AN ECONOMICAL BUSINESS-CYCLE MODEL

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Paper available at https://www.pascalmichaillat.org/7.html
ASSUMPTIONS
A SERVICE ECONOMY, WITHOUT FIRMS
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ASSUMPTION 1: MATCHING FUNCTION
Thinking about all the money you have in financial accounts over the course of your retirement, do you plan to ...?

Survey of 2,000 Americans aged 62 to 75, conducted in September 2020

Source: Employee Benefit Research Institute
grow their assets in retirement, leave them untouched, or spend down only a little. The survey by EBRI, a nonprofit research group, was conducted in September and covered 2,000 Americans ages 62 to 75, 97% of whom were retired. So U.S. undertakers don't need to fear bounced checks.

The second chart zeroes in on the people who said they don't plan to spend down their assets in retirement. They were asked why not, and multiple responses were permitted. Three of the answers seem like different ways of saying the same thing: “saving for unforeseen costs,” “afraid of running out of money,” and “once assets spent, cannot be recovered.”

The most intriguing answer in this second chart is “makes me feel better.” In standard finance and economic theory, saving for its own sake makes no sense because the only purpose of money is to pay for things, which could include bequests. You feel better when you spend, not when you refrain from spending. Clearly, though, a lot of retirees find satisfaction in the very act of saving. This third chart gets at that:

Close to two-thirds of respondents agree somewhat or strongly that “saving as much as I can makes me feel happy and fulfilled.” In an EBRI conference...
ASSUMPTION 2: WEALTH IN THE UTILITY FUNCTION

Saving as much as I can makes me feel happy and fulfilled.
Survey of 2,000 Americans aged 62 to 75, conducted September 2000.

Source: Employee Benefit Research Institute
SOLUTION
BEVERIDGE CURVE

Beveridge curve:
inflow into unemployment = outflow from unemployment

Vacancy rate

0

Unemployment rate rate
Tightness = vacancy / unemployment
EULER EQUATION

\[ \dot{\gamma} \]

\[ \gamma_0 \]

0

\[ \text{Euler} \]
EULER EQUATION → AGGREGATE DEMAND

Graph showing the relationship between Tightness and Capacity, with AD and AS curves intersecting.
SOLUTION OF THE MODEL

Tightness vs. Output

AD

AS

θ

0

y

Output

Capacity
SOLUTION OF THE MODEL

![Graph showing the solution of the model with AD and AS curves, intersecting at a point labeled 'y' indicating the equilibrium output. The x-axis represents output, the y-axis represents tightness, and the point 'y' is marked as 'Unemployment'.]
KEYNESIAN VS. FRICTIONAL UNEMPLOYMENT

Keynesian
KEYNESIAN VS. FRICTIONAL UNEMPLOYMENT

A diagram illustrates the comparison between Keynesian and frictional unemployment. The horizontal axis represents output, while the vertical axis shows tightness. The diagram includes two curves: the Aggregate Demand (AD) and the Aggregate Supply (AS) curves. The point of intersection, labeled as 'y', indicates a balance between the two curves, highlighting the distinction between frictional and Keynesian unemployment.
INEFFICIENCY
EFFICIENT ALLOCATION (MICHAILLAT & SAEZ 2020)

Vacancy rate

Beveridge curve

Unemployment rate
Efficient Allocation (Michaillat & Saez 2020)

Unemployment rate
Vacancy rate
Beveridge curve
0
Isowelfare curve:
1 – u – recruiting cost × v = const.
Efficient Allocation (Michaillat & Saez 2020)

- Unemployment rate
- Vacancy rate
- Beveridge curve
- Efficiency
- Isowelfare curve

Diagram showing the relationship between unemployment rate and vacancy rate, with the Beveridge curve and isowelfare curve illustrated.
EFFICIENT ALLOCATION (MICHAILLAT & SAEZ 2020)

- Beveridge curve
- Efficiency
- Unemployment rate
- Vacancy rate
- Efficient tightness
- Isowelfare curve
INEFFICIENT ALLOCATIONS

- Beveridge curve
- Inefficiently high tightness
- Unemployment rate
- Vacancy rate
- Iso-welfare curve

Diagram showing the relationship between vacancy and unemployment rates, highlighting inefficient tightness and iso-welfare curve.
EFFICIENT TIGHTNESS

![Graph showing Efficient Tightness with AS curve and point θ*]
BUSINESS CYCLES
NEGATIVE DEMAND SHOCK

Tightness

Capacity

Output

AD

AS
NEGATIVE DEMAND SHOCK

![Diagram showing negative demand shock with demand (AD) and supply (AS) curves intersecting at a point, indicating a decrease in output and a decrease in capacity.](image-url)
NEGATIVE SUPPLY SHOCK

Diagram showing the relationship between Tightness and Output, with the AD and AS curves intersecting at a point.
MONETARY POLICY
REDUCTION IN INTEREST RATE

Tightness

AD

AS

Output

Capacity

0
REDUCTION IN INTEREST RATE
ZERO LOWER BOUND

[Diagram showing a graph with axes labeled "Tightness" and "Output" on the vertical axis and "Capacity" on the horizontal axis. The graph includes curves labeled "AD" and "AS" and a shaded area labeled "AD @ ZLB".]
ZERO LOWER BOUND

Tightness vs. Output

AD @ ZLB

Capacity

AS

Output
INCREASE IN WEALTH TAX

The graph illustrates the relationship between tightness and output, indicating an increase in wealth tax. The curves represent the aggregate demand (AD) and aggregate supply (AS) in the economy. The intersection point shows the equilibrium output and capacity.
INCREASE IN WEALTH TAX

![Graph showing the relationship between Tightness, Output, and Capacity with an increase in wealth tax effect on the AS curve.][1]

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[1]: https://example.com/graph.png
OPTIMAL MONETARY POLICY: BOOM

![Graph showing the relationship between Tightness and Output, with an intersection at θ and θ*. The AD curve intersects with the AS curve at the point of optimal monetary policy.](image-url)
OPTIMAL MONETARY POLICY: BOOM

The diagram illustrates the relationship between tightness and output, with the AD and AS curves depicting different market conditions. The diagram aims to show the optimal monetary policy for economic boom conditions.
OPTIMAL MONETARY POLICY: SMALL SLUMP

Graph showing the intersection of the AD and AS curves, indicating the optimal monetary policy for a small slump.
OPTIMAL MONETARY POLICY: SMALL SLUMP
OPTIMAL MONETARY POLICY: LARGE SLUMP

Graph showing the relationship between tightness and output, with an AD curve, AS curve, and the point AD @ ZLB.
OPTIMAL MONETARY POLICY: LARGE SLUMP

Diagram showing the relationship between tightness, output, and capacity with a focus on the AD @ ZLB and AS curves. The diagram highlights points of interest labeled as $\theta^*$ and $\theta^z$. The shaded area represents the optimal monetary policy region.
TIGHTNESS

AS

Output

AD with wealth tax

Capacity

Tightness

θ*

0

Output

0

Capacity

LARGE SLUMP: ROLE FOR WEALTH TAX
**MONETARY MULTIPLIER:** \( du/di = 0.5 \)

<table>
<thead>
<tr>
<th>Study</th>
<th>( du/di )</th>
<th>Method</th>
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<tbody>
<tr>
<td>Bernanke &amp; Blinder (1992)</td>
<td>0.6</td>
<td>VAR</td>
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<td>Leeper, Sims &amp; Zha (1996)</td>
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<tr>
<td>Christiano, Eichenbaum &amp; Evans (1996)</td>
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<td>Romer &amp; Romer (2003)</td>
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<td>narrative</td>
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<td>Bernanke, Boivin &amp; Eliasz (2005)</td>
<td>0.2</td>
<td>FAVAR</td>
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<tr>
<td>Coibion (2012)</td>
<td>0.5</td>
<td>narrative &amp; VAR</td>
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UNEMPLOYMENT GAP: MICHAILLAT & SAEZ (2020)
OPTIMAL MONETARY POLICY FORMULA

- linear expansion around suboptimal \([i, u]\) assessed at optimal \([i^*, u^*]\): 
  \[u^* \approx u + (du/di) \cdot (i^* - i)\]

- sufficient-statistic formula:
  \[i - i^* \approx \frac{u - u^*}{du/di}\]

→ Fed should reduce interest rate by 2 percentage points for each percentage point of unemployment gap

→ in line with observed Fed behavior (Bernanke & Blinder 1992)
OTHER POLICIES
• public hiring
  – $0 < \text{multiplier} < 1$
  – multiplier is higher when unemployment is higher
  – see Michaillat (2014)

• public expenditure
  – optimal public expenditure deviates from the Samuelson rule to reduce the unemployment gap
  – see Michaillat & Saez (2019)

• unemployment insurance
  – optimal unemployment insurance deviates from the Baily-Chetty rule to reduce the tightness gap
  – see Landais, Michaillat & Saez (2018)