow Jones Industrial Average?
2. How has factors like GDP-Inflation-Fed Rates impacting the DJIA historically?
3. 2024 being a Presidential Election year, how has the DJIA performed in such years previously?
4. Are there any significant events in USA that might impact the DJIA?

To answer these questions let's take a quick look at the excel sheet where we have tried to perform some analysis.

Have we reached a
Conclusion?

Dow Jones Industrial Average
according to our predictions finishes
anywhere between 39250 to 40750,
almost certainly not to finish at
43,000.

Citations for the dataset

U.S. GDP 1960-2023. MacroTrends. (n.d.).
<https://www.macrotrends.net/countries/USA/united-states/gdp-gross-domestic-product>

Inflation Rate Historical Data. MacroTrends. (n.d.)
<https://www.macrotrends.net/countries/USA/united-st>

U.S. Inflation Rate. Yahoo Finance.
<https://finance.yahoo.com/quote/%5EDJI/history?p=%255EDJI>