

U.S. PUBLIC PENSION ASSET ALLOCATIONS

Research Question: How do fund characteristics (performance and composition) effect the asset allocations of U.S. public pension funds from 2001-2016?

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IMPORTANCE OF TOPIC

What factors influence asset allocation of U.S. public pensions?

- WHY PUBLIC PENSIONS?

- Many U.S. public pensions are underfunded
 - In 2016, the median funding ratio (assets available for payments to retirees) was 71.1% (Bloomberg)
 - In 2017, “US public pension funds lack \$3.85tn that they need to pay the retirement benefits of current and retired workers” (Financial Times)

- WHY ASSET ALLOCATION?

- Modern portfolio theory - reducing portfolio risk through diversified, uncorrelated assets

DATA

- Public Plans Database

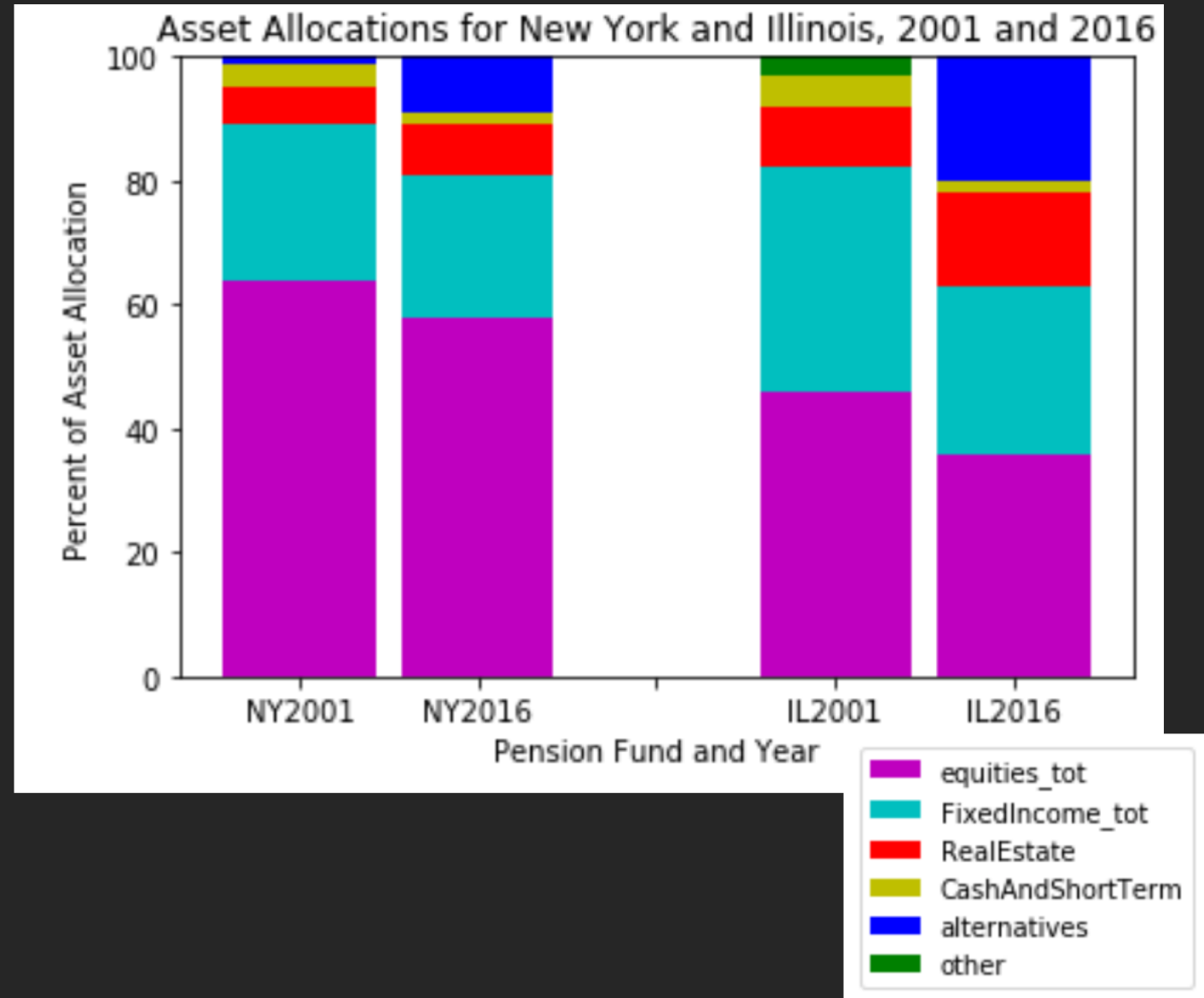
- Plan-level data on 170 public pension plans: 114 administered at a state level and 56 administered locally
- Covers 2001-2016 (16 years)
- Covers 95 percent of public pension membership and assets nationwide
- Includes information on
 - Asset Allocation
 - Membership composition (type and quantity)
 - Funding
 - Returns
 - Etc.

VARIABLES

- Endogenous:
 - Asset Allocation
- Potential exogenous variables to consider:
 - Funded Ratio
 - Number of pensioners in plan
 - Assets under management
 - Pension industry
 - Previous year's investment return

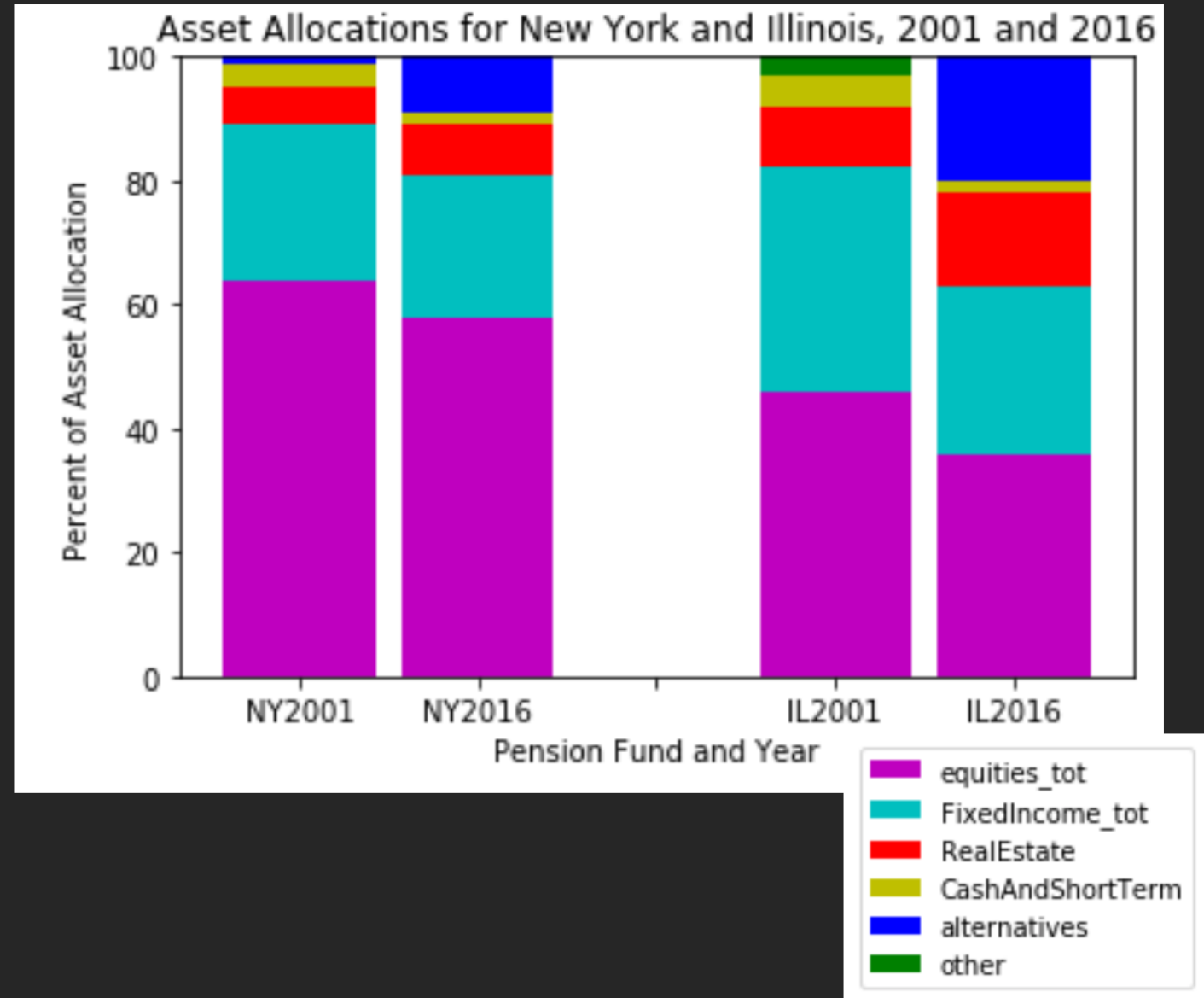
DEFINING ASSET ALLOCATION: BREAKDOWN

- % total assets invested in:
 - Equities
 - Fixed Income
 - Alternatives
 - Real Estate
 - Cash/Short-Term
 - Other
- Vary by year and plan
 - NY has higher funded ratio than IL



DEFINING ASSET ALLOCATION: CATEGORICAL?

- Operationalizing asset allocation
 - Classifier
 - High (1) and low (0) equity to fixed income ratio
 - Continuous
 - Finer-grained ratio
 - Scale of allocation profiles
 - Different Models?
 - Predict 6 categories



MODEL/THEORY

- Let's do a horse race!
 - Logistic Regression vs. Random Forest vs. Neural Net
- Take model strengths/weaknesses into account
 - Classification vs. continuous model of asset allocation
 - Adding more features (Neural Net vs. Random Forest)

POTENTIAL ISSUES WITH MODEL

- Data is relatively small (170 obs/year)
 - Include resampling methods
- Time-Series data
 - Will need to account for changes in markets and investment strategies over time
- Omitted Variable Bias and correlations between variables
 - Need to think hard about the exogenous variables I use

PLACE IN EXISTING LITERATURE

- Pennacchi and Rastad, 2010
 - Analyzed factors that effect risk in 125 public pension funds, as measured by tracking error (higher risk assuming by managers following low performance)
- Weller and Wegner, 2008:
 - Have public sector pension plan managers acted “imprudently” to chase returns after encountering underfunding? (No)

CONTRIBUTION

- Looking at overall asset allocation (not a measure of risk or prudent behavior)
- Different exogenous variables
- Different models
- Data years are more recent (pensions have become more underfunded in recent years)