Distributive Effects of Banking Sector Losses

Caterina Mendicino  
European Central Bank

Lukas Nord  
European University Institute

Marcel Peruffo  
European Central Bank

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Disclaimer: The views expressed herein are those of the authors and should not be attributed to the ECB or the Eurosystem.
Motivation: Unequal Effects of Bank Distress

- **disruptions in the banking sector** have significant real effects
  - transmission via interest rates, spreads, asset prices

- households exposed in **heterogeneous** ways
  - portfolio composition (e.g. borrowers vs. savers)
  - income sources (e.g. labor vs. financial)
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- understanding heterogeneous effects is a prerequisite for **policy design**
  - *Who benefits from government support to banks in crisis?*
  - *Who bears the costs from banking sector losses?*
This Paper

Quantitative heterogeneous agent model with a banking sector

- HHs: idiosyncratic risk, hold (liquid) deposits & (illiquid) capital (Kaplan and Violante, 2014)
- banks: leverage constraint, intermediate deposits/capital/loans (Gertler and Karadi, 2011)

⇒ micro-founded supply of deposits, explicit liquidity transformation
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Bank distress: simulate surprise decline in return on banks’ assets

- consumption response decreases in income (in line with empirical evidence)
- channels: low-income respond to earnings & borrowing cost, high-income to asset returns
- welfare more unequal: high-income gain from lower asset prices & high returns
Related Literature and Contribution

- **financial recessions**
  ⇒ **distributive effects**

- **inequality and aggregate shocks**
  ⇒ **isolate bank loss channel, endogenous transmission of financial shocks**

- **intermediation frictions and heterogeneous HHs**
  Fernández-Villaverde et al. (2019), Arslan et al. (2020), Lee et al. (2021), Schroth (2021), Ferrante and Gornemann (2021)
  ⇒ **portfolio choice (liquid vs. illiquid assets), micro-founded demand for deposits**
A Heterogeneous Agent Economy with a Banking Sector
Model Setup: Households

- stochastic idiosyncratic income
  - (cyclical) labor income risk $w_t \gamma(z_t, Y_t) z_t$
  - dividend income $\text{div}_t$ for top 1% ($z_t = z^*$)

save/borrow in (intermediated) liquid asset $a_{t+1}$ at rate $r_{HH}(a_t, z_t)$
- deposit rate if $a_t \geq 0$:
  $r_{HH}(a_t, z_t) = r_D$
- borrowing rate if $a_t < 0$:
  $r_{HH}(a_t, z_t) = r_L + \tau(z_t)$

save in illiquid asset $k_{t+1}$ with stochastic utility cost of adjustment $\eta_t$

$V_t(a_t, k_t, z_t, \eta_t) = \max \left\{ \begin{array}{l}
V_{a_t}(a_t, k_t, z_t) - \eta_t \\
V_{n_t}(a_t, k_t, z_t)
\end{array} \right\}$
Model Setup: Households

- stochastic idiosyncratic income
  - (cyclical) labor income risk $w_t \gamma(z_t, Y_t) z_t$
  - dividend income $\text{div}_t$ for top 1% ($z_t = z^*$)

- save/borrow in (intermediated) liquid asset $a_{t+1}$ at rate $r_t^{HH}(a_t, z_t)$
  - deposit rate if $a_t \geq 0$: $r_t^{HH}(a_t, z_t) = r_t^D$
  - borrowing rate if $a_t < 0$: $r_t^{HH}(a_t, z_t) = r_t^L + \tau(z_t)$
Model Setup: Households

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  - (cyclical) labor income risk $w_t \gamma(z_t, Y_t)z_t$
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- save/borrow in (intermediated) liquid asset $a_{t+1}$ at rate $r_t^{HH}(a_t, z_t)$
  - deposit rate if $a_t \geq 0$: $r_t^{HH}(a_t, z_t) = r_t^D$
  - borrowing rate if $a_t < 0$: $r_t^{HH}(a_t, z_t) = r_t^L + \tau(z_t)$

- save in illiquid asset $k_{t+1}$ with stochastic utility cost of adjustment $\eta_t$

\[
V_t(a_t, k_t, z_t, \eta_t) = \max \left[ \begin{array}{c}
V_t^a(a_t, k_t, z_t) - \eta_t, V_t^n(a_t, k_t, z_t)
\end{array} \right]
\]

\[
\text{adjust} \quad \text{do not adjust}
\]
Model Setup: Households

- non-adjusting household: $k_{t+1} = k_t$

$$V_t^n(a_t, k_t, z_t) = \max_{\substack{c_t \geq 0 \\ a_{t+1} \geq a \\ k_{t+1} \geq 0}} \left\{ u(c_t) + \beta \mathbb{E}_t V_{t+1}(a_{t+1}, k_t, z_{t+1}, \eta_{t+1}) \right\}$$

s.t. $c_t + a_{t+1} \leq (1 + r_t^{HH}(a_t, z_t))a_t + (r_t^K - \delta q_t)k_t + w_t\gamma(z_t, Y_t)z_t + I_{z_t = z^*}div_t$

- adjusting household: $k_{t+1} \geq 0$

$$V_t^a(a_t, k_t, z_t) = \max_{\substack{c_t \geq 0 \\ a_{t+1} \geq a \\ k_{t+1} \geq 0}} \left\{ u(c_t) + \beta \mathbb{E}_t V_{t+1}(a_{t+1}, k_{t+1}, z_{t+1}, \eta_{t+1}) \right\}$$

s.t. $c_t + a_{t+1} + q_t k_{t+1} \leq (1 + r_t^{HH}(a_t, z_t))a_t + (r_t^K + (1 - \delta)q_t)k_t + w_t\gamma(z_t, Y_t)z_t + I_{z_t = z^*}div_t$
Model Setup: Banks

- following Gertler and Karadi (2011)
- bankers exit stochastically & distribute equity $e_t$ with probability $\theta \Rightarrow$ dividend to HHs
- maximize expected payout by choosing deposits $d_t$, loans $l_t$, capital $k^B_t$
- subject to incentive and balance sheet constraints

\[
v_t^B = \max_{k^b_t, l_t, d_t} (1 - \theta) \mathbb{E}_t \sum_{j=0}^{\infty} \theta^j \beta^{j+1} e_{t+j+1}
\]

s.t. \[q_t k^b_t + l_t = d_t + e_t\]
\[e_t = (\xi^B r^K_t + (1 - \delta) q_t) k^b_{t-1} + (1 + r^L_t) l_{t-1} - (1 + r^D_t) d_{t-1}\]
\[v_t^B \geq \chi(q_t k^b_t + l_t)\]

$\Rightarrow$ no arbitrage: \[\mathbb{E}\left(\frac{\xi^B r^K_t + (1 - \delta) q_t}{q_{t-1}}\right) - 1 = r^L_t\], binding incentive constraint: \[r^D_t < r^L_t\]
Model Setup: Supply

- **intermediate goods producer**
  \[ Y_t^I = A_t K_t^\alpha N_t^{1-\alpha} \quad K_t = K_{HH}^t + \xi_t^B K_t^B \]

  - rent capital from households \( K_{HH}^t \) and banks \( K_t^B \)
  \[ \rightarrow \text{wages } w_t \text{ and rental rate } r^K_t \]

- **retailers (monopolistic competition)**
  - sell differentiated intermediate good to final good’s (\( Y_t \)) producer at a **markup** \( \mu \)
  \[ + \text{ dividends } div_t^Y = \left(1 - \frac{1}{\mu}\right) Y_t \Rightarrow \text{wealth inequality} \]

- **capital producers**
  - convert final good into capital, subject to **adjustment cost**
  \[ \rightarrow \text{fluctuations in asset price } q_t \]
Quantitative Results
Quantitative Exercise

1. calibrate steady state to **US data**
   - size of commercial banks, households' balance sheet
Quantitative Exercise

1. calibrate steady state to **US data**
   - size of commercial banks, households' balance sheet

2. simulate **surprise decline** in productivity of bank investments
   - **bank losses** ⇒ **reduced intermediation** ⇒ **transmission to HH’s**
   - size and persistence match:
     - drop of 12.43% in bank equity (**one standard deviation** of empirical returns)
     - 12-quarter cumulative **aggregate** change in consumption of 4.67%
### Model Fit - Untargeted Moments

<table>
<thead>
<tr>
<th></th>
<th>Liquid/Deposits</th>
<th></th>
<th>Total Net Worth</th>
<th></th>
<th>Total Income</th>
<th></th>
<th>NW (by Income)</th>
<th></th>
<th>Liq. (by Income)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
<td>Model</td>
<td>Data</td>
</tr>
<tr>
<td>Q1</td>
<td>-3.5</td>
<td>-4.2</td>
<td>-0.1</td>
<td>-0.2</td>
<td>4.3</td>
<td>7.0</td>
<td>2.2</td>
<td>2.9</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Q2</td>
<td>1.4</td>
<td>0.2</td>
<td>2.0</td>
<td>1.2</td>
<td>9.1</td>
<td>10.5</td>
<td>4.5</td>
<td>4.5</td>
<td>6.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Q3</td>
<td>4.8</td>
<td>1.7</td>
<td>5.1</td>
<td>4.2</td>
<td>13.7</td>
<td>14.9</td>
<td>6.5</td>
<td>8.1</td>
<td>7.2</td>
<td>8.7</td>
</tr>
<tr>
<td>Q4</td>
<td>11.1</td>
<td>8.1</td>
<td>10.5</td>
<td>11.5</td>
<td>21.4</td>
<td>20.8</td>
<td>13.0</td>
<td>14.7</td>
<td>12.8</td>
<td>16.8</td>
</tr>
<tr>
<td>Q5</td>
<td>86.4</td>
<td>94.2</td>
<td>82.4</td>
<td>83.3</td>
<td>51.5</td>
<td>47.7</td>
<td>73.8</td>
<td>69.8</td>
<td>71.8</td>
<td>68.7</td>
</tr>
</tbody>
</table>

- Gini of net worth: 81.4 in the model vs. ~80 in the data
- interest on consumer loans: 12.9% vs. 11.1%
- fraction of $a \leq 0$: 18.7% vs. 19.3%

⇒ model captures **realistic exposure** to banking sector losses
Aggregate Response to Shock
Results - Consumption Inequality
Consumption Inequality - Income Quintiles
Consumption Inequality - Income Quintiles

⇒ HH’s consumption responds to prices (earnings, interest rates, returns...) – decompose responses → transmission mechanisms
Consumption Inequality – Mechanisms

Consumption of Q1

Consumption of Q2

Consumption of Q3

Consumption of Q4

Consumption of Q5

Aggregate

- Baseline
- Earnings
- Borrowing
- Financial Markets (Ex, Dividends)
Consumption Inequality – Mechanisms

- ↑ borrowing cost → low income (more likely borrowers)
Consumption Inequality – Mechanisms

- ↓ earnings → decreasing importance (insurance, cyclicality)
Consumption Inequality – Mechanisms

returns on savings ↓ then ↑ → high income (future consumption)
Consumption Inequality – Mechanisms

⇒ heterogeneity in response and transmission mechanisms
Results: Welfare Inequality
Welfare vs. Consumption

⇒ welfare impact **substantially more unequal** than (initial) consumption response

⇒ top quintile (marginally) **gains** from bank distress
Heterogeneity in Welfare

- 14% of HHs are better off
  - income 61% larger than avg.
  - 4.5× wealthier than avg.
  - 4.4× more liquid wealth

Distribution of Welfare Changes
Robustness to Alternative Specifications

Main conclusions are robust to:

- direct shock to **banks’ equity**
  - equivalent change in banks’ resources on impact
  ⇒ relatively larger role for asset returns and borrowing cost

- introduction of **New Keynesian** frictions
  - sticky wages, labor union as in Auclert et al. (2020), Taylor rule
  ⇒ relatively larger role for earnings
Empirical Evidence
Data and Estimation

- Micro-data from Consumer Expenditure Survey (CEX), 1980-2018
  - **Consumption** $\equiv$ nondurables + durables + services
  - Averaged by (total) income quintile, quarterly series

- **Bank equity returns index** from Baron et al. (2021)
  - based on stock market prices and dividends
  - supplement with non-financial market returns (S&P 500 Industrials)

- **Quintile-level local projections** (similar to Baron et al. (2021)):

\[
\log c_{i,t+h} = \alpha_i^h + \gamma_i^h (t + h) + \sum_{j=0}^{J} \beta_i^{h,j} r_{t-j}^B + \sum_{s=0}^{S} \delta_i^{h,s} r_{t-s}^{NF} + \sum_{k=1}^{K} \lambda_i^{h,k} c_{i,t-k} + \epsilon_{i,t}
\]
Consumption and Bank Returns

Response to a one-standard-deviation decline in bank equity returns
Consumption: Model vs. Data

![Bar chart showing the % Cumulative Change over 12 quarters for different income quintiles. The chart compares Model (black bars) and Data (red bars). The income quintiles are labeled 1 to 5 from left to right. The y-axis represents the % Cumulative Change over 12 quarters, ranging from -12 to 0. The chart illustrates how consumption data diverges from the model predictions across different income quintiles.](chart.png)
Conclusion
Conclusion

- quantitative model with heterogeneous households, portfolio decisions, and banking sector
  - low-income consumption responds more to distress in the banking sector
  - mechanisms differ along the income distribution
    + bottom: low insurance to earnings losses, borrowing rates
    + top: benefit from asset prices, high future returns ⇒ portfolio composition matters
  - welfare losses concentrated among low-income

- consumption response in line with empirical evidence

⇒ alleviating consequences of bank losses supports low-income households
Appendix
References


References (cont.)


Reference (cont.)


Intermediate Goods Producer

- competitive markets
- Cobb-Douglas production function for intermediate good

\[ Y^I_t = A_t K_t^\alpha N_t^{1-\alpha} \]

- \( K_t = K_t^{HH} + \xi_t^B K_t^B \equiv \text{effective units of capital} \)
- input prices:

\[ r^K_t = \frac{1}{\mu} \alpha A_t K_t^{\alpha-1} N_t^{1-\alpha} \]

\[ w_t = \frac{1}{\mu} (1 - \alpha) A_t K_t^\alpha N_t^{-\alpha} \]
Retailers and Final Goods Producer

- **monopolistic-competitive** retailers indexed by $j$:
  - purchase intermediate good, differentiate to $y_{jt}$
  - sell to final goods’ producer
  $$Y_t = \left( \int_j y_{jt} \frac{1}{\mu} dj \right)^\mu$$
  - retailers pricing: **markup** $\mu$ over marginal cost

- retailers’ dividends:
  $$\text{div}^Y_t = \left( 1 - \frac{1}{\mu} \right) Y_t$$
Capital Producers

- competitive markets
- convert final good into capital, subject to **adjustment cost**

\[
\max_{K_t} \beta^t \sum_{t=0}^{\infty} \left( (q_t - 1)K_t - \frac{\phi}{2} \left[ \log \frac{K_t}{K_{t-1}} \right]^2 K_t \right)
\]
Market Clearing

- demand and supply for effective capital units

\[ K_t = \xi_t^B K_t^B + \int k_t(i) di \]

- deposits:

\[ D_{t+1} = \int_{a_{t+1} \geq 0} a_{t+1}(i) di \]

- consumer loans:

\[ L_{t+1} = \int_{a_{t+1} < 0} a_{t+1}(i) di \]

- investment:

\[ I_t = (K_{t+1}^{HH} + K_t^B) - (1 - \delta)(K_t^{HH} + K_t^B) \]

- final goods:

\[ C_t + I_t + \frac{\phi K}{2} \left( \frac{I_t}{K_{ss}} - \delta \right)^2 + \int \tau(z(i)) a_{t+1}(i) di = Y_t \]
Calibration Strategy

1. **earnings process with Gaussian mixture**
   - match higher-order moments of after-tax earnings changes
   - capitalist state $z^*$ (top 1%)
     + transitions from top labor productivity state
     + probabilities calibrated following Guvenen et al. (2021)
   - elasticities to aggregate income $\gamma(z, Y)$ calibrated to Guvenen et al. (2017)

2. **externally set parameters**

3. **internally calibrated parameters**
   - Commercial Banks’ Balance Sheet (Fed H.8 2004)
     + Deposits, Assets
   - Households’ Balance Sheet (SCF 2004)
     + Consumer Credit
Calibration - Earnings Risk

- Data: PSID from 1962 to 1992
  - After-tax household-level income (De Nardi et al. (2019))

- Step 1 - non-capitalists: \( \log(z_t) = \rho \log(z_{t-1}) + \varepsilon_t \)
  - \( \varepsilon_t \) drawn from mixture of normals
    - Match higher-order moments of the distribution of earnings changes
    - Discretize \( z \in \{z_1, z_2, ..., z_N\} \)

- Step 2 - add capitalist state \( z^* \)
  - \( z_N \to z^* \) with probability \( \nu^i \)
  - \( z^* \to z_N \) with probability \( \nu^o \)
Earnings Risk - Details

- AR1 Process, innovations from mixture of normals:

$$\log(z_t) = \rho \log(z_{t-1}) + \varepsilon_t,$$

$$\varepsilon_t \sim \begin{cases} 
\mathcal{N}(\mu_1, \sigma_1^2) \text{ with probability } p \\
\mathcal{N}(\mu_2, \sigma_2^2) \text{ with probability } 1 - p
\end{cases}$$

- $$\rho = 0.963$$, $$\sigma_1 = 0.50$$, $$\sigma_2 = 0.01$$, $$p = 0.156$$, $$\mu_1 = -0.105$$, and $$\mu_2 = 0.019$$.

<table>
<thead>
<tr>
<th>Target</th>
<th>Model</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Sectional Variance</td>
<td>0.57</td>
<td>0.57</td>
</tr>
<tr>
<td>Standard Deviation of Changes</td>
<td>0.33</td>
<td>0.33</td>
</tr>
<tr>
<td>Skewness of Changes</td>
<td>-0.99</td>
<td>-0.98</td>
</tr>
<tr>
<td>Kurtosis of Changes</td>
<td>10.5</td>
<td>10.3</td>
</tr>
<tr>
<td>P90-P10 of Changes</td>
<td>0.65</td>
<td>0.64</td>
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</tbody>
</table>
### Calibration - External Parameters

<table>
<thead>
<tr>
<th>Parameter/Function</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Function</td>
<td>( u(c) = \frac{c^{1-\sigma} - 1}{1-\sigma} )</td>
<td>CRRA</td>
</tr>
<tr>
<td>Risk Aversion</td>
<td>( \sigma = 2 )</td>
<td>standard</td>
</tr>
<tr>
<td>Capital Share</td>
<td>( \alpha = 0.33 )</td>
<td>standard</td>
</tr>
<tr>
<td>Borrowing limit</td>
<td>( a = 1 )</td>
<td>Kaplan et al. (2018)</td>
</tr>
<tr>
<td>( P(\text{Entering Capitalist State}) )</td>
<td>( \nu^i = 0.025 )</td>
<td>1% of households</td>
</tr>
<tr>
<td>( P(\text{Quitting Capitalist State}) )</td>
<td>( \nu^o = 0.0625 )</td>
<td>Guvenen et al. (2021)</td>
</tr>
<tr>
<td>Dispersion of Adjustment Cost</td>
<td>( \sigma_\eta = 10 )</td>
<td>robust to other values</td>
</tr>
<tr>
<td>Markup</td>
<td>( \mu = 1.1 )</td>
<td>standard</td>
</tr>
<tr>
<td>( PB(\text{Bank Survival}) )</td>
<td>( \theta = 0.972 )</td>
<td>Gertler and Karadi (2011)</td>
</tr>
</tbody>
</table>
## Calibration - Internal Parameters

<table>
<thead>
<tr>
<th>Target</th>
<th>Model</th>
<th>Data</th>
<th>Closest Parameter</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{K}{Y}$ Ratio</td>
<td>3</td>
<td>3</td>
<td>$\delta = 0.016$</td>
<td>Penn World Tables</td>
</tr>
<tr>
<td>Elasticity of $q$ to $I$</td>
<td>0.58</td>
<td>0.58</td>
<td>$\phi_K = 115$</td>
<td>Gertler and Karadi (2011)</td>
</tr>
<tr>
<td>Deposit-to-output $\frac{D}{Y}$</td>
<td>0.40</td>
<td>0.40</td>
<td>$\chi = 0.271$</td>
<td>Fed H.8 2004</td>
</tr>
<tr>
<td>Liquid Asset Share Q1</td>
<td>2.2%</td>
<td>2.2%</td>
<td>slope of $\tau = -2.47$</td>
<td>SCF 2004</td>
</tr>
<tr>
<td>Bank investment-to-output $\frac{K_B}{Y}$</td>
<td>0.60</td>
<td>0.60</td>
<td>$\mu_{\xi} = 16.4$</td>
<td>Fed H.8 2004</td>
</tr>
<tr>
<td>Annual $r^D$</td>
<td>2%</td>
<td>2%</td>
<td>$\beta = 0.971$</td>
<td>annualized 3M Tbill rate</td>
</tr>
<tr>
<td>Annual spread ($r^L - r^D$)</td>
<td>2%</td>
<td>2%</td>
<td>$\omega = 0.0036$</td>
<td>Philippon (2015)</td>
</tr>
</tbody>
</table>
Households’ Portfolio Composition

![Bar chart showing the share of illiquid assets (capital) across quintiles of net worth, comparing model and data. The x-axis represents quintiles of net worth (1 to 5), and the y-axis represents the share of illiquid assets. The chart indicates a comparison between model predictions and actual data.]
Equilibrium Aggregate Responses
Equilibrium Price Responses
Earnings by Income Quintile
Consumption Inequality – Mechanisms
Consumption Inequality – Financial Channels

Consumption of Q1

Consumption of Q2

Consumption of Q3

Consumption of Q4

Consumption of Q5

Aggregate

- All Financial
- Price of Capital
- Return on Capital
- Deposit Rate
- Dividends
The Role of Returns to Savings

Chart 1: Consumption of Q1, Q2, Q3, Q4, and Q5

- Consumption of Q1
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)

- Consumption of Q2
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)

- Consumption of Q3
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)

- Consumption of Q4
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)

- Consumption of Q5
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)

- Aggregate
  - Baseline
  - Fixed Return on Savings ($r^K, q, r^D$)
Welfare Computation

\[
CE(a, k, z) = 100 \times \left[ \left( \frac{\tilde{V}_0(a, k, z) - V^{ss}(a, k, z)}{EU} + 1 \right) \frac{1}{1 - \sigma} - 1 \right],
\]

\[
EU = E \sum_{t=0}^{\infty} \beta^t u(c_t^{ss}(a, k, z))
\]

- **Interpretation:** what fraction of its consumption a household would be willing to (permanently) forgo to avoid the consequences of the shock and have the economy remain in steady state.
# Gainers and Losers from Bank Losses

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Welfare Losses</th>
<th>Welfare Gains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Liquid Assets</td>
<td>0.44</td>
<td>4.37</td>
</tr>
<tr>
<td>Avg. Capital Holdings</td>
<td>0.41</td>
<td>4.55</td>
</tr>
<tr>
<td>Avg. Total Income</td>
<td>0.90</td>
<td>1.61</td>
</tr>
<tr>
<td>Avg. Portfolio Liquidity</td>
<td>1.05</td>
<td>0.77</td>
</tr>
<tr>
<td>Avg. Dependence on Earnings</td>
<td>93.7</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Gainers and Losers from Bank Losses

Note: *Dependence on labor income* refers to the average share of earnings in households’ total income. With the exception of the last row, numbers are displayed as a multiple of economy-wide values.
## Welfare Changes

<table>
<thead>
<tr>
<th>Change in (%) CE (1)</th>
<th>Average</th>
<th>Workers</th>
<th>Capitalists</th>
<th>NW↑</th>
<th>NW↓</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.737</td>
<td>-0.735</td>
<td>-0.944</td>
<td>-0.607</td>
<td>-0.796</td>
</tr>
<tr>
<td>by Income (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q5</td>
</tr>
<tr>
<td></td>
<td>-2.266</td>
<td>-0.794</td>
<td>-0.476</td>
<td>-0.186</td>
<td>0.017</td>
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<tr>
<td>by Net Worth (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q5</td>
</tr>
<tr>
<td></td>
<td>-2.443</td>
<td>-0.745</td>
<td>-0.415</td>
<td>-0.202</td>
<td>0.139</td>
</tr>
<tr>
<td>by Dep. on Labor Income (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
<td>Q5</td>
</tr>
<tr>
<td></td>
<td>0.015</td>
<td>-0.297</td>
<td>-0.410</td>
<td>-0.638</td>
<td>-2.342</td>
</tr>
</tbody>
</table>
Welfare - Capitalist

Income Quintile

Welfare Change (% CE)

Q1  Q2  Q3  Q4  Q5  Capitalists

Total
Earnings
Borrowing (r^L)
Savings Markets
Dividends
Welfare - Financial Channels

![Bar chart showing welfare change by income quintile for different financial channels: Financial, Capital Price (q), Rental Rate (r^K), Deposit Rate (r^D), and Dividends.](image)
Welfare by Net Worth Quintile
BE: Prices
BE: Consumption Dynamics

Consumption Dynamics

- Consumption of Q1
- Consumption of Q2
- Consumption of Q3
- Consumption of Q4
- Consumption of Q5
- Aggregate

Baselines:
- Baseline
- Earnings
- Borrowing
- Financial Markets (Ex, Dividends)
BE: Welfare
NK: Prices
NK: Consumption Dynamics
NK: Welfare
Appendix - Empirical Analysis
Data Sources: Return Series

<table>
<thead>
<tr>
<th></th>
<th>$r^B$</th>
<th>$r^N$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.0174</td>
<td>0.0197</td>
</tr>
<tr>
<td>Std</td>
<td>0.1229</td>
<td>0.0976</td>
</tr>
<tr>
<td>Min</td>
<td>-0.4666</td>
<td>-0.2988</td>
</tr>
<tr>
<td>P25</td>
<td>-0.0465</td>
<td>-0.0231</td>
</tr>
<tr>
<td>Median</td>
<td>0.0288</td>
<td>0.0347</td>
</tr>
<tr>
<td>P75</td>
<td>0.0943</td>
<td>0.0786</td>
</tr>
<tr>
<td>Max</td>
<td>0.2946</td>
<td>0.2069</td>
</tr>
<tr>
<td>Auto-corr.</td>
<td>0.0168</td>
<td>0.0371</td>
</tr>
</tbody>
</table>

Descriptive Statistics - Return Indices
Event Studies - Consumption Dynamics

1990 Recession
2007 Recession

Notes: Dynamics of real aggregate consumption and bank equity return index around (a) Early 1990’s recession and (b) the recession caused by the GFC. Bank equity declines begin at quarter $t = 0$. The dotted vertical line denotes the NBER recessions start dates (Q1 1990 and Q4 2007). The average consumption trend over the full sample is presented by the dashed line. Consumption and the bank indexes are normalized to 0 at $t = 0$. Lines represent changes relative to $t = 0$. 
Transmission Channels

![Graphs showing Labor Earnings, Investment, Spread on CC Rate, and Return on NFCs over quarters.](image-url)
Transmission Channels: Data Sources

- **Labor Earnings:** Aggregate wages and salaries disbursed, adjusted by the All Urban CPI.
- **Investment:** Real Gross Private Domestic Investment
- **Spread on Credit Card Rate:** difference of the average interest rate on credit cards and the 3-month T-bill rate.
  - We add the charge-off rate on credit card loans as a control in the local projection
- **Return on NFCs:** Dow Jones Industrial Index
Robustness Checks

- Consumption categories
  - non-durables
  - durables
- Results not driven by mortgagors
  - mortgagors
  - non-mortgagors
- Lag criterion
  - Aikake
- Monthly analogue
  - monthly
- Income adjusted by paid rent
  - rent
- Positive vs. negative Returns
  - below-median
  - above-median
Consumption and Bank Returns: Nondurables
Consumption and Bank Returns: Durables
Consumption and Bank Returns: Lag Selection

For any combination of $i/h$ lag selection according to AIC
Consumption and Bank Returns: Monthly
Consumption and Bank Returns: Rent

- after-tax income adjusted by rent paid before sorting quintiles
Consumption and Bank Returns: Mortgagors

- selected sample: only mortgagors
Non-Mortgagors

- selected sample: renters and homeowners
Below-median Returns

- interaction with dummy for below-median returns
Above-median Returns

- interaction with dummy for above-median returns