The Impact of Monetary Policy on Inequality in the UK. An Empirical Analysis

Haroon Mumtaz    Angeliki Theophilopoulou

May 2017
Introduction

- Inequality in wages, income and consumption high over the Great Moderation period.
- Complex reasons including technological change, changes in family structure, fiscal policy.
- Did monetary policy play a role?
**Monetary Policy and inequality**

**Monetary Expansion may benefit**
- Financial market participants.
- Households whose maturing liabilities exceed their maturing assets.
- Borrowers
- Households more exposed to unemployment

**Monetary Expansion may harm**
- Low income households vulnerable to inflation
- Households with short-term assets.
- Savers
### Related Evidence

<table>
<thead>
<tr>
<th>Country</th>
<th>Study</th>
<th>Shock</th>
<th>Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Coibion et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
<tr>
<td>EA</td>
<td>Guerello (2016)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Ind.</td>
<td>Hubers and Stephen (2014)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>USA</td>
<td>Bivens (2015)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Saiki and Frost (2014)</td>
<td>UMP +</td>
<td>+</td>
</tr>
<tr>
<td>Italy</td>
<td>Casiraghi et.al (2016)</td>
<td>UMP +</td>
<td>-</td>
</tr>
<tr>
<td>Ind. and dev</td>
<td>Furceri et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
</tbody>
</table>
### Related Evidence

<table>
<thead>
<tr>
<th>Country</th>
<th>Study</th>
<th>Shock</th>
<th>Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Coibion et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
<tr>
<td>EA</td>
<td>Guerello (2016)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Ind.</td>
<td>Hubers and Stephen (2014)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>USA</td>
<td>Bivens (2015)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Saiki and Frost (2014)</td>
<td>UMP +</td>
<td>+</td>
</tr>
<tr>
<td>Italy</td>
<td>Casiraghi et.al (2016)</td>
<td>UMP +</td>
<td>-</td>
</tr>
<tr>
<td>Ind. and dev</td>
<td>Furceri et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
</tbody>
</table>
## Related Evidence

<table>
<thead>
<tr>
<th>Country</th>
<th>Study</th>
<th>Shock</th>
<th>Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Coibion et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
<tr>
<td>EA</td>
<td>Guerello (2016)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Ind.</td>
<td>Hubers and Stephen (2014)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>USA</td>
<td>Bivens (2015)</td>
<td>M +</td>
<td>-</td>
</tr>
<tr>
<td>Japan</td>
<td>Saiki and Frost (2014)</td>
<td>UMP +</td>
<td>+</td>
</tr>
<tr>
<td>Italy</td>
<td>Casiraghi et.al (2016)</td>
<td>UMP +</td>
<td>-</td>
</tr>
<tr>
<td>Ind. and dev</td>
<td>Furceri et.al (2016)</td>
<td>M -</td>
<td>+</td>
</tr>
</tbody>
</table>
Cloyne et.al. (2016) show that policy shocks affect durable consumption of mortgagors more than home-owners.
Summary

- We build quarterly time-series for measures of income, earnings and consumption inequality 1969-2010.
- Using a battery of SVARs, we show that contractionary policy shocks associated with an increase in inequality.
- Policy shocks contribute about 10% to FEV of the Gini coefficient.
- Some evidence to suggest that QE was associated with an increase in income inequality.
Data and Inequality Measures

- We collect data for four variables: disposable income, total consumption, consumption of non durables and gross wage.
- 43 waves from UK Family Expenditure Survey (FES) (EFS, 2001 and LCFS, 2008)
- 7,000 households per year
- FES over represents mortgage holders, people living in the country and under represents people living in council flats
- Time Span: 1969-2012 Quarterly data
- Quarterly data are constructed by assigning households according to the date of their interview (Cloyne and Surico, 2016)
- We trim the distributions of all variables by removing the top and bottom 1%
Data and Inequality Measures

- Two widely used measures of Inequality:
  1. The Gini coefficient of levels which takes values between 0 (perfect equality) and 1 (perfect inequality).
  2. The cross sectional standard deviation of log levels.

- The inequality measures are calculated using household level data for each quarter of interview.
- Disposable income is equivalised for the family size and composition by using the modified OECD scale.
- The measures for wage is on individual level and consumption is per capita.
Inequality Measures

Graph showing Gini Coefficients from 1970 to 2009 for different categories: Income, Wage, Total consumption, and Non-durable consumption.
The VAR model

- We estimate the following VAR model 1975Q1-2008Q4 (excluding Bretton Woods and the QE period)

\[ Z_t = c + \sum_{j=1}^{P} B_j Z_{t-j} + A_0 \varepsilon_t \]

- where \( Z \) contains the growth of real GDP per capita, CPI, the three month treasury bill rate, the growth of nominal effective exchange rate and the measure of Inequality.
Identifying the policy shock

- Benchmark model uses sign restrictions

<table>
<thead>
<tr>
<th>Var</th>
<th>GDP</th>
<th>CPI</th>
<th>Inequality</th>
<th>R</th>
<th>ER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign</td>
<td>−</td>
<td>−</td>
<td>×</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

- Results robust to
  1. Recursive scheme
  2. Using a narrative measure of shocks (Cloyne and Huertgen (2014))
  3. Large data set (FAVAR)
Impulse Responses
Contribution of monetary policy shocks to forecast error variance of Inequality
Consider households and individuals that fall within the following percentiles in a given quarter:

- $P_1 = [2^{nd} : 19^{th}]$
- $P_2 = [20^{th} : 39^{th}]$
- $P_3 = [40^{th} : 59^{th}]$
- $P_4 = [60^{th} : 79^{th}]$
- $P_5 = [80^{th} : 98^{th}]$.

We then construct measures of average real wage, real income and real per-capita consumption within these percentiles.

These measures are then included in the SVAR along with four macroeconomic variables used above and their response to a monetary policy shock is examined.
Heterogenous Impulse Responses

- Wage
- Income
- Non-durable Consumption
- Total Consumption

Haroon Mumtaz, Angeliki Theophilopoulou
Inequality and Monetary Policy
Heterogenous Impulse Responses

- Income and Wages fall for groups $P_1$ to $P_3$
  - quick reversal (unemployment, social security)
- Rise in income for higher groups
  - Investments form a larger proportion of Gross income (5% compared to 1.5% for $P_1$)
  - Consistent with evidence for the US.
- Consumption declines for $P_5$ and rises for $P_1$
  - Consistent with $P_1$ substituting non-durable consumption for durables due to credit constraints.
- Expenditure does not decline as much for $P_5$
  - This group has high income
  - may spend more on durables and housing (interest sensitive)
Heterogenous Impulse Responses

- **Savings re-distribution channel**
  - increase in rates benefits savers and those receiving interest income

- **Earnings heterogeneity channel**
  - increase in interest rates hurts low income households who may become unemployed

- **Financial segmentation channel**
  - Less direct evidence visible
Impact of QE

- Post 2008 QE employed by the BOE
- Portfolio balance effect may trigger financial segmentation channel by stimulating asset prices.

We use two methods:

1. Kapetanios et al. (2012): Include bond spread in the VAR model and assume QE reduced spread by 100 basis points. Conduct two forecasts over 2009Q1-2010Q4:
   - Policy Scenario: Forecast of Gini coefficient assuming spread and policy rate equal realised values
   - No-policy scenario: As above but assume spread higher by 100 bp over horizon.
Impact of QE


- Counterfactual simulation using spread shocks scaled to ensure spread is higher by 100 basis points over 2009Q1-2010Q4
- Compare the counter-factual path of the Gini coefficient with the actual path.

Counterfactual scenarios approximating the absence of QE are associated with a peak impact of about -1% on GDP growth over the simulation period.
Results: Method 1

![Wage](image1)

![Income](image2)

![Total Consumption](image3)

![Non-Durable Consumption](image4)
Results: Method 2

- Wage
- Income
- Total Consumption
- Non-Durable Consumption
Impact of QE

- Evidence that wage and total consumption inequality was systematically different in the absence of QE appears to be limited.
- More evidence that QE worsened income and non-durable consumption inequality.
  - Re-run counterfactual forecast using income and consumption in groups $P_1$ to $P_5$
  - Present difference in projected income/consumption under policy and no-policy scenarios.
  - Positive values $\rightarrow$ positive impact of QE
Impact of QE

Haroon Mumtaz, Angeliki Theophilopoulou

Inequality and Monetary Policy
Impact of QE

- QE may signal that rates are likely to remain low.
- Asset prices positively affected (Joyce et.al 2010)
  - Financial segmentation channel
- Investors willing to hold longer-term bonds
  - Lower unhedged interest rate exposure (Auclert 2016)
  - Derive benefit from low rates (Interest rate exposure channel)
Summary

- Contractionary policy shocks associated with an increase in inequality
  - Saving re-distribution channel
  - Earnings heterogeneity channel
- QE associated with higher income and consumption inequality
  - Financial segmentation channel
Some issues of interest

- Exploring the channels of transmission
- Role of wealth
- Permanent/systematic policy changes
  - Coibion et.al. report that decrease in target increases inequality
Long-run correlation

Gini-Inflation (Long-Run)

Gini-Policy Rate (Long-Run)
Time-Varying response of the Gini Coefficient

Cumulated response of Income Gini


0 0.1 0.2 0.3 0.4

0 10 20 30
Data details

- **Income:** Weekly household income net of taxes and national insurance contributions
  - Equivalised using OECD scale
- **Wage:** normal gross wage from any type of occupation before taxes including national insurance contributions and other deductions and bonuses.
- **Total Consumption:** sum of housing, food, alcohol, tobacco, fuel, light and power, clothing and footwear, durable household goods, other goods, transport, vehicles and services.
- **Non-durable consumption:** excludes housing and durable household goods