Debt, Inequality, and Credit Stagnation

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Secular Stagnation Mark I

• Hansen 1939
  – “Not until the problem of full employment ... from the long-run, secular standpoint was upon us, were we compelled to give serious consideration to those factors ... which tend to make business recoveries weak .. and which tend to prolong and deepen the course of depressions.
  – This is the essence of secular stagnation—sick recoveries which die in their infancy and depressions which feed on themselves and leave a hard and seemingly immovable core of unemployment.” (Hansen, 1939, p. 4)

• Hansen blamed “external factors”
  – Technological change & population growth:
    • “Fundamental to an understanding of this problem are the changes in the "external" forces, if I may so describe them, which underlie economic progress—changes in the character of technological innovations, in the availability of new territory, and in the growth of population.” (Hansen, 1939, p. 4)
Secular Stagnation Mark I

- His timing was a bit off...
Secular Stagnation Mark II

• 80 years later, along comes Larry:
  – “a decline in the full-employment real interest rate (FERIR) coupled with low inflation could indefinitely prevent the attainment of full employment…”

• This is after the financial crisis, which, of course, is no longer an issue:
  – “If a financial crisis represents a kind of power failure, one would expect growth to accelerate after its resolution as those who could not express demand because of a lack of credit were enabled to do so…
  – How might one understand why growth would remain anaemic in the absence of major financial concerns? Suppose that a substantial shock took place … and that this tended to raise private saving propensities and reduce investment propensities…
  – one would expect interest rates to fall … until the saving and investment rate were equated at the full-employment level of output…
  – But this presupposes full flexibility of interest rates…”
Secular Stagnation Mark II

- Finance clearly irrelevant when Hansen & Summers extemporised...

USA private debt to GDP

BIS and US Census Normalized Data

Percent of GDP

Hansen 1934
Summers
Back to Larry’s **FERIR** brainwave:

“A variety of structural changes ... suggest that **FERIR** levels may have declined substantially. These include:

– Slower population and possibly technological growth means a reduction in the demand for new capital goods to equip new or more productive workers...”

And the cure for a **FERIR** is?

– “some major exogenous event will occur that raises spending or lowers saving...”; or

– “In the long run, as the economy’s supply potential declines, the **FERIR** rises, restoring equilibrium – albeit not a very good one.”

So a **FERIR** is really, really important!

Um, but what is it though?...
Secular Stagnation Mark II

- The **FERIR** was recently discovered by **MIT**’s fabled **CERN*** laboratory
  - **CERN** stands for “Crazy Economic Rationalisations of aNomalies”
- A “**FERIR**” (“Full-Employment Real Interest Rate”) is an antiparticle to a “**NAIRU**” (“Non-Accelerating Inflation Rate of Unemployment”)
- **FERIR** created when **NAIRU** collides with a **GFC** (“Global Financial Crisis”)
  - The **GFC** particle does not exist in **TSM** (“The Standard Model”)
  - It may come from a parallel (or possibly orthogonal) universe called **TRW** (“The Real World”)
- The collision with a **GFC** causes the **NAIRU** to decay...
  - And to emit a **ZLB** (“Zero Lower Bound”) and a **FERIR**
- The long-lived **ZLB** particle inverts all other standard particles, so that
  - **Growth**, which was high, is now low
  - **Inflation**, which was bad & everywhere, is now good & nowhere
  - **CBs** (“Central Banks”) which prevent inflation, now **try** to cause it; &
  - **HMDs** (“Helicopter Money Drops”) which were mad, are now sane
- Footnote *: **CERN** has been reported to **COCOA** (the “Campaign to Outlaw Contrived and Outrageous Acronyms”)

*Footnote CERN has been reported to COCOA (the “Campaign to Outlaw Contrived and Outrageous Acronyms”)
• Of course, there was no empirical data that might have alerted *CERN* to
  - the possible importance of the *CREDIT* particle...

Credit and Employment (Correlation 0.93)

Summers
Secular Stagnation Mark I

- Just like there was nothing to alert Hansen in 1934

Credit and Employment (Correlation 0.8)
Secular Stagnation Mark II

- This correlation is zero in the \textit{TSM}, & therefore can be ignored:

Change in Credit and Employment Change (Correlation 0.88)

BIS & BLS Data

Percent of GDP per year

Percent change per year (Inverted)

Credit Change

Unemployment Change

GFC

Summers
Let’s leave MIT, CERN and TSM for TRW…

- Credit doesn’t matter in TSM because of “Loanable Funds”
  - “Think of it this way: when debt is rising, **it’s not the economy as a whole borrowing more money.**
  - It is, rather, a case of less patient people—people who for whatever reason want to spend sooner rather than later—borrowing from more patient people.” (Krugman 2012, pp. 146-47)

- Macro role for credit still not accepted in Post Keynesian economics
  - “In this primer we will examine the macroeconomic theory that is the basis for analysing the economy as it actually exists. **We begin with simple macro accounting, starting from the recognition that at the aggregate level spending equals income.**” (Wray 2011)
  - “Unless Keen (2014a) can explain how a purchase of a good or service does not provide income for the seller, then he should rethink his claim that debt extensions can force an inequality between expenditure and income at the aggregate level…
  - a sector can spend more than its current income, but the sum of sectors cannot.” (Fiebiger 2014, p. 296)
Integrating Credit into Income \(\equiv\) Expenditure

- An expenditure table view:
  - Divide economy into 3 non-bank sectors plus banking sector
  - Aggregate Expenditure negative sum of diagonal
  - Aggregate Income positive sum of off-diagonal elements
  - All flows (in $/Year) shown in lowercase
  - All stocks (in $) shown in uppercase
  - Greek \(\rho\) used for interest rate
  - First case: lending/borrowing does not occur:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>(S_1)</td>
<td>(S_2)</td>
</tr>
<tr>
<td>Level ($)</td>
<td>Flows ($/Year)</td>
<td></td>
</tr>
<tr>
<td>(S_1)</td>
<td>(a)</td>
<td>(b)</td>
</tr>
<tr>
<td>(S_2)</td>
<td>(c)</td>
<td>(d)</td>
</tr>
<tr>
<td>(S_3)</td>
<td>(e)</td>
<td>(f)</td>
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<tr>
<td>(B_E)</td>
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</tbody>
</table>

\[ AE = (a + b) + (c + d) + (e + f) \]
\[ AY = a + b + c + d + e + f \equiv AE \]
Credit and Income ≡ Expenditure

- Loanable Funds and (almost) no role for credit
  - Sector 1 borrows $I$ ($/\text{Year}$) from Sector 2
  - Pays interest of $\rho L$ ($/\text{Year}$) to Sector 2

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Equity</th>
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</thead>
<tbody>
<tr>
<td>Loans</td>
<td>$S_1$</td>
<td>$S_2$</td>
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<tr>
<td>Level ($\text{$}$)</td>
<td>Flows ($/\text{Year}$)</td>
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<td>$S_1$</td>
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<td>$S_2$</td>
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<td>$S_3$</td>
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<tr>
<td>$B_E$</td>
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</tr>
</tbody>
</table>

\[ AE = (a + b + \rho \cdot L) + (c + d) + (e + f) \]
\[ AY = a + b + \rho \cdot L + c + d + e + f \equiv AE \]
Credit and Income $\equiv$ Expenditure

- Endogenous Money and *an essential* role for credit
  - Sector 1 borrows $I$ ($/Year) from banking sector
  - Pays interest of $\rho \cdot L$ ($/Year) to banking sector...

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans</td>
<td>$S_1$</td>
<td>$S_2$</td>
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</table>

<table>
<thead>
<tr>
<th>Level ($$)</th>
<th>Flows ($/Year)</th>
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</thead>
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<tr>
<td>$S_1$</td>
<td>$L$</td>
</tr>
<tr>
<td>$S_2$</td>
<td>$c$</td>
</tr>
<tr>
<td>$S_3$</td>
<td>$e$</td>
</tr>
<tr>
<td>$B_E$</td>
<td>$g$</td>
</tr>
</tbody>
</table>

$$AE = (a + b + l + \rho \cdot L) + (c + d) + (e + f) + (g + h + i)$$

$$AY = a + b + l + \rho \cdot L + c + d + e + f + g + h + i \equiv AE$$

- Change in debt ($\equiv$credit) plays an *essential* role in aggregate expenditure & *aggregate income* with endogenous money
- Expenditure is fundamentally monetary
- 2 sources of expenditure: turnover of existing money
- New expenditure financed 1:1 by new debt
Credit and Income $\equiv$ Expenditure

- How to measure?
  - GDP a (poor) approximate measure of flow of expenditure *financed by existing money* in $/\text{Year}$
  - Change in debt a (better) measure of flow of credit *created by new debt* in $/\text{Year}$
  - Dimensionally accurate & empirically OK to add together to measure aggregate expenditure at a point in time
  - Analogy
    - Flow in river
    - with a pump injecting or removing water:

\[ \text{GDP ($/\text{Year})} \] \[ \text{Credit ($/\text{Year})} \]
The “Smoking Gun of Credit” & Walking Dead of Debt

- Add GDP to change in debt (credit) to measure aggregate expenditure
- Peak GDP+Credit identifies every economic crisis since Japan...

Japan GDP and Credit

Average credit 5 years before Crisis 18% GDP

Average after: minus 1.8% GDP

BIS Data
USA GDP and Credit

Average credit 5 years before Crisis 11% GDP

Average after: 3.7% GDP
The “Smoking Gun of Credit” & Walking Dead of Debt

- UK

UK GDP and Credit

BIS Data

Billion Currency Units per year

Change in Private Debt per year as percent of GDP

Crisis UK
The “Smoking Gun of Credit” & Walking Dead of Debt

- Ireland

Ireland GDP and Credit

BIS Data

GDP
GDP + Credit
Credit

Change in Private Debt per year as percent of GDP

Crisis Ireland

Billion Currency Units per year

The “Smoking Gun of Credit” & Walking Dead of Debt

- Spain

Spain GDP and Credit

BIS Data
Billion Currency Units per year
Change in Private Debt per year as percent of GDP

Crisis Spain
The “Smoking Gun of Credit” & Walking Dead of Debt

- Greece

Greece GDP and Credit

BIS Data

Billion Currency Units per year
Change in Private Debt per year as percent of GDP

GDP

GDP + Credit

Credit

Crisis
The “Smoking Gun of Credit” & Future Debt Zombies

• Future Debt-Zombies:
  – Countries with >150% GDP private debt to GDP
  – Where debt is growing quickly (above 10% of GDP per year)
  – Can’t predict timing
    • Can be delayed by government enticement into private debt
      – Australia 2008 “First Home Vendors Boost”
      – UK “Help to Sell”
  – But inevitable since at high levels even stabilisation of debt/GDP ratio causes fall in aggregate demand & income
The “Smoking Gun of Credit” & Future Debt Zombies

- Low debt ratio

<table>
<thead>
<tr>
<th>GDP Growth Rate</th>
<th>10%</th>
<th>10%</th>
<th>10%</th>
<th>10%</th>
<th>10%</th>
<th>10%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Growth Rate</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Final Debt Growth Rate</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Initial Debt Ratio</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Years</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>GDP</td>
<td>1000</td>
<td>$1,100</td>
<td>$1,210</td>
<td>$1,331</td>
<td>$1,464</td>
<td>$1,611</td>
<td>$1,772</td>
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<tr>
<td>Debt</td>
<td>$500</td>
<td>$600</td>
<td>$720</td>
<td>$864</td>
<td>$1,037</td>
<td>$1,244</td>
<td>$1,369</td>
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<tr>
<td>Debt to GDP Ratio</td>
<td>50%</td>
<td>55%</td>
<td>60%</td>
<td>65%</td>
<td>71%</td>
<td>77%</td>
<td>77%</td>
</tr>
<tr>
<td>Credit</td>
<td>$100</td>
<td>$120</td>
<td>$144</td>
<td>$173</td>
<td>$207</td>
<td>$241</td>
<td>$285</td>
</tr>
<tr>
<td>Total Demand</td>
<td>$1,200</td>
<td>$1,330</td>
<td>$1,475</td>
<td>$1,637</td>
<td>$1,818</td>
<td>$1,967</td>
<td>$1,896</td>
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<tr>
<td>Demand Growth Rate</td>
<td>10.8%</td>
<td>10.9%</td>
<td>11.0%</td>
<td>11.1%</td>
<td>4.3%</td>
<td>11.0%</td>
<td>11.1%</td>
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</table>
The “Smoking Gun of Credit” & Future Debt Zombies

- Medium debt ratio

<table>
<thead>
<tr>
<th>GDP Growth Rate</th>
<th>10%</th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Debt Growth Rate</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Debt Growth Rate</td>
<td>10%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Debt Ratio</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>GDP</td>
<td>$1,000</td>
<td>$1,100</td>
<td>$1,210</td>
<td>$1,331</td>
<td>$1,464</td>
<td>$1,611</td>
</tr>
<tr>
<td>Debt</td>
<td>$1,000</td>
<td>$1,200</td>
<td>$1,440</td>
<td>$1,728</td>
<td>$2,074</td>
<td>$2,488</td>
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<tr>
<td>Debt to GDP Ratio</td>
<td>100%</td>
<td>109%</td>
<td>119%</td>
<td>130%</td>
<td>142%</td>
<td></td>
</tr>
<tr>
<td>Credit</td>
<td>$200</td>
<td>$240</td>
<td>$288</td>
<td>$346</td>
<td>$415</td>
<td>$249</td>
</tr>
<tr>
<td>Total Demand</td>
<td>$1,300</td>
<td>$1,450</td>
<td>$1,619</td>
<td>$1,810</td>
<td>$2,025</td>
<td>$2,020</td>
</tr>
<tr>
<td>Demand Growth Rate</td>
<td>11.5%</td>
<td>11.7%</td>
<td>11.8%</td>
<td></td>
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</table>
## The “Smoking Gun of Credit” & Future Debt Zombies

- **High Debt Ratio**

<table>
<thead>
<tr>
<th>GDP Growth Rate</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Growth Rate</td>
<td>20%</td>
</tr>
<tr>
<td>Final Debt Growth Rate</td>
<td>10%</td>
</tr>
<tr>
<td>Initial Debt Ratio</td>
<td>125%</td>
</tr>
<tr>
<td>Years</td>
<td>0</td>
</tr>
<tr>
<td>GDP</td>
<td>$1,000</td>
</tr>
<tr>
<td>Debt</td>
<td>$1,250</td>
</tr>
<tr>
<td>Debt to GDP Ratio</td>
<td>125%</td>
</tr>
<tr>
<td>Credit</td>
<td>$250</td>
</tr>
<tr>
<td>Total Demand</td>
<td>$1,350</td>
</tr>
<tr>
<td>Demand Growth Rate</td>
<td>11.9%</td>
</tr>
</tbody>
</table>

- **Future Debt Zombies include...**
Some Future Debt Zombies

- A sample of 18 vulnerable countries...

Private Debt to GDP Ratios in Future Zombie Economies

![Graph showing private debt to GDP ratios in future zombie economies with countries like China, Canada, Korea, Australia, Norway, Sweden, and France.](image_url)
Canada: Debt crisis almost certain during life of Trudeau Government

Canada GDP & Credit

BIS & BLS Data

Billion Loonies per year

Percent of GDP

0

Great Recession


GDP

GDP+Credit

Credit
Modeling credit in capitalism

• My Minsky model can be derived by from 3 definitions in dynamic form:
  – Employment rate L/N=λ;
  – Wages share of GDP W/Y=ω;
  – Private debt to GDP ratio d=D/Y

• “Employment will rise if economic growth exceeds the sum of population & labor productivity growth”

\[
\frac{1}{\lambda} \frac{d}{dt} \lambda \equiv \hat{\lambda} \equiv \hat{Y}_R - (\hat{a} + \hat{N})
\]

• “Wages share of output will rise if wage rise exceeds growth in labor productivity”

\[
\frac{1}{\omega} \frac{d}{dt} \omega = \hat{\omega} \equiv \hat{W}_R - \hat{a}
\]

• “Debt ratio will rise if rate of growth of debt exceeds rate of growth of GDP”

\[
\frac{1}{d} \frac{d}{dt} d = \hat{d} \equiv \hat{D} - \hat{Y}_R
\]
Modeling credit in capitalism

- Operationalise with simplest possible linear expressions
- We get this system with intrinsic nonlinearities:

\[
\begin{align*}
\dot{\lambda} &= \lambda \cdot \left( \pi_S \cdot \left( \frac{1 - \omega - r \cdot d}{v} - \pi_N \right) \right) - (\alpha + \beta + \delta_{KR}) \\
\dot{\omega} &= \omega \cdot \left( \lambda_S - (\lambda - \lambda_N) - \alpha \right) \\
\dot{d} &= \left( \pi_S \cdot \left( \frac{1 - \omega - r \cdot d}{v} - \pi_N \right) \right) \cdot d \cdot \left( \frac{1 - \omega - r \cdot d}{v} - \pi_N \right) - \delta_{KR}
\end{align*}
\]
Two possible outcomes

• (1) Convergence to “good” equilibrium
Two possible outcomes

- (2) Convergence to “bad” equilibrium after apparent “moderation”
We’ve seen this before—in complex systems

- Property of Lorenz “chaotic” model of fluid flow
- Decreasing followed by increasing turbulence
- Convergence to laminar flow...
- This behaviour cannot be generated by standard equilibrium-oriented “linear” model
- Inherent nonlinearity & non-equilibrium dynamics are essential

**Fig. 4.** The motion through the channel corresponds to the laminar phase of the movement. The slow drift is quite imperceptible on the time record of Fig. 1b
Modeling credit in capitalism

- Solving for $\pi_{Eq}$, $\omega_{Eq}$ and $d_{Eq}$ yields:

$$
\lambda_{Eq} = \frac{\alpha}{\lambda_S} + \lambda_Z
$$

$$
\pi_{Eq} = v \cdot \left( \frac{v \cdot (\alpha + \beta + \delta_{KR})}{\pi_S} + \pi_Z \right)
$$

$$
v \cdot (\alpha + \beta + \delta_{KR}) - v \cdot \left( \frac{v \cdot (\alpha + \beta + \delta_{KR})}{\pi_S} + \pi_Z \right)
$$

$$
d_{Eq} = \frac{\alpha + \beta}{\alpha + \beta}
$$

- Wages share is a residual:

$$
\omega_{Ee} = 1 - \pi_{Ee} - r \cdot d_{Ee}
$$

- Inequality stabilises if debt ratio converges to stable equilibrium
- Inequality rises if debt ratio continues to rise
- Rising inequality as a sign of systemic breakdown
- Paradoxes as well: higher investment propensity $\rightarrow$ lower growth
Modeling credit in capitalism

- Higher propensity to invest—higher debt level—lower growth
- Strong sensitivity of debt to slope of investment function
- Bankers benefit at expense of capitalists, workers
- Higher desire to invest, lower growth rate
Simple complex systems model…

- With price dynamics & variable interest rate

\[ \pi_s = 1 - \omega(t) - r(t) \cdot d(t); \pi_r = \frac{\pi_s}{v} \]

**Inflation-adjusted nominal interest rate**

**1st order time lag determines inflation**

\[ \frac{1}{d} \frac{d}{dr} \left( \frac{l_{fn}}{v} \delta_{kr} \right) \left( \alpha + \beta \right) \]

**Inflation affects wages share**

**Inflation affects debt growth**

**Lagged interest rate reaction to inflation**
Simple complex systems model...

- The same model in Open Source system dynamics program Minsky:
Conclusion

- We’re suffering from credit stagnation, not “secular stagnation”
- **Summers is as wrong now as Hansen was then…**