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Income Distribution Macroeconomics

by

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Abstract

Recent research stresses the macroeconomic dimension of income distribution, but no theory has yet emerged. In this note, we introduce factor shares into popular growth models to gain insights into the macroeconomic effects of income distribution. The cost of modifying existing models is low compared to the benefits. We find, analytically, that (1) the multiplier is equal to the inverse of the labor share and is about 1.4; (2) income distribution matters mostly in the medium run; (3) output is wage led in the short run, i.e., as long as unemployment persists; (4) capacity expansion is profit led in the full-employment long run, but this is temporary and unstable.

Keywords: Economic Growth; Income Distribution; Multiplier; Factor Share; Output Capacity; Instability

JEL codes: D33, E25

1 INTRODUCTION

Much of the literature on income distribution and economic growth uses inequality measures and a microeconomic analysis. In a different approach, this note echoes a recent trend relating income distribution to macroeconomic outcomes, as suggested in Galbraith (2012), Krugman (2007), Piketty (2014), Reich (2013) and Stiglitz (2012), among others. Our approach is macroeconomic and we will consider factor shares as a measure of income distribution.[2]

Little attention has been paid to factor shares in recent decades. Part of the reason is that factor shares were constant in the postwar era and that this constancy became a stylized fact not worth discussing. The most-used macroeconomic growth models, the Cobb-Douglas production function and Solow growth models, feature constant factor shares. In the case of perfect competition and constant returns, "income distribution is irrelevant to the growth process" (Bertola et al. 2006). As a result, the questions of production and distribution have largely been divorced, and little progress has been made in income distribution macroeconomics over the past fifty years (Giovannoni 2014a). In this sense the question is new: no standard model has yet appeared.

In this note I show that rather powerful insights can be gained from relatively simple modifications of the traditional growth models to account for income distribution. What follows are extensions of the Keynesian cross, Solow and Harrod-Domar models.

[2] In Giovannoni (2014b), we show that the profit share, inequality and top incomes have behaved in the same way over sixty years in the United States, describing what has been deemed "fractal inequality

2 DISTRIBUTION, MULTIPLIER AND GROWTH

The set-up is the textbook case of a closed economy operating below capacity where we consider disposable income $Y_D = C + I + G - T$. Assume classic linear functions for consumption and investment such as (Samuelson 1939):

$$Y_D = cY_D + C_0 + iY_D + I(r) + I_0 + (G - T) \tag{1}$$

Complications such as borrowing, or the presence of assets or a foreign sector would distract us from the main point and need not be introduced for the model to be insightful. The intuition is to introduce a breakdown of YD on the right-hand side into wages and profits

$$Y_D = c(W + \Pi) + C_0 + i(W + \Pi) + I(r) + I_0 + (G - T) \tag{2}$$

At this point it is customary to move the variables endogenous with respect to Y_D to the left-hand side and leave the remaining exogenous variables on the right-hand side, which prompts the question of what the endogenous variables are. This is an important choice which influences the rest of this analysis, although not fundamentally. In what follows we will assume that profits are endogenous, on the grounds that profits can only exist if production has already taken place—profits depends on the profit-maximizing level of output. Thus profits are a function of disposable income, and by definition $\Pi = (1 - \alpha)Y_D$, where the labor share α is allowed to vary. Replacing this value in equation (2) introduces the distribution of income in the discourse. Solving for Y_D we get

$$Y_D = \frac{1}{1 - (1 - \alpha)(c + i)}[(c + i)W + I(r) + (G - T) + (C_0 + I_0)]$$

But since $c + i \approxeq 1$, this collapses to [3]

$$Y_D \approxeq \frac{1}{\alpha}[W + I(r) + (G - T) + (C_0 + I_0)] \tag{3}$$

[3] Empirically on US data, the elasticity of consumption and investment to disposable income are 0.81 and 0.23, respectively. The balance $(G - T) + (X - M)$ is nearly zero.

2.1 Features

Let the multiplier for variable Φ be $m_\Phi = \partial Y_D / \partial \Phi$. Equation (3) leads to identical multipliers $m = m_G = m_I = m_w = 1/\alpha$.

Magnitude of m. A labor share between 0.65 and 0.80 (see Giovannoni 2014a) puts the multiplier $1/\alpha$ between 1.2 and 1.5, which is in line with the literature (see Chinn 2013 for a survey). The finding that G- and I- multipliers are greater than one legitimizes the use of fiscal and monetary policies. It is also reassuring to find that the multiplying effect of $1/\alpha$ is the same regardless of where the money comes from. A dollar spent is a dollar spent.

Finally, note that we are talking about a multiplying effect on disposable income. Because of this, the balanced budget multiplier is $m_{G-T} = 0$, and not unity, as commonly assumed. A net injection of zero in the circular flow produces no change.

Is the economy wage- or profit-led? In our setting we assumed that profits were endogenous so that the economy is necessarily wage-led. Had we assumed instead in equation (2) that wages, instead of profits, are endogenous, we would have gotten a multiplier equal to $\frac{1}{1-\alpha} \in [2.9, 5.0]$, which is considerably more than any estimate in the literature. Our multiplier $m = \frac{1}{\alpha} \in [1.2, 1.5]$ seems more reasonable.

To prove the same point we can consider the elasticities of disposable income to wages and to profits:

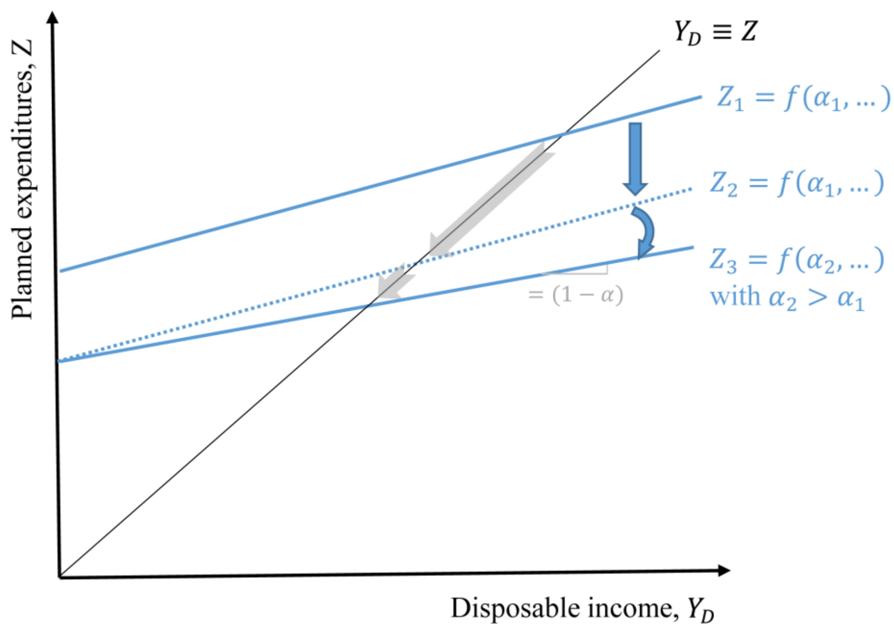
$$\begin{cases} \varepsilon_{Y_D/W} = \frac{\partial Y_D / Y_D}{\partial W / W} = \underbrace{\frac{\partial Y_D}{\partial W}}_{\text{multiplier}} \cdot \underbrace{\frac{W}{Y_D}}_{\text{share}} = m\alpha \quad = 1 \\ \varepsilon_{Y_D/\Pi} = \frac{\partial Y_D / Y_D}{\partial \Pi / \Pi} = \frac{\partial Y_D}{\partial \Pi} \cdot \frac{\Pi}{Y_D} = 0 * (1 - \alpha) \quad = 0 \end{cases} \tag{4}$$

All this makes the case for a wage-led economy in the short-run which is, again, compatible with the literature (Lavoie and Stockhammer 2012). Recall that the present setup deals with effective production, not production capacity, which is assumed fixed and not achieved—capacity will be dealt in the section after the representation below.

2.2 Representation

The present exposition lends itself to the traditional 45-degree line diagram. Start with equation (2) whose left side we rename aggregate demand, Z.

Figure 1 Increase in Aggregate Demand and Substantial Fall in the Labor Share



Rearranging, we get

$$\begin{cases} Y_D = Z \\ Z = (1-\alpha)Y_D + W + I(r) + (G-T) + (C_0 + I_0) \end{cases} \tag{5}$$

The slope of aggregate demand, $(1-\alpha)$, is positive. Exogenous changes cause the aggregate demand line to shift. A novelty compared to the textbook model appears with the slope of aggregate demand being a function of α, generating the possibility of rotations of the line depending on the distribution of income. At business cycle frequencies, the labor share varies so little—4 basis points at best—that the rotation is negligible. However, for a sustained fall in the labor share of 15 points, such as the one that took place over the last thirty years in many developed countries (Giovannoni 2014a), the slope of aggregate demand increases from 0.20 to 0.35, which is more substantial (see effect on Fig. 1).

3 LONG-RUN GROWTH

Along the balanced growth path (Solow 1956) $I = S$ or

$$k^* = \frac{s}{\delta + g_A} f(k^*) \tag{6}$$

where s is the exogenous savings rate, δ represents capital depreciation, technical progress A grows at a rate g_A, f (•) features constant returns, and $k = K/AL$ is the capital stock per effective worker. Multiplying through by the profit rate r and rearranging, we get the profit share (see e.g., Gollin 2008)

$$\frac{rk^*}{f(k^*)} = \frac{sr}{\delta + g_A} \tag{7}$$

This profit share is constant since s11, s_w, 8, r and gA are constant in the long run. Thus, factor shares are exogenous in the long run and there is "no feedback from distribution to macroeconomic developments" (Bertola, Foellmi and Zweimüller 2006). However, the distribution of income will change if, for instance, technology is biased, if markets are imperfect, if the production function is not Cobb-Douglas, or still if taxes and subsidies exist or change.

3.1 Modification #1: Heterogeneous Savings Rates Along the Balanced Growth Path

The profit share can be rewritten using a Kaldor (1956) decomposition of the savings rate. Let s_w and s_Π be the savings rates out of wages and out of profits, respectively, so that $S = S_w + S_\Pi = s_w W + s_\Pi \Pi$. The savings rate can then be shown to be

$$s = \frac{S}{Y} = \frac{\Pi}{Y}(s_\Pi - s_w) + s_w \tag{8}$$

Replacing this value in equation (7) and solving for the profit share we get, after rearranging and simplifications, the general expression

$$\frac{\Pi}{Y} = \frac{s_w r}{\delta + g_A - r(s_\Pi - s_w)} \tag{9}$$

If the saving rates are undifferentiated ($s_w = s_\Pi$) equation (9) collapses to the original equation (7). We note in passing a peculiar case[4] when $s_w = 0$.

Besides those particular values the steady-state profit share is positive and constant. Thus, income distribution is irrelevant to the growth process along the balanced growth path (Bertola, Foellmi and Zweimüller 2006). But could distribution matter during the transition path?

3.2 Modification #2: Endogenous Savings Rate Along the Transition Path

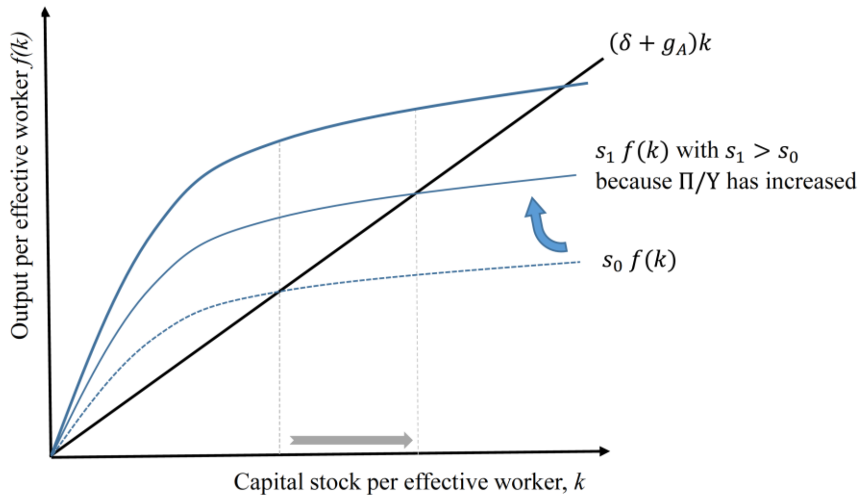
We can endogenize the savings rate in equation (6) by using the same Kaldorian decomposition $s = \frac{\Pi}{Y}(s_\Pi - s_w) + s_w = s\left(\frac{\Pi}{Y}\right)$ so that

$$(\delta + g_A)k^* = s\left(\frac{\Pi}{Y}\right).f(k^*) \tag{10}$$

Assuming that saving out of profits is greater than saving out of wages, $\frac{\partial s}{\partial(\Pi/Y)} = s_\Pi - s_w > 0.$ So a higher profit share leads to a new position where the savings rate and output per worker are permanently higher (see Fig. 2). The profit share, in turn, can change for the reasons mentioned above. However, the permanent rise in the profit share only leads to a *temporary* increase in the rate of growth. After the transition is completed the economy settles in to a steady state where growth is given by the rate of depreciation and the rate of technological change, not by income distribution. There remains, however, that the transition path is profit-led.

[4] The profit share becomes null, despite $s_\Pi, r > 0$. In this case capital-owners get what workers save: nothing, which is the reverse of the proposition (attributed to Kalecki) according to which "workers spend what they get, capitalists get what they spend." This case is unlikely because, as the labor share grows, s_w is likely to grow as well.

Figure 2 The Transition Path, with Income Distribution Effect



3.3 HARROD-DOMAR

Alternatively, one may start from the Harrodian growth framework (Harrod 1939). Along the warranted growth path actual growth equals the warranted growth $g = g_w = s_\sigma$ where $\sigma = \frac{\Delta Y}{\Delta K}$ is the marginal productivity of capital.

Introducing again the Kaldorian savings rate decomposition, we have

$$g_w = \sigma \left[\frac{\Pi}{Y} (s_\Pi - s_w) + s_w \right] \tag{11}$$

Thus the warranted growth path (production capacity) is profit-led. Note that this doesn’t affect the classic instability of the warranted growth path, which still prevails.

4 CONCLUDING REMARKS

The model extensions presented above are simple and could be used for teaching purposes. The modifications led to the conclusion that income distribution indeed matters, but in specific ways that ought to be reflected in the design of institutions and economic policies. In the short run, counter-cyclical policies ought to target the stability of aggregate wages. In the long run, institutions should facilitate profit accumulation and capacity expansion with the provision that profit-led expansions are only temporary and unstable.

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