An Economical Business-Cycle Model

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Objective of the paper

develop a tractable business-cycle model to analyze monetary policy with

- variable slack (unemployment + idle labor + idle capacity)
- stable inflation
Slack and inflation in the US

idle labor (ISM)

idle capacity (Census)
Slack and inflation in the US

idle capacity

idle labor

unemployment (right scale)
Slack and inflation in the US
Overview of the model

start from money-in-the-utility-function model of Sidrauski [AER 1967]

- add matching frictions on market for labor services as in Michaillat & Saez [QJE 2015]
- add utility for wealth as in Kurz [IER 1968]
Behavior of households

$$\max_{c,m,a} \int_0^{+\infty} e^{-\delta \cdot t} \cdot \left[ \frac{\epsilon}{\epsilon - 1} \cdot c^{\frac{\epsilon - 1}{\epsilon}} + \phi(m) + \omega(a) \right] \, dt$$

s.t. $$\frac{da}{dt} = f(x) \cdot k - \left[ 1 + \tau(x) \right] \cdot c - i \cdot m + r \cdot a + s$$

$c =$ consumption; $m =$ real money; $a =$ real wealth;

$x =$ market tightness; $1 - f(x) =$ unemployment rate;

$\tau(x) =$ matching cost; $i/r =$ nominal/real interest rate;

$k =$ supply of services; $\delta =$ discount rate; $s =$ seignorage
Utility for real money

\[
\phi(m)
\]

money bliss point

real money \( m \)
Utility for real wealth

\[ a = m + b = 0 \]

no aggregate wealth

\[ \omega(a) \]

real wealth \( a \)
Steady state \( \{a, m, i, c, x, \pi\} \)

- no real wealth in aggregate: \( a = 0 \)
- monetary policy sets real money \( m \)
- IS curve (consumption Euler equation)
- LM curve (demand for money)
- AS curve (supply and matching process)
- \textbf{inflation} \( \pi \) is a fixed parameter
IS curve with utility of wealth

\[
c^{IS}(i, \pi, x) = \left[ \frac{\delta + \pi - i}{(1 + \tau(x)) \cdot \omega'(0)} \right]^\epsilon
\]
IS curve without utility of wealth

\[ i = \pi + \delta \]
LM curve away from liquidity trap

\[ c^{LM}(i, m, x) = \left[ \frac{i}{(1 + \tau(x)) \cdot \phi'(m)} \right]^{\epsilon} \]
LM curve in liquidity trap

\[ i = 0 \]
IS & LM determine AD and i
AD curve

\[ c^{AD}(x, \pi, m) = \left[ \frac{\delta + \pi}{(1 + \tau(x)) \cdot (\phi'(m) + \omega'(0))} \right]^{\epsilon} \]
$c^{AS}(x) = \frac{f(x)}{1 + \tau(x)} \cdot k$
AS curve

market tightness $x$

overheating economy

efficient economy

slack economy

consumption $c$
AS & AD determine $c$ and $x$

Diagram:
- AS (supply curve)
- AD (demand curve)
- Intersection point indicating general equilibrium
- Market tightness $x$ vs. consumption $c$
AS & AD determine output

output \( f(x)k \)  
capacity \( k \)

market tightness \( x \)

matching cost

consumption \( c \)
AS & AD determine unemployment

output
capacity

unemployment = idle labor
= idle capacity

market tightness x

consumption c

AS

AD
Increase in money supply

market tightness $\chi$

output

capacity

depressed AD

low tightness and output

$AD$
Increase in money supply

AD increases

nominal interest rate $i$

consumption $c$

LM

IS
Increase in money supply

market tightness $x$

output
capacity
efficient tightness

AS
AD
consumption $c$
Money supply in a liquidity trap

![Diagram showing AS curve with market tightness and output, and a green box indicating 'very low tightness and output', and an orange box indicating 'very depressed AD' with consumption c and market tightness x axes.]
Money supply in a liquidity trap

![Diagram of IS-LM model in a liquidity trap]
Money supply in a liquidity trap

output  capacity

inefficiently low tightness

AD in liquidity trap

market tightness $x$

consumption $c$
Extensions in the paper

- policies to stimulate IS curve: tax on wealth
  + helicopter drop of money
- inflation and tightness dynamics from directed search and price-adjustment cost