might not benefit from redistribution both in absolute and relative terms: the gray points roughly scatter around the solid line, above which Home's share is falling. Third, the two countries' response to redistribution is on average significantly stronger for wage–led cases. This finding is of course driven by the assumption of wage–led demand in autarchy. Still, to the extent that this is a plausible assumption, as we argued above discussing the sign of δ_1, generating profit–led growth through trade with labor suppression is reminiscent of "pushing on a string", as the wage–led domestic demand must first be overcome.

That said, recall the key results derived above: a wage–led country that redistributes towards labor will always gain in terms of its own demand, but *might* lose in terms of its share of global demand; while a profit–led country that redistributes towards labor will always lose in terms of its global demand share, but *might* still gain in terms of its own demand. This is where the fallacy of composition can emerge, and the area of interest in Figure 5 is region E—where Home demand is wage–led, but its demand share is falling; or Home demand is profit–led, but its demand level is nevertheless rising.

[TABLE 3 ABOUT HERE]

Let us dissect these observations. Table 3 summarizes all simulation results. Consider column 1, where countries are assumed to be identical, before we proceed to the other examples. The top of the table collects frequencies in the eight plot regions; the bottom further statistics; see the caption for details. These numbers confirm what appears clearly after a visual inspection of the scatter. Rows 11 and 12 concern the critical area: In 44% of all Home wage–led cases the Home demand share is falling. Quite strikingly, on the other hand, in 93% of all Home profit–led cases Home's utilization rate rises. In other words, for two identical countries, *the likelihood of a fallacy of composition is quite significant.* For identical countries and the assumed calibration, these shares correspond to the gray areas of Figures 3 and 4, respectively.

In subsequent columns, we relax the identical country assumption. First, consider different relative country size. Whether the large or small country redistributes has an effect on whose share rises *and* on total global demand. Redistribution in a relatively small Home country is more likely to have a larger *marginal effect* on the Home country than on the Foreign country. Hence, the share of the small Home country in global demand is more likely to rise. A relatively large Home country (column 3), in contrast, always sees significant demand leakages—which emphasizes the marginal effect on the small Foreign country. The share of the Foreign country is then likely to rise, which increases the observed frequency for both types of fallacies.

Further, total global demand is stronger if the relatively large country redistributes. Simply, the larger country's share of global consumption is larger. On the other hand, redistribution in the smaller country can produce negative growth, since the overall consumption effect is weaker: In Table 3, the frequencies in column 2 shift towards regions C and D, which means towards weaker and possible negative overall demand effects. Frequencies in column 3 concentrate in regions E and F, which implies a shift towards stronger positive overall demand effects.

Second, consider trade imbalances. An external surplus of the Home country ($\epsilon > 1$) increases the share of wage–led observations, and decreases the possibility of a fallacy of

composition to emerge. The overall effects of such a surplus are, however, relatively small. Similarly, a Home deficit (column 5) has overall limited effects. The largest impact of the assumed trade imbalances appears for a Home deficit paired with profit–led demand. The frequency count for the Home country to benefit from redistribution in terms of its level of demand despite being profit–led falls from 93% (in the identical country case) to 86%. Simply put, with the trade deficit the demand spillovers are limited.

Lastly, let us consider differences in all parameters, such that country size, initial trade deficit as well as behavioral parameters are drawn randomly within the bounds in Table 2. The last column of Table 3 as well as Figure 6 show the results of these runs. Home wage–led demand arises in 64% of observations. The Home share of global demand increases in 46% of the observations (region F), while fallacies of composition arise 28% of the times if Home is wage–led, and 71% of the times if Home is profit–led.

Summing up, this numerical section provides support for the analytical argument made previously. Based on the assumed ranges for parameters, the fallacies of composition can indeed arise. Roughly one third of wage–led countries would experience a fall in their demand share despite an increase in their level of demand, and roughly two thirds of profit–led countries would experience an increase in their demand level despite a decrease in their demand share. While these numerical examples are only illustrative in nature, the results point toward potentially strong returns to policy coordination.

5 Conclusion

In a neo–Kaleckian model with two identical countries and initially balanced trade, raising money wages in a wage–led economy causes demand to expand in both countries, but may reduce the appreciating country's share in global income due to expenditure–switching. Even when demand is profit–led overall, raising money wages in one country can still be expansionary, once demand spillovers between the two countries are accounted for. Moreover, global demand will always increase following redistribution. Yet, the appreciating country will always see a decrease in its share of global demand, which means that most of the gains of appreciation will be felt abroad.

Simulations over empirically informed parameter ranges suggest that the type of neo–Kaleckian economies studied in this paper can indeed experience such a decrease in relative economic growth. Globalization—increases in trade shares—strengthen the incentive to engage in relative wage suppression. This happens despite the fact that, on the one hand, coordinated redistribution towards labor would achieve larger global aggregate demand gains and, on the other hand, coordinated redistribution may provide global demand gains even in profit–led economies. Further, redistribution in relatively large countries promises the largest overall demand gains—but these countries would as well most likely see a decrease in its demand share.

The potential benefits of international economic policy coordination have been previously addressed (Fischer, 1988; Willett, 1999). However, this literature mainly focused on the open economy effects of fiscal and monetary policies. By specifically addressing the expansionary effects of redistribution, this paper emphasizes "returns to coordination" through the wage channel. La Marca and Lee (2013) provide a relevant discussion of the game–theoretic aspects of coordination in an otherwise similar framework. Their analysis

complements ours. Though the details differ, Kiefer and Rada (2013) provide evidence that broadly supports the ideas outlined here.

In this sense, our theoretical results feed into a broader discussion about the role of wage suppression and real exchange depreciations as *beggar–thy–neighbor* policies. Robinson (1966) highlighted that incentives for such policies may increase when there is a fall in world employment and international trade. However, she also warned that pursuing a greater share in the total of world economic activity implies *exporting unemployment* to the rest of the world. With that in mind, she condemned any mechanism for rebalancing trade which is pursued by deficit countries—namely exchange rate depreciations, reduction of incomes or imposition of tariffs. These policies have the potential to generate a slump in the surplus country and thus reduce the deficit country's exports, ultimately increasing initial imbalances. The obvious—and here unaddressed—question is how coordination can actually be achieved.

A A note on derivation of equations (3.12), (3.19) and (3.20)

To derive equation (3.12), differentiate $0 = g - s_\pi \pi u + \kappa\mu^* - \rho\mu$, which yields

$$0 = (\beta - s - m_u)du + (s_\pi u - \alpha)\theta^\psi d\upsilon - \left(\kappa\frac{\partial\mu^*}{\partial\rho} - \frac{\partial\mu}{\partial\rho} - \mu\right)(1-\theta^\psi)(1+\bar{\tau})d\upsilon.$$

The last term is

$$-\mu\left(\frac{\kappa}{\mu}\frac{\partial\mu^*}{\partial\rho}\frac{\mu^*\rho}{\mu^*\rho} - \frac{\partial\mu\rho}{\partial\rho\mu} - 1\right)(1-\theta^\psi)(1+\bar{\tau})d\upsilon \;= \delta_2(1-\theta^\psi)d\upsilon,$$

where the last equality follows from equations (3.8) and (3.9). Note that the elasticities are evaluated at an initial price distributive equilibrium: $\frac{\partial\psi}{\partial\upsilon} = \theta^\psi$ since $\psi = \upsilon$, and $\frac{\partial\rho}{\partial\upsilon} = \theta^\rho(1+\bar{\tau})$ since $\rho = 1$.

f_υ and f_υ^* in Equations 3.19 and 3.20, respectively, follow therefrom: f_υ is derived above; and f_υ^* can be derived analogously from Foreign's trade balance *in Home currency*: $\rho\mu/\kappa - \mu^*$. Note that Home's trade balance responds positively to a rise in the real exchange rate (or a real depreciation in Home), and negatively to a rise in Home nominal unit labor costs, when the Marshall–Lerner condition is satisfied; while Foreign's trade balance responds negatively to a rise in the real exchange rate (or a real appreciation in Foreign), and positively to a rise in Home nominal unit labor costs, when the Marshall–Lerner condition is satisfied.

B Proofs of Propositions 1 and 2

Proposition 1 Claims (i), (ii) and (iii) follow trivially from the fact that $f_\upsilon > 0$ and $f_\upsilon^* > 0$ by assumption. Foreign's share in global demand rises if

$$\begin{aligned} u^*_{\upsilon,2} - u_{\upsilon,2} > 0 \quad &\iff (m_u + \gamma)(f_\upsilon - f_\upsilon^*) > 0 \\ &\iff (\beta - s_\pi\pi)(f_\upsilon - f_\upsilon^*) > 0 \end{aligned}$$

but $\beta - s_\pi \pi < 0$ for stability, hence $u^*_{v,2} - u_{v,2} > 0 \iff f^*_v > f_v$. Expanding and dividing by $\delta_1 \theta^\psi$,

$$f^*_v > f_v \iff -\frac{(1-\theta^\psi)\delta_2}{\theta^\psi \delta_1} - \left[1 + \frac{(1-\theta^\psi)\delta_2}{\theta^\psi \delta_1}\right] > 0.$$

Using equation (WL), Foreign gains in terms of Home if and only if

$$0 < 1 - \theta(M, \sigma) < \theta(M, \sigma) < 1.$$

Conversely, Home gains in terms of Foreign if $f_v > f^*_v$ which, proceeding as above, occurs if and only if

$$0 < \theta(M, \sigma) < 1 - \theta(M, \sigma) < 1.$$

Proposition 2 To prove (i), observe that for Home demand to increase we must have: $m_u f^*_v - \gamma f_v > 0$. This will be true whenever

$$-m_u \frac{(1-\theta^\psi)\delta_2}{\theta^\psi \delta_1} > \gamma \left[1 + \frac{(1-\theta^\psi)\delta_2}{\theta^\psi \delta_1}\right]$$

or, equivalently,

$$m_u \theta(M, \sigma) > \gamma \left[1 - \theta(M, \sigma)\right].$$

Factoring and simplifying, while using (PL), we obtain the required inequality, taking account of the fact that $m_u + \gamma < 0$.

Next, proving (ii) amounts to show that $m_u f_v - \gamma f^*_v > 0$. Expanding, we need to show that

$$m_u \left[1 - \theta(M, \sigma)\right] - \gamma \theta(M, \sigma) > 0.$$

Rearranging, and using both (PL) and the fact that $\gamma < 0$, we get:

$$\frac{m_u}{m_u + \gamma} < \theta(M, \sigma),$$

which is always satisfied, since the LHS is negative and $\theta(M, \sigma) > 1$ in the PL case.

The required condition to show that the foreign share in global demand increases as per claim (iii) is $u^*_{v,2} - u_{v,2} > 0$. This will be true if

$$(m_u + \gamma)(f_v - f^*_v) = (\beta - s_\pi \pi)(f_v - f^*_v) > 0.$$

Since $\beta - s_\pi \pi < 0$ for stability, we simply need to show that $f_v - f^*_v < 0$ which will always be true if home demand is profit–led.

Finally, proving (iv) requires to show that

$$(m_u - \gamma)(f^*_v + f_v) = (2m_u + s_\pi \pi - \beta)(f^*_v + f_v) > 0,$$

where the equality is ensured because $\rho = 1$. The first term is always positive if the model is stable. Hence, we need to show that $f^*_v + f_v > 0$. But this will always be true, since $f^*_v + f_v = \theta^\psi \delta_1 > 0$.

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References

Barbosa-Filho, N. H. and Taylor, L. (2006). Distributive and Demand Cycles in the US-Economy—A Structuralist Goodwin Model. *Metroeconomica*, 57:389–411.

Bhaduri, A. and Marglin, S. (1990). Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies. *Cambridge Journal of Economics*, 14(4):375–393.

Blecker, R. A. (1989). International Competition, Income Distribution and Economic Growth. *Cambridge Journal of Economics*, 13:395–412.

Blecker, R. A. (2002). Distribution, Demand and Growth in Neo–Kaleckian Macro–Models. In Setterfield, M., editors, *The Economics of Demand–led Growth*. Edward Elgar, Cheltenham.

Blecker, R. A. (2010). Open economy models of distribution and growth. In Hein, E. and Stockhammer, E., editors, *A Modern Guide to Keynesian Macroeconomics and Economic Policies*. Edward Elgar, Cheltenham.

Blecker, R. and Razmi, A. (2008). The fallacy of composition and contractionary devaluations: output effects of real exchange rate shocks in semi-industrialised countries. *Cambridge Journal of Economics*, 32:83–109.

Bowles, S. and Boyer, R. (1995). Wages, aggregate demand, and employment in an open economy. In Epstein, G. and Gintis, H., editors, *Macroeconomic Policy After the Conservative Era*. Cambridge University Press, Cambridge.

Carvalho, L. and Rezai, A. (2013). Personal Income Inequality and Aggregate Demand. *Discussion Paper, mimeo*.

Chiarella, C., Franke, R., Flaschel, P., and Semmler, W. (2006). *Quantitative and Empirical Analysis of Nonlinear Dynamic Macromodels, Volume 277*. Elsevier Science.

Clarida, R., Gali, J., Gertler, M. (2001). Optimal Monetary Policy in Closed versus Open Economies: An Integrated Approach. *NBER Working Paper Series*, 8604.

Davis, D. and Weinstein, D. (1997). Economic Geography and Regional Production Structure: An Empirical Investigation. *NBER Working Paper Series*, 6093.

Devereux, M. B., Engel, C. (2007). Expenditure Switching versus Real Exchange Rate Stabilization: Competing Objectives for Exchange Rate Policy. *Journal of Monetary Economics*, 54(8): 2346–2374.

Dixon, D. and Santoni, M. (1997). Fiscal Policy Coordination with Demand Spillovers and Unionised Labour Markets. *The Economic Journal*, 107(441):403–417.

Dutt, A. K. (1984). Stagnation, Income Distribution and Monopoly Power. *Cambridge Journal of Economics*, 8(1):25–40.

Ederer, S. and Stockhammer, E. (2007). Wages and aggregate demand in france: an empirical investigation. In Hein, E. and Truger, A., editors, *Money, Distribution and Economic Policy: Alternatives to Orthodox Macroeconomics*, pages 119–40. Edward Elgar, Cheltenham.

Fischer, S. (1988). International Macroeconomic Policy Coordination. In M. Feldstein (ed., *International Economic Cooperation*, pp. 11–43. Chicago: University of Chicago Press.

Franke, R., Flaschel, P., and Proano, C. R. (2006). Wage-price dynamics and income distribution in a semi-structural Keynes-Goodwin model. *Structural Change and Economic Dynamics*, 17(4):452–465.

Gandolfo, G. (2002) *International finance and open–economy macroeconomics.* New York: Springer

Hein, E. and van Treeck, T. (2007). 'Financialisation' in Kaleckian/Post-Kaleckian models of distribution and growth. *IMK Working Paper*, 7.

Hein, E. and Vogel, L. (2008). Distribution and Growth Reconsidered: Empirical Results for Six OECD Countries. *Cambridge Journal of Economics*, 32:479–511.

Johnson, H. G. (1956). The transfer problem and exchange stability. *The Journal of Political Economy*, 64(3):212–225.

Keynes, J. M. (1929). The German transfer problem. *The Economic Journal*, 39(153):1–7.

Kiefer, D. and C. Rada (2013). Profit maximizing goes global: the race to the bottom. *The University of Utah Department of Economics Working Paper Series*, 2013–05

Krugman, P. and Venables, A. (1995). The Seamless World: A Spatial Model of International Specialization. *NBER Working Paper Series*, 5220.

La Marca, Massimiliano and Lee, Sangheon (2013). Wages and growth in open economies: A policy dilemma? In I. Islam and Kucera, D. (eds.), *Beyond macroeconomic stability: Structural transformation and inclusive development*

Nikiforos, M. and Foley, D. K. (2012). Distribution and capacity utilization: Conceptual issues and empirical evidence. *Metroeconomica*, 63(1):200–229.

Onaran, O., Stockhammer, E. and Grafl, L. (2011). Financialisation, income distribution and aggregate demand in the USA. *Cambridge Journal of Economics*, 35(4):637–661.

Rezai, A. (2011). The political economy implications of general equilibrium analysis in open economy macro models. *Department of Economics/NSSR Working Paper 11.*

Robinson, J. (1966). *The New Mercantilism: An Inaugural Lecture.* Cambridge University Press, Cambridge.

Rowthorn, R. E. (1982). Demand, Real Wages and Economic Growth. *Studi Economici*, 18:3–53.

Sasaki, H. (2011) Trade, non–scale growth and uneven development. *Metroeconomica*, 62:691–711.

Skott, P. (2012). Theoretical and empirical shortcomings of the Kaleckian investment function. *Metroeconomica*, 63:109–38.

Stockhammer, E. and Onaran, O. (2012). Rethinking wage policy in the face of the Euro crisis. Implications of the wage-led demand regime. *International Review of Applied Economics*, 26(2):191-203.

Sutherland, A. (2006). The expenditure switching effect, welfare and monetary policy in a small open economy. *Journal of Economic Dynamics and Control*, 30(7):1159–1182.

Tavani, D., and Vasudevan, R. (2012). Capitalists, Workers and Managers: Wage Inequality and Effective Demand. Working Paper No. 7/2012, The New School for Social Research.

Taylor, L. (2004) *Reconstructing Macroeconomics: Structuralist Proposals and Critiques of the Mainstream* Harvard University Press

Willett, T. (1999). Developments in the Political Economy of Policy Coordination. *Open Economies Review*, 86: 221-53.

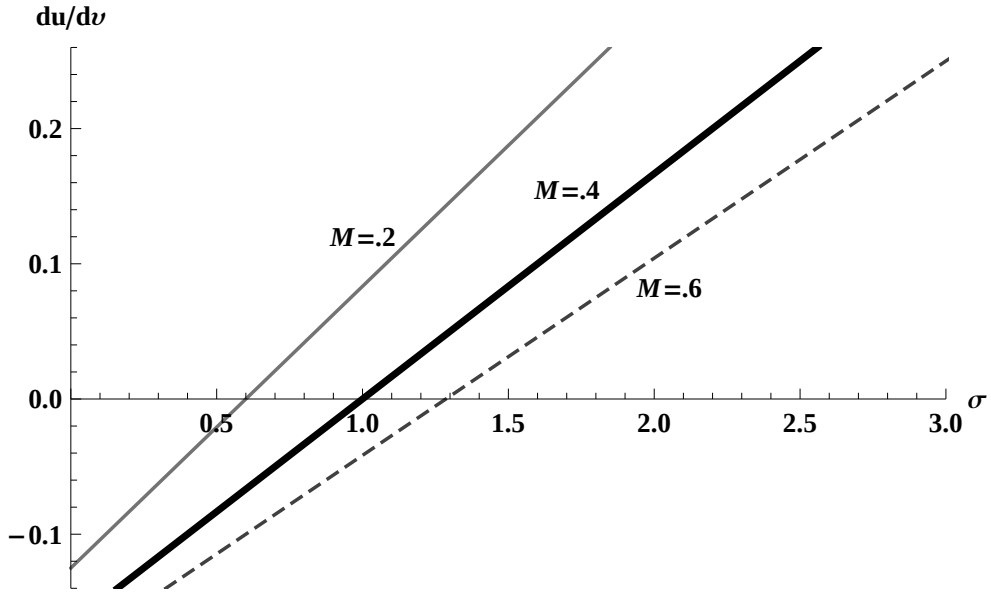

Figure 1: *One country demand regime. Equation 3.12 as a function of* σ*. The parameters used to create this plot are* $\rho = \epsilon = 1, \bar{\pi} = 1/3$ *(or* $\bar{\tau} = 1/2$*) and* $s_\pi = 0.9, \alpha = 0.1, \beta = 0.1, \chi = \chi^* = 0.75$*.* $u = 1/3$ *and* $K = 3$*. Essentially, this amounts to normalize income to unity and assume the income–capital ratio to be 1/3.*

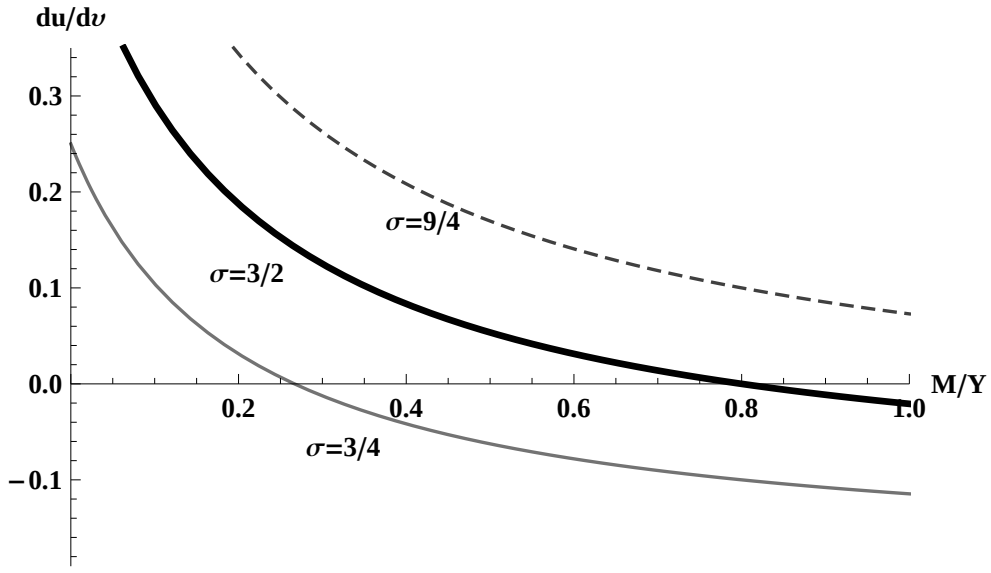

Figure 2: *One country demand regime. Equation 3.12 as a function of* M*, where the thick black line (*$\sigma = 3/2$*) represents 50/50 pass–through of nominal unit labor cost changes into prices and the wage share, respectively. See the note to Figure 1 for the parameter values used.*

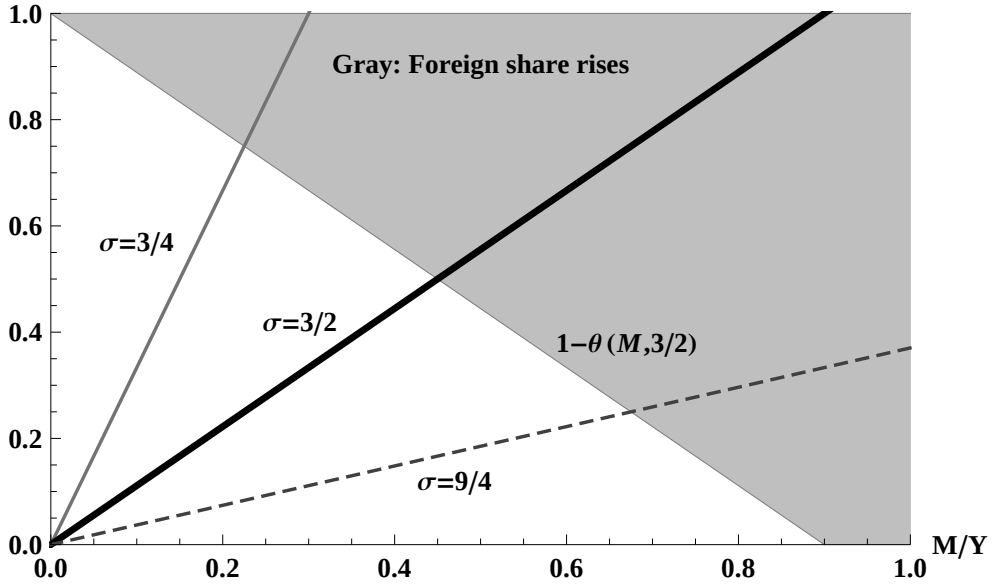

Figure 3: *The constraint of Proposition 1: $\theta(M, \sigma)$ for three different values of σ. The shaded area indicates the threshold; above, Foreign's share in global demand rises, below, Home's. Note that the constraint varies with σ: The lower, the "looser." As drawn, the thick bold line $\theta(M, 3/2)$ and the constraint correspond; so that $M < \delta_1/\eta = 0.45$* **and** *$\theta(M, 3/2) < 1/2$ with these parameter values for Home's share to rise. (For the threshold of M, see Equation (4.3).*

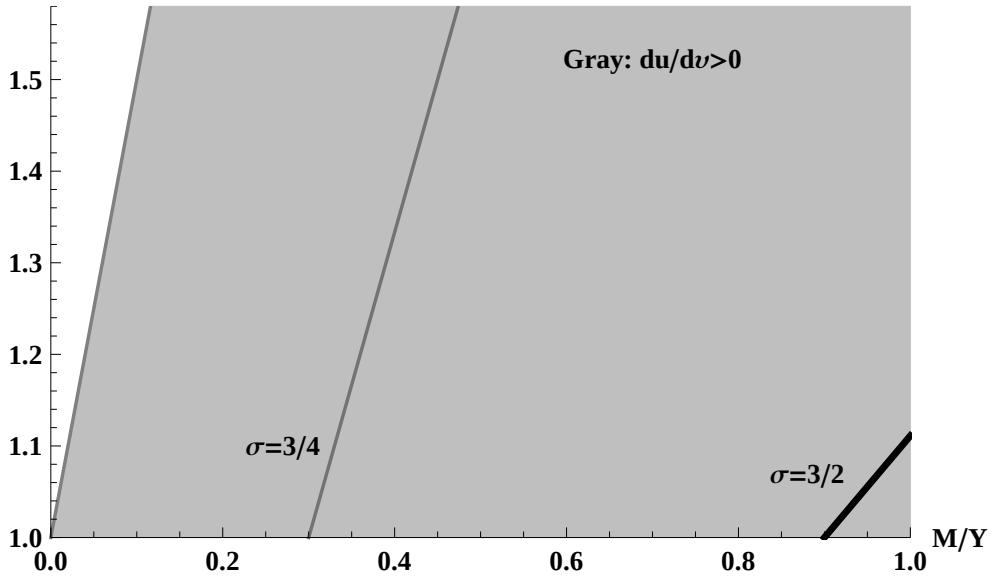

Figure 4: *The constraint of Proposition 2: The shaded area indicates the threshold; below, Home's demand rises, above, it falls. The black and grey line show $\theta(M, \sigma)$ for two different values of σ.*

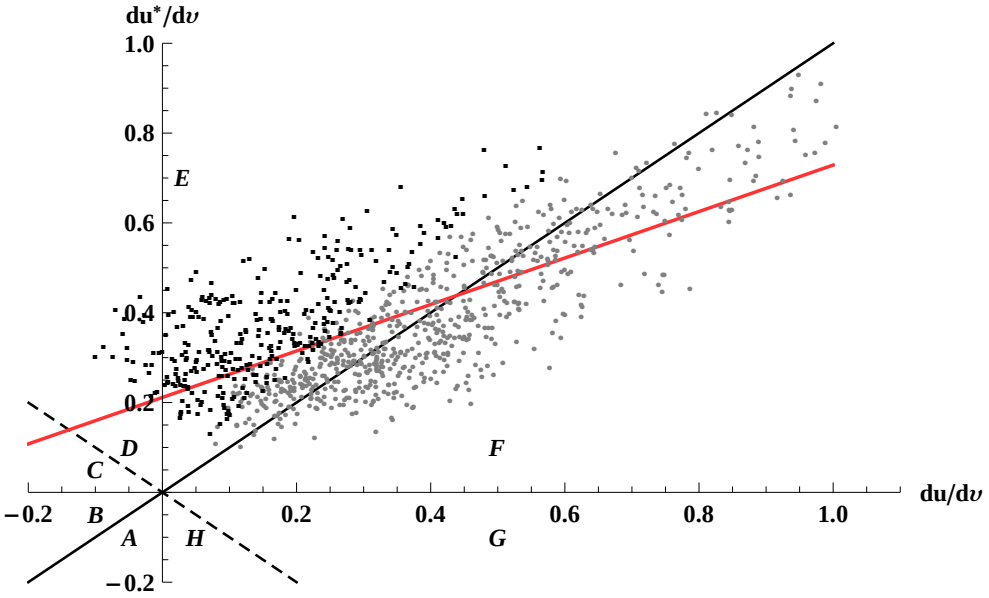

Figure 5: *Numerical analysis ($n = 1000$). Above the dashed line with slope -1, global growth is positive; above the solid line with slope 1, Foreign's share in global demand is rising. Clockwise from the first quadrant below the solid line with slope 1, we get eight ($A \to H$) sections. Gray dots are draws in which Home is wage–led, black dots are profit–led draws. Table 3 provides frequencies. Scatter of $du^*/dv, du/dv$ for two identical countries ($\kappa = 1$) in balanced trade ($\epsilon = 1$). The red line is a linear regression.*

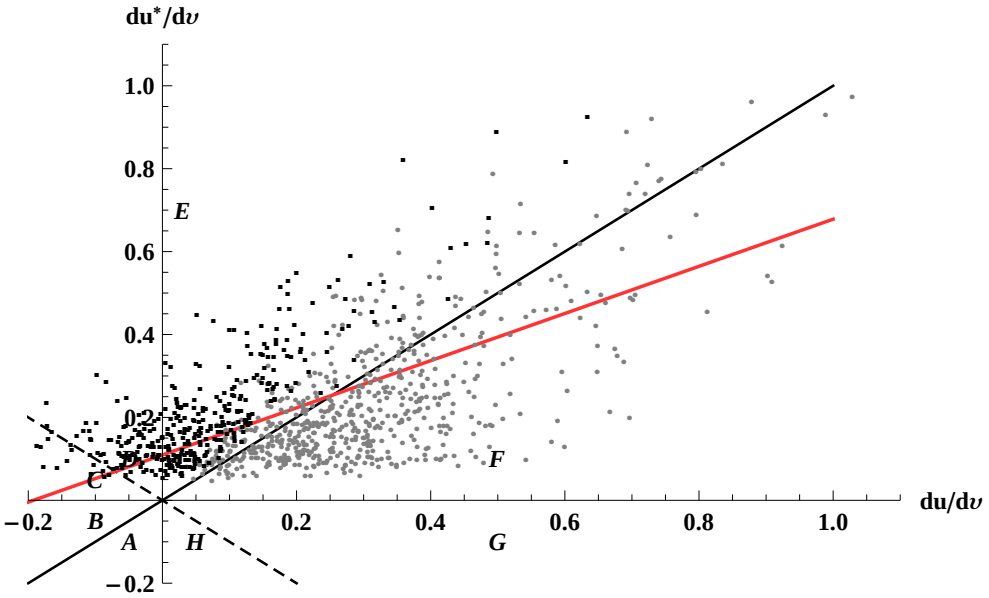

Figure 6: *Numerical analysis ($n = 1000$). Scatter of $du^*/dv, du/dv$ for two differing countries (all parameters). The red line is a linear regression. Table 3 provides frequencies. See notes for Figure 5.*

Variable/Parameter	Interpretation
$\psi = wL/PY$	labor share
$\pi = 1 - \psi$	profit share
u	utilization rate (real GDP Y as fraction of capital stock K)
c	consumption as a fraction of capital stock
g	investment as a fraction of capital stock
μ	import demand as a fraction of capital stock
M	imports; equal import share with Home GDP normalized to one
$\rho = eP^*/P$	real exchange rate
τ	markup
P	price index
$\delta_1 > 0$	effect of labor share on utilization through consumption and investment
$\delta_2 < 0$	effect of labor share on utilization through the trade balance
$\delta_2^* > 0$	effect of home labor share on foreign utilization
$\eta > 0$	Marshall–Lerner condition
α	effect of labor share on investment rate
β	effect of utilization on investment rate
$-1/\gamma > 0$	expenditure multiplier
κ	ratio of Foreign to Home capital stock
υ	nominal unit labor costs (NULC)
σ	elasticity (pass–through) of the mark–up with respect to υ
θ^ψ	elasticity of labor share with respect to υ
θ^ρ	elasticity of the real exchange rate with respect to υ
ϵ	Ratio of real exports to real imports in Home currency
χ	elasticity of import demand with respect to the real exchange rate

Table 1: *Summary of the main variables and parameters used throughout the paper. Endogenous variables are listed first, parameters are below the line. Throughout the paper, equilibrium values are denoted by bars. The signs of selected parameters are as assumed in Section 4.*

1	2	3	4	5	6	7
M	σ	α	β	χ,χ^*	κ	ϵ
$\Omega[0.15, 0.65]$	$\Omega[0.75, 2.25]$	$\Omega[0, 0.1]$	$\Omega[0, 0.2]$	$\Omega[0.65, 1.35]$	$\Omega[0.2, 5]$	$\Omega[0.94, 1.06]$

Table 2: *Parameter calibration:* $\Omega[a, b]$ *represents a uniform probability distribution with bounds* $[a, b]$*. See the text for further discussion.*

		1 Identical countries	2 Foreign large $\kappa = 5$	3 Home large $\kappa = 1/5$	4 Foreign deficit $\epsilon = 1.06$	5 Home deficit $\epsilon = 0.94$	6 Random (all par.)
1	Region A						
2	B						
3	C		7				2
4	D	2	12		1	5	9
5	E	60	22	93	60	58	44
6	F	38	59	7	39	37	46
7	G						
8	H						
9	Sum	100	100	100	100	100	100
10	Home WL	68	68	68	69	66	64
11	FC1	44	12	89	43	43	28
12	FC2	93	42	100	96	86	71

Table 3: *Summary of results ($n = 1000$). The first eight rows (A–H) show percentage shares of observations in the respective plot regions. (Due to rounding, A–H might not sum to 100. Empty cells are zero.) Rows 10–12 show relevant frequencies, as well in percentage shares: "Home WL" all Home wage–led demand regimes. "FC1" reports wage–led countries experiencing a fallacy of composition as a share of all that are wage–led. In other words, $f_v > 0$* **and** *$\partial u^*/\partial v > \partial u/\partial v$ as a share of all $f_v > 0$. FC2 reports profit–led countries experiencing a fallacy of composition as a share of all that are profit–led. In other words, $f_v < 0$* **and** *$\partial u/\partial v > 0$ as a share of all $f_v < 0$. Figure 5 corresponds to column 1, Figure 6 to column 6.*