

TEAM FED PROPOSAL PRESENTATION

Project Objective: Our goal for this project is to provide an interactive dashboard that allows users to observe correlations between household debt and other economic factors, along with predicting household debt given user-determined values for factors like Federal Interest Rates and yields on 10-year US bonds



Current Practices and Limitations

- The 2008 Recession highlighted many factors that could be used to more accurately predict economic downturns.
- Such as accurately predicting household debt could provide insights into financial instability associated with government policies & consumer spending
- Machine learning is widely used to analyze and make financial predictions
- Multiple researchers have created models to predict market fluctuations, for example:
 - Nyman and Ormerod (2018) created a model to predict economic downturns. Although the model was able to accurately predict the previous recessions, it was unable to account for certain data points (such as negative yields)
 - The Guggenheim Investments (2019) model is another recession probability model that includes the yield curve, but both positive and negative rates. Even with this inclusion, a gap within their pre-existing model is how any coming due Federal policy changes will statistically fluctuate their model



Relevant Work

- Nyman and Ormerod (2018) created a model to predict early market corrections. Their model used a random forest algorithm as the input data had many dimensions and was noisy. The model accurately predicted historical recessions using household debt as a variable. However, they did not consider the effect of negative yields to the economy, which we can plan to account for with our model.
- A major contributor to the increase in household debt during the housing boom was people taking on debt using the increased value of their homes (Mian & Sufi, 2011). This hints to us that we should look at the housing market as an important factor for determining household debt. However, this paper does not quantify the mathematical relationship between home appreciation and household debt, which we can do with our model.
- People may take on debt if they suspect their income is lower than it should be due to temporary market conditions (Friedman, 1957). This tells us that we can anticipate debt-taking during market corrections. Again, the quantitative link between income and spending was not determined empirically, but our model can help establish this.

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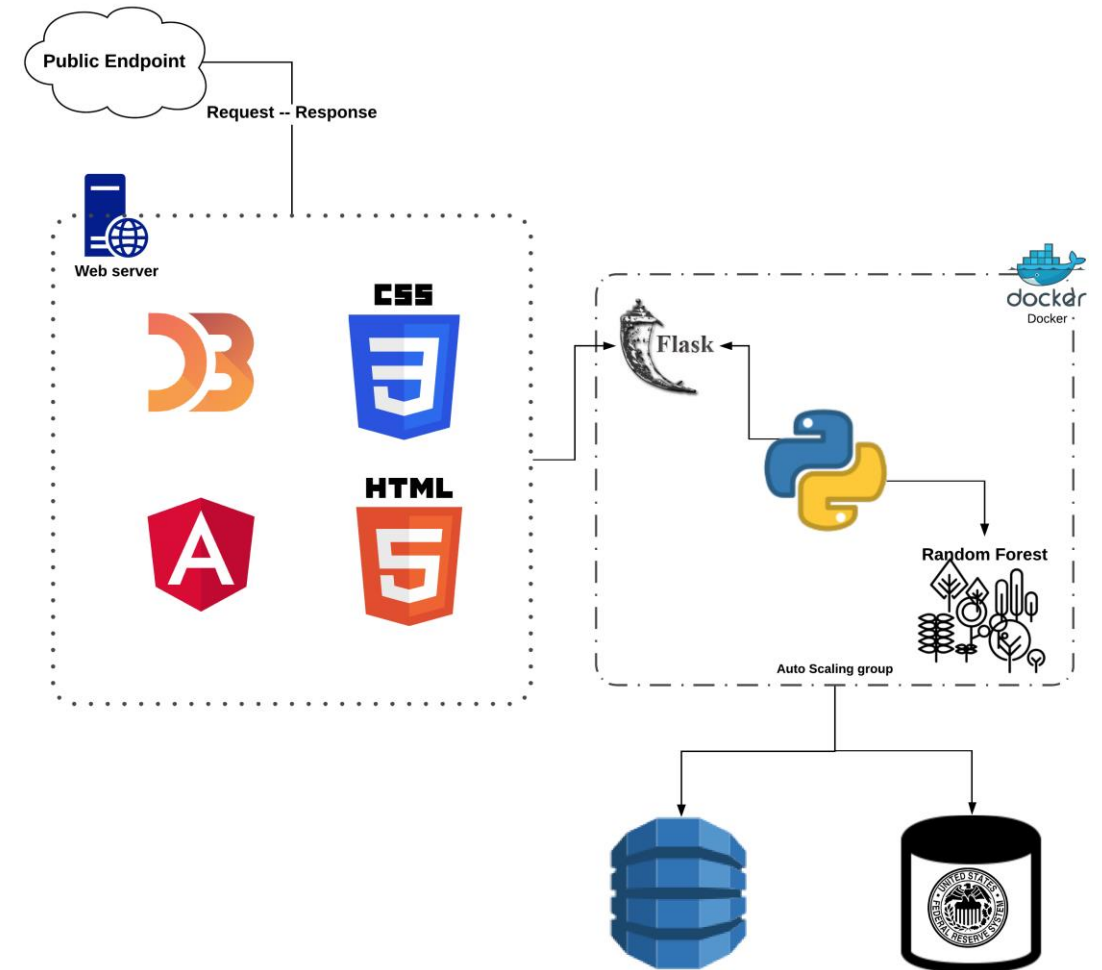
Importance of Household Debt

- Household debt is a strong indicator of the economy's health. If household debt is high the chance of a recession is much higher
- Consumers typically take on debt if they suspect their income is lower than it should be due to temporary market conditions (Friedman, 1957).
- Therefore, if economists understand debt better, they can provide consumers with debt management recommendations

Project Approach and Innovation

We propose to streamline current algorithms processes by creating a web application that will have the following improvements:

- Run a selected algorithm (possibly a random forest algorithm) with clean data
- Use training data to produce coefficients
- Use cross validation data to ensure accuracy
- Use test data to produce the prediction
- Graph and report the algorithm
- Allow the user to change values of certain input variables within the pre-trained model



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Project Details

Risks

- We need a significant amount of input variables added in our model in a short time frame
- For each input variable we also need a large dataset to maximize the predictive power of the machine learning algorithm
 - The risk of influencing decisions based on a poor prediction carries a lot of consequences. Since mitigation strategies often include increasing training data observations, we also run the risk of not having a diverse enough set of training data

Payoff and Impact if our Model is Successful

- The payoff is enormous if our model is successful in predicting household debt, then we can use it for the following activities:
 - Corroborating current research findings by graphing the prediction of household debt and overlaying it with GDP
 - Determining which metrics consumers should observe in order to make better financial decisions
 - Providing government officials the ability to observe what economic impacts certain policy decisions can make

Cost

- We will use open source data and software so the cost will be minimal other than human capital

Length of Time

- The project will take ~6-7 weeks to complete



Project Plan

Step	Estimated Completion	Lead
Collect Data	03/07/2020	John and Khwala
Variable Exploration	03/14/2020	George
Variable Selection	03/21/2020	Jason and Khwala
Clean Data	03/21/2020	John and Jason
Machine Algorithms	03/31/2020	John and Jason
Front-end Set Up	03/31/2020	Bemi and George
Back-end Set Up	03/31/2020	Bemi
Progress Report	03/27/2020	Jason
Final Report	04/17/2020	Jason
Final Presentation	04/17/2020	Khwala

All team members have contributed a similar amount of effort thus far.

Checks for Success

