Understanding Sources of Demand-Led Growth and Stagnation

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Keynesian Dynamics and the Real World

- Basic Keynesian message: demand drives production and employment – little doubt about empirical relevance
  - Wall Street Journal: “consumers power the economy”
  - But over what time horizon?
- Heterodox Keynesian message: demand dynamics shape economic performance beyond the short run
  - More contested; harder to verify
  - Important to consider the supply side over longer horizons
- Fazzari’s message today:
  - Analytical framework for organizing thinking about dynamics of both demand and supply
  - Interpret the past decade of US experience with this framework

Modeling Demand Dynamics

- Back to Stanford in 1980 (Ph.D. dissertation)!
- Micro-level firm behavior
  - Firms produce to fulfill expected demand
  - Firms invest to reach desired capital / output ratio (utilization)
- Investment dynamics + consumption function determine demand path
- Rediscovery of Harrod!
  - Partial discussion of results in JPKE (1984)
Interesting Starting Point, But ...

- Well-known problems with the Harrod model
- (1) Knife-edge instability of steady-state “warranted rate”
- (2) Unbounded deviation between demand-led actual growth path and supply-driven “natural” growth path
- But, basic micro behavior of the firm in this version of the Harrod model is sensible and realistic
- => Don’t give up

Return to My Roots (After 30!! Years)
(FFGV, ROKE, 2013)

- Containing demand instability
  - Upside contained by resource constraints (“supply”)
  - Downside constrained by any amount of autonomous demand
- One possibility: unstable cyclical dynamics bounce between:
  - Supply-driven “ceiling”
  - “Floor” determined as autonomous demand * dynamic multiplier
- But, steady-state path between ceiling and floor may be stable
- Rediscovered Serrano’s super-multiplier
  - Steady-state growth driven by autonomous demand
  - Allain, Freitas, Cesaratto, Stirati and co-authors, Lavoie, Summa, ...
Intuition for Possible Convergence

- Dynamic law of motion for demand (output) growth
  \[ 1 + g_t = [(1 - s)(1 + Eg_t)] + \left[ \hat{\delta}_t (1 + Eg_t)^2 - \frac{K_t}{Y_{t-1}} (1 - \delta) \right] + \frac{F_t}{Y_{t-1}} \]

- Final term becomes large (small) as output falls (rises)

- Keys to stability:
  - Moderate multiplier-accelerator parameters (high s; low v)
  - Speed of expectation and capital adjustment

  \[ Eg_t = (1 - \alpha)g_{t-1} + \alpha Eg_{t-1} \]

  \[ \hat{\delta}_t = (1 - \lambda)u_{t-1} + \lambda \nu^* \]

Endogenous Supply – Part 1

- Labor supply growth depends on unemployment:

- Growth of labor supply = \( \theta_0 - \theta_1(u) \)
  - Labor force participation and matching
  - Immigration effects
  - Phillips Curve and wages

- Level of output affects growth of supply
Endogenous Supply – Part 2

• Labor productivity growth depends on unemployment and rate of capital turnover

• Productivity Growth = \( p_0 - p_1(u) + p_2 (K \text{ Growth} + \text{Depr. Rate}) \)
  • Dutt: “necessity is the mother of invention” \( \Rightarrow \) low unemployment stimulates actions to raise productivity
  • Learning by doing
  • Technology dissemination through investment
  • Skill decay from high unemployment, ...

• Again, level of economy affects supply growth \( (p_1) \)
• Embodies Verdoorn’s Law effect \( (p_2) \)

Steady-State Results

• Demand growth at growth rate of autonomous demand \( (F_t) \)

• If model is dynamically stable, supply growth converges to demand growth
  • Intuition: demand drives output growth and unemployment
  • Changes in unemployment and growth affect growth of labor supply and productivity

• Response to second Harrod problem: supply growth rate converges to demand growth rate

• Demand-led growth of both actual output and potential output: “reverse Say’s Law”
Level and Growth Effects on Supply

- Convergence result requires an effect of level of output on growth of supply \((\theta_1 + \rho_1 > 0)\)
- Unemployment rate that causes supply growth to equal demand growth:
  \[ u^* = \frac{\theta_0 + \rho_0 - g^* (1 - \rho_2) + \rho_2 \delta}{\theta_1 + \rho_1} \]
- Verdoorn effect \((\rho_2)\) magnifies sensitivity of supply to demand

Limits of Accommodating Supply

- Lower bound on unemployment \((\bar{u})\) limits supply growth
- Maximum supply growth:
  \[ \hat{\gamma} = \frac{\theta_0 + \rho_0 + \rho_2 \delta - \bar{u} (\theta_1 + \rho_1)}{(1 - \rho_2)} \]
- Reasonable result: demand growth cannot raise output growth arbitrarily high (unless \(\rho_2 = 1\))
- But there is a range of demand growth rates that can be matched by supply growth
Empirical Calibration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Benchmark Value</th>
<th>Bottom of Range</th>
<th>Top of Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand-Side Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propensity to Consume ((1 - s))</td>
<td>0.50</td>
<td>0.40</td>
<td>0.80</td>
</tr>
<tr>
<td>Target Capital-Output Ratio (v^*)</td>
<td>1.10</td>
<td>1.00</td>
<td>1.25</td>
</tr>
<tr>
<td>Adjustment Speed for (v (\lambda))</td>
<td>0.09</td>
<td>0.05</td>
<td>0.20</td>
</tr>
<tr>
<td>Adjustment Speed for expected growth (u)</td>
<td>0.90</td>
<td>0.75</td>
<td>0.95</td>
</tr>
<tr>
<td>Capital Depreciation rate (\delta)</td>
<td>0.084</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Supply-Side Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effect of unemployment rate on labor force growth (\beta_1)</td>
<td>0.20</td>
<td>0.10</td>
<td>0.30</td>
</tr>
<tr>
<td>Effect of unemployment rate on labor productivity growth (\rho_2)</td>
<td>0.50</td>
<td>0.30</td>
<td>0.70</td>
</tr>
<tr>
<td>Effect of capital replacement rate ((g+\delta)) on labor productivity growth (p_2)</td>
<td>0.50</td>
<td>0.30</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Empirical Observations

- Time-series estimation (DOLS)
- Why \((1-s)\) relatively low (0.5)?
  - Dependent variable is GDP, not disposable income
  - Taxes
  - Imports
- Verdoorn effect consistent with other empirical research
- Surprisingly large effect of unemployment on productivity growth
- Slow speeds of adjustment
  - Expectations estimated from Survey of Professional Forecasters data
  - Capital adjusts to long-run equilibrium, but slowly
Dynamic Stability

- Stability implies tendency to converge to steady state
- Over full range of parameters, stability in about 75% of cases
- Most realistic specifications are strongly stable
  - But convergence slow and will likely be interrupted by other changes
- Autonomous demand, in reality, will not likely grow at a constant rate
- Relevance of steady-state as a "center of gravity"

Interesting Quantitative Results

- Empirical calibration of parameters
- Key equation:
  \[
  \frac{du^*}{dg^*} = -\frac{1-\rho_2}{\theta_1+\rho_1}
  \]
- Estimation (and related literature) => $du^*/dg^*$ near -0.7
  - Supply growth can accommodate 1.0% acceleration in demand growth with 0.7% drop in unemployment rate
  - Important: entirely plausible that acceleration of demand growth will pull supply along with it!
  - Slower autonomous demand growth always drags supply down
Implications – Big Differences from Mainstream Macro

- Demand path pulls supply along with it, in either direction
  - Positive direction: "reverse Say's Law"
  - Negative direction: permanent demand decline has permanent effect on output and employment
- Contrast with neoclassical synthesis
  - Keynesian demand effects "beyond the short run"
- "Luddite" effect of positive productivity shock
  - Need to stimulate demand
  - Will monetary policy be adequate dynamically?
- No supply-determined “natural” rate of growth
  - Supply adapts to demand
  - Inflation targeting could give misleading signals
- Government supports huge share of autonomous demand
  - Fiscal austerity necessarily implies slow growth

Compelling Framework

- Simple, yet powerful
  - Demand drives the economy; supply largely follows
- Understanding macro growth requires deep analysis of movements in autonomous demand
  - Need for more empirical / historical research
- Heterodox macro has known these results for decades
  - Model framework draws together ideas in a simple, coherent way
  - Model provides basis for quantitative analysis: how much demand growth can be accommodated by supply?
- Fundamental policy implications
  - Concepts like potential output and “natural” rate of unemployment are endogenous to demand dynamics
  - Need deep analysis of what is feasible: understand demand dynamics and possibilities for supply accommodation
  - Can economies grow adequately with government austerity?
Application: US Stagnation

- Simple argument: stagnant household demand in after the Great Recession has led to a historically anemic recovery
  - 10 years – beyond the "short run"
  - Fits the basic demand-led growth model
- Conflicts with conventional wisdom of a “booming” economy
  - Low unemployment rate
  - Extended period of growth (record length) and job creation
  - President’s political desire to validate policy
- Conventional view misleading beyond the short run. Look at some evidence

Case for US Stagnation – Part 1
(Peak to peak changes in real GDP per capita)

<table>
<thead>
<tr>
<th>Peak Dates</th>
<th>Total Growth</th>
<th>Growth per Year</th>
<th>Number of Qtrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973:2 to 1978:4</td>
<td>11.9%</td>
<td>1.8%</td>
<td>25</td>
</tr>
<tr>
<td>1978:4 to 1990:2</td>
<td>24.7%</td>
<td>2.1%</td>
<td>46</td>
</tr>
<tr>
<td>1990:2 to 2000:2</td>
<td>24.1%</td>
<td>2.2%</td>
<td>40</td>
</tr>
<tr>
<td>2000:2 to 2007:4</td>
<td>11.5%</td>
<td>1.5%</td>
<td>30</td>
</tr>
<tr>
<td>2007:4 to 2019:2*</td>
<td>11.1%</td>
<td><strong>0.9%</strong></td>
<td>46</td>
</tr>
</tbody>
</table>

*Final cycle is incomplete
Case for Stagnation – Part 2
Current and Vintage Output Gap from 2007:2 CBO Projection

The Challenge for Our Model

- How to explain stagnation?
  - Conventional wisdom: because stagnation is “beyond the short run” it must be a supply problem
  - Our intrinsic Keynesian model: demand stagnation can explain persistent weak output path
  - Weak demand pulls supply down with it

- We need to look at this interesting history in more detail ...
  plan for next week