Redistribution in a neo–Kaleckian two–country model

Rudiger von Arnim*
University of Utah

Daniele Tavani
Colorado State University

Laura Carvalho
São Paulo School of Economics - FGV

March 24, 2014

Abstract

We investigate the interaction between demand–driven growth and income distribution in open economies, by combining expenditure–switching and demand spillover effects in a neo–Kaleckian two country model. First, we specify elasticities of wage share and real exchange rate to the money wage relative to labor productivity, in order to precisely describe the distributive pass–through from money wages to the labor share and the real exchange rate. Second, we analyze the demand effects of an increase in the money wage for given labor productivity (a redistribution toward labor) in both *Home* and *Foreign* country, as well as globally. We derive closed form results for two identical countries. These results indicate that redistribution towards labor at Home: (i) always increases growth globally if Home is wage–led, but can lead to lower growth at Home relative to Foreign; (ii) will always imply lower growth at Home relative to Foreign if Home is profit–led, but can still be growth–enhancing at Home. Thus, to the extent that countries are concerned with their relative economic performance, a fallacy of composition can emerge. Numerical simulations suggest that these fallacies could indeed occur. As a consequence, "returns to coordination" over international labor policies might be substantial.

Keywords: neo–Kaleckian demand and distribution, two country model, demand spillovers, expenditure–switching
JEL Classification: E12, E27, F42, F59

*Corresponding author: Department of Economics, University of Utah, Salt Lake City, UT; rudiger.vonarnim@economics.utah.edu. The authors are grateful to Massimiliano La Marca, Armon Rezai, Alex Izurieta, Marc Lavoie, Robert Blecker, Duncan Foley, Codrina Rada and an associate editor of this journal for comments. Two anonymous referees have tirelessly worked to help us improve the paper. The International Institute for Labour Studies of the ILO supported related research; financial support is gratefully acknowledged. The usual disclaimer applies.

1 Introduction

This paper studies the interaction between demand–driven growth and income distribution in two interdependent economies. The key question is whether redistribution towards wages in an economy open to trade is able to generate higher effective demand locally as well as globally. To address the issue, we discuss a neo–Kaleckian two country model of the real side, incorporating demand spillovers and expenditure–switching through the effect of unit labor costs on the real exchange rate.[1]

The literature on the relationship between distribution and demand is extensive. The earlier wave of contributions in the post–Keynesian tradition, which builds on Rowthorn (1982) and Dutt (1984), has pointed towards the *wage–led* character of effective demand: an increase in the labor share in national income has a positive effect on the rate of capacity utilization, as additional aggregate consumption outweighs the decrease in investment due to lower profitability. After Bhaduri and Marglin (1990), however, post–Keynesians have come to take the paradox of costs with a grain of salt: effective demand can very well be *profit–led*, so that it is a redistribution away from wages that generates an increase in the rate of capacity utilization directly through the investment channel. In an open economy, an increase in the labor share may produce a domestic exchange rate appreciation that lowers exports and increases imports, ultimately depressing aggregate demand. Blecker (1989) presented an early investigation of these linkages, and Blecker (2002, 2010) detailed surveys. In this literature, some authors prefer to label open economies that turn profit–led due to trade as *export–led*, but we will use the broader concept.[2]

Open economy effects of economic policies through expenditure–switching (Clarida et al., 2001; Sutherland, 2006; Devereux and Engel, 2007) and positive demand spillovers (Krugman and Venables, 1995; Dixon and Santoni, 1997; Davis and Weinstein, 1997) have also been studied extensively in the literature. However, these contributions do not consider the impact of changes in the functional distribution of income on the level of economic activity, which is at the center of our discussion.

Further, open economy models of growth and distribution have traditionally focused on small open economy settings, where demand spillovers between the two countries are neglected. A major exception is the work by Rezai (2011), which takes into account the demand interactions between two countries in a neo–Kaleckian model with fixed import coefficients. The introduction of foreign trade extends the distributional conflict in the model. Demand spillovers then give rise to a wider range of outcomes: in particular, devaluations can be contractionary through reductions in unit labor costs, which in turn depress consumption thus lowering aggregate demand.

Our contribution is twofold. First, we specify a simple rule to endogenize the mark–up, in order to derive elasticities of the wage share and real exchange rate with respect to nominal unit labor costs, defined as the money wage relative to labor productivity.

[1] "Demand spillovers" have been labeled variously as *multi–country multipliers* or *multipliers with repercussions* following the literature on transfer theory (Keynes, 1929; Johnson, 1956); we will use the term spillovers throughout this paper.

[2] A still different literature on two country interdependence considers *North–South* differences specifically. Structural characteristics such as sectoral output composition matter greatly here. See Sasaki (2011) for a recent example. We do not address these issues, but instead focus on two one sector economies that might differ in size and behavior (i.e. elasticities), but not structure.

We can then precisely characterize the response of effective demand to changes in income distribution. Second, we set up a two country model (Home and Foreign) with a focus on economies in which effective demand is wage–led in autarchy, but can turn profit–led with trade, as emphasized by Blecker (2002, 2010).[3] In this framework we investigate the interaction between effective demand in the two countries given a distributional shock at Home.

We are able to derive closed form results for two identical countries that are initially in trade balance, and our basic findings can be summarized as follows. If Home is wage–led, an increase in nominal wages relative to labor productivity—a redistribution towards labor, in other words—is *always globally expansionary*. But the more Home is open to trade, the more redistribution at Home is likely to produce an increase in Foreign's share in global demand. Conversely, if Home is profit–led, redistribution will always increase Foreign's share in global demand and employment. Yet, demand spillovers raise the possibility that Home demand will increase, despite it being profit–led.

These analytical findings inform numerical simulations for different countries, given that even this fairly simple model becomes too involved to interpret only analytically when the two countries are different. The numerical analysis appears useful in order to go beyond the 'anything goes' results found by Rezai (2011, p.12). By letting parameters vary randomly within empirically plausible, explicit ranges, we can give a precise account of the parametric configurations that allow Home increase in nominal wages to generate higher effective demand globally as well as locally.

A key implication of our analysis is that a *fallacy of composition* can emerge. Consider identical countries, and suppose first that both countries are wage–led. Obviously, if both countries redistribute towards labor, they will both see an increase in their own *level* of aggregate demand (and employment). However, if only Home redistributes towards labor, its *share* in global demand might fall because of demand leakages. Equivalently, Foreign will reap most of the increase in aggregate demand (and growth), basically 'free riding' on the effects of redistribution at Home. Hence, to the extent that each of the two countries is concerned with such aggregate demand leakages to the other country, then *relative* real wage suppression can emerge as a preferable policy. As a consequence, global demand and growth would be lower than otherwise. Second, suppose both countries are profit–led. Depreciation through wage suppression then promises gains in terms of demand and employment for each individual country. However, once demand spillovers are accounted for, global demand *will fall* in response to mutual wage suppression. Each country pursues own demand gains through beggar–thy–neighbor policies, but the ultimate effect will be that of lowering the other country's imports, in turn equal to own exports.[4]

To qualify our results, we should briefly consider finance, relevant time scales, and the empirical dispute on the distributional features of effective demand. First, we focus on the real side only for simplicity, and not to dismiss the role of the financial sector. Yet, we argue that abstracting from financial considerations does not undermine our basic argument. The real side open economy accounting implies that there are compensating capital flows between countries, even though we do not consider them explicitly. Open capital accounts

[3] In Section 3.1, we argue on empirical grounds that this is indeed the case to consider.

[4] Empirical support for a "fallacy of composition" argument in semi–industrialized countries can be found in Blecker and Razmi (2008). Evidence discussed in Stockhammer and Onaran (2012) suggests European Union countries might be wage–led, but nevertheless engage in labor suppression.

reinforce the role of higher openness to trade, and transnational production networks with flexible sourcing options present strong arguments for local labor suppression. Second, our framework is standard neo–Kaleckian: the rate of utilization does not converge to a *long period position*. To skirt the controversy over the long run applicability of the Kaleckian model, one then might say that the model applies to the short or medium run. See Skott (2012) for a discussion and references.

Finally, empirical disputes on whether effective demand is profit–led or wage–led are far from settled. Results depend on countries, time periods, and on specifications of demand as well as distributive variables. Some studies find demand to be wage–led (Bowles and Boyer, 1995; Ederer and Stockhammer, 2007; Hein and Vogel, 2008). Estimations of full macromodels tend to show profit–led results (Franke et al., 2006; Chiarella et al., 2006; Barbosa–Filho and Taylor, 2006), but often do not explicitly account for the export channel (which of course means that this literature does not address the question whether demand in a *closed* economy is wage–led or not). Kiefer and Rada (2013) explicitly consider economic interdependence between a multitude of countries. Their empirical evidence suggests that many individual countries might be profit–led, but that *globally* lower demand coincides with lower wage shares. Further, Nikiforos and Foley (2012) show that non–linearities in distributive feedbacks can matter greatly. Recent literature also provides evidence that economies have turned more profit–led with financialization (Hein and van Treeck, 2007; Onaran et al., 2011), and the rise in wage inequality between different types of labor (Tavani and Vasudevan, 2012; Barbosa De Carvalho and Rezai, 2013).

Given the lack of conclusive evidence, we provide analytical conditions for expansionary appreciations in identical countries, and illustrate these numerically with reasonable parameterizations. Importantly, expansionary appreciations arise in a large share of parametric specifications, all within the ranges found in the empirical contributions mentioned above.

The paper is organized as follows. Section 2 outlines the price–distributive system, proposes a simple route to endogenize the mark–up, and defines pass–through elasticities of a nominal wage increase to wage share and real exchange rate. Section 3 presents an investigation of the resulting changes in wage share and real exchange rate on domestic and external demand, first for a one country neo–Kaleckian economy, and second for two such interdependent countries. Section 4 outlines analytical results for two identical countries, and extends the discussion to differing countries on the basis of simulations. Section 5 concludes.

2 Mark–up and redistribution

To precisely trace out the effects of redistribution in an open economy, it is necessary to specify the source of the distributive shock as well as its pass–through to domestic and external sources of demand.

Consider, for example, a rise in nominal wages relative to labor productivity. Assume further a fixed mark–up. A rise in the nominal wage would have a direct impact on the real exchange rate, and a direct impact on external demand via expenditure–switching. However, it would *not* affect the wage share and would *not* have an impact on domestic demand through changes in consumption and investment. In other words, changes in nominal unit labor costs can have effects both on the real exchange rate and the labor share only if the

mark–up is endogenous.[5]

There are then principally two routes one can take to study the interaction between distribution and demand in open economies. On the one hand, one can analyze conflicting claims on total supply (the sum of imports and domestic output) between wage, capital and foreign income recipients. This is the route chosen by Rezai (2011). It implies that wage and profit share add up to less than one, and that the relevant price is that of total supply. On the other hand, and in line with most of the literature, one can analyze conflicting claims between wage earners and capital income recipients over domestic value added. The implication is that wage and profit share add up to unity, and that the relevant price index is the price of a unit of domestically produced value added—or, equivalently, a factor cost index—rather than the price of total supply.

We proceed with the latter assumption. In standard fashion, wage and capital income sum to total income:

$$PY = wL + rPK, \tag{2.1}$$

where P is the price of a unit of GDP (Y), w is the nominal wage rate, L an index of employment, and rPK the flow of total nominal profits.

In our open economy–setting, goods produced in Home and Foreign country are imperfect substitutes. Setting the nominal exchange rate, which is secondary to our argument, equal to 1, we can define the real exchange rate as $\rho \equiv P^*/P$, where P^* is the price of Foreign value added. With these assumptions, the relative price of value added is the relevant measure of competitiveness.

From Equation (2.1) and with average labor productivity $\xi \equiv Y/L$, distributive accounting for the profit share π is standard: $\pi \equiv 1 - \psi \equiv 1 - wL/PY \equiv rK/Y \equiv \tau/(1+\tau)$. Defining nominal unit labor costs as $\upsilon \equiv w/\xi$ gives the factor cost index as:

$$P = (1+\tau)\upsilon \tag{2.2}$$

A combined look at (2.1) and (2.2) shows why the mark–up needs to be endogenous. A fixed mark–up rate τ implies $\frac{\partial P}{\partial \upsilon}\frac{\upsilon}{P} = 1$; and, with $\psi = 1/(1+\tau)$, $\frac{\partial \psi}{\partial \upsilon}\frac{\upsilon}{\psi} = 0$. To endogenize the mark–up, we assume that capitalists are unable to pass on all nominal wage increases to consumers. Specifically, suppose the mark–up τ is a decreasing function of nominal unit labor costs υ. A simple parameterization is:

$$\tau = \tau_0 \upsilon^{-\sigma}, \tag{2.3}$$

where $\sigma > 0$ is the elasticity and $\tau_0 > 0$ is a constant. Given labor productivity, a nominal wage increase implies a reduction in the mark–up, which is equivalent to a fall in the profit share and a rise in the wage share. The elasticity of the mark–up with respect to nominal unit labor costs, $-\sigma$, determines the degree of pass–through. Blecker (1989, p.402) and Blecker (2002, p.142) used a similar specification of an endogenous mark–up, even though he assumed the mark–up to be a function of the real exchange rate rather than nominal

[5] An earlier version of this paper assumed that a distributive shock affects the labor share, and that the real exchange rate is *proportional* to relative labor shares. While one might consider that a defensible simplification, the more detailed specification of pass–through elasticities here makes our results more robust. We are grateful to a referee as well as Massimiliano La Marca to point us in this direction.

unit labor costs. Under Blecker's specification, the mark–up would be *directly* responsive to foreign price competition. Here, we frame the discussion in terms of distributive changes. If labor successfully bargains for higher nominal wages at constant productivity, firms will decide to what degree to erode these by price increases. In this sense, the elasticity σ is a catch–all parameter meant to capture the institutional environment as well as foreign price competition. For instance, a high σ can stem from domestic regulation (i.e., against market concentration and in support of labor agreements) as well as the structure of foreign competition.

An implication of (2.3) is that a rise in the nominal wage relative to labor productivity leads to a fall in the *equilibrium* profit share, and there is no countervailing force to return to a *long period* position. In this sense, our distributive specification mirrors the Kaleckian assumption on the demand side, where the rate of utilization *does not* converge to a long period position. Thus, as mentioned before, the model is then best—or at least most conventionally—interpreted as applicable to the short or medium run.

Let us now define the two crucial elasticities of the price–distributive system with respect to υ. Denoting initial equilibrium variables with bars, the elasticity of the labor share θ^{ψ} and the elasticity of the real exchange rate θ^{ρ} with respect to υ are:[6]

$$\theta^{\psi} \equiv \frac{\partial \psi}{\partial \upsilon}\frac{\upsilon}{\psi} = 1 - \frac{\partial P}{\partial \upsilon}\frac{\upsilon}{P} = \sigma\bar{\pi} \tag{2.4}$$

$$\theta^{\rho} \equiv \frac{\partial \rho}{\partial \upsilon}\frac{\upsilon}{\rho} = \frac{\partial \rho}{\partial P}\frac{P}{\rho}\frac{\partial P}{\partial \upsilon}\frac{\upsilon}{P} = -(1-\theta^{\psi}) = -(1-\sigma\bar{\pi}). \tag{2.5}$$

To get a sense of sign and magnitude for θ^{ψ} note that it will be positive as long as $\sigma > 0$. However, for $1 - \theta^{\psi} > 0$, we must have $\sigma < 1/\bar{\pi}$. In words: for factor costs to respond positively to redistribution, an equilibrium profit share of 1/3 would require the (absolute value of) the elasticity of the mark–up with respect to nominal unit labor costs to be between 0 and 3 (we exclude the "perverse" case of $\sigma > 1/\bar{\pi}$).

Next, the elasticities with respect to labor share and factor costs are equal if

$$\sigma\bar{\pi} = 1 - \sigma\bar{\pi} \Leftrightarrow \sigma\bar{\pi} = 1/2,$$

so that with an equilibrium profit share of 1/3, $\sigma = 3/2$ produces *50/50* pass–through of redistribution into labor share and factor costs.

Further, note that $-1 < \theta^{\rho} < 0$ as long as $0 < \sigma < 1/\bar{\pi}$. In words: as long as the mark–up elasticity σ is positive but less than the inverse of the equilibrium profit share, the elasticity of the real exchange rate with respect to υ lies between 0 and -1.

Summing up, if wages rise and the mark up is constant, the real exchange rate will appreciate but the wage share does not change. If, on the other hand, wages rise and prices are constant, the mark–up will fall, the wage share rise, and the real exchange rate will remain constant. The economic structure implicit in a simple two country Keynesian framework crucially affects the distributive pass–through, and the specification outlined above allows us to investigate the cases in–between these two extremes.

[6] To derive θ^{ψ}, note that $\psi \equiv \upsilon/P \equiv 1/(1+\tau) \equiv 1/(1+\tau_0\upsilon^{-\sigma})$, so that $\frac{\partial \psi}{\partial \upsilon}\frac{\upsilon}{\psi} = \sigma\tau_0/(\tau_0+\upsilon^{\sigma})$. At an initial price–distributive equilibrium, $\tau_0 = \bar{\tau}(1/(1+\bar{\tau}))^{\sigma}$ since $P = 1$, so that $\tau_0/(\tau_0+\upsilon^{\sigma}) = \bar{\tau}/(1+\bar{\tau}) = \bar{\pi}$. θ^{ρ} follows.

3 Effective demand

What is the effect of a distributive shock on demand, in light of the two country price system discussed above? To answer this question, we first present a one country neo–Kaleckian economy where foreign utilization is given, and reproduce the well–known *wage–led, profit–led* results within our price–distributive framework. Then, we extend the analysis to two countries.

3.1 One country

Let us here outline a standard neo–Kaleckian framework for a single country open to trade. Denote the rate of utilization by $u \equiv Y/K$, the consumption rate by $c \equiv C/K$, the investment rate by $g \equiv I/K = \hat{K}$ and the import rate by $\mu \equiv M/K$. The export rate is the import rate of the foreign country, $\mu^* \equiv M^*/K^*$, which for demand accounting at Home must be scaled by the ratio of the capital stocks, $\kappa = K^*/K$ (we are following Rezai, 2011, here).

Concerning behavioral functions, suppose that: (i) no aggregate saving comes out of wage income; (ii) the aggregate investment function depends positively on utilization and negatively on the labor share as in Bhaduri and Marglin (1990); (iii) import demand functions are linear, depending positively on utilization and negatively on the real exchange rate; (iv) there is no public sector. We have:

$$\begin{aligned} c &= [1 - s_\pi(1-\psi)]u \equiv [1 - s(\psi)]\, u && (3.1)\\ g &= g_0 - \alpha\psi + \beta u \equiv g(u,\psi) && (3.2)\\ \mu &= m_0 + m_u u - m_\rho \rho \equiv \mu(u,\rho) && (3.3)\\ \kappa\mu^* &= \kappa(m_0^* + m_u^* u^* - m_\rho^* \rho^{-1}) \equiv \kappa\mu^*(u^*,\rho), && (3.4) \end{aligned}$$

where s represents the savings rate out of income, s_π the savings rate out of profits, and $g_0, \alpha, \beta, m_0, m_u, m_\rho$ as well as their foreign (starred) counterparts are non–negative parameters. Then u^d—aggregate demand normalized by the capital stock—follows as:

$$u^d = c + g + \kappa\mu^* - \rho\mu, \tag{3.5}$$

and partial output adjustment to effective demand implies the differential equation

$$\begin{aligned} \dot{u} &= \lambda[u^d - u] \\ &= \lambda[g(u,\psi) - s(\psi)u + \kappa\mu^*(u^*,\rho) - \rho\mu(u,\rho)], \end{aligned} \tag{3.6}$$

in which $\lambda > 0$ denotes the speed of adjustment. To simplify the notation below, we use the following definitions:

$$\begin{aligned} \gamma &\equiv \beta - s_\pi\pi - \rho m_u && (3.7)\\ \epsilon &\equiv \kappa\mu^*/\rho\mu = M^*/\rho M && (3.8)\\ \mu\eta &\equiv \mu\,(\chi^*\epsilon + \chi - 1) && (3.9)\\ \delta_1 &\equiv s_\pi u - \alpha && (3.10)\\ \delta_2 &\equiv -\mu\eta(1+\bar{\tau}), && (3.11) \end{aligned}$$

where: γ is the negative of the inverse of the multiplier; ϵ is the ratio of real exports to imports in home currency, equal to 1 in trade balance, while less than (greater than) one in trade deficit (surplus); δ_1 expresses the effect of a distributional change in utilization through consumption and investment; η describes the Marshall–Lerner condition, in turn determining the sign of δ_2. Specifically, with the Home (Foreign) elasticity of import demand to the exchange rate denoted by χ (χ^*), from initial trade balance, a sum of the absolute values of these elasticities larger than 1 guarantees an improvement in real net exports following depreciation. In other words, provided that $\chi^* + \chi > 1$, $\eta > 0$ as defined.

The sign of δ_1, the autarchy demand response to the labor share as defined in (3.10), is important in what follows. The empirical literature suggests that the *elasticity* of investment with respect to the labor share is at most -0.4.[7] More specifically, with an accumulation rate of 10% and a labor share of 2/3, a specification of the investment function like (3.2) implies $\frac{\partial g}{\partial \psi}\frac{\psi}{g} \simeq -6.67\alpha$. Consequently, a reasonable and not particularly strong parameterization for the upper bound of $\partial g/\partial \psi$ is -0.1. It follows therefrom that the average savings rate ($s_\pi u$ in our model where workers do not save) is *usually* larger than this partial, and the autarchy demand response to redistribution towards labor is *usually* positive.

We are now ready to characterize the response of utilization to changes in money wages. Totally differentiate (3.6) at $\dot{u} = 0$ to obtain

$$u_{v,1} \equiv \left.\frac{du}{dv}\right|_{\text{One Country}} = -\frac{1}{\gamma}\left[\theta^\psi \delta_1 + (1-\theta^\psi)\delta_2\right]. \tag{3.12}$$

See Appendix A for a note on the derivation. First, note that the multiplier must be positive in order for the adjustment dynamics in (3.6) to be self–correcting. Equivalently, $\gamma < 0$ is required for stability. Next, observe that the term $\delta_1\theta^\psi$ summarizes the *domestic* demand response to redistribution, while $(1-\theta^\psi)\delta_2$ summarizes the *external* demand response to redistribution, or expenditure–switching.[8] The sum of these effects determines whether effective demand is wage–led (stagnationist) or profit–led (exhilarationist) overall. Both responses crucially depend on the elasticities θ^ψ and θ^ρ. In quite standard fashion, we can summarize as follows: A closed economy will more strongly tend to be wage–led, since δ_1 will tend to be positive and $\theta^\psi > 0$. Conversely, an open economy will tend more strongly to be profit–led, when the Marshall–Lerner condition is satisfied and $\theta^\rho < 0$, because the negative effect of nominal unit labor costs on net exports might be large. Simply put, for demand to be wage–led in a closed economy, the increase in consumption from redistribution towards labor must be stronger than the decrease in investment; in an open economy, it must be stronger than the sum of the decrease in investment and exports.

[FIGURES 1 and 2 ABOUT HERE]

Figures 1 and 2 illustrate equation (3.12). Figure 1 shows Equation 3.12 as a function of σ, the elasticity of the mark–up with respect to unit labor costs: the right hand side of the equation is a function of this crucial parameter, since the elasticity θ^ψ depends on σ. A

[7] See the references in the introduction, specifically page 4. Some studies estimate investment functions, others aggregate demand functions, and it is not always straightforward to compare these. Overall, the range we adopt for the *elasticity* is certainly wide enough to account for these difficulties.

[8] Note the difference between δ_1, the *autarchy* response to redistribution, and the *domestic* response $\delta_1\theta^\psi$.

UU IR Author Manuscript

higher σ tends to render the demand regime wage–led: the more labor benefits from unit labor cost increases, the more likely demand is to be wage–led. However, the more open the country is to trade, the higher σ needs to be for demand to be wage–led, as the line rotates clockwise.[9] Figure 2 shows equation (3.12) as a function of the import share: the right hand side of equation 3.12 depends on M. As is clear from the figure, a high trade share in combination with a low σ tilts the economy towards profit–led demand.

Let us further condense some of the notation above in order to highlight the impact of different parameters. We define

$$\theta(M,\sigma) \equiv -\frac{1-\theta^{\psi}}{\theta^{\psi}}\frac{\delta_2}{\delta_1} \tag{3.13}$$

and assume a positive multiplier ($\gamma < 0$), stagnationist demand in autarchy ($\delta_1 > 0$) and the Marshall–Lerner condition to be satisfied ($\delta_2 < 0$). It follows that the home country's demand regime will be wage–led if:

$$0 < \theta(M,\sigma) < 1, \tag{WL}$$

whereas home demand will be profit–led if

$$\theta(M,\sigma) > 1. \tag{PL}$$

In the following section, we derive closed form results for two identical countries, and use $\theta(M,\sigma)$ to illustrate the effect of different import shares M (normalizing Home GDP to one) and different elasticities of the mark–up with respect to nominal unit labor costs σ on the demand regime.

3.2 Two countries

In a two country setting, we must consider dynamic adjustment in both Home and Foreign utilization rates. We check dynamic stability first, and then proceed to discuss the impact of a Home increase in nominal unit labor costs. For both countries, income–output accounting in *Home currency* can be summarized as:

$$\begin{aligned} u &= c + g + \kappa\mu^* - \rho\mu \\ \rho u^* &= \rho(c^* + g^* + \mu/\kappa) - \mu^*, \end{aligned} \tag{3.14}$$

where the first line reproduces equation (3.5). As above, we stipulate partial output adjustment to aggregate demand: hence, our model is a Keynesian cross in rates of utilization. The dynamical system in (u, u^*), with the first line reproducing equation (3.6), is:

$$\begin{aligned} \dot{u} &= \lambda(g - su + \kappa\mu^* - \rho\mu) \\ \rho\dot{u}^* &= \lambda^*\left(\rho(g^* - s^*u^* + \mu/\kappa) - \mu^*\right). \end{aligned} \tag{3.15}$$

Stability can be studied by calculating the Jacobian matrix (with $\lambda = \lambda^* = 1$ without loss of generality):

$$J \equiv \begin{bmatrix} \frac{\partial\dot{u}}{\partial u} & \frac{\partial\dot{u}}{\partial u^*} \\ \frac{\partial\rho\dot{u}^*}{\partial u} & \frac{\partial\rho\dot{u}^*}{\partial u^*} \end{bmatrix} = \begin{bmatrix} \gamma & \kappa m_u^* \\ \frac{\rho m_u}{\kappa} & \gamma^* \end{bmatrix}, \tag{3.16}$$

[9] Note that we normalize $Y = 1$, so that imports equal the import share. See the Figure caption for details.

where $\gamma^* = \rho(\beta^* - s^*_\pi \pi^*) - m^*_u$ is the negative inverse of the foreign multiplier in home currency. Assuming positive multipliers (or, equivalently, stable partial adjustments in each country), the trace will be negative, or $Tr[J] < 0$. Further, $Det[J] > 0$ if $0 < \beta < s < 1$ and $0 < \beta^* < s^* < 1$, with the implication that the model is convergent if for both countries savings are more responsive than investment to changes in utilization.[10]

At $\dot{u} = \dot{u}^* = 0$, the right hand side of equations (3.6) and (3.15) defines two implicit functions $f(u, u^*; \upsilon, \upsilon^*)$ and $f^*(u, u^*; \upsilon, \upsilon^*)$ that depend on Home and Foreign utilization as well as Home and Foreign nominal unit labor costs. We now consider the rates of utilization at their equilibrium levels *given* nominal unit labor costs in both countries, which implies that variables u, u^* on the right hand side are *given values*, or parametric. The effect of changes in home nominal unit labor cost on both countries' equilibrium demand is readily calculated as:

$$u_{\upsilon,2} \equiv \left.\frac{\partial u}{\partial \upsilon}\right|_{\text{Two Countries}} = \frac{\kappa m^*_u f^*_\upsilon - \gamma^* f_\upsilon}{|J|} \tag{3.17}$$

$$u^*_{\upsilon,2} \equiv \left.\frac{\partial u^*}{\partial \upsilon}\right|_{\text{Two Countries}} = \frac{\frac{\rho m_u}{\kappa} f_\upsilon - \gamma f^*_\upsilon}{|J|}, \tag{3.18}$$

where $|J| > 0$ is the determinant of the Jacobian matrix defined in equation (3.16) evaluated at equilibrium. The numerators can be seen as the "multiplier–weighted" distributive effects. In both (3.17) and (3.18), provided that Keynesian stability holds in both countries, the denominator is positive. Hence, the ultimate effect of Home redistribution in both countries will depend on whether the numerators are positive or negative. In turn, recall that $\gamma, \gamma^* < 0$ for stability, and that import propensities as well as the capital stock ratio are all positive. Hence, we need to focus on the partials f_υ, f^*_υ. They are:

$$f_\upsilon = \theta^\psi \delta_1 + (1 - \theta^\psi)\delta_2 \tag{3.19}$$

$$f^*_\upsilon = -(1 - \theta^\psi)\frac{\delta_2}{\kappa}, \tag{3.20}$$

where Equation 3.19 is of course the term in brackets in Equation 3.12, and f^*_υ is Foreign's gain in the current account in Home currency.

[TABLE 1 ABOUT HERE]

[10]The condition that $0 < \beta < s < 1$ and $0 < \beta^* < s^* < 1$ is both sufficient and necessary with two identical countries; it is sufficient for two differing countries. See Gandolfo (2002), p. 446, for a discussion. We will throughout assume that this *sufficient* condition is satisfied. Further, the linearity of the dynamical system ensures that these stability results hold globally as well as locally. The system could be represented in standard fashion in a two–dimensional phase diagram: with negative Jacobian entries along the main diagonal and positive entries on the off–diagonal, *both* isoclines are positively sloped. With Home utilization u on the horizontal axis, the $\dot{u} = 0$ isocline must cut the $\dot{u}^* = 0$ isocline from below for stability. Convergence will always be monotonic.

4 Results

We are now able to address a number of questions. Throughout, it will be assumed that (i) an increase in nominal unit labor costs υ leads to a rise in the wage share *and* real appreciation: $0 < \sigma < 1/\bar{\pi} \Rightarrow \theta^{\psi} > 0, \theta^{\rho} < 0$; (ii) the Marshall–Lerner condition is satisfied: $\eta > 0, \eta^* > 0$; (iii) the model is stable: $s - \beta > 0$ and $s^* - \beta^* > 0$; (iv) the model is initially in a price–distributive equilibrium, and (v) that demand in autarchy responds positively to redistribution: $\delta_1 > 0$, this last restriction being motivated by our discussion in Section 3.1. In other words, $\delta_1 > 0, \delta_2 < 0$ and $\delta_2^* \equiv -\delta_2/\kappa > 0$ in what follows.

4.1 Identical Countries

Consider first the simplest case, namely two identical countries *initially* in trade balance. That is, we impose $m_u = m_u^*, \gamma = \gamma^*$ and $\kappa = \rho = \epsilon = 1$. Observe further that we can rewrite (3.20) as:

$$f_{\upsilon}^* = -(1 - \theta^{\psi})\delta_2 > 0,$$

since $\kappa = 1$. While the two economies start off in balanced trade, the trade balance is free to vary in response to a shock. Consider first the case where Home demand is wage–led.

Proposition 1 *Consider two identical countries in trade balance and price–distributive equilibrium. If the Home country is wage–led ($f_{\upsilon} > 0$), an increase in Home nominal wages relative to labor productivity: (i) always increases demand at Home; (ii) always increases Foreign demand; and therefore (iii) always increases global demand; (iv) increases the Foreign share in global demand if:*

$$1 > \theta(M, \sigma) > 1 - \theta(M, \sigma) > 0, \tag{4.1}$$

but increases Home's share in global demand if:

$$1 > 1 - \theta(M, \sigma) > \theta(M, \sigma) > 0. \tag{4.2}$$

See Appendix B for a proof. Figure 3 illustrates the interaction between demand regime and implied constraint. The main thrust of this result is that demand spillovers matter. Since Home is wage–led, and both countries are identical, Foreign demand always benefits from Home redistribution. Moreover, the larger the import rate μ, the more likely that Foreign will end up with a larger share of global demand following redistribution at Home. In fact, the above implies that Home's share of global demand rises as long as

$$\mu < \frac{1}{2}\frac{\sigma\pi(1-\pi)}{1-\sigma\pi}\frac{\delta_1}{\eta}. \tag{4.3}$$

For illustrative purposes, suppose $\sigma = 9/4$. With an equilibrium profit share of 1/3, the inequality simplifies to $\mu < \delta_1/\eta$: the weaker the domestic demand response, the tighter the constraint; and, crucially, the larger the trade shares, the more the constraint tends to be violated.

Let us translate these findings into policy considerations. In the basic neo–Kaleckian framework, on which our analysis rests, the question is whether or not to pursue distributive

policy. Now suppose, for the sake of the argument, that Home's policymakers have identified demand in autarchy to be wage–led ($\delta_1 > 0$), and want to expand economic activity and employment through redistribution towards labor. However, suppose that Home's policymakers realize that some of the additional demand will 'leak' to Foreign. If (4.2) holds, the majority of demand and employment is generated at Home, and Home's share in global demand will rise. Correspondingly, growth and employment gains in Home would be higher than in Foreign. If, on the other hand, (4.1) is true, the majority of demand and employment leaks to Foreign: its share in global demand rises, and its employment and growth gains would be higher than Home's. If this is the case, the effectiveness of redistributive policy in Home would be greatly reduced in the sense that Foreign, loosely speaking, 'free rides' on Home redistribution in terms of aggregate demand and employment gains. The deeper the trade linkages between countries, the more pronounced the 'free riding' problem will be.

Relative wage suppression, on the other hand, would buffer Home against such demand and employment leakages, while it might even promise employment gains through demand spillovers, if Foreign itself did not engage in wage suppression. If such concerns are pressing for policymakers, a fallacy of composition can emerge: Home can benefit from redistribution towards labor in Home in terms of its own level of output and employment; Foreign can benefit from redistribution towards labor in Foreign in terms of its own levels of output and employment. Both, however, might pursue policies of *relative* wage suppression, in order to prevent the other country to reap most of the benefits of the demand expansion. As a consequence, global economic performance would be weaker than otherwise. In Figure 3, the gray area illustrates that—for the assumed parameters; see the caption—this type of fallacy of composition is quite likely. The numerical analysis for different countries will show some remarkable similarities with the identical countries case.

[FIGURES 3 AND 4 ABOUT HERE]

Next, we turn to the case where Home demand is profit–led.

Proposition 2 *Consider two identical countries in trade balance and price–distributive equilibrium. If the Home country is profit–led ($f_v < 0$), an increase in Home nominal wages relative to labor productivity: (i) increases Home demand if*

$$\frac{1}{1 + m_u/\gamma} > \theta(M, \sigma) > 1;$$

(ii) always increases Foreign demand; (iii) always increases the foreign share in global demand: $u^*_{v,2} > u_{v,2}$; (iv) independently of (i) and (ii), always increases global demand.

These results are proved in Appendix B. Figure 4 illustrates the interaction between the demand regime and the implied constraint. It should be emphasized that *global demand always increases* in response to Home redistribution. The reason for this result is that both countries are wage–led in autarchy. If the two identical countries become profit–led with trade, they switch expenditures in trade balances—but the global net effect of redistribution,

namely $\theta^{\psi}\delta_1/|J|$, is positive.[11] Further, the Foreign country's share in global demand always rises; but—note the large gray area in Figure 4—the Home country's *level* of aggregate demand is quite likely to increase. The same fallacy of composition as above emerges: if Home redistributes towards labor, its economic performance would suffer in relative terms, even if redistribution could increase the level of demand. If both countries consider the 'free riding' problem relevant, relative wage suppression can emerge as a preferable policy.

4.2 Different Countries

Next, we consider two countries that differ in terms of size, trade balances, and behavioral parameters. We calibrate the parameters of the model—equations (3.17) and (3.18)—within ranges that are informed by the empirical literature discussed above. By letting the parameter space vary, we are able to check the robustness of our main analytical results to different parametric configurations. These simulations should be looked at as a *theoretical* exercise. Nevertheless, they complement our analytical results and in that sense inform the debate on neo–Kaleckian demand regimes and related policy considerations. To foreshadow results: The numerical examples suggest that the fallacy of composition might very well arise for different countries.

Numerical methods are helpful since the relevant conditions become quite cumbersome to derive as well as difficult to interpret. To see why, consider two countries that are in initial trade balance ($\epsilon = 1$) and otherwise identical except for their relative size κ. Since one country's exports are the other country's imports, the import share of the larger country will be *lower*. In other words, in a two country model in trade balance, the larger country must be the less open to trade. This is relevant when we determine the income elasticity of import demand in the Foreign country:

$$\frac{\partial \mu^*}{\partial u^*}\frac{u^*}{\mu^*} \equiv x^* = m_u^*\frac{Y^*}{M^*},$$

which is of course the product of the marginal effect of the rate of utilization on the rate of imports by the demand–to–import ratio (or the inverse of the import share). To focus on the effect of different relative country sizes, it is reasonable to assume unchanged behavior. Taking x^* as given, m_u^* is a negative function of relative country size. Since this import propensity appears in equations (3.17) and (3.18) in a variety of places—including the determinant—the combined direct and indirect effects of κ are indeed difficult to interpret.

Similar concerns arise for ϵ. To see why, note that equations (3.17) and (3.18) can be applied only in macroeconomic balance, meaning that total injections equal total leakages. Now suppose the two countries are identical and of the same size ($\kappa = 1$), but initially not in trade balance ($\epsilon \neq 1$). For the Home country, macro balance can be written as

$$g - s_\pi \pi u + (\epsilon - 1)\mu = 0,$$

where $(\epsilon - 1)\mu$ are net exports relative to the capital stock. To satisfy this equation for different levels of ϵ, we need to adjust a parameter. Since π and u as well as g are given at the initial values, only s_π can adjust. In summary, different levels of κ and ϵ have significant *indirect* effects on $u_{\upsilon,2}$ and $u^*_{\upsilon,2}$ through careful calibration beyond the *direct* effects.

[11] This results does not hold for countries that differ substantially in size. See the next section for discussion.

To get started with calibration we normalize Home's GDP to 1, and we assign a value to Home's capital stock $K = 3$, so that $u = 1/3$, which is broadly in line with the unconditional average for the output/capital ratio in US data. Then, $K^* = 3\kappa$, $Y^* = \kappa$ and $u^* = 1/3$. With $s_\pi = 0.9 = s_\pi^*$, $\bar{\pi} = 1/3 = \bar{\pi}^*$ and $u = 1/3$, the equilibrium growth rate of capital stock is $g = s_\pi \pi u = 0.1$.

The seven crucial parameters are listed in Table 2. They are the import share (at $Y = 1$) in the Home country M, the mark–up elasticity σ, the investment coefficients α, β, the trade price elasticities χ, χ^* the relative country size κ, and ϵ, which describes the trade balance. In the table, we also list the bounds for the uniform probability distributions from which these parameters are drawn. These bounds are informed by our reading of the literature.

[TABLE 2 ABOUT HERE]

For the trade price elasticities (χ, χ^*) the values in the table represent the upper and lower bound of the actual *elasticities*. Other elasticities are combinations of the coefficients in the table and other parameters. For example, the elasticity of imports with respect to income for Home is equal to unity when $m_u = M$. Similarly, at $\rho = 1$, $M^* = \epsilon M$: $\frac{\partial \mu^*}{\partial u^*} \frac{u^*}{\mu^*} = m_u^* \frac{\kappa}{\epsilon M}$.[12]

Further, as discussed previously, the elasticity of investment with respect to the labor share is $\frac{\partial g}{\partial \psi} \frac{\psi}{g} = -\alpha\psi/g$ which, at the equilibrium wage share and accumulation rate, equals $-20/3\alpha$: The assumed upper bound goes beyond the usual ranges for estimated elasticities—which might be as large as 0.4, but certainly not larger than 1.

Now, let us consider a first example, namely the two identical countries in balanced trade of Proposition 1 and 2, meaning $\kappa = \epsilon = 1$. To focus on the price–distributive effects, we set $m_u = M$ and $m_u^* = \epsilon M/\kappa$, so that both income elasticities of trade are unity. We then set the variables and parameters as described above, draw parameters 1–5 of Table 2 randomly, evaluate $u_{v,2}$ and $u_{v,2}^*$ and plot the scatter.

[FIGURES 5 AND 6 ABOUT HERE]

Figure 5 shows this scatter, and a regression line fitted through it. Further, we show two lines with slope 1 and -1 respectively: above the solid black line with slope 1, Home's share in global demand is falling, since $u_{v,2} > u_{v,2}^*$; below the line, Home's share is rising. On the other hand, above the dashed line with slope -1, global growth is positive, because $u_{v,2} + u_{v,2}^* > 0$; below the line, global growth is negative.[13]

The scatter plot immediately highlights a few issues. First, within the assumed parameter ranges, Home (and, since the countries here are identical, Foreign as well) will tend to be wage–led; the majority of points is gray. Second, if Home is wage–led, might or

[12] Similar concerns do not arise for the income elasticity of investment: In trade balance, a lower import share for a larger Foreign country ($\kappa > 1$) corresponds to a lower export share. The investment and savings (and consumption) shares in income are unaffected.

[13] Observe that we can add these partials, because valuation effects at the equilibrium do not play a role.

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 $f^*_v + f_v = \theta^\psi \delta_1 > 0$.

UU IR Author Manuscript

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.

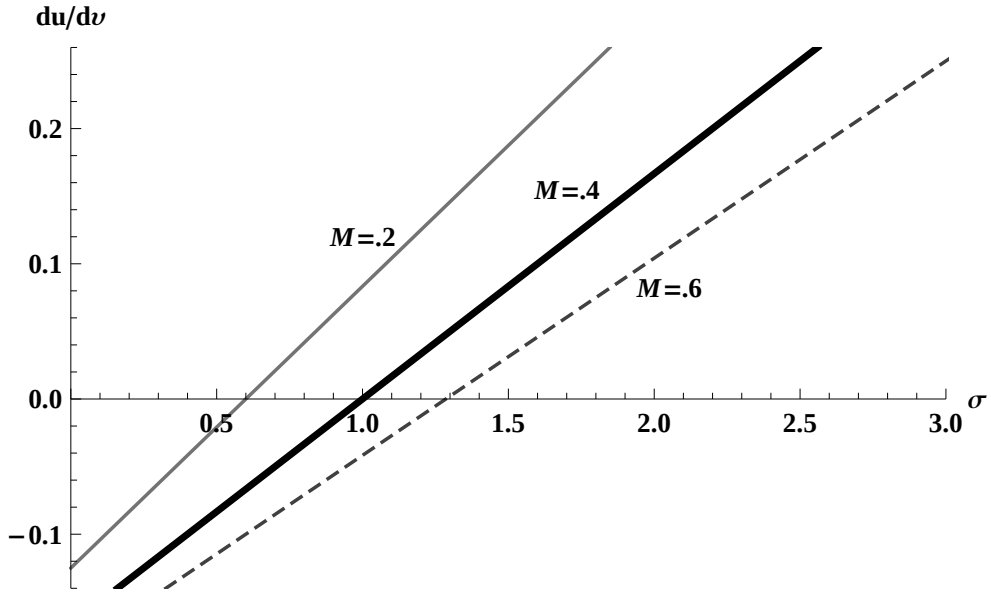

Figure 1: *One country demand regime. Equation 3.12 as a function of* σ*. The parameters used to create this plot are* $\rho = \epsilon = 1, \bar{\pi} = 1/3$ *(or* $\bar{\tau} = 1/2$*) and* $s_\pi = 0.9, \alpha = 0.1, \beta = 0.1, \chi = \chi^* = 0.75$*.* $u = 1/3$ *and* $K = 3$*. Essentially, this amounts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

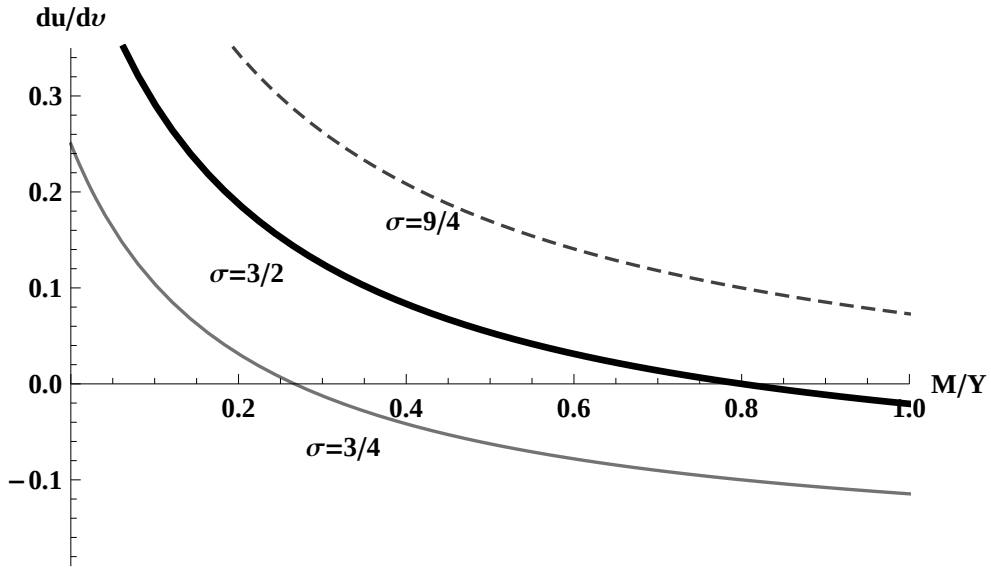

Figure 2: *One country demand regime. Equation 3.12 as a function of* M*, where the thick black line (*$\sigma = 3/2$*) represents 50/50 pass–through of nominal unit labor cost changes into prices and the wage share, respectively. See the note to Figure 1 for the parameter values used.*

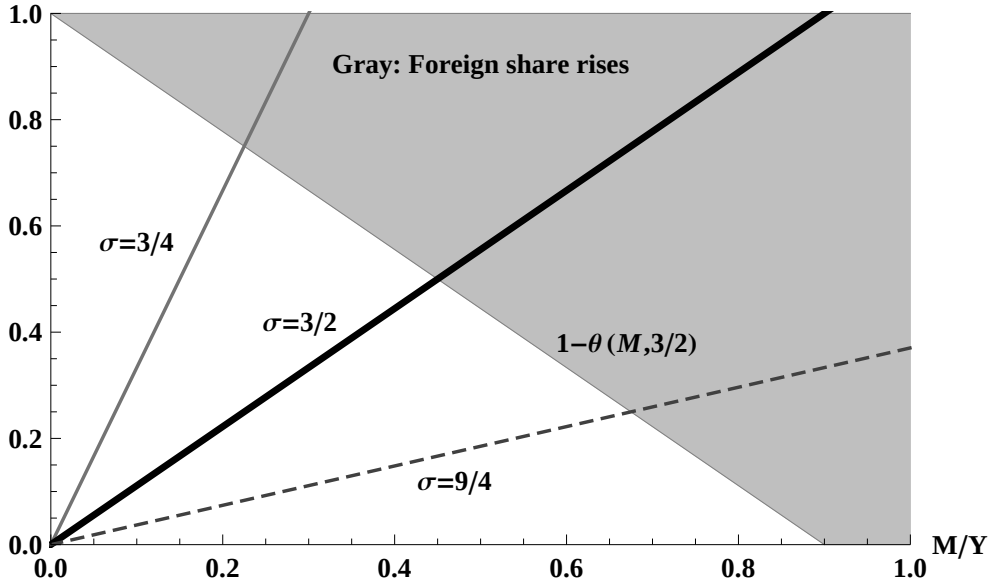

Figure 3: *The constraint of Proposition 1: $\theta(M, \sigma)$ for three different values of σ. The shaded area indicates the threshold; above, Foreign's share in global demand rises, below, Home's. Note that the constraint varies with σ: The lower, the "looser." As drawn, the thick bold line $\theta(M, 3/2)$ 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).*

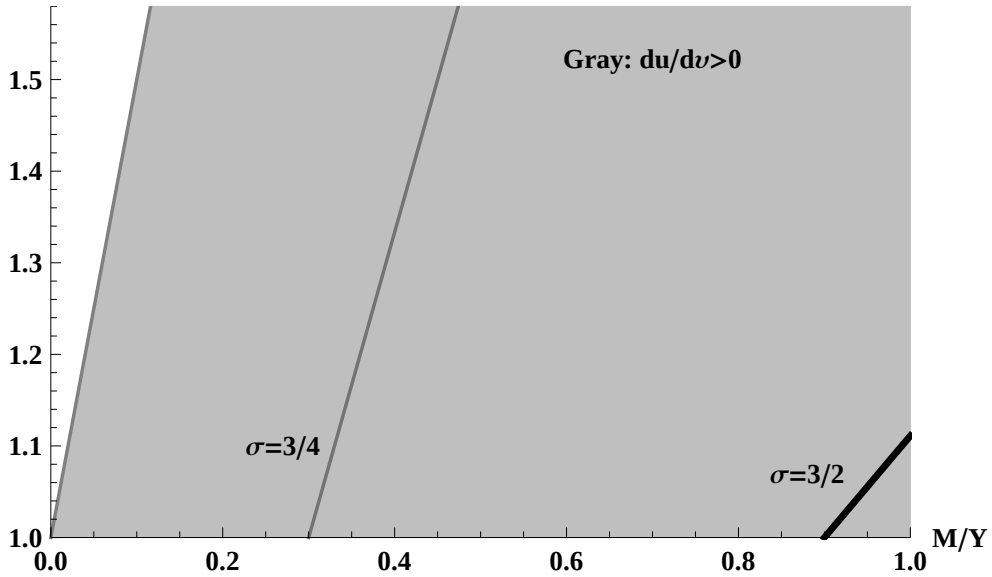

Figure 4: *The constraint of Proposition 2: The shaded area indicates the threshold; below, Home's demand rises, above, it falls. The black and grey line show $\theta(M, \sigma)$ for two different values of σ.*

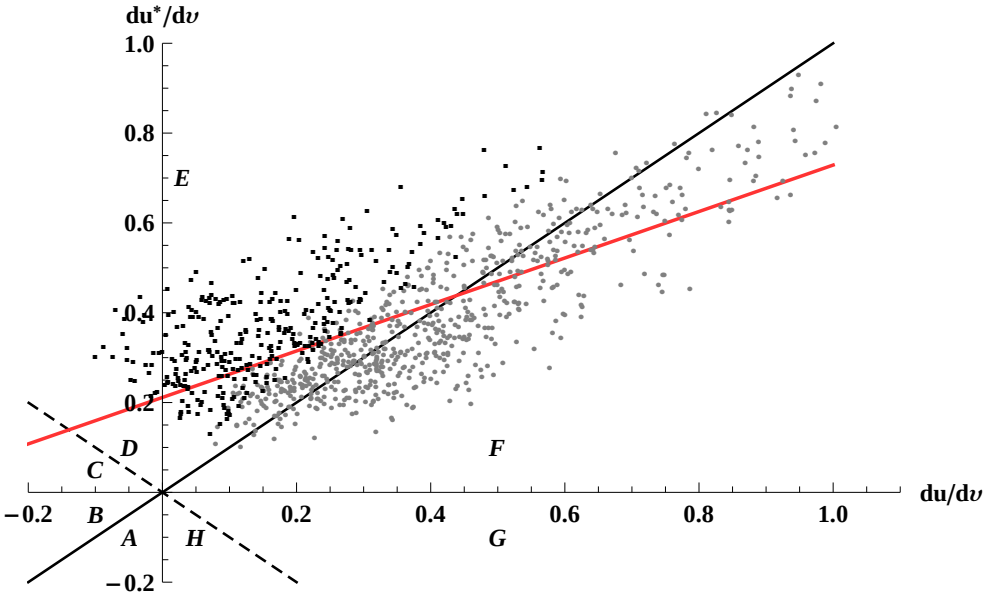

Figure 5: *Numerical analysis ($n = 1000$). Above the dashed line with slope -1, global growth is positive; above the solid line with slope 1, Foreign's share in global demand is rising. Clockwise from the first quadrant below the solid line with slope 1, we get eight ($A \to H$) sections. Gray dots 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.*

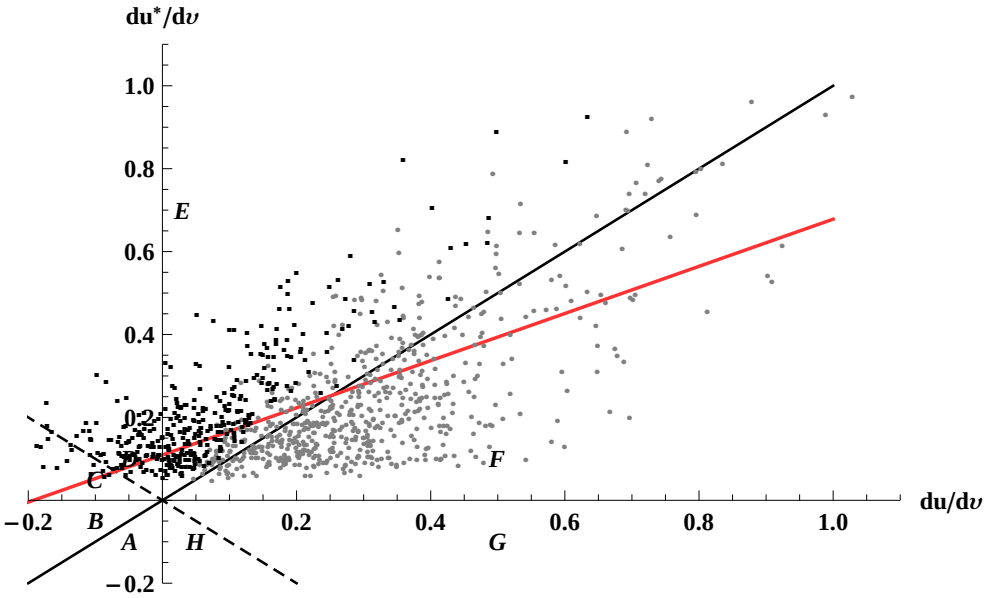

Figure 6: *Numerical analysis ($n = 1000$). Scatter of $du^*/dv, du/dv$ for two differing countries (all parameters). The red line is a linear regression. Table 3 provides frequencies. See notes for Figure 5.*

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.*