Income inequality and savings: a reassessment of the relationship in cointegrated panels

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   - Modeling income variation

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3 Estimations

4 Discussion

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Income inequality and savings: a reassessment of the relationship in cointegrated panels
The relationship between income inequality and savings has been "on the research agenda" for, at least, 80 years, starting from Fisher (1930).

Several theories explain the relationship:

- Permanent income hypothesis (Friedman 1957)
- Life-cycle hypothesis (Ando and Modigliani 1963)
- Savings under liquidity constraint (Deaton 1991)
Implications

- All theories tend to find that the propensity to save would increase with income (also the "corrected" version of Deaton’s (1991) savings under liquidity constraint by Travaglini (2008)).
- Studies with micro data usually concur with this finding.
- Results of macro studies have been controversial.
- Very little knowledge on the "long-run" relationship between distribution of income and savings.
Results of recent macro studies

- Leigh & Posso (2009): no statistically significant effect of inequality on gross savings
- Schmidt-Hebbel & Serven (2000): the same
- Smith (2001): positive effect of income inequality on gross savings
- Li & Zou (2004): negative effect of inequality to private savings
Early theoretical studies on income variation

- Early studies on income inequality assumed that the process of income inequality could be nonstationary
  - In the first formal study on income variation, Chambernowne (1953) modeled the evolution of income as a $I(1)$ nonstationarity process.
  - Mandelbrot (1961) stated that nonstationary income variation is likely to describe the evolution of inequality better than stationarity one, which is usually assumed for modeling reasons.
- Still, macro models generally assume stationary income variation
Models of intertemporal allocation

- Muth (1960) developed a model where the individual income process was divided into permanent (random walk) and transitory (stochastic stationary) components.
- The idea of Muth is still used in modern models of intertemporal allocation.
- Microeconometric studies also tend to find a (permanent) $I(1)$ nonstationary component affecting the income series of households (e.g. Blundell et al. 2008, Meghir & Pistaferri 2004).
Controversy?

- If individual series are affected by a stochastic trend, the aggregated time series is likely to be characterized by a random walk (Rossana and Seater 1995).
- However, macroeconometric studies usually use some bounded measure, like the Gini index, which, by definition, cannot be an I(1) nonstationary process.
- Still, results of Jäntti and Jenkins (2010), Herzer and Vollmer (2011) and Malinen (2011) indicate that bounded measures of income inequality tend to follow a I(1) process.
Stochastic trends

- It is possible that the distribution can have a stochastic trend in its other moments, like the mean, skewness, and kurtosis, than variance (White and Granger 2010).

- Aggregation of series with a random walk component to a bounded measure is thus likely to lead to a distribution characterized by a stochastic trend in kurtosis and/or skewness.

- This way the measure (a functional) of income inequality derived from some income distribution may exhibit such high levels of persistence that it is better approximated by an I(1) than a stationary process.
Detrended GDP series and its first difference

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Top 1% income share: mean- or trend-reverting process?

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So, what is the problem?

- In previous research ratios of savings to GDP have usually been regressed against (different) measures of income inequality.
- But, if income inequality is an $I(1)$ nonstationary variable, these studies have regressed stationary variable is against $I(1)$ nonstationary variable.
- This setup is likely to lead to spurious regressions (Stewart 2011).
- Even if income inequality is globally stationary, long periods of nonstationarity can lead to erroneous inference in regressions.
Data

- Baseline data (on all variables) on nine countries ranging from 1960 till 2004. Inequality data from 1925 to 2004.
  - Countries included are: Canada, Finland, France, the Netherlands, Norway, Sweden, Switzerland, United Kingdom and the United States
- Top 1% income share is used to proxy income inequality
- Gross national savings and total expenditure of private consumption are used as dependent variables
- Other included variables: the GDP per capita and the interest rate
  - From databases of AMECO, IMF, and the World Bank.
Panel unit root tests

- Tests allowing for cross-sectional correlation are used (Pesaran 2007, Phillips and Sul 2003).
- All tests find the top 1% income share to be a $I(1)$ nonstationary variable (Switzerland not included).
- Gross savings, private consumption, the GDP per capita and the interest rate also found to be $I(1)$ nonstationary.
Panel trace cointegration test

- The possible cointegration between included variables is tested using the panel trace cointegration test by Larsson and Lyhagen (2007).
- Test allows for cross-sectional correlation.
- Because the test requires that $T$ is considerable larger than $n$, the countries are divided into three groups which are: Anglo-Saxon, Central-European, Nordic countries.
- The cointegration between gross savings and the top 1% income share as well as between private consumption and the top 1% income share are tested.
According to the results, inequality and gross savings are not cointegrated in the Central-European and Anglo-Saxon countries.

But, inequality and gross savings are found to be cointegrated of order 1 in the Nordic countries.

The top 1% income share and private consumption are found to be cointegrated in all groups of countries.
Baseline for estimation

- Estimations are done in country groups.
- Panel DSUR and panel VAR estimators are used.
  - Both control for endogeneity and cross-sectional correlation.
- Only the results on private consumption are presented, but the effect of top 1% income share on gross savings was negative in Nordic countries and not statistically significant in other groups.
<table>
<thead>
<tr>
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<th>Nordics</th>
<th>Central-Europe</th>
<th>Anglo-Saxon</th>
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<tr>
<td><strong>Panel DSUR</strong></td>
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<tr>
<td>log(top 1%)</td>
<td>-0.1051***</td>
<td>-0.1480***</td>
<td>-0.0704*</td>
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<td></td>
<td>(0.0119)</td>
<td>(0.0168)</td>
<td>(0.0304)</td>
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<td><strong>Panel VAR</strong></td>
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<tr>
<td>log(top 1%)</td>
<td>-0.1349*</td>
<td>-0.1748***</td>
<td>0.0826***</td>
</tr>
<tr>
<td></td>
<td>(0.0512)</td>
<td>(0.0451)</td>
<td>(0.0262)</td>
</tr>
<tr>
<td>log(GDP)</td>
<td>0.0919***</td>
<td>0.0996***</td>
<td>0.1007***</td>
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<tr>
<td></td>
<td>(0.0042)</td>
<td>(0.0024)</td>
<td>(0.0021)</td>
</tr>
<tr>
<td>log(interest)</td>
<td>-0.0132</td>
<td>0.0203</td>
<td>-0.0383***</td>
</tr>
<tr>
<td></td>
<td>(0.0262)</td>
<td>(0.0120)</td>
<td>(0.0108)</td>
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<tr>
<td><strong>countries</strong></td>
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<tr>
<td><strong>years</strong></td>
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<td>1960-00</td>
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<td><strong>observations</strong></td>
<td>132</td>
<td>111</td>
<td>123</td>
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* = p<.05, ** = p<.01, *** = p<.001.
On results

- Results for Nordic and Central-European countries imply that income inequality has diminished private consumption, i.e., it has increased private savings.

- Result well in-line with theories and (most) micro-econometric evidence. Results also robust for inclusion of control variables.

- Results for Anglo-Saxon countries depend on the inclusion of GDP per capita. Without it, the estimate for top 1% income share is negative.

- Unclear of why this is. Positive estimate would contradict most theories and results of several micro-econometric studies.
Conclusions

- Income inequality seems to be characterized by $I(1)$ nonstationarity as predicted by microeconomic studies.
- It is possible that income inequality does not affect gross savings in some countries.
- Thus, results imply that previous macroeconomic research may have produced biased results on the effect of inequality to savings.
- Individual country analyses on the relationship are the way forward.
THANK YOU!
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