Personal Income Inequality and Aggregate Demand

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5th FMM Summer School

July 28, 2015

Functional distribution of income and aggregate demand

Kaldor (1955): different savings propensities between profit earners and wage earners make aggregate demand sensitive to the **functional distribution of income**.

Neo-Kaleckian models: combine differential savings, mark-up pricing and an independent investment function in an output adjusting short-run framework (Rowthorn, 1982; Dutt, 1984; Taylor, 1985; Bhaduri and Marglin, 1990)

Demand regimes can be wage-led or profit-led depending on the savings rate differential and on the sensitivity of investment to the profit share.

Reminder: a standard Neo-Kaleckian model

$$
\begin{aligned}
u &= \frac{Y}{K} \\
\psi &= 1-\pi = \frac{wL}{PY} = \frac{\omega}{\epsilon} \\
r &= \frac{\pi Y}{K} = \pi u
\end{aligned}
$$

$$
\begin{aligned}
g^i &= \frac{I}{K} = \gamma_0 + \gamma_u u + \gamma_r r = \gamma_0 + (\gamma_u + \gamma_\pi \pi) u \\
g^s &= \frac{S}{K} = [s_\pi \ \pi + s_w (1-\pi)] \, u = s(\pi) u
\end{aligned}
$$

Reminder: a standard Neo-Kaleckian model

$$g^i = g^s$$

$$\Longrightarrow u^* = \frac{\gamma_0}{-\left[\gamma_r \pi + \gamma_u - s_\pi\ \pi - s_w(1-\pi)\right]} \equiv \frac{\gamma_0}{\Delta}$$

$$\frac{\partial u^*}{\partial \pi} = \frac{\gamma_0\left[\gamma_r - (s_\pi - s_w)\right]}{\Delta^2}$$

Wage-led: $\frac{\partial u}{\partial \pi} < 0 \Longleftrightarrow \gamma_r < (s_\pi - s_w)$

Profit-led: $\frac{\partial u}{\partial \pi} > 0 \Longleftrightarrow \gamma_r > (s_\pi - s_w)$

Empirical studies on demand regimes

Full estimations tend to show **profit-led demand** (Franke et al, 2006; Chiarella et al, 2004; Barbosa-Filho and Taylor, 2006)

Evidence on the role of **open economy effects**: economies may be wage-led domestically and profit-led with trade (Bowles and Boyer, 1995; Naastepad and Storm, 2007; Ederer and Stockhammer, 2007; Hein and Vogel, 2008).

Open economy extensions: Blecker (2004), Rezai (2011), Von Arnim et al (2012).

Another potential source of bias: the **size distribution of income**.

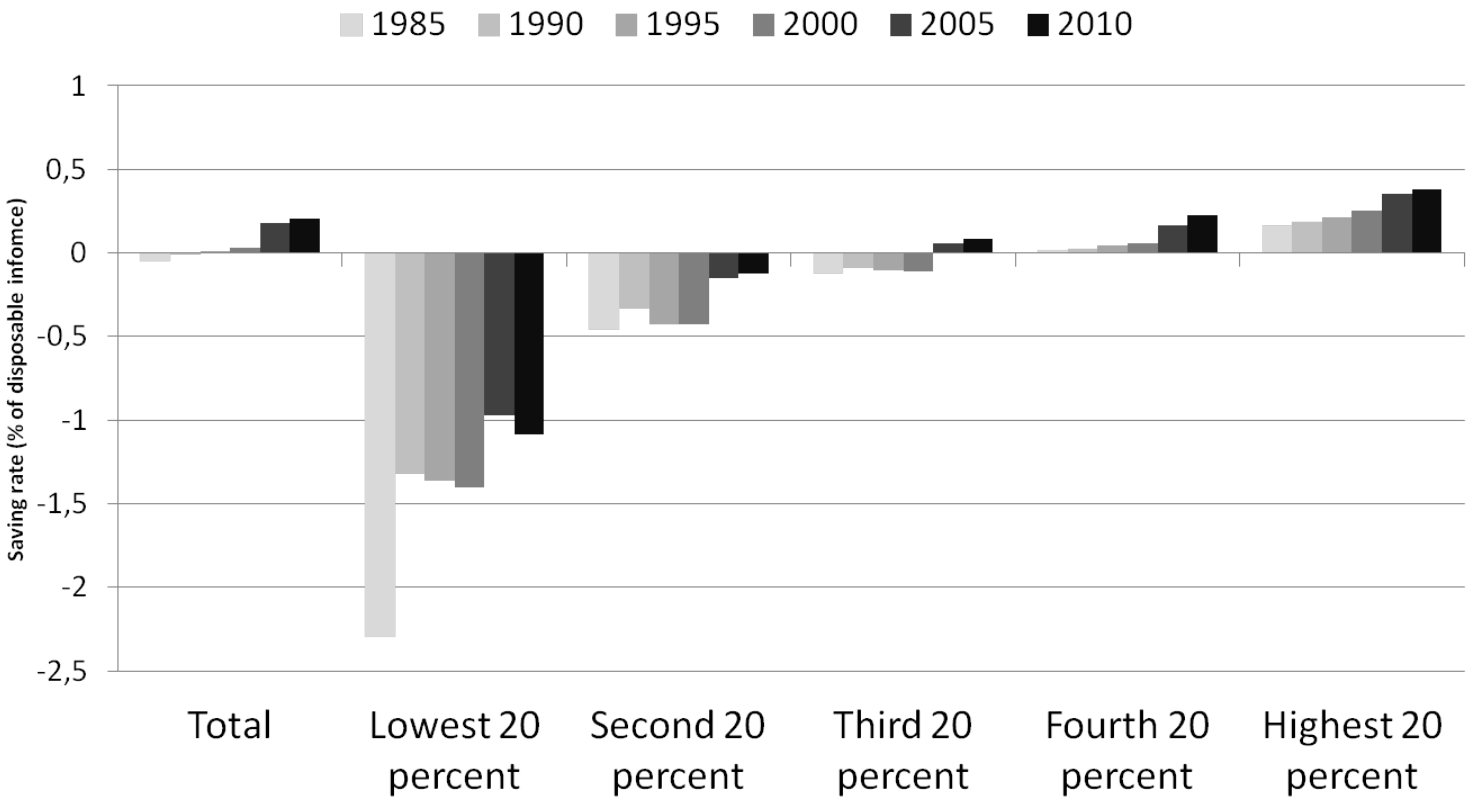
Size vs functional distribution of income

Piketty and Saez (2003), Piketty (2014): data for the top shares of income and wages in the US from 1913 to 1998 show a rise in income inequality + **working rich** have replaced rentiers at the top.

Mohun (2012): increase in the share of **supervisory workers** in total wages.

The question: *What is the effect of a rising income inequality among wage earners in the Neo-Kaleckian framework? How does it affect empirical results on demand regimes*?

Empirical Motivation



Savings rate increase with income, and the average savings rate at the top has itself increased over time.

Modeling strategy

Tavani and Vasudevan (2012) add an **unproductive managerial class** to the basic Neo-Kaleckian framework and investigate the role of wage inequality among managers and workers.

This paper: savings rate as an increasing function of wage inequality.

Savings function

Personal saving from household i is assumed to be a function of its own income y_i , and that of the median household y_ν.

$$S_i = a_0\ y_i + a_1(y_i - y_\nu).$$

Aggregate saving is then given by:

$$S_w = \int \left[a_0\ y_i + a_1(y_i - y_\nu)\right]\ f(y)\ dy = \left[a_0\ + a_1(1 - \frac{\nu}{\mu})\right] \mu.$$

where μ is average income and ν is median income.

Savings function: Pareto

Assuming a Pareto distribution for wage income (Yakovenko, 2012), we obtain an aggregate savings function of the form:

$$\frac{S_w}{K} = \left[a_0 + a_1 \left(1 - \frac{2^{1/\alpha}\ \alpha - 1}{\alpha}\right) \right] \psi\ u = s_w\left[\alpha\right]\ \psi\ u$$

with $s_w\left[\alpha\right]$ the average propensity to save (APS) and α the parameter of the Pareto distribution which captures the degree of income inequality. Note that:

$$\begin{aligned} \frac{ds_w}{d\alpha} &< 0 \\ \lim_{\alpha \to \infty} s_w &\to a_0 \end{aligned}$$

Model Structure

Kaldorian-Steindlian investment function and two savings functions (out of wages and profits) determine the short-run equilibrium output:

$$
\begin{aligned}
g^i &= \frac{I}{K} = \gamma_0 + \gamma_u u + \gamma_r r = \gamma_0 + (\gamma_u + \gamma_\pi(1-\psi))u \\
g^s_w &= \frac{S_w}{K} = s_w[\sigma]\ \psi\ u \\
g^s_\pi &= \frac{S_\pi}{K} = s_\pi\ \pi\ u = s_\pi\ (1-\psi)\ u
\end{aligned}
$$

Short-run equilibrium

Output adjustment for macroeconomic balance.

$$\dot{u} = g^i - g^s_w - g^s_\pi = 0$$

$$u^* = u|_{\dot{u}=0} = \frac{\gamma_0}{-(\gamma_u + \gamma_\pi(1-\psi) - s_w[\sigma]\ \psi\ - s_\pi\ (1-\psi))} = \frac{\gamma_0}{\Delta}$$

Comparative Statics: the effects of wage inequality

Reduction of inequality among wage earners **always stimulates demand** due to lower aggregate savings...

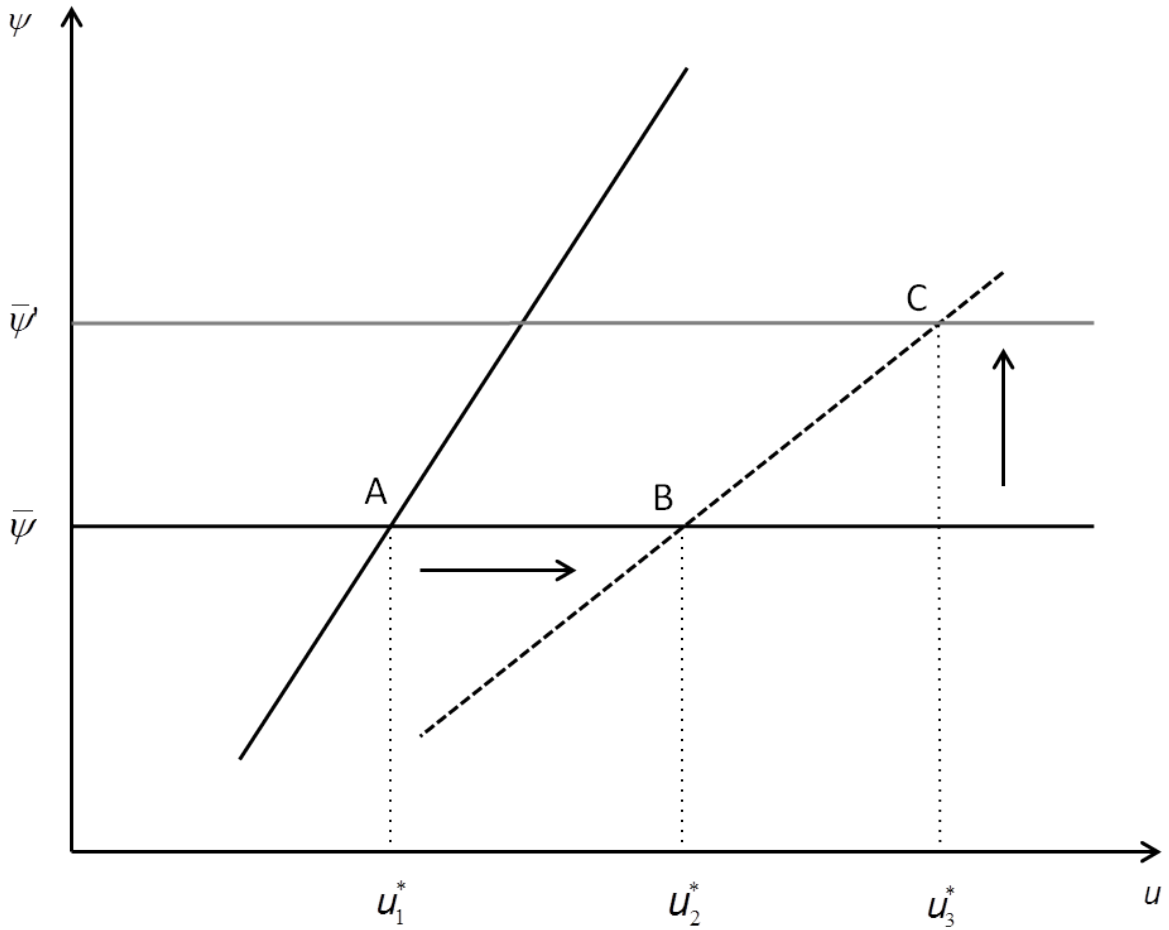
$$\frac{du^*}{d\sigma} = \frac{\gamma_0}{\Delta^2}\frac{d\Delta}{d\sigma} = -u^*\frac{\psi}{\Delta}\frac{ds_w[\sigma]}{d\sigma} < 0$$

... but the impact on the demand regime of the economy is **ambiguous**, due to the effect on the multiplier (the sign of the second term depends on the demand regime itself).

$$\frac{d\frac{du^*}{d\psi}}{d\sigma} = -\frac{u}{\Delta}\frac{ds_w}{d\sigma} - \frac{du^*}{d\psi}\frac{1}{\Delta}\frac{ds_w}{d\sigma} \lessgtr 0.$$

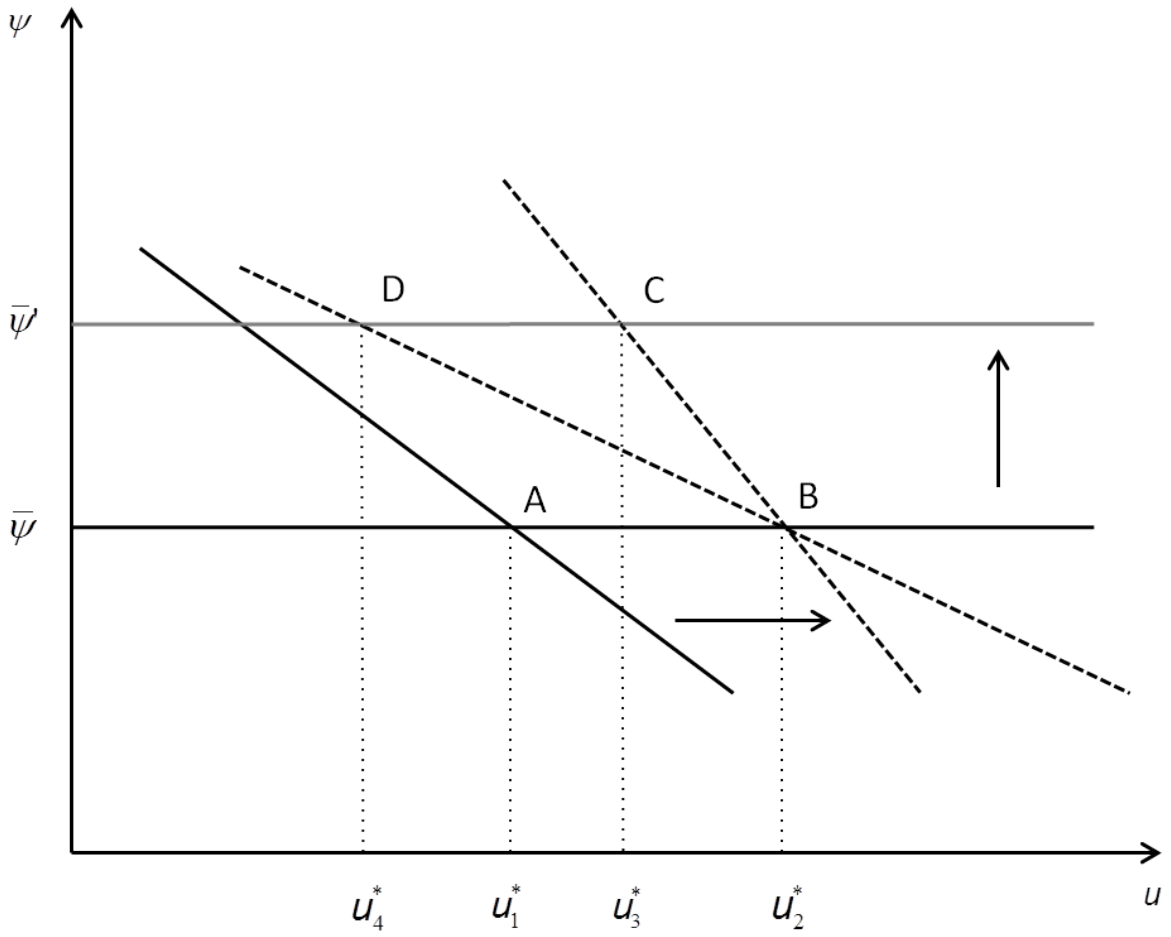
Reducing wage inequality...

... always pushes toward more *wage-ledness* if the economy is *wage-led* or *weakly profit-led*.



Reducing wage inequality...

... leads to more *profit-ledness* if the economy is *strongly profit-led*.



Size distribution of income and demand regimes

Since there is **theoretical indetermination**....

Empirical question: *How did changes in the size distribution of income affect demand regimes in different countries? Did this effect significantly bias previous empirical results?*

Empirical study: the case of the United States (1967-2010

Endogeneity problem: bi-directional causality between the wage share and capacity utilization.

A simple **two-dimensional VAR for capacity utilization and the wage-share** indicates that the US economy is **profit-led** (Barbosa-Filho and Taylor, 2006).

Question: *Did the increase in personal income inequality since 1980 in the US lead to an over- or to an under-estimation of such profit-led features?*

Econometric method

Tong (1990): **threshold autoregressive models** allow for a non-linearity in dynamic relationships.

Tsay (1998) extends it to the **multivariate** context: Threshold Vector Autoregression (TVAR).

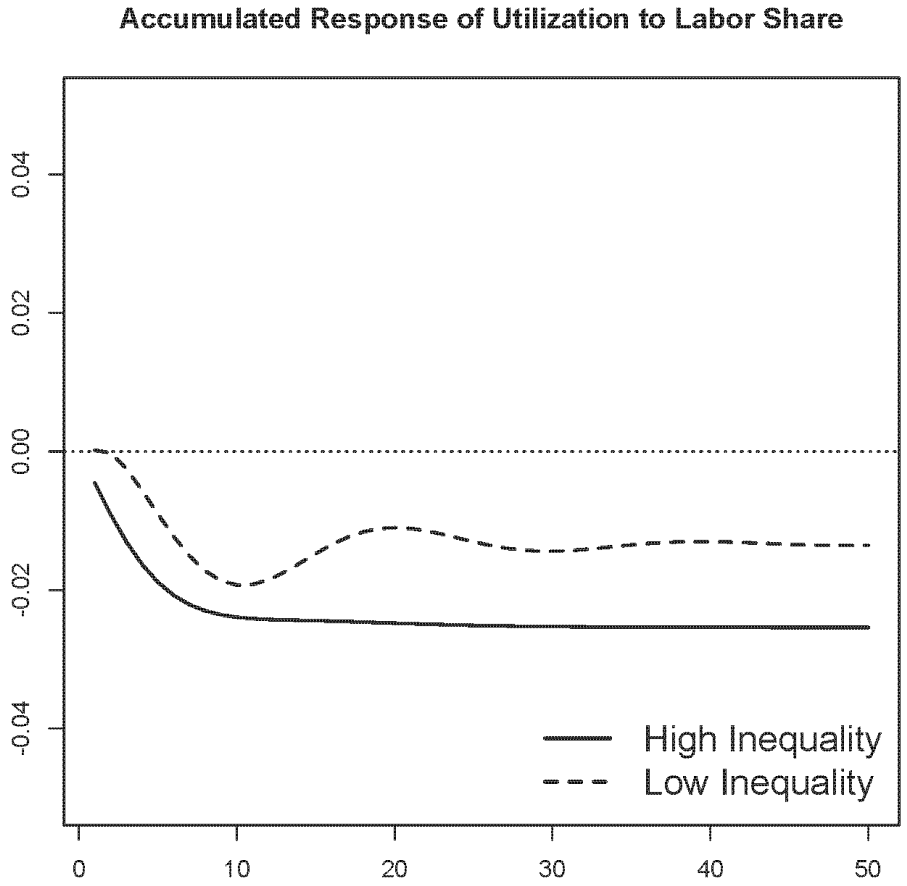
We run a **two-dimensional TVAR** for capacity utilization and the wage share using the **Gini Coefficient as threshold variable** for the period 1967-2010, with two lags.

Results

	Equation for u		Equation for Ψ	
	Low Inequality	High Inequality	Low Inequality	High Inequality
u_{-1}	1.3095***	1.4477***	-0.0039	0.0732
u_{-2}	-0.5941***	-0.6297***	0.2071*	0.0948
Ψ_{-1}	0.8536***	0.2956**	0.5271***	0.7473***
Ψ_{-2}	-0.9124***	-0.3181**	0.1603	0.2652**
Intercept	0.2456	0.0932	1.3061***	-0.053
Signif. Codes: *** 1%; **5%; *10%				
Threshold value: 0.406469				
Percentage of Observations in each regime: 32.9% 67.1%				

Results

Higher inequality has turned the US economy more 'profit-led'. Selected Threshold: 0.406 (approx. Gini index of 1981).



Discussion

Theoretical aspect: size distribution of income emerges as another omitted and important bias in the traditional Neo-Kaleckian framework (such as consumer debt, open economy issues and financialisation).

Policy implication: taxes-and-transfer schemes can prove effective to boost aggregate demand due to high savings differentials, and may also tilt the economy in a wage-led direction (thus reinforcing the economic argument for redistributing toward wages).

Brazil: empirical evidence for a profit-led regime... **But:** wage-led growth in 2005-2010 (with decreasing inequality!).

Distribution in Brazil (PNAD, IBGE)