Today

- Inflationary Finance

- Inflationary Redistributions of Income

- Indirect Fiscal Effects of IT
Inflation vs Money Growth

Figure 1.2
Average Inflation Rate Versus Average Rate of Money Growth for a Number of Countries: 1980–1990 Source International Financial Statistics.

Why do some countries allow high $\frac{\Delta M}{M}$?
Brazilian Currency

1962 Cruzeiro

1967 New Cruzeiro
= 1000 Cruzeiros

1986 Cruzeado
= 1000 N. Cruzeiros

1994 New Cruzeado
= 1000 Cruzeados

1994 Real Cruzeiro
= 1000 N. Cruzeiros
Alan Greenspan:

“The United States can pay any debt it has because we can always print money to do that, so there is zero probability of default.”

Meet the Press, Aug. 7, 2011
3 motives for $\Delta M/M$:

1. Inflationary Finance
   $(M+I_S)$

2. Reduce unemployment
   $(M+I_U)$

3. Reduce $R$, $r$
   $(M+B, r)$
Simplest case: Gov't creates all \( M \) directly at 0 cost, pays no interest on \( M \).

\[ \Rightarrow \Delta M = \text{perpetual interest-free loan to Gov't.} \]

(same as gift).

\[ S = \Delta M = \text{nominal Seigniorage} \]

\[ s = S/P = \text{real Seigniorage} \]

\[ S = \frac{\Delta M}{P} \cdot \frac{M}{M} \]

\[ = \Delta M \cdot \frac{M}{P} \]

\[ S = \mu \cdot M \]

\[ \mu = \frac{\Delta M}{M} \]

\[ m = \frac{M}{P} \]

(\( \mu \): Greek \( \mu \))
Seigniorage:

\[ s = \frac{\Delta m}{\rho} = \mu \cdot m \]

If \( m \) were constant at \( m_0 \),

\[ s \propto \mu \]

\[ s = \mu \cdot m \]

slope: \( m_0 \)

\[ \mu = \frac{\Delta m}{m} \]

\( s \) would be unbounded.

Not valid in Long Run
Instead,

\[ \mu \uparrow \rightarrow \Pi \uparrow \] by Q.E.

\[ \rightarrow \pi^a \uparrow \] by Adaptive Learning

\[ \rightarrow i \uparrow \] by Fisher equation (aka R)

\[ \rightarrow m^0 \downarrow \] by slope of \( m^0(i) \)

\[ \rightarrow m \downarrow \] by Q.T.O.M.

so (in L.R.)

\[ S = \mu \cdot m \]

"Monetary
Laffer
Curve"
Ordinary Laffer Curve
(Arthur Laffer)

Tax Rate

30% + 70% give same revenue.

Tax Revenue

0% 10% 20% 30% 70% 100%

1981 Reagan Tax Cut

Top rate 70% → 28% 
(Clinton 39.6%, 
Bush 35%)
Back in Business
Supply-Side Economists Regain Influence Under Bush

Arthur Laffer, above, explained his curve with the help of a blackboard in Los Angeles in 1981.

1981 Reagan Tax Cut
- Top Rate 70% → 28%
- Clinton → 39.6%
- GWB → 35.7%

Taxing the Top Tier
The maximum federal income tax rate on high incomes, once over 90 percent, remains far below its peak despite rising in the 1990s. It fell most sharply during the Reagan years, when supply-side economists had their greatest influence.

Source: Congressional Joint Committee on Taxation
The New York Times
U.S. Real M1 Demand

3-mo T Bill rate

M/P, $ billions (1982-4)
1996.IV real money demand

\[ i \sim \pi \sim \mu \]

\[ i \text{ (aka } R) \text{ (}\% \text{/year)} \]

\[ m^0(y_{1996}, i) \]

\[ M/P \text{ (billions 1987$\text{)})} \]
US Monetary Laffer Curve (1996.IV money demand)

$S_{max}$

$\approx 2\%$ of $y$

$M_{max}$

$\approx 35\%$
US Monetary Laffer Curve (1996.IV money demand)

- Real Seigniorage/Real GDP (%/y)
- Monetary expansion (mu), Inflation (pi) (%/y)

Key Points:
- 2.0%
- 1.7%
- 1.3%
- 10% 20% 35% 55% 88%
Inflation acts as a tax on $m = M/P$

Gov't gains $\mu \cdot m = \pi$

Public loses $\pi \cdot m$

$$\pi = \mu + \frac{\delta V}{V} - \frac{\delta Y}{Y}$$

$\approx \mu$ if $V, Y$ = const.

So $\pi \cdot m \approx \mu \cdot m$

Transfer:

Public $\rightarrow$ Gov't

$-\pi \cdot m \rightarrow +\mu \cdot m$
3. Income transfers from \( \text{g} \):

1. Inflationary finance
   - \( \text{gov't gains} \)
   - \( \text{public loses} \)
   \( \text{public} \rightarrow \text{gov't} \)

2. Debtor - Creditor
   - If \( \text{II} \neq \text{II} \) and debt not indexed.

3. Ripple Effect
   - \( \text{Last in line} \rightarrow \text{First in Line} \)

May be comparable in size.
Hyperinflations

Germany 8/22 - 11/23
\[ \frac{P}{P_0} = 1.02 \times 10^{10} \]

Greece 11/43 - 11/44
\[ \frac{P}{P_0} = 4.70 \times 10^{8} \]

Russia 12/21 - 1/24
\[ \frac{P}{P_0} = 1.24 \times 10^{5} \]

Yugoslavia 1991 - 99
\[ \frac{P}{P_0} = 1 \times 10^{22} \]
Jan 1994 - 313,000,000 %

\[ \frac{P}{P_0} = 8.53 \times 10^{23} \]

These rates exceed estimates of \( \mu_{max} \) - WHY?
Reichsbanknote

Zwei Millionen Mark

zwecks der Reichsbankshälfte in Berlin gegen diese
Banknote den Einlöser. Von 1. September 1923
ab kann diese Banknote eingelöst und unter Hinz
konst gegen andere Decken-Arbisse gezogen werden.

Berlin, den 3. August 1923

Reichsbankdirektorium

[Signature]

1923
Runaway Inflation (Hyper inflation)

\[ S = \mu \cdot m \]

In Short Run, \( T, \mu, m, m_0 \) are given, do not depend on \( \mu \).

⇒ Short Run Laffer curve is a straight line, with slope \( m = m_0 \left( T + r \right) \).

Target Seigniorage
\[ s^* = \text{Seigniorage target} = \mu \cdot m \]

⇒ \( M = \frac{s^*}{\mu} \) obtains \( s^* \) in S.R.
US Monetary Laffer Curve (1996.IV money demand)

$S^* > S_{max}$

$\frac{S^*}{25\%}{\text{y}}$

Real Seigniorage/Real GDP $s/y$

Monetary expansion (mu), Inflation (pi) (%/yr)

$\mu_0 = 0$

$\mu = 15\%$

$\mu = 26\%$

$\mu = 37\%$
$S^k < S_{max} \Rightarrow \Pi \text{ stabilizes below peak.}$

US Monetary Laffer Curve (1996.IV money demand)

$S^k = b$
Summary

$s < s_{\text{max}}$  

$\Rightarrow$ rapid but steady $\pi$ on Long-Run Laffer Curve.

$s > s_{\text{max}}$

$\Rightarrow$ unbounded $\pi$

- Iraq War?
- Subprime Mortgage Bailout?
- Social Security?
Indirect Fiscal Effects of Inflation

1. Taxation of Capital

2. Bracket Creep
Inflation-induced taxation of capital

\[ r = \text{before tax real return on capital investment} \]
\[ T = \text{income tax rate} \]  \( (T = \tau) \)
\[ r_{AT} = \text{after tax real return} \]

\[ \text{No inflation:} \]
\[ r_{AT} = r (1 - T) \]

\[ \text{With inflation } \Pi: \]

Nominal rate of return
\[ = r + \Pi \]
\[ \text{tax} = T (r + \Pi) \]
Nominal after-tax rate of return
\[ = r + \Pi - T (r + \Pi) \]
Real after-tax rate of return:
\[ r_{AT} = r (1 - T) - \Pi \]
\[ r_{AT} = r (1 - T) - \tau \]
Example

\[ r = 4\% \] Real return before Tax

\[ \tau = 50\% \]

\[ \Pi = 10\% \]

\[ r + \Pi = 14\% \] Nominal Return

\[ -\tau(14\%) = -7\% \] taxes

\[ 7\% \] After tax Nominal Return

\[ -\Pi = -10\% \]

\[ r_{AT} = -3\% \] Real After Tax Return

By Formula:

\[ r_{AT} = r (1 - \tau) - \Pi \]

\[ = (4\%)(1 - 0.5) - (10\%)(0.5) \]

\[ = 2\% - 5\% \]

\[ = -3\% \]
2. Bracket creep

- Federal, State Income Tax
  "Graduated" ("Progressive")
  Marginal Tax rates ↑ with income.
  \[ \text{P ↑ \Rightarrow same real income taxed at higher rate, unless brackets indexed.} \]

- Federal brackets, personal exemptions indexed since 1981.

- Ohio taxes indexed only since 2010. (New!)

- Local taxes proportional (Franklin Co.)
  \[ \text{-- no creep.} \]
## Marginal Tax Rates

### US Single

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<tr>
<th></th>
<th>2003</th>
<th>2010</th>
<th>Marginal Rate</th>
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<tbody>
<tr>
<td>0-7000</td>
<td>0-58375</td>
<td>$83,750</td>
<td>10%</td>
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<tr>
<td>28,400</td>
<td>34,000</td>
<td></td>
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<tr>
<td>68,800</td>
<td>82,400</td>
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<td>25%</td>
</tr>
<tr>
<td>143,500</td>
<td>176,850</td>
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<td>28%</td>
</tr>
<tr>
<td>311,950</td>
<td>373,650</td>
<td></td>
<td>33%</td>
</tr>
<tr>
<td>$311,950 up</td>
<td>$373,650 up</td>
<td></td>
<td>35%</td>
</tr>
</tbody>
</table>

### Ohio

<table>
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<th></th>
<th>2008, 2009</th>
<th>2010</th>
<th>Marginal Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5,000</td>
<td>0-5,050</td>
<td></td>
<td>0.6%</td>
</tr>
<tr>
<td>-10,000</td>
<td>-10,100</td>
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<td>1.2%</td>
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<tr>
<td>-15,000</td>
<td>-15,150</td>
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<td>2.5%</td>
</tr>
<tr>
<td>-20,000</td>
<td>-20,200</td>
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<td>3.1%</td>
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<tr>
<td>-40,000</td>
<td>-40,350</td>
<td></td>
<td>3.7%</td>
</tr>
<tr>
<td>-80,000</td>
<td>-80,700</td>
<td></td>
<td>4.3%</td>
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<tr>
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<td>-100,900</td>
<td></td>
<td>4.9%</td>
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<tr>
<td>-200,000</td>
<td>-201,800</td>
<td></td>
<td>5.7%</td>
</tr>
<tr>
<td>200,000 up</td>
<td>201,800 up</td>
<td></td>
<td>6.2%</td>
</tr>
</tbody>
</table>