WEALTH AND VOLATILITY

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Aggregate Demand, the Labor Market and Macroeconomic Policy
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Sources of Business Cycles

• Great Recession brought back old idea: business cycles driven by self-fulfilling waves of optimism/pessimism
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- Problem: why now? why not after September 11?
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• Great Recession brought back old idea: business cycles driven by self-fulfilling waves of optimism/pessimism
• Problem: why now? why not after September 11?
• Our idea: extent to which these waves can generate fluctuations depends on the level of household wealth
• Decline in asset prices which occurred prior to the crisis left many economies fragile and susceptible to a confidence-driven recession
Sunspot-driven fluctuations

- Rise in expected unemployment
  → consumers reduce demand
  → firms reduce hiring
  → higher unemployment

- For a wave of self-fulfilling pessimism to get started need high sensitivity of demand to expected unemployment

- High wealth:
  → demand less sensitive to expectations
  → no or small sunspot-driven fluctuations

- Low wealth:
  → demand more sensitive to expectations
  → sunspot-driven fluctuations
Outline

1. Some suggestive macro evidence
2. A stylized model of confidence driven recessions
3. Micro evidence on the mechanism
4. Policy
Wealth & GDP Volatility

Note: Standard deviation of GDP growth are computed over 40 quarters rolling windows. Observations for net worth are average over the same windows.
A Stylized Model

- Related to Farmer 2010, Chamley 2011, Guerrieri and Lorenzoni 2009
A Stylized Model

- Non-durable consumption good
- Produced by competitive firms using labor

\[ c + g = y = 1 - u \]

where \( u \) is mass of workers unemployed
- Durable housing \( h \), in fixed supply with relative price \( p \)
- Each representative household contains a continuum of workers
Household Problem

\[
\max_{c_t^w, c_t^u} E \sum_{t=0}^{\infty} \beta^t \left[ (1 - u_t) \log c_t^w + u_t \log c_t^u + \phi h_{t-1} \right]
\]

s.t.

\[
\begin{align*}
    c_t^u & \leq p_t h_{t-1} \\
    c_t^w & \leq p_t h_{t-1} + w_t \\
    [1 - u_t] c_t^w + u_t c_t^u + p_t [h_t - h_{t-1}] & \leq [1 - u_t] [w_t]
\end{align*}
\]

\( \phi \): Preference weight on housing
\( u_t \): Fraction of unemployed

Note: no disutility from work, so unemployment inefficient
Timing and labor markets

1. Households co-ordinate expectations on current unemployment, distributions of future unemployment rates

2. Representative household sends out workers with contingent consumption orders \((c^u_t, c^w_t)\), assets \(p_t h_{t-1}\), and reservation wage \(w^*_t\)

3. Firms take orders as given and search for workers to fill them in decentralized labor markets

4. Firms and workers meet randomly, firms decide whether or not to hire at \(w^*_t\)

5. Firms pay wages, all agents consume

6. Household regroups, net resources determine \(h_t\).
Wage Determination

Optimal firm strategy: hire worker iff aggregate order
\[ c_t = (1 - u_t)c_t^w + u_t c_t^u \] not yet filled and \( w_t^* \leq 1 \)

Optimal household strategy: set \( w_t^* = 1 \)
Frictions and Features

1. Labor market friction: No role for labor supply in determining allocations $\Rightarrow$ equilibrium unemployment, multiplicity

- Workers cannot affect probability of meeting a firm by asking a lower wage, and when meet ask for reservation wage (alternatively downward wage rigidity)
Frictions and Features

1. Labor market friction: No role for labor supply in determining allocations ⇒ equilibrium unemployment, multiplicity
   - Workers cannot affect probability of meeting a firm by asking a lower wage, and when meet ask for reservation wage (alternatively downward wage rigidity)

2. Uninsurable unemployment risk: Can’t transfer resources from employed to unemployed ⇒ precautionary motive, low consumption demand with low wealth
First Order Conditions

\[ \frac{p_t}{c_t^w} = \beta E \left[ \frac{p_{t+1}}{c_{t+1}^w} \left( 1 + u_{t+1} \max \left\{ \frac{c_{t+1}^w - c_{t+1}^u}{c_{t+1}^u}, 0 \right\} \right) \right] + \beta \phi \]

\[ c_t^u = p_t h_{t-1} \]

- Unemployment risk \( \sim \) tax on consumption, which depends on expected unemployment
  - Basis for self-fulfilling crisis: high expected unemployment \( \rightarrow \) high tax \( \rightarrow \) low consumption \( \rightarrow \) high realized unemployment

- If low \( p_t \rightarrow \) low \( c_t^u \), strong sensitivity of consumption (and thus \( u \)) to expected unemployment
Asset Prices

- Measure zero “marginal investor” same preferences as RA, faces no unemployment risk \((c = \bar{c} = 1)\)
- In equilibrium no housing trade between the two types
- Marginal investor establishes a floor \(p\) for house prices:
  \[
  p_t \geq p = \frac{\beta}{1 - \beta} \phi
  \]
- Price never go below \(p\)
Characterizing Equilibria

- Characterize paths for unemployment that satisfy the inter-temporal FOC and the condition \( c_t = 1 - u_t \)
  - Unique Steady State
  - Multiple Steady States
  - Equilibria with unemployment dynamics
  - Sunspots
Steady state asset price decomposition

Fundamental part \( \frac{\phi \beta}{1-\beta} (1-u) \)

Liquidity part \( \simeq c_w - c_u \)

Equilibrium \( p \)
Unique full employment steady state

If \( \phi \geq \bar{\phi} = f(\beta) \) then:

Only steady state is \( p = \underline{p} \) and \( u = 0 \)

Logic:

- when \( \phi \) high, \( p \) high (because of marginal investor) \( \Rightarrow c_u \) high \( \Rightarrow \) small liquidity component of \( p \),
- Suppose consumers expect high \( u \)
- Since \( c_u \) high, no much increase in saving, rather sell house -> Inconsistent with \( p_t \geq \underline{p} \)
- Unique equilibrium
- Pinning down \( p \) pins down \( u \)
Unique full employment equilibrium

Fundamental $p = \frac{\phi \beta}{1-\beta} c = \frac{\phi \beta}{1-\beta} (1 - u)$
Multiple Steady States

If $\phi < \bar{\phi}$ then

1. There is (still) a steady state with $p = \underline{p}$ and $u = 0$
2. There is another steady state with $p = \underline{p}$ and $u > 0$
3. There are additional steady states with $p > \underline{p}$ and $u > 0$. 
Multiple Steady States

Fundamental $p \frac{\phi \beta}{1-\beta} (1 - u)$
Multiple Steady States

Logic:

- When $\phi$ low, $p$ low $\Rightarrow c_u$ low, high liquidity value of housing if $u > 0$
- Equilibrium 1: ($u = 0$): price = fundamental, no liquidity value of housing
- Equilibrium 2: ($u > 0$): same price with lower fundamental, but higher liquidity
Unemployment dynamics with fixed prices
Intuition for Dynamics

- Consider the high unemployment phase
- Incentive to accumulate (because wealth helps reduce unemployment risk): low consumption/output
- Incentive to consume (because expected recovery): high consumption/output
- Two incentives balance out as unemployment declines ⇒ stable demand for savings ⇒ stable prices
The Great Recession?

Model

Data

House Price (left axis)

Unemployment Rate (right axis)

House Price (left axis, real minus 2% trend)

Unemployment Rate (right axis)
• Characterize Markov equilibria switching from high to low unemployment, with a fixed probability $1 - \lambda$ and a fixed price.

• Results:
  • For these equilibria to exist $\lambda$ has to be large enough
  • Equilibria with higher prices are characterized by low volatility
Sunspot recessions and persistence

![Graph showing the relationship between $\lambda$ and the unemployment rate in a recession state.](image)
Understanding Persistence

• It is only because agents expect high $u_{t+1}$ that they cut $c_t$

• Logic extends forwards: only expect high $u_{t+1}$ (low $c_{t+1}$) if also high expected $u_{t+2}$

• Permanent income intuition: Only persistently high expected unemployment consistent with low optimal current consumption

• The longer things are expected to stay bad, the sharper is the fall in demand and the larger the recession on impact

• Consistent with data from Michigan Survey of Consumers
More Wealth $\Rightarrow$ Less Volatility

- Recession State (Red)
  - Solid line: $\lambda=0.99$
  - Dashed line: $\lambda=0.98$

- Boom State (Blue)
• High asset prices $\Rightarrow$ weak precautionary motive $\Rightarrow$ unique full employment equilibrium

• Lower asset prices $\Rightarrow$ strong precautionary motive $\Rightarrow$ range of equilibrium unemployment rates larger the lower is the asset price

• Volatility of unemployment is larger for low asset prices because low asset prices make consumption demand more sensitive to expectation
Why is the recovery slow?

- Large demand driven recession is driven by a large fall in consumption demand
- Large fall in consumption demand only happens if persistent fall in income is expected (PIH logic)
- Large fall $\iff$ Slow recovery
- Consistent with data from Michigan Consumers Expectation, showing slow expected recovery in 2008
Micro Evidence for the Mechanism

- **Key mechanism:** Elasticity of demand wrt unemployment risk is larger when wealth is low

- **Natural test:** Did wealth-poor households reduce consumption more than rich households as unemployment rose during the Great Recession?
Differential Sensitivity in the Model

![Graph showing differential sensitivity in the model with two lines: one for u = 5% and another for u = 15%. The x-axis represents Housing, and the y-axis represents the sensitivity values, ranging from 0 to 1.2.]
Consumer Expenditure Survey

- Households aged 25-60 with 4 quarters of consumption data

- Sort households by wealth (net financial wealth plus home equity) relative to consumption

- Compare consumption growth of top and bottom halves of wealth distribution
## Characteristics of Rich versus Poor

<table>
<thead>
<tr>
<th></th>
<th>Wealth Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-50</td>
</tr>
<tr>
<td>Sample size</td>
<td>8,864</td>
</tr>
<tr>
<td>Average age of head</td>
<td>41.4</td>
</tr>
<tr>
<td>Heads with college</td>
<td>25.7%</td>
</tr>
<tr>
<td>Average household size</td>
<td>2.9</td>
</tr>
<tr>
<td>Mean</td>
<td>1,498</td>
</tr>
<tr>
<td>Median</td>
<td>238</td>
</tr>
<tr>
<td>Mean after-tax income p.c. (2005$)</td>
<td>22,117</td>
</tr>
<tr>
<td>Mean consumption p.c. (2005$)</td>
<td>9,353</td>
</tr>
</tbody>
</table>
Consumption Growth: Rich versus Poor

Growth in consumption expenditures (annual rate)

-0.2  -0.15  -0.1  -0.05  0  0.05  0.1

2005q4  2006q1  2006q2  2006q3  2006q4  2007q1  2007q2  2007q3  2007q4  2008q1  2008q2  2008q3  2008q4  2009q1  2009q2  2009q3  2009q4  2010q1  2010q2  2010q3  2010q4  2011q1

- Wealth poor
- Wealth rich
Consumption vs. Income Growth

<table>
<thead>
<tr>
<th>Wealth Group</th>
<th>0-50</th>
<th>50-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean growth income p.c.</td>
<td>-0.3%</td>
<td>-1.0%</td>
</tr>
<tr>
<td>Mean growth cons. p.c.</td>
<td>-5.6%</td>
<td>-3.1%</td>
</tr>
</tbody>
</table>
Consumption Rates: Rich versus Poor

Change in consumption rate

-0.06 -0.05 -0.04 -0.03 -0.02 -0.01 0 0.01 0.02

2005q4 2006q1 2006q2 2006q3 2006q4 2007q1 2007q2 2007q3 2007q4 2008q1 2008q2 2008q3 2008q4 2009q1 2009q2 2009q3 2009q4 2010q1 2010q2 2010q3 2010q4 2011q1

Wealth poor
Wealth rich
## Evidence from PSID

<table>
<thead>
<tr>
<th></th>
<th>Low Wealth</th>
<th>High Wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable Income</td>
<td>36600</td>
<td>+15%</td>
</tr>
<tr>
<td>Consumption</td>
<td>24800</td>
<td>-13%</td>
</tr>
<tr>
<td>Consumption Ratio</td>
<td>68%</td>
<td>-16%</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>2008-2010</td>
</tr>
<tr>
<td>Disposable Income</td>
<td>41200</td>
<td>+2%</td>
</tr>
<tr>
<td>Consumption</td>
<td>22600</td>
<td>+3%</td>
</tr>
<tr>
<td>Consumption Ratio</td>
<td>55%</td>
<td>+1%</td>
</tr>
</tbody>
</table>
Micro Evidence: summary

- Low wealth households reduce consumption more during recession, despite facing similar increase in unemployment/income risk
Policy 1: Tax and Spend

Figure 1
Policy 1: Review

- Reduces elasticity of aggregate demand to expectations
- Also reduces asset values (induces more precautionary saving)
- Can narrow/expand range of equilibrium unemployment
- Welfare implications depend on utility from $G$
- Not necessarily effective!
Policy 2: Unemployment benefit $b$ financed by proportional tax $\tau$ on earnings
Policy 2: Review

- Policy reduces precautionary motive $\Rightarrow$ shrinks range of possible unemployment rates
- Policy reduces asset prices but..
- Unique full employment equilibrium if $b$ sufficiently large
Conclusions

- Model in which macroeconomic stability threatened by (exogenously) low asset values
- Great Recession: Decline in home values left economy vulnerable to wave of pessimism
- Macro evidence of a link between level of wealth and aggregate volatility
- Micro evidence that low wealth households reduced consumption most sharply
- Can evaluate effectiveness of policies geared toward stabilization of these fluctuations
Household net worth in the long run

The graph shows the trend of real household net worth, along with deviations from this trend. The trend line is marked with a red line, and it has an annual growth rate of 3.2%. The deviations from the trend are represented by a green line, which fluctuates around the trend line, indicating periods of household net worth decline and growth.