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DEPARTMENT OF ECONOMICS

Working Paper

**Is planet Earth as a whole likely to
be wage-led?**

by

Arslan Razmi

Working Paper 2017-11



**UNIVERSITY OF MASSACHUSETTS
AMHERST**

Is planet Earth as a whole likely to be wage-led?

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Abstract

Evidence regarding the relationship between distribution, demand, and growth in the short run has been mixed. Open economy models that create the possibility of “beggar-thy-neighbor” growth offer one theoretical explanation for why this may be expected. Several authors have argued recently, however, that even if demand and growth are profit-led in many individual countries, the global economy is likely to be wage-led since the planet as a whole runs balanced trade. This paper finds that this argument, although intuitively appealing, does not hold up to careful examination. Although the world economy as a whole is a closed system, it is not isomorphic to a closed economy, thanks to repercussion effects, relative price movements, and cross-country heterogeneity. The effects of *global* redistribution depend on the nature of its constituent economies.

JEL classifications: F43, O41, O11, E12

Key words: Demand regime, income distribution, wage-led growth, neo-Kaleckian open economy models.

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1 Introduction and Background

By recognizing the dual role of wages - as costs of production and sources of aggregate demand - neo-Kaleckian models have made an extremely important contribution to short-run macroeconomic analysis. In a closed economy set-up with mark-up pricing, involuntary unemployment, unutilized capacity, and nominal wage stickiness, a redistribution of national income from capitalists to workers - who save less, on average - may generate additional spending and demand. If firms respond by increasing capacity utilization, output rises. Insofar as investment responds positively to expected future demand, higher utilization boosts accumulation *given the profit share*. Thus, growth in a closed demand-driven capitalist economy could be wage-led barring a strong profit share effect on desired investment. Other work, however, has shown that growth is much less likely to be wage-led in an open economy. This is because while redistribution towards workers boosts consumption demand, it simultaneously reduces external demand by making the domestic good less competitive in international markets.

Blecker (1989) investigated this issue in an open economy “imperfect substitutes” framework by introducing a flexible mark-up factor over average variable costs. Depending on the specification of the mark-up, any increase in the real wage is partially or fully passed through to the export price, making domestic goods less competitive internationally. This counters any positive effects on growth through increased utilization and investment. Thus, if the Marshall-Lerner condition is satisfied, open economy considerations constrain the room for wage-led growth. Even an economy that is wage-led in the absence of international trade can transform into a profit-led one if a decline in real wages boosts international demand adequately to offset the fall in domestic absorption. However, this kind of growth has a “beggar-thy-neighbor” aspect to it as it originates from one country “stealing” demand from another. The rise in demand for the wage-lowering country, in other words, plays out in a zero-sum environment where one country benefits at the expense of the other. How is the analysis affected if we take the whole global economy as our unit of analysis?

Some recent literature has argued that since the world as a whole is a closed economy, global growth is likely to be wage-led. Put differently, since the constraint on export-led growth in an imperfect substitutes framework arises from the fact that one country runs trade surpluses at the expense of the other, and since the planet as a whole cannot run trade imbalances, the issues raised in an open economy context are not relevant, and the global economy is highly likely to experience wage-led demand and growth. Lavoie and Hein (2015)[p. 8] point out, for instance, that “at the level of planet earth, since net exports are zero by definition, the only reasonable strategy for the expansion of aggregate demand is to pursue a strategy of wage-led growth, that is, a strategy that is favourable to the labour force.” Similarly, Onaran (2016)[p. 464] observes that “even if there are some countries, which are profit-led, the global economy as a whole is wage-led because the world is a closed economy. This makes intuitively sense; because planet earth is a closed economy, at least as long as we do not

trade with Mars!”

It is not clear, however, that the conclusion follows from the premise. The relevant issue is the presence of trade imbalances *within* the planet, that is, between countries. As long as countries differ along the relevant dimensions (saving rates, levels of capacity utilization, resource scarcity, consumer behavior, etc.), global demand as a whole can be either wage-led or profit-led, even in the absence of beggar-thy-neighbor effects. The same observations apply with even more force to global growth. The fact that the planet as a whole does not run trade surpluses or deficits against itself is not central.

To put the point across starkly, suppose that the world consists of two countries that are identical in every way. Indeed let’s go further and assume that saving rates are identical across classes (capitalists and workers) within countries, so that re-distribution has no effect on spending. Increasing the real wage now has no effect on internal demand but lowers external competitiveness and, therefore, leads to a trade deficit.¹ Demand is thus affected negatively for the re-distributing country and we could say, using the conventional definition, that demand in the country is profit-led. The other country now has an equivalent trade surplus although there has been no re-distribution in that country. Thus world demand is profit-led even though intra-planetary trade is balanced, so there is no beggar-thy-neighbor effect at the global level. As long as there is a line dividing the globe into more than one economy, it is the national level demand that becomes the relevant unit of analysis.

Another stark example again involves a two-country world where both countries are identical in size and every other aspect except that one country produces its own investment goods but imports all its consumption goods from the other country while the other country is self sufficient in consumption goods. Then a re-distribution towards profits in the first country increases investment spending without affecting the (non-existent) consumer demand for the domestic good. Utilization rises as a result and demand in that country is profit-led. Moreover, the boost in utilization increases consumer demand for the second country’s goods, increasing utilization there as well. The world as a whole then appears to be profit-led thanks to differences in consumer demand for the goods produced in the two countries.

This paper explores the conditions under which the global economy as a whole could experience wage- or profit-led demand and growth in the short run. I start with a simple framework where the world consists of two countries and both countries are exactly identical in terms of the level of capital stocks, saving, investment, and consumption behavior, and income distribution. Both countries are capital abundant in the sense that a lack of capital does not constrain production and capacity utilization varies in response to demand. Employing this framework, I first show that, even in a zero sum, beggar-thy-neighbor world, the nature of world demand is not independent of constituent country characteristics. I do this by demonstrating the effects of differences in consumption demand for goods across countries. Next, I show that, even if we

¹ Assuming that the well-known Marshall-Lerner condition is satisfied.

assume away beggar-thy-neighbor effects through constant relative prices, the nature of world demand and growth continues to depend on constituent country characteristics. Again, I do this by demonstrating the effects of differences in consumption patterns. In particular, I show that, even in this boiled down set-up, global demand could be either profit-led or wage-led, while the nature of the demand regime *within* each country depends on global consumption behavior via repercussion effects. For example, if global consumption is skewed heavily towards the good produced by one country, then the other country will tend to have profit-led demand. The intuition is simple; if the good produced by a country is only used as an investment good, then any global re-distribution towards profits necessarily increases demand for that good, regardless of the nature of the demand regime in the other country.

These simple exercises show that simply considering the global economy as a whole does not make wage-led growth more likely. The global economy is the sum of its parts. When divided into two equal parts, the planet as a whole is wage-led only if either: (1) *both* economies are wage-led, or (2) if one economy is profit-led, the other economy is very strongly wage-led. Thus, as long as one finds that, as suggested by empirical studies, at least some countries have profit-led growth, one cannot make a general statement about the planet as a whole likely being wage-led.

Finally, I extend the model to re-introduce beggar-thy-neighbor effects by employing a more conventional structuralist North-South closure, with the South modelled as a capital-constrained economy with an exogenously fixed real wage. I show that the possibility of global wage-led growth is more limited in such a set-up. Intuitively, a global redistribution towards wages in this set-up lowers investment in the South without affecting capacity utilization, while possibly raising the latter in the North if it has wage-led demand.

In sum, the global economy can be either wage-led or profit-led. The fact that the globe as a whole has balanced trade is not the decisive factor one way or another.

To the best of my knowledge, one other paper has explored related issues in a two-country framework. von Arnim et al. (2014) analyze the effects of redistribution in a country when it interacts with the rest of the world as a large economy. Analyzing a two-country world with varying combinations of wage-led and growth-led economies, they show that, redistribution in a country could raise global demand, even though it may lower *relative* growth for that country. The fact that one country can derive benefits from redistribution in another country gives rise to a possible fallacy of composition. However, the relevant thought exercise for our purposes would involve the global effects of redistribution *across the world* rather than in one country. This is because the argument that I explore in this paper is about whether the fact that the world is a closed economy as a whole makes wage-led growth more likely. Investigating this question requires analyzing the comparative statics of redistribution that is global in nature.

2 A Simple Two-Country Model

2.1 When both countries are capacity-constrained

Let's start by defining macroeconomic behavior. Consider two countries, say North and South that are similar in the sense that neither economy has a capital constraint. Each produces a good – called good N in the case of North and S in the case of South – and the two goods are imperfect substitutes in consumption.² At this point I attach no significance to the terms North and South as far as income or structural differences are concerned. Both economies have excess capacity, and rates of utilization (denoted by u_N and u_S) vary in order to equilibrate the respective goods markets. Consumers in each country spend a fraction of their income on their own goods and the remainder on the foreign good. Only profit income is saved. Utilization is proxied by outputs as ratios of capital stocks (e.g. $u_N \equiv Y_N/K_N$). Thus, denoting the consumption of good i by country j 's consumers by C_{ij} , I am able to define the following equations to describe macroeconomic consumption behavior after expressing all real variables in terms of the price of the N -good:

$$C_{NN} = \Theta_N q^\gamma (1 - s_N \pi_N) u_N K_N \quad (1)$$

$$C_{SN} = \frac{(1 - \Theta_N q^\gamma)(1 - s_N \pi_N) u_N K_N}{q} \quad (2)$$

$$C_{SS} = \Theta_S q^{-\gamma} (1 - s_S \pi_S) u_S K_S \quad (3)$$

$$C_{NS} = q(1 - \Theta_S q^{-\gamma})(1 - s_S \pi_S) u_S K_S \quad (4)$$

The share of consumption of each good ($\Theta_N q^\gamma$ and $1 - \Theta_N q^\gamma$ in the case of Northern consumers) is affected by its relative price ($q \equiv P_S/P_N$) and national income. Ignoring government spending and taxes, we only need to define the investment functions in order to specify equilibrium conditions. Since I do not impose a trade balance condition, I can specify independent investment functions for each country. I employ general functions that specify investment as a function of profitability conditions and aggregate demand.³

$$\frac{I_N}{K_N} = f(\pi_N, u_N) \quad (5)$$

$$\frac{I_S}{K_S} = h(\pi_S, u_S) \quad (6)$$

The two goods market conditions in excess demand form follow:

²See Table 1 for a list of symbols and their definitions.

³The investment specifications here address the Marglin-Bhaduri critique of neo-Kaleckian investment functions (see Marglin and Bhaduri (1990)). Modifying investment to be a function of the profit rate instead of the profit share will not qualitatively affect the gist of our analysis.

$$C_{NN} + C_{NS} + \frac{I_N}{K_N} - u_N = 0, \text{ or}$$

$$NN(u_N, u_S; \pi) = [\Theta_N q^\gamma (1 - s_N \pi_N) - 1] u_N + (1 - \Theta_S q^{-\gamma})(1 - s_S \pi_S) q u_S k + f(\pi_N, u_N) = 0 \quad (7)$$

$$C_{SS} + C_{SN} + \frac{I_S}{K_S} - u_S k = 0, \text{ or}$$

$$SS(u_N, u_S; \pi) = (1 - \Theta_N q^\gamma)(1 - s_N \pi_N) u_N + [\Theta_S q^{-\gamma}(1 - s_S \pi_S) - 1] q u_S k + g(\pi_S, u_S) = 0 \quad (8)$$

where all the quantities in both equations have been normalized by $P_N K_N$, and k ($\equiv K_S/K_N$) defines the relative capital stock in the South.

2.2 Beggar-thy-neighbor effects

Before we explore the effects of redistribution on global income and demand, let's take a quick look at the consequences of a relative price change in this framework. Does the world economy as a whole experience changes in demand as a result?

We can figure out the partial effect of a change in q – keeping the distributional variables fixed – from eqs. (7) and (8).

$$NN_q = \gamma \Theta_N q^\gamma (1 - s_N \pi_N) u_N + [1 - (1 - \gamma)(1 - \Theta_S) q^{-\gamma}] (1 - s_S \pi_S) u_S k$$

$$SS_q = - \frac{[\gamma \Theta_N + (1 - \Theta_S)] q^\gamma}{q^2} (1 - s_N \pi_N) u_N - (1 - \Theta_S) \gamma q^{-\gamma-1} (1 - s_S \pi_S) u_S k$$

An increase in q substitutes demand away from the S good and toward the N good. To focus on the question at hand, let's now simplify by assuming that each country begins with the same level of capital stock ($k = 1$ initially) and that consumers in the two countries are exactly similar in that they have identical preferences over the basket of goods available. Thus, $\Theta_N = 1 - \Theta_S = \Theta$. In other words, consumers in both countries devote the same share of expenditure to each good. Let's assume also that wages, when measured in the same currency, are the same across countries as is the constant mark-up over costs. This latter assumption translates into equal profit shares of income in each country ($\pi_N = \pi_S = \pi$). Notice also, that under these conditions, $q = 1$. To see this, consider the relative price variable in more detail:

$$q = \frac{(1 + \tau_S) W_S}{(1 + \tau_N) W_N} \quad (9)$$

where τ_i and W_i ($i = N, S$) represent the mark-up factors and nominal wages, respectively, and the nominal labor coefficients have been normalized to unity for simplicity. With zero pass-through of labor costs into good prices, identical profit shares $\pi_i \equiv \left(\frac{\tau_i}{1+\tau_i}\right)$ require identical mark-up factors, so that $q = 1$. Finally, let's assume away differences in saving and investment behavior in the two countries so that $s_N = s_S = s$, $f_\pi = h_\pi$, and $f_u = h_u$.

In sum,

$$\begin{aligned} \Theta_N = 1 - \Theta_S = \Theta, \pi_N = \pi_S = \pi \text{ (so that } q = 1), s_N = s_S = s, f_\pi = h_\pi, \\ f_u = h_u, \text{ and initially, } W_N = W_S, k = 1 \end{aligned} \quad (10)$$

Now suppose there is a nominal devaluation in the North. The effect will be to raise q (a real devaluation) without a change in distribution. In order to highlight the importance of country differences, we compare the cases where the countries are exactly identical in every respect with the one where they are not.

Consider first the case where the two countries are exactly identical in the sense that not only the assumptions listed under (10) hold, but that in addition, each country divides its consumption expenditure equally between the two goods. In this case the substitution towards the N good caused by the Southern revaluation raises utilization in the North while lowering it to an identical extent in the South.

$$\frac{du_N}{dq} + \frac{du_S}{dq} = 0$$

The beggar-thy-neighbor effects cancel out between the two regions so that things play out at the global level as a zero sum game.⁴ In such a world, relative price changes have an effect only at the country level. This is the case that one has in mind when one expects the world as a whole to act as a closed economy.

Next, consider the case where global consumption demand is extremely skewed towards the S -good, so that $\Theta = \Theta_N = 0$ and $\Theta_S = 1$. Unlike the previous case, this generates an asymmetry.

$$\begin{aligned} \frac{du_N}{dq} + \frac{du_S}{dq} &= \frac{(1 - s\pi)\gamma u_N}{1 - f_u} + \left[-\frac{\gamma(s\pi - f_u) + (1 - f_u)}{(s\pi - f_u)(1 - f_u)}(1 - s\pi)\gamma u_N \right] \\ &= -\frac{1 - s\pi}{s\pi - f_u} u_N < 0 \end{aligned}$$

The overall effect on utilization is negative even though substitution effects cancel out at the global level. Intuitively, this is because global consumption demand is skewed towards the S good. The negative valuation effects of the relative price change on Northern imports, therefore, lowers global utilization.

Not surprisingly, the mirror image result holds when global consumption demand is skewed towards the N good (i.e., $\Theta = \Theta_N = 1 - \Theta_S = 0$).

⁴Notice that the fact that the two countries are identical in terms of size allows us to add up the effects on the two rates of utilization to get the global effect.

$$\frac{du_N}{dq} + \frac{du_S}{dq} = \frac{1 - s\pi}{s\pi - f_u} u_N > 0$$

Global consumption patterns matter. A bias towards consumption for any of the two goods results in changes in global utilization in response to relative price changes. Unless its constituents are exactly identical, the world as a unit does not act like a closed economy.⁵

The difference considered here between the economies is that in global consumer preferences over the two goods. One would, of course, reach similar conclusions were one to explore other differences such as those in saving rates, size, initial utilization rates, or distributional shares.

The next sections builds on the intuition derived here; I will continue to explore the effects of differences in global consumption of the two goods.

2.3 Global redistribution toward wages

Now suppose there is a redistribution of income globally from profits to wages. In order to limit the number of moving parts, I will constrain the analysis to redistributions involving no changes in relative prices. That is, I will exclude the beggar-thy-neighbor effects of relative price changes. As demonstrated in section 2.2, the main conclusion drawn from our exercise, i.e., that the nature of world demand and growth is not independent of the constituent economies, is robust to relative price changes.

First, a look at the partial effects in each market:

$$-NN_\pi = [\Theta_N q^\gamma s_N u_N + (1 - \Theta_S q^{-\gamma}) s_S u_S q k] - f_\pi \gtrless 0 \quad (11)$$

$$-SS_\pi = [\Theta_S q^{-\gamma} s_S u_S q k + (1 - \Theta_N q^\gamma) s_N u_N] - h_\pi q k \gtrless 0 \quad (12)$$

Redistribution away from profits raises consumption spending in both countries. For either country, if this increase along with the boost to exports (due to repercussion effects) is sufficient to dominate the decline in investment due to the lower profit share, then demand in that country is wage-led; otherwise it is profit-led. The nature of demand is influenced by the initial distribution of world capital stock, global consumer preferences, and of course, more standard factors such as saving and investment behavior. In order to anticipate later results, notice that the more world demand is skewed towards a country's own products, the more likely it is to have wage-led demand.

⁵Notice, however, that substitution effects (as captured by the variable γ) are absent from the terms for global utilization rate changes regardless of the nature of constituent economies. This is the dimension in which the world does act as a closed economy.

2.3.1 Demand

The world in this framework is essentially one large economy except for that there is a line running through it that divides it equally in such a way that one good is produced in each part. In this world, one cannot have relative price effects from *global* redistribution since an identical change in the mark-up factor across the world will leave q unchanged.

Under these conditions, and based on eqs. (7) and (8), we get the following expressions for comparative static changes in the rates of utilization following global redistribution towards wages.

$$-\frac{du_N}{d\pi} = \frac{(1-f_u)[\Theta(u_N+u_S)-f_\pi] + (1-s\pi)(1-2\Theta)f_\pi}{(s\pi-f_u)(1-f_u)} \gtrless 0 \quad (13)$$

$$-\frac{du_S}{d\pi} = \frac{(1-f_u)[(1-\Theta)s(u_N+u_S)-f_\pi] - (1-s\pi)(1-2\Theta)f_\pi}{(s\pi-f_u)(1-f_u)} \gtrless 0 \quad (14)$$

Note that both bracketed terms in the denominators are positive by the traditional Keynesian stability conditions.⁶

Output in either economy could be either wage-led or profit-led. The outcome, as we see shortly, depends crucially on global consumption behavior in terms of composition. In order to dig deeper, let's explore some interesting cases.

Skewed global preferences

Consider first the case where global consumption demand is extremely skewed towards the S -good, so that $\Theta = \Theta_N = 0$ and $\Theta_S = 1$. The effect is to ensure that the North is profit-led. Why? Because, with the N -good being used only for investment, any redistribution towards wages leaves consumer demand for that good unchanged. The only remaining effect on demand is the negative one through lower investment demand. Mathematically,

$$-\frac{du_N}{d\pi} = -\frac{f_\pi}{(1-f_u)} < 0 \quad (15)$$

The effect on South is, on the other hand, is ambiguous. The intuition is a bit more involved. Since global redistribution toward wages lowers utilization in the North, Southern exports suffer. The direct effect of the redistribution on demand for the S -good works through the two standard channels. The direct effect on investment is to lower it. The effect on consumption, and indirectly via consumption on demand, is positive. Thus, the overall effect on demand for the S -good is ambiguous.

⁶ More specifically, stability requires that $s\pi > f_u$, while, given that $s, \pi < 1$, we know that $f_u < 1$.

$$-\frac{du_S}{d\pi} = \frac{(1-f_u)s(u_N+u_S) - (2-f_u-s\pi)f_\pi}{(s\pi-f_u)(1-f_u)} \geq 0$$

It is clear, however, that the South is less likely to be wage-led than if it were a closed economy. This is because of the harm to exports that redistribution causes even when beggar-thy-neighbor effects are absent by construction. To see this more clearly, we can decompose the numerator of the expression above into two terms such that wage-led demand requires that:

$$\{s[f_u(u_N+u_S) - f_\pi\pi] + (1-f_u)f_\pi\} - [s(u_N+u_S) - f_\pi] < 0$$

Now, the second term (in square brackets) is positive if the South is wage-led, i.e., $SS_\pi < 0$, which tends to make the overall expression negative. However, the first term (in curly brackets) is highly likely to be positive,⁷ and makes satisfaction of the inequality less likely.

What about *global* demand?

$$-\left(\frac{du_N}{d\pi} + \frac{du_S}{d\pi}\right) = \frac{s(u_N+u_S) - 2f_\pi}{(s\pi-f_u)} \geq 0 \quad (16)$$

A *sufficient* condition for global demand to be wage-led is that *both* countries are wage-led.⁸ Since that is not true in this case – recall that the North is unambiguously profit-led – the South should be sufficiently wage-led to offset the profit-led demand in the North. Mathematically this condition boils down to:

$$s(u_N+u_S) - f_\pi > f_\pi$$

The left hand side is the condition for the South to be profit- or wage-led (with the conditions summarized by equation (10) imposed). Thus, if the South is profit-led, the globe as a whole is profit-led. If the South is wage-led, things become ambiguous in spite of the absence of beggar-thy-neighbor effects at the global level.⁹

⁷Note that $f_u(u_N+u_S)$ is the response of investment to utilization in both countries while $f_\pi\pi$ is the response to the profit share in the North only.

⁸Again, we can add up changes in the two utilization rates because the initial level of capital stocks in the two countries are the same.

⁹Note that, with $\Theta = 0$, the trade balance conditions in the North and South are given by:

$$TB_N = -(1-s\pi)u_N = -TB_S$$

Thus, the North starts out with a trade deficit while the South starts out with a surplus. Intuitively, the North buys all its consumer goods from the South. A redistribution towards wages has an ambiguous effect on the Northern trade balance, although it continues to have a trade deficit (and the South continues to have an equivalent trade surplus). Mathematically,

$$-\frac{d(TB_N)}{d\pi} = -\frac{s(1-f_u)u_N - (1-s\pi)f_\pi}{1-f_u} \geq 0$$

Why is the effect ambiguous? Intuitively, a redistribution toward wages increases consumption spending (hurting the trade balance) but also reduces u_N (since the North is profit-led), which improves the trade balance. This remains a zero-sum world as far as the trade balance is concerned.

Finally, since the two countries are symmetric, the same analysis would apply in mirror image form if global consumer preferences were skewed towards the S -good rather than the N -good.

Symmetric global preferences

Next, consider the case where global consumers devote an equal proportion of their spending to either good, i.e., $\Theta = \Theta_N = \Theta_S = 0.5$. Now the relevant conditions assume a different form. Mathematically, from eqs. (13) and (14),

$$-\frac{du_N}{d\pi} = \frac{s(u_N + u_S) - 2f_\pi}{2(s\pi - f_u)} = -\frac{du_S}{d\pi} \geq 0 \quad (17)$$

Not surprisingly the condition for utilization to rise in response to global redistribution toward wages is the same in each country. Moreover, it is the same as the condition for global demand to be wage-led in the presence of skewed preferences (see equation (16) above). For the globe as a whole, the change in utilization is given by:

$$-\left(\frac{du_N}{d\pi} + \frac{du_S}{d\pi}\right) = \frac{s(u_N + u_S) - 2f_\pi}{(s\pi - f_u)} \geq 0 \quad (18)$$

which is the same as the condition in the case of skewed preferences. The necessary condition for both countries to be wage-led is that the globe be wage-led and a sufficient condition for the globe to be wage-led is that both countries be wage-led. As in the case of skewed preferences, if one of the two-countries has profit-led demand, the world as a whole could have profit-led demand. Redistribution is not a zero-sum game at the global level.

2.3.2 Growth

Let's now turn our focus to the nature of effects on accumulation rather than demand in the short run and over time. Equations (5) and (6) have already defined investment behavior. Since the economies start with identical levels of capital stocks, the immediate change in the global rate of accumulation is given by $\frac{\hat{K}_S + \hat{K}_N}{2}$, where the hats over variable symbols denote growth rates.

We are now in a position to re-visit our thought experiment involving global redistribution. Once again, we will contrast scenarios with different global consumption behaviors.

Skewed global preferences

Recall that in this case the N -good is only used for investment. Redistribution towards wages, therefore, lowers investment demand, making both demand and growth unambiguously profit-led in the North. Indeed demand declines to the same extent as investment.

$$-\frac{d\hat{K}_N}{d\pi} = -\frac{f_\pi}{(1-f_u)} < 0$$

As in the case of utilization, the effect on Southern accumulation is less clear. Indeed, not unexpectedly, the condition for wage-led growth is more stringent than that for wage-led demand. This is because, even if demand is wage-led, the resulting boost to investment must dominate the direct effect of a lower profit share on investment to make growth wage-led.

$$-\frac{d\hat{K}_S}{d\pi} = -\frac{(1-f_u)s[f_\pi\pi - f_u(u_N + u_S)] + f_u f_\pi(1-s\pi)}{(s\pi - f_u)(1-f_u)} \geq 0$$

A positive effect on *global* accumulation requires, as a sufficient condition, that investment in both countries be more sensitive to utilization than to the profit share (i.e., $2f_\pi\pi - f_u(u_N + u_S) < 0$). Since growth in the North is unambiguously profit-led, simply having wage-led growth in the other country will not suffice to make global accumulation wage-led. Instead, investment in the latter country will have to more than compensate for decumulation in the former country in response to redistribution.

$$-\left(\frac{d\hat{K}_N}{d\pi} + \frac{d\hat{K}_S}{d\pi}\right) = -\frac{s[2f_\pi\pi - f_u(u_N + u_S)]}{(s\pi - f_u)} \geq 0$$

Symmetric global preferences

Recall that this is the case where consumers world-wide allocate an equal share of their consumption expenditures to each good. In this case, both goods are demanded symmetrically so that neither of the two countries is unambiguously profit-led.

$$-\frac{d\hat{K}_S}{d\pi} = -\frac{s[2f_\pi\pi - f_u(u_N + u_S)]}{2(s\pi - f_u)} = -\frac{d\hat{K}_N}{d\pi} \geq 0$$

The effect on investment in each country is determined by the cumulative effect in the two countries. A sufficient condition for global growth to be wage-led is that the utilization elasticity of investment in each country be less than the profit share elasticity. Exactly the same condition ensures that global growth is wage-led. A less stringent necessary condition is that at least one of the countries have wage-led growth. If one of the countries has a profit-led growth regime, the other must have a strongly wage-led regime. The world as a whole may have either of the two regimes as long as the two countries differ in their regimes.

$$-\left(\frac{d\hat{K}_N}{d\pi} + \frac{d\hat{K}_S}{d\pi}\right) = -\frac{s[2f_\pi\pi - f_u(u_N + u_S)]}{(s\pi - f_u)} \geq 0$$

2.4 Extension: The traditional structuralist North-South closure

Structuralist models have typically employed a different closure for North-South models whereby capacity utilization adjusts in response to disequilibria in the industrialized North while relative prices (or the terms of trade) adjust in a capacity-constrained South.¹⁰ As we see below, this closure makes global wage-led growth less likely. The two goods market equilibrium conditions are largely similar to what we had before (see eqs. (7) and (8)), with the difference that investment in the South is no longer a function of capacity utilization (which is normalized to unity for convenience).

Assuming again that, $\Theta_N = 1 - \Theta_S = \Theta$, and $s_N = s_S = s$, and $\pi_N = \pi_S = \pi$,

$$NN(u_N, q; \pi) = [\Theta q^\gamma (1 - s_N \pi) - 1]u_N + [1 - (1 - \Theta)q^{-\gamma}](1 - s\pi)qk + f(\pi, u_N) = 0 \quad (19)$$

$$SS(u_N, q; \pi) = (1 - \Theta q^\gamma)(1 - s_N \pi)u_N + [(1 - \Theta)q^{-\gamma}(1 - s\pi) - 1]qk + h(\pi) = 0 \quad (20)$$

Notice that, with full utilization, the profit share in the South is the same as the profit rate. Also, it may be useful to note that although output cannot be wage- or profit-led with full utilization, demand can, since only capitalists save.

We can now analyze our earlier distributional thought experiment employing the more traditional structuralist closure. Table 2 summarizes the results for ease of comparison between this and the previous section.

2.4.1 Global redistribution again

To carry out the analysis, we will have to separate movements in relative prices due to excess demand or supply in the goods markets from those due to policy-induced redistribution. Recall that, with exogenous profit shares in both regions, a redistribution towards wages requires a decline in the mark-up. Since the reduction in the mark-up factor is the same in both regions – our thought experiment involves identical redistribution across the world – q is unchanged. When relative prices adjust, on the other hand, the real wages and profit shares must remain unchanged. In sum, distribution must remain exogenous, while endogenous relative price adjustments will now re-introduce the beggar-thy-neighbor expenditure-switching effects seen in section 2.2.¹¹

As earlier, first a look at the partial effects:

$$-NN_\pi = s\Theta(u_N + 1) - f_\pi \geq 0 \quad (21)$$

¹⁰See, for example, Taylor (1983)(chapter 10), Blecker (1996), and Dutt (2002).

¹¹In mathematical terms, consider equation (9). Since the mark-up factor is an exogenous constant, changes in the price level must be reflected proportionally in the nominal wage, keeping the real wage constant.

$$-SS_\pi = s(1 - \Theta)(u_N + 1) - f_\pi \geq 0 \quad (22)$$

where again $f_\pi = h_\pi$, and initially $k = q = 1$. The partial effects are similar to those derived in the previous section except for that now $u_S = 1$, so that the sum of utilization rates appears in the expressions above as $u_N + 1$ instead of $u_N + u_S$. Next, let's take a look at the comparative statics under different assumptions regarding consumer demand for the two goods.

Global consumer preferences skewed towards the S-good

Again, first the case where global consumption demand is extremely skewed towards the S-good, i.e., $\Theta_N = 0$ and $\Theta_S = 1$, so that $\Theta = 0$. In this case,

$$\begin{aligned} -\frac{du_N}{d\pi} &= -\frac{[2f_\pi - s(u_N + 1)]\gamma + f_\pi u_N}{(1 - f_u)u_N + (s\pi - f_u)\gamma} \geq 0 \\ -\frac{dq}{d\pi} &= -\frac{[2f_\pi - s(u_N + 1)] - s[f_\pi\pi - f_u(u_N + 1)] - f_u f_\pi}{[(1 - f_u)u_N + (s\pi - f_u)\gamma](1 - s\pi)} \geq 0 \end{aligned}$$

Recall that, in section 2.1, where both regions had excess capacity, demand was unambiguously profit-led in this scenario. The reason was that, with no consumption of the Northern good, any reduction in the profit share will result only in lower investment demand. Now things are more ambiguous. Even though no Northern goods are initially being demanded for consumption, the redistribution may lead to a rise in the equilibrium value of q if demand in the South is wage-led, which would in turn cause a consumption switch towards Northern goods. Notice that, in the absence of expenditure-switching effects, i.e., with $\gamma = 0$,

$$-\frac{du_N}{d\pi} = -\frac{f_\pi}{(1 - f_u)} < 0$$

which is unambiguously signed and is in fact the expression that we got earlier when both regions had excess capacity (see equation (15)). Obviously the effect of removing expenditure-switching effects is to ensure that the level of output in the North is profit-led.

Symmetric global preferences

Next, consider the case where, i.e., $\Theta_N = \Theta_S = \Theta = 0.5$. The sufficient but not necessary condition for u_N to be higher in the new equilibrium after a redistribution toward wages is that demand in both countries be wage-led, i.e., the decline in investment following redistribution be higher than that in saving in each country. The same condition is sufficient to ensure a decline in Southern terms of trade (q). Mathematically,

$$\begin{aligned}
-\frac{du_N}{d\pi} &= \frac{[s(u_N + 1) - 2f_\pi][\gamma u_N + 1 + \gamma]}{2(1 - s\pi)(s\pi - f_u)(\gamma u_N + 1)} \geq 0 \\
-\frac{dq}{d\pi} &= \frac{[s(u_N + 1) - 2f_\pi](1 - f_u)}{2(1 - s\pi)(s\pi - f_u)(\gamma u_N + 1)} \geq 0
\end{aligned}$$

Again notice that, if $\gamma = 0$, that is, there are no expenditure-switching/beggarthy-neighbor effects, the condition for global output and demand to be demanded (i.e., $du_N/d\pi > 0$) reduces to that in the case where both regions had excess capacity (see equation (18)).

Global consumer preferences skewed towards the N-good

Now the case where $\Theta_N = 1$, $\Theta_S = 0$, so that $\Theta = 1$. Only the Northern good is used for consumption across the world. Recall that we did not have to consider this case in Section 2.1.1 since there utilization adjusted in both countries, making these mirror images of each other in every dimension except for consumption demand for their goods. In the present case, redistribution toward wages unambiguously lowers investment demand for the S good, which in turn reduces q , leading to substitution away from the Northern good. Demand for the Northern good depends on this effect in addition to the standard one that depends on whether the world demand as a whole is wage-led or profit-led. The weaker the substitution effect (as measured by γ), the greater the decline in q , and as a result, the higher the likelihood that world demand as a whole is profit-led.

$$\begin{aligned}
-\frac{du_N}{d\pi} &= \frac{[s(u_N + 1) - 2f_\pi]\gamma u_N - f_\pi}{(s\pi - f_u)\gamma u_N} \geq 0 \\
-\frac{dq}{d\pi} &= -\frac{f_\pi}{(1 - s\pi)\gamma u_N} < 0
\end{aligned}$$

2.4.2 Growth

How is growth (as opposed to demand) affected by redistribution in this case where the South has full capacity utilization? Since it is *global* growth that we are interested in, let's take a look at the expressions for aggregated global growth. Since growth in the South is now only a function of the profit rate (share), intuitively one would expect the likelihood of global wage-led growth to be lower in this case. This is indeed the main outcome of the analysis below.

Global consumer preferences skewed towards the S-good

Recall that, in the case where global preferences are skewed, so that $\Theta = 0$, the sufficient condition for global growth to be wage-led was that growth in both countries be wage-led. This is no longer sufficient. Now the condition for wage-led global growth is more stringent, and is given by:

$$-\left(\frac{d\hat{K}_N}{d\pi} + \frac{d\hat{K}_S}{d\pi}\right) = -\frac{s\gamma[2f_\pi\pi - f_u(u_N + 1)] + [f_\pi u_N(2 - f_u)]}{(1 - f_u)u_N + \gamma(s\pi - f_u)}$$

The term in the first set of square brackets in the numerator is the same as in the case where both regions had excess capacity. The second pair of square brackets in the denominator contain the additional positive term that makes wage-led growth less likely even if investment is more responsive to the profit share than to utilization.

Symmetric global preferences

With symmetric global preferences, i.e., $\Theta = 0.5$, again, the sufficient condition for global growth to be wage-led is more stringent compared to the case where both regions have excess capacity. This is captured by the additional term $[1 + \gamma + \gamma u_N)]f_u f_\pi$ in the numerator below.

$$-\left(\frac{d\hat{K}_N}{d\pi} + \frac{d\hat{K}_S}{d\pi}\right) = -\frac{s\gamma(u_N + 1)[2f_\pi\pi - f_u(\frac{u_N}{2} + 1)] + [\gamma u_N + 1 + \gamma]f_u f_\pi}{(s\pi - f_u)(\gamma u_N + 1)}$$

Global consumer preferences skewed towards the N-good

The expression derived in this case, i.e., when $\Theta = 1$, is as follows:

$$-\left(\frac{d\hat{K}_N}{d\pi} + \frac{d\hat{K}_S}{d\pi}\right) = -\frac{s[2f_\pi\pi - f_u(u_N + 1)]\gamma u_N + f_u f_\pi}{(s\pi - f_u)\gamma u_N}$$

Unlike the case where both regions had excess capacity, it is no longer enough for both countries to be wage-led to make global growth wage-led. Instead the additional term $f_u f_\pi$ that appears in the numerator means that the world as a whole experiencing wage-led growth is less likely than in the case where both regions have excess capacity.

In sum, in all 3 cases considered, world growth is less likely to be wage-led when one country is capacity-constrained.

3 Concluding Remarks

Do open economy arguments pointing out the constraints to wage-led demand and capital growth become irrelevant once we consider that the planet as a whole is a closed system? This paper demonstrates that this is not the case. Even in a closed world economy where both countries have excess capacity and underutilized resources, the world as a whole could easily be profit-led. This is because as long as there is a line dividing the world into two countries that produce different goods, it requires for only one country to be profit-led for the

Table 1: Definitions of key variables

Variable	Definition
Y_i	Output of good i , respectively ($i = N, S$)
π_i	Profit share of output in each country ($i = N, S$)
C_{ij}	Consumption by country j of good i
K_i	Stock of capital in country i ($i = N, S$); $k = K_S/K_N$
u_i	Capacity utilization rate in country ' i '
π_i, τ_i, W_i	Profit share of output, mark-up factor and nominal wage in country i
I_i	Investment in country i ($i = N, S$)
TB	Trade balance
s_i	Saving rate in country i ($i = N, S$)
P_i	Price of good i
q	Relative price ($\equiv P_S/P_N$)
Θ_i	Share (with $q = 1$) of global consumption expenditure devoted to the good i

world as a whole too to be profit-led. The fact that global consumption of the two goods is not identical may indeed push demand regimes in some countries in the direction of being profit-led.

The lesson extends to a multi-country world, where again, it's possible at least in theory for world demand and growth to be profit-led if even one or a few countries have that feature. Furthermore, the likelihood of world growth being profit-led increases if one incorporates the typical structuralist assumption that the South is capital constrained, and does not have excess capacity, or that the Southern countries are price takers in international tradable markets.¹² That the world economy is a closed system is not the central issue as long as individual countries can have trade imbalances and are not exactly alike in all respects.

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¹²See, for example, Ros (2016), Razmi (2015) and Razmi (2016).

Table 2: Summary of results

	Both countries have excess capacity (Section 2.3)		North has excess capacity (Section 2.4)
$\Theta = 0$	$\frac{du_N}{d\pi}$	$\frac{f_\pi}{(1-f_u)}$	$\frac{[2f_\pi - s(u_N+1)]\gamma + f_\pi u_N}{(1-f_u)u_N + (s\pi - f_u)\gamma}$
	$\frac{du_S}{d\pi}$	$-\frac{(1-f_u)s(u_N+u_S) - (2-f_u-s\pi)f_\pi}{(s\pi-f_u)(1-f_u)}$	
	$\frac{du_N}{d\pi} + \frac{du_S}{d\pi}$	$\frac{2f_\pi - s(u_N+u_S)}{(s\pi-f_u)}$	
	$\frac{dK_N}{d\pi} + \frac{dK_S}{d\pi}$	$\frac{s[2f_\pi\pi - f_u(u_N+u_S)]}{(s\pi-f_u)}$	$\frac{s\gamma[2f_\pi\pi - f_u(u_N+1)] + [f_\pi u_N(2-f_u)]}{(1-f_u)u_N + \gamma(s\pi-f_u)}$
$\Theta = 0.5$	$\frac{du_N}{d\pi}$	$\frac{2f_\pi - s(u_N+u_S)}{2(s\pi-f_u)}$	$\frac{[2f_\pi - s(u_N+1)]\gamma u_N + \gamma(s\pi-f_u)}{2(1-s\pi)(s\pi-f_u)(\gamma u_N+1)}$
	$\frac{du_S}{d\pi}$	$\frac{2f_\pi - s(u_N+u_S)}{2(s\pi-f_u)}$	
	$\frac{du_N}{d\pi} + \frac{du_S}{d\pi}$	$\frac{2f_\pi - s(u_N+u_S)}{(s\pi-f_u)}$	
	$\frac{dK_N}{d\pi} + \frac{dK_S}{d\pi}$	$\frac{s[2f_\pi\pi - f_u(u_N+u_S)]}{(s\pi-f_u)}$	$\frac{s\gamma(u_N+1)[2f_\pi\pi - f_u(\frac{u_N}{2}+1)] + [\gamma u_N+1+\gamma]f_u f_\pi}{(s\pi-f_u)(\gamma u_N+1)}$
$\Theta = 1$	$\frac{du_N}{d\pi}$	$-\frac{(1-f_u)s(u_N+u_S) - (2-f_u-s\pi)f_\pi}{(s\pi-f_u)(1-f_u)}$	$\frac{[2f_\pi - s(u_N+1)]\gamma u_N + f_\pi}{(s\pi-f_u)\gamma u_N}$
	$\frac{du_S}{d\pi}$	$\frac{f_\pi}{(1-f_u)}$	
	$\frac{du_N}{d\pi} + \frac{du_S}{d\pi}$	$\frac{2f_\pi - s(u_N+u_S)}{(s\pi-f_u)}$	
	$\frac{dK_N}{d\pi} + \frac{dK_S}{d\pi}$	$\frac{s[2f_\pi\pi - f_u(u_N+u_S)]}{(s\pi-f_u)}$	$\frac{s[2f_\pi\pi - f_u(u_N+1)]\gamma u_N + f_u f_\pi}{(s\pi-f_u)\gamma u_N}$

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