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Discussion of:
Concept Tree: High-Level Representation of Variables for More Interpretable Surrogate Decision Trees (Renard et al. 2019)

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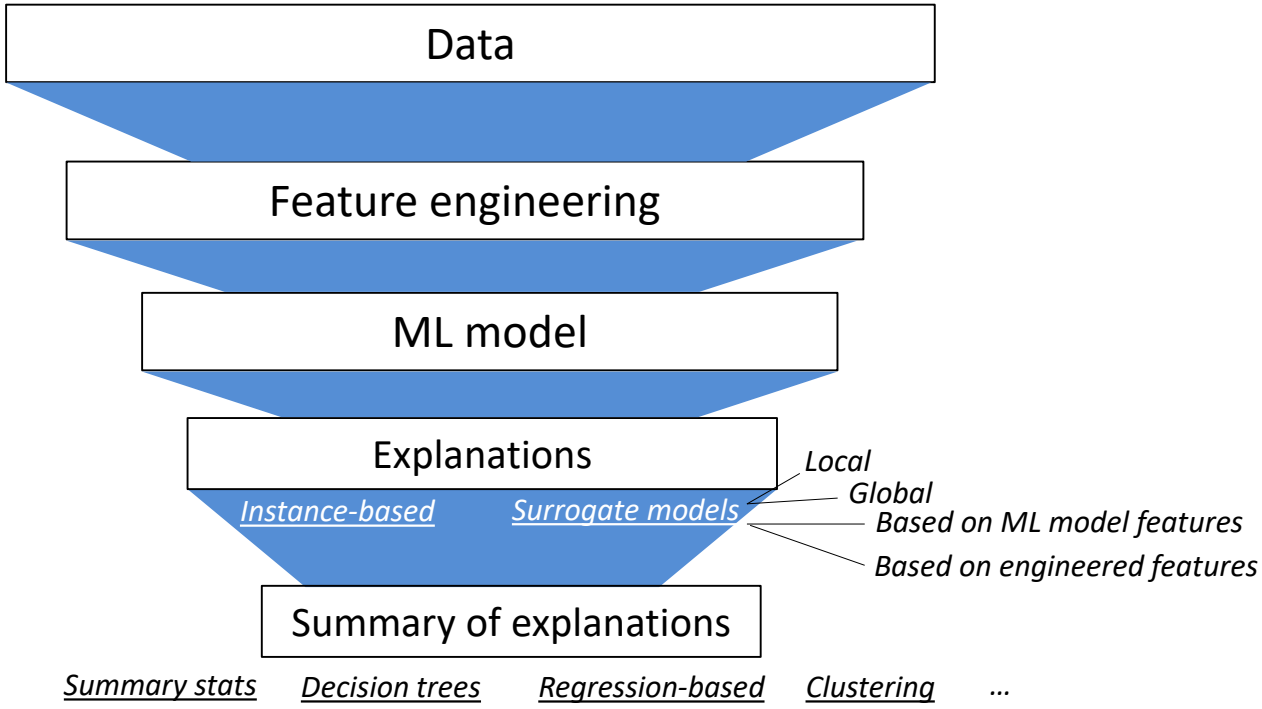
The machine learning process and its explainability



Pros and deltas of the paper

Pros:

- Important to highlight feature engineering as integral part of explainability
  - Similarly important for other models that are not based on surrogate models
  - So could, for instance use it with an instance-based approach, like Shapley (Bracke et al 2019)
- Use of concepts useful way of addressing colinearity issues

Deltas :

- Variable groupings isn't the only shortcoming of surrogate model approaches
  - We may also want local interpretations
  - Could be important to understand the gap between ML model and its surrogate
- The challenge for ML in macroeconomics: establishing causality
  - Unclear if this approach can help with this
  - Usually restrictions are theory-based, on parameters in regressions
  - Decision trees not necessarily intuitive
- Feature correlation issues can be addressed at other stages in ML process
  - eg feature engineering, explicit modelling, or when calculating instance-based explanations

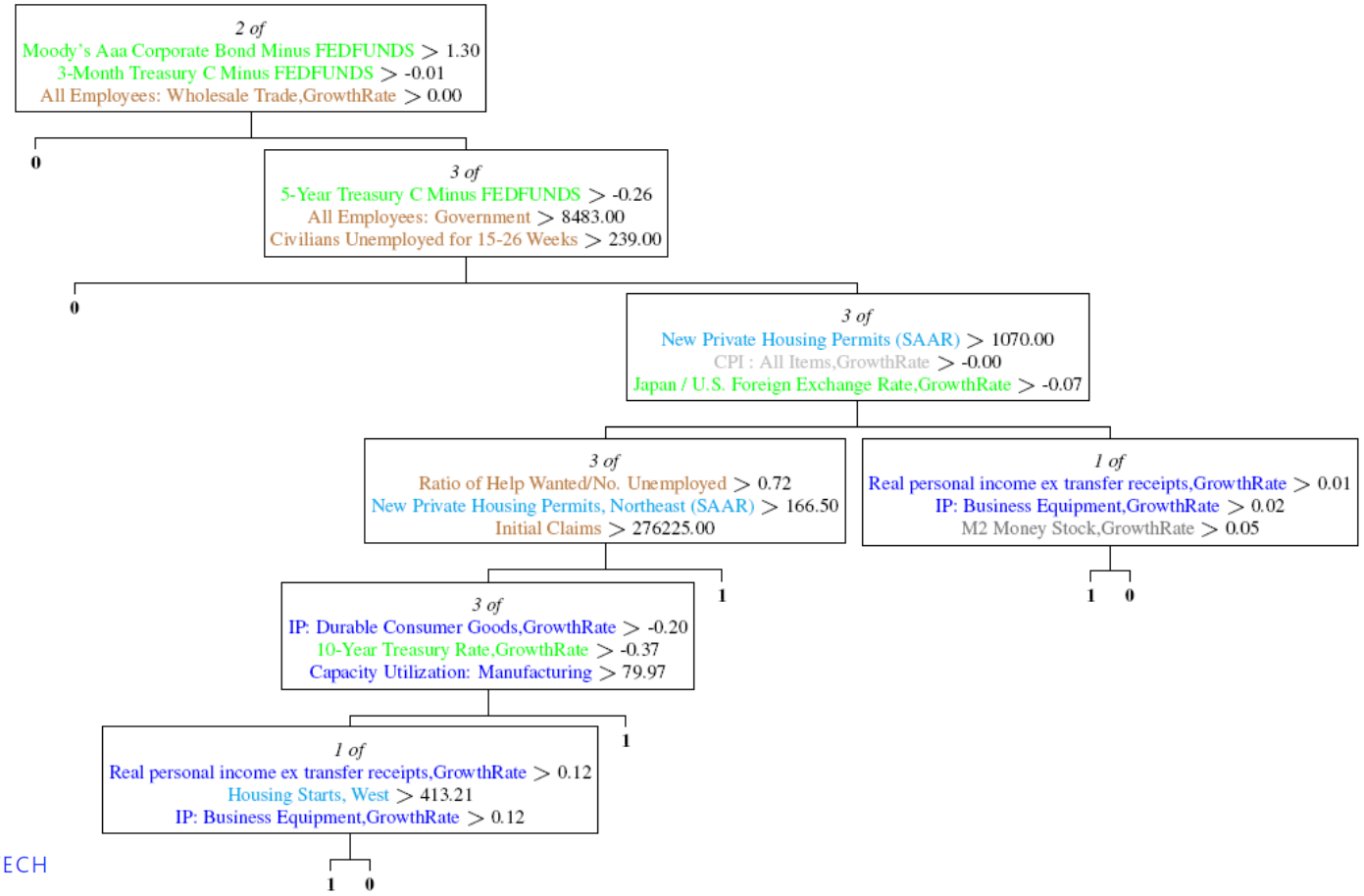
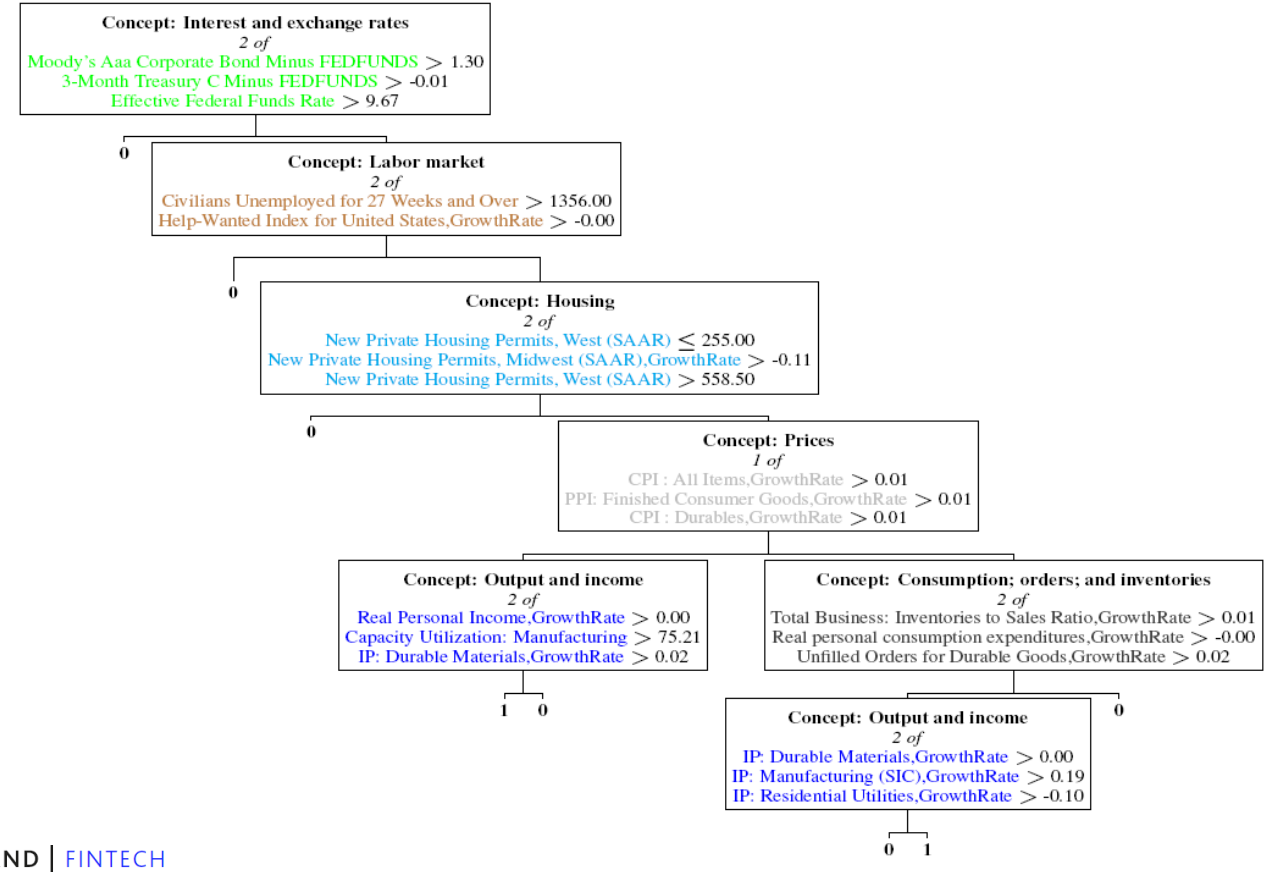
Additional slides

Summary of paper

- Use ‘concepts’ at each node of the decision tree to constrain the training of the split rule
  - Expert-defined grouping
  - Automatically-defined grouping (based on statistical criterion such as feature correlation)

- Use 134 features, over 700 months, to predict downturns [classification]
- They do time series cross-validation and hyper-parameter grid search
- ML model: gradient boosted tree with 500 estimators
- Concept tree roughly matches accuracy of unconstrained surrogate tree

Unconstrained decision tree



Expert-based concept tree