Will Inequality Continue to Rise? Forecasting Income Inequality in the United States

Marina Gindelsky
Bureau of Economic Analysis, U.S.

Discussant
Session 5 (Plenary)
Thursday, August 25, 2016
Starting in 1980….

- 1980 represents a turning point in inequality after which it “exploded" (Piketty 2014, Goldin and Katz 2008)

- Trends are different afterwards such that beginning in a previous period leads to worse forecasts

- Change in labor market conditions starting in 1980 due to skill-biased technological change (SBTC)

- Analysts do not expect future trends to resemble the prior period

- Swaps crosswalk only to 1975 too many changes in CPS survey methods
Motivation and Aim

- Efforts to explain trends in inequality-hot topic for policy
- Recent work by Piketty (2014) to predict future trends
- Role of skill-biased technological change—role in inequality trends
- Best model to predict trends?

“This paper [attempts to] answers question by choosing models to forecast several inequality measures and providing short-term forecast.”
Motivation

Research Questions:
- Will income inequality continue to rise in the short-run?
- Does this depend on other macro, human capital and labor market variables?

Strong growth in income inequality in the United States since 1980. This growth has differed by group and by income share.

To predict inequality, need answers to questions

- Most appropriate measure?
- Determinates?
Measure

What to measure? Income
- Individual earnings-wages, self-employment, and farm income
- Household income-labor (70% of hh Y), capital income, capital income, government transfers

How to measure? Dependent variable in regression model
- Gini index
- 90/10 income ratios
- Income shares

Where to measure using Gini?
- Overall distribution
- Top 1% income share
- Top 0.1% income share
Determinants on Inequality Forecast

- Human capital attainment
- Labor Force structure
- Macroeconomic variables
Predictive Factors I: Human Capital Attainment Indicators

- % Population 25+ Years Who have Completed College
- % Female Population 25+ Years Who have Completed College
- % of Population 25+ Years Who have Completed High School
- % of Female Population 25+ Years Who have Completed High
- Skill Premium (College Wage/High School Wage)
Predictive Factors II: Labor Force Structure Indicators

- High-Skill Employment (Non-routine Cognitive)
- Middle-Skill Employment I (Routine Cognitive)
- Middle-Skill Employment II (Routine Manual)
- Low-Skill Employment (Non-routine Manual)
- Share of Services in GDP
- Labor Force Participation
- Female Labor Force Participation

- “Skill” vars. defined as log number employed in group
Predictive Factors III: Macroeconomic Indicators

- Real GDP ($gdp$)
- Government Expenditure as a Share of GDP ($gov/gdp$)
- Inflation ($infl$)
- Unemployment ($unemp$)
- Male Unemployment ($m\_unemp$)
Data: Current Population Survey

- Annual microdata in CPS 1975-2014 (public use)

- Structural breaks
  - 1993: Structural break due to survey instrument change
    - Asked specifically about other sources of income
    - Allowed higher values for income reporting (internal topcode)
    - Weighting and imputation changes
    - Change in interview mode
  - Most of increase is not increase in income inequality but to structural break from 1992 to 1993

- Top-coding - existence and consistency: used rank proximity swapping technique (all value greater >= topcode swapped with other values within a bounded interval to better represent internal data and allow for more accurate inequality calculations)
Individual and Household: All and Top 1%: Gini

Ginis compared: Individuals & Households

Top 1 Ginis compared: Individuals & Households
Income Data Adjusted for Break

Top 1 Ginis compared: 1992-1993 Structural Break

- Individual Earnings
- Household Income
- Individual Earnings (no adjustment)
- Household Income (no adjustment)
Model Selection

- Dickey-Fuller test: all series stationary after first differencing, except labor force participation and female labor force participation which were second differenced
- Model in differences, converted back into levels
- Max 4 lags
- Standard autoregressive models were chosen
- General-to-Specific modeling approach¹, with Impulse Indicator
- Saturation (Impulse Indicator Saturation) at 1% level
- Forecast comparison in pseudo-out-of-sample periods with Diebold-Mariano tests and White Reality Check
- Cautions: Correlation of indicators and overfitting

¹ Autometrics (OxMetrics) used to select best model
Results

- Best predictors
  - Human capital attainment
  - Labor force structure
- Model selection not robust but yields robust forecasts
- Out of sample forecasts differ between models by <6% for all variables and <2% for 4/8 measures
- Top 1% is projected to rise, while share of top 0.1% predicted to fall - consistent with inequality within top 1% falling
- Overall (Gini) individual inequality constant while household inequality rises
Gini: Individual Earnings

\[ \Delta \hat{Gini}_t = -0.04 - 1.97d_{2007} + 1.05d_{2008} - 0.15 \Delta Gini_{t-1} - 0.37 \Delta Gini_{t-2} - 0.09 \Delta mskill_{t-1}^- - 3.55 \Delta mskill_{t-2}^- + \epsilon_t \]

Gini of Top 1%: Individual Earnings

\[ \Delta Top1Gini_t = -0.69 + 19d_{1985} + 208 \Delta \frac{mskill_t}{lskill_{t-1}} - 258 \Delta \frac{mskill_t}{lskill_{t-2}} - 185 \Delta \frac{mskill_t}{lskill_{t-3}} \]

Gini: Household Income

\[ \Delta \text{Gini}_t = 0.01 - 0.91d_{2007} + 6.10 \Delta \text{serv/gdp}_{t-2} - 38.90 \Delta \text{medilh}_{t-3} + 0.28 \Delta \text{col/fem}_{t-3} + \epsilon_t \]

Gini of Top 1%: Household Income

\[ \Delta \text{Top1Gini}_t = -0.73 - 5.78d_{1981} + 3.83d_{1985} + 35.89 \Delta \text{lskill}_{t-2} - 1.23 \Delta \text{fem/lftp}_{t-2} - 0.27 \Delta \text{fem/lftp}_{t-3} + 0.63 \Delta \text{fem/lftp}_{t-4} + \epsilon_t \]

Also results plotted for change in shares
Results: Model Selection

- Best predictors
  - Indicators of human capital attainment
  - Labor force structure - no one variable is super predictive

- Model selection in a General-to-Specific modeling approach is not robust but yields robust forecasts

- Sensitive to lag length and variable inclusion
Results: Forecasts

- 2010-2013 models forecast in the same direction as 2011-2014 models

- Out of sample forecasts differ between models by <6% for all variables and <2% for 4/8 measures

- Best models not statistically different from naive models

- Overall Gini individual earnings inequality constant while household inequality increases steady. Inequality among individual and households continues to show different patterns

- Share of top 1% rising but inequality within top 1% falling
Comments-1

- Concern with forecast since income used appears to subject to topcodes (Burkhuser et al. 2011)—concern swapping adequate
  - Try analysis with internal data
  - Try analysis with imputes from SCF at top or tax data
- Are these data appropriate/adequate for measuring top 1% much less 0.1%?

- Issue of taxes, realized capital gains, definitions of transfers (especially at top given different compensation packages for executives)
- Farm income versus income from rental properties (one individual, one household)

- Use of equivalence scales? Major changes in households composition over this time period
Comments-2

- Determinants are macro—what about micro? You have the data...
  - Different determinants for individuals and households over the income distribution

- Macroeconomic econometrics—what about micro?
Contact Information

Thesia I. Garner, Ph.D.

Supervisory Research Economist
Division of Price and Index Number Research, BLS
U.S. Department of Labor, Washington, DC

202-691-6576
Garner.Thesia@bls.gov