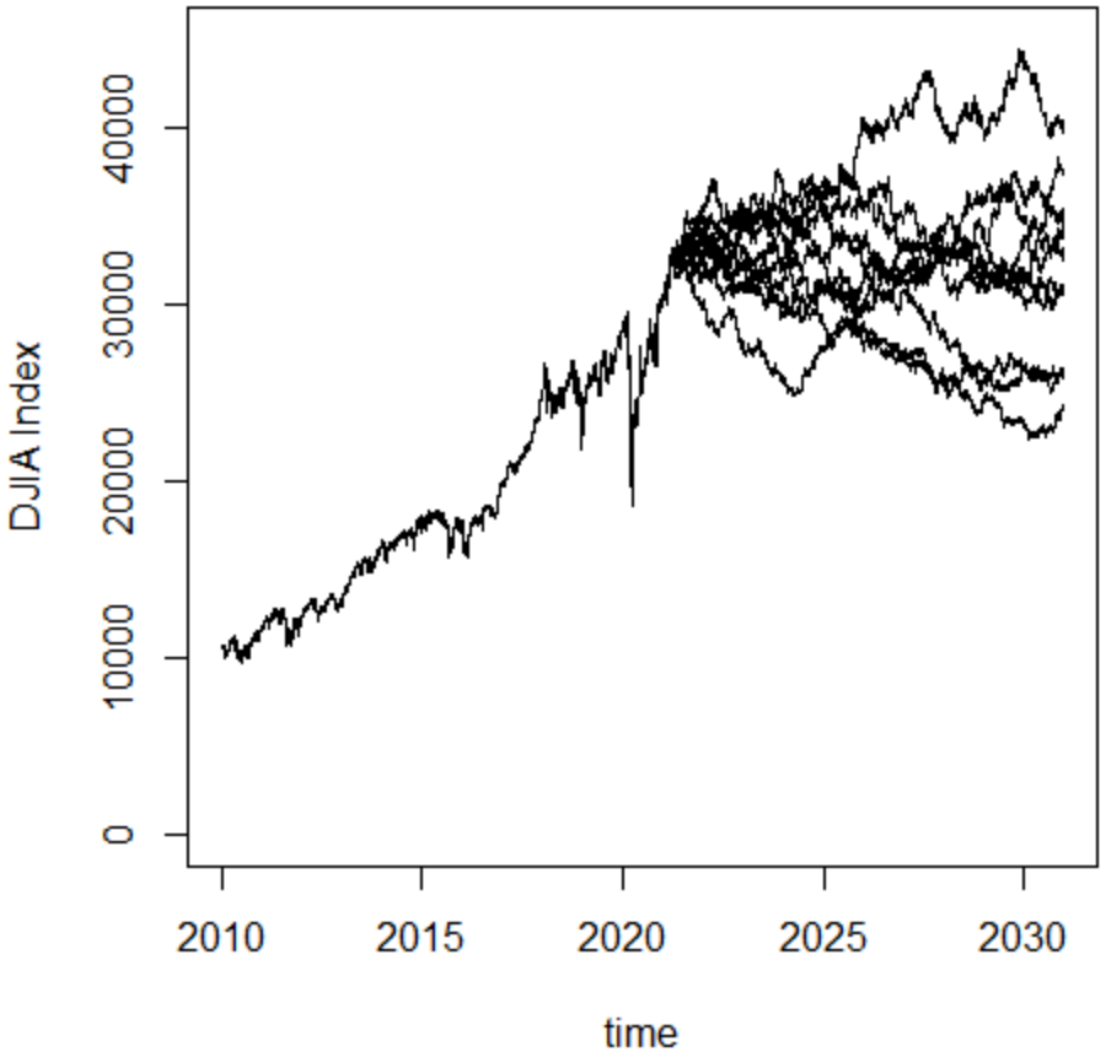
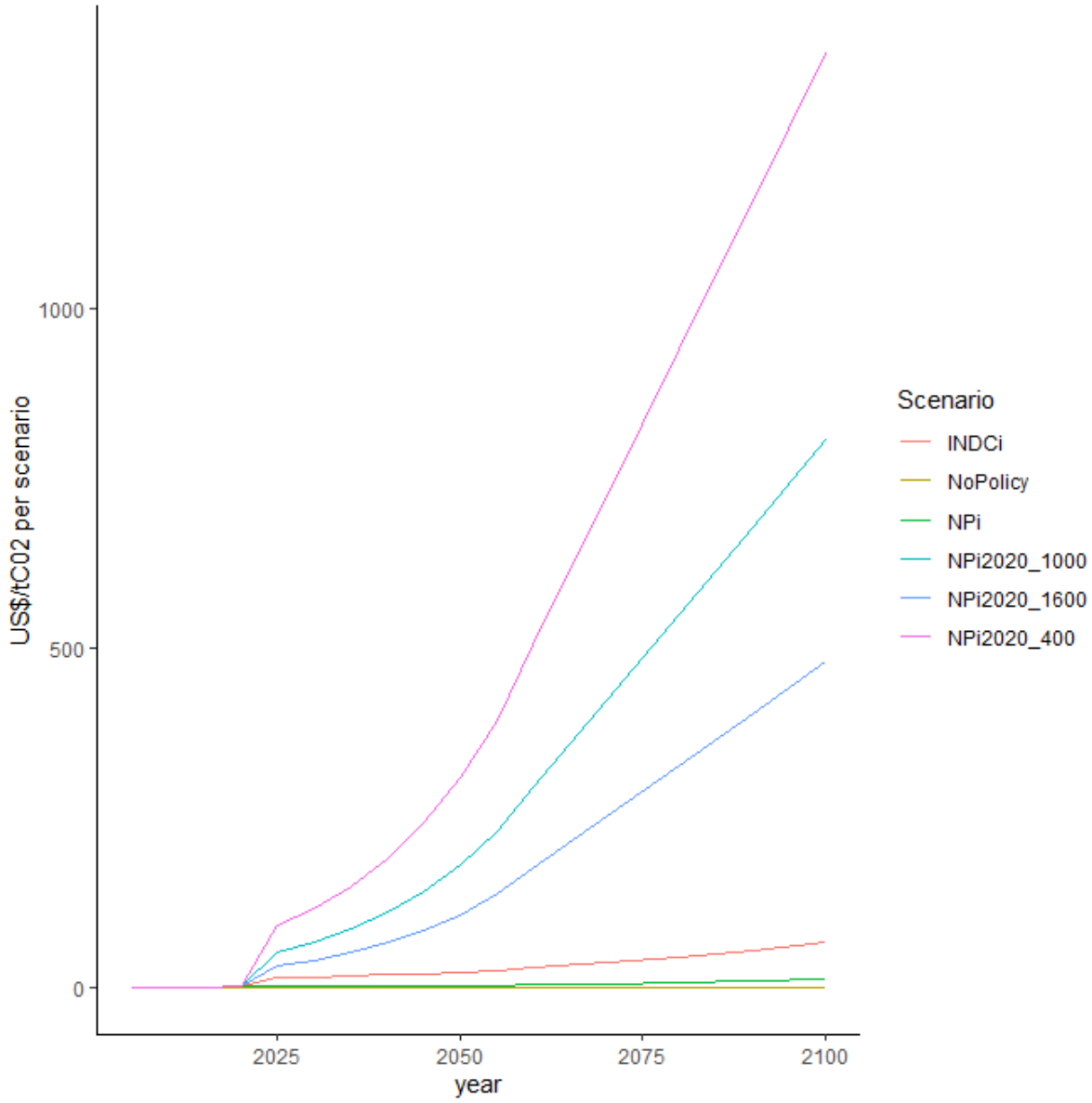
- Brainstorming for high-level visualizations
    - possible to **simulate stock prices with geometric brownian motion** -> logarithmic bounds due to law of iterated logarithm
    - **incorporate climate change risk in simualations** different sources/possibilities
        - carbon price
            - via carbon emissions in USA total
            - via carbon emissions per sector
            - via carbon emissions per GDP
        - variations: assume parameters vs historic fit, CO2 vs CO2equivalent
    - explore **past reactions to climate policy decisions**
- Very simplified model for incorporating climate change risk in simulations
    - Simulate stock prices assuming they follow a geometric brownian motion:
    - $$d S_{t} = \mu S_{t} dt + \sigma_{t} S_{t} dW_{t} \ \Leftrightarrow S_{t} = S_{0} e^{(\mu - \frac{\sigma^{2}}{2})t + \sigma W_{t}} $$
    - Value of a company(using the methodology of SPGlobal Carbon Adjusted Index Weighting described in https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-carbon-price-risk-adjusted-indices.pdf
    - $$ \text{Adjusted company valuation} = \text{Max}[0, \text{Current company market valuation}] \ - \big(\text{Estimated Loss in Earnings due to Carbon Price Risk (ELECR)} \times \text{Valuation multiple} \big) \ \text{and} \ \text{ELECR} = \text{Cost of Carbon Price Risk} \times \text{Profit Impact Ratio} $$
    - where
        - **Cost of Carbon Price Risk** is the additional cost a company has due to rising carbon prices
        - **Profit Impact Ratio** is the ratio by which the carbon prices impact the company's profits
        - **Valuation multiple** is the relationship between profits and market capitalization
    - Next steps
        - {{[[TODO]]}} US aggregate/DJIA aggregate
            - Adjusted DJIA = ELECR * sensitivity/valuation multiple
                - ELECR = % change in emission price
        - {{[[TODO]]}} coloring of scenario graphs and add legend - only left for sector
- Visualization of simulaions

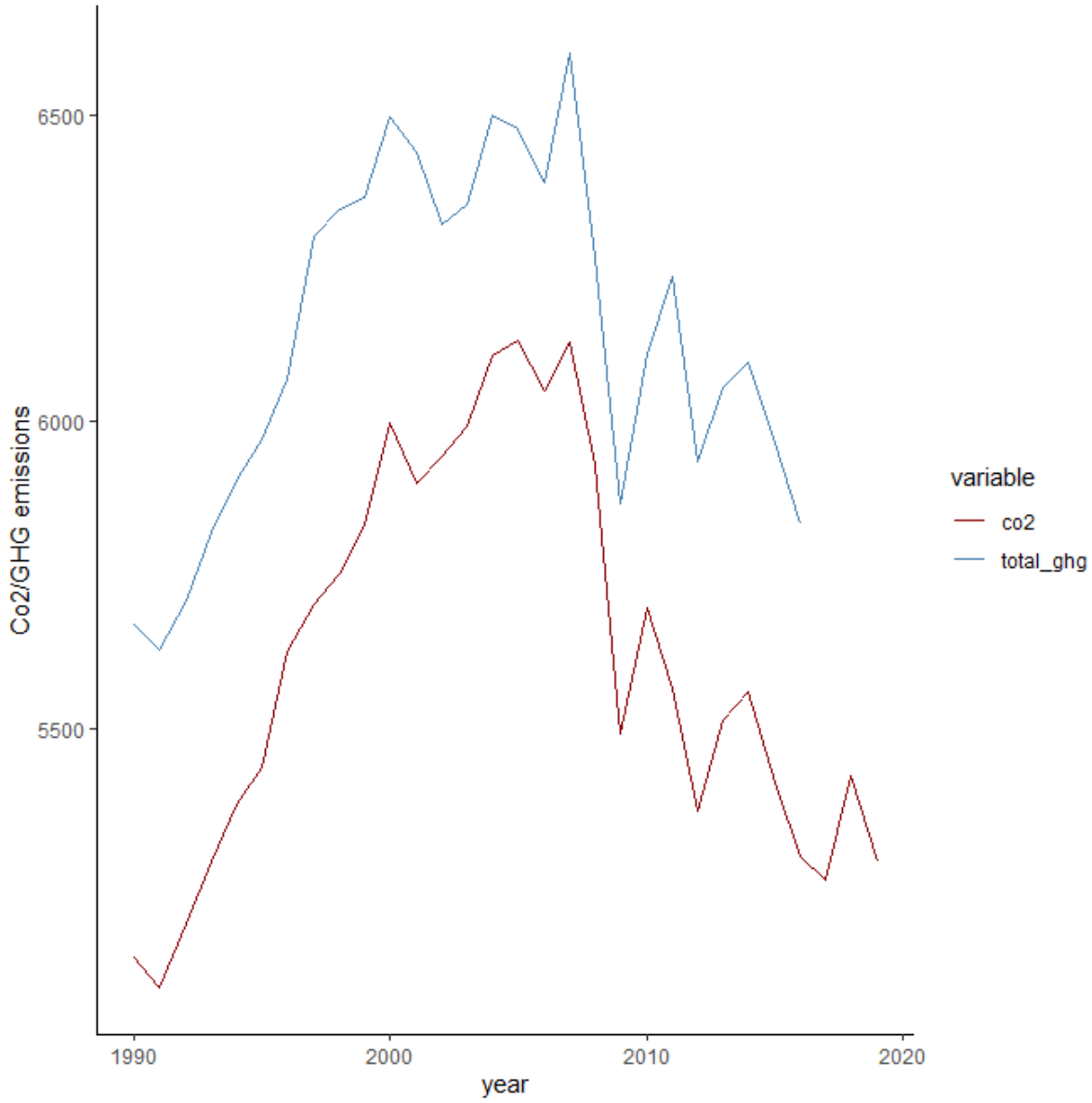
- Simulations of Dow Jones with Geometric Brownian Motion



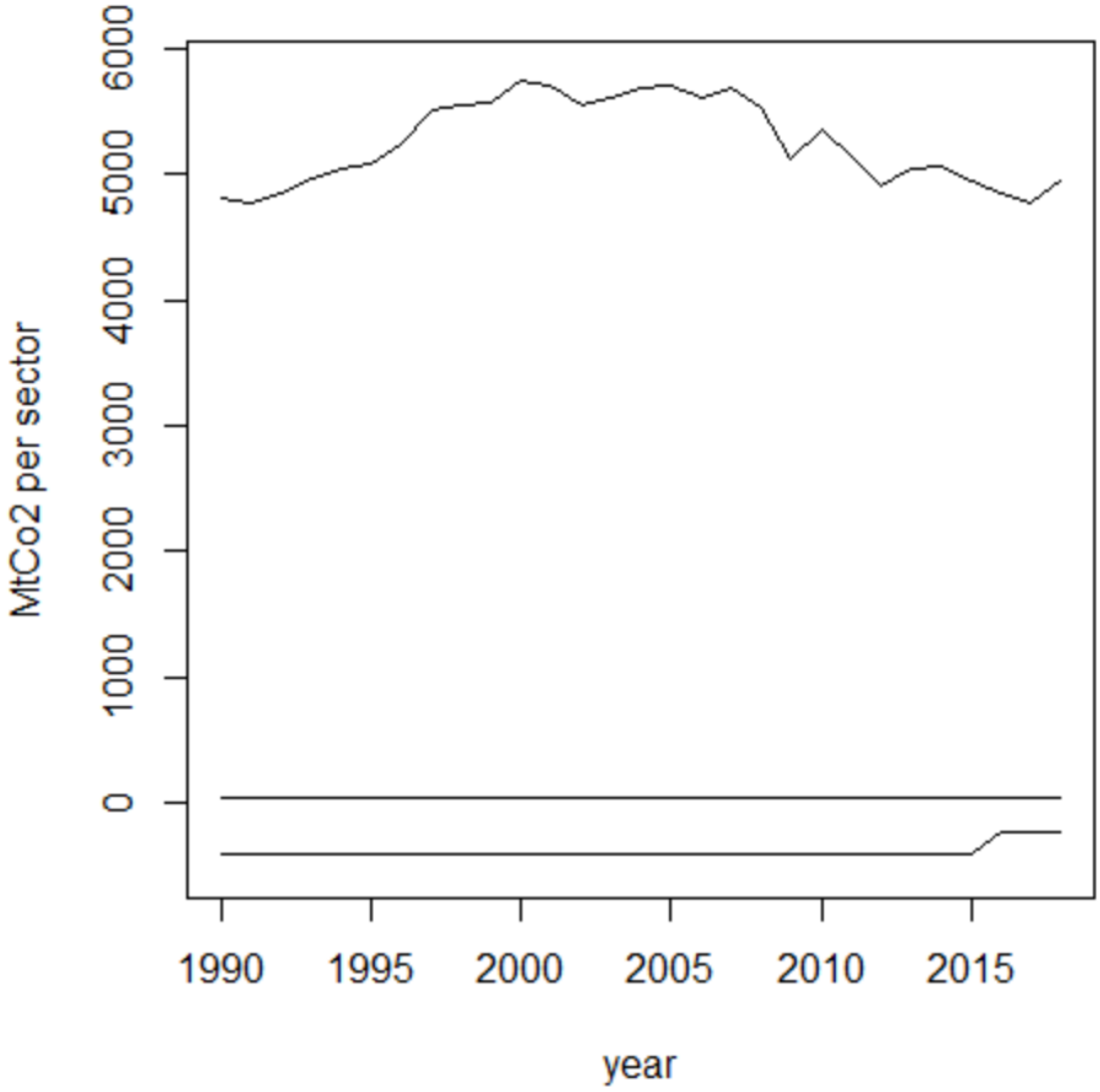
- price of Co2 in different scenarios (cost of emission abatement)



- Total Co2 emissions in the US

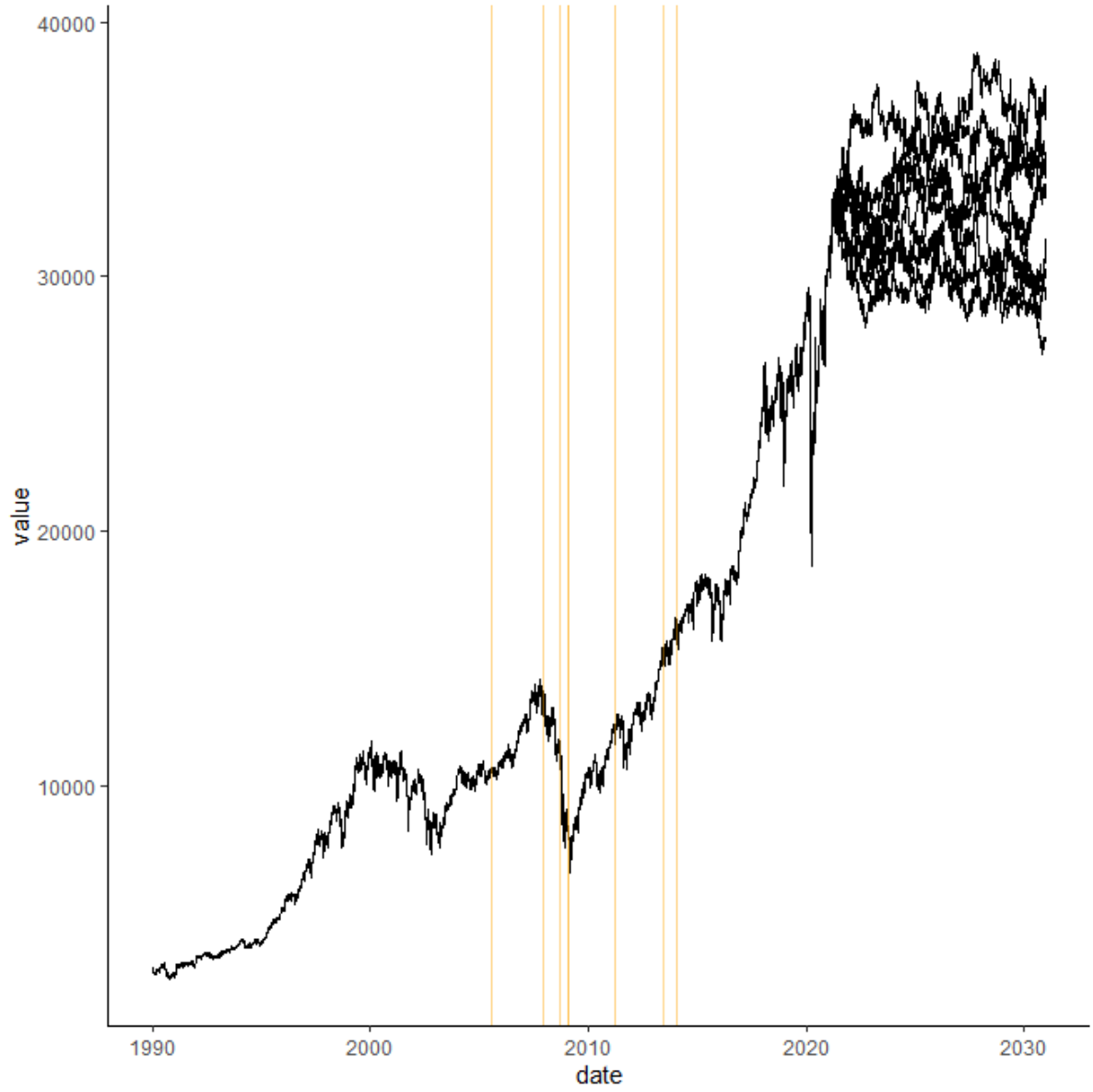


    - Co2 emissions per sector in the US



- Inspect past policies
    - past policies obtained from [[NewClimate Instiute - Climate Policy Database]]
        - filter: USA, impact: high
        - add dates of decision/signature to dataset
    - next steps
        - {{[[TODO]]}} look at return characteristics at the respective day
            - issues: not many dates so not sure if that is reliable
        - {{[[TODO]]}} maybe add other events to graph
            - extreme weather events, policy events indirectly related to climate (elections etc.),...
        - {{[[TODO]]}} maybe look at effects per industry
- Visulization of past policies

- In time series since 1990



- Zoom in in time period with many decisions