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Abstract

This paper develops a two-country Kaleckian model in which "Northern" firms invest a fixed fraction of total investment in foreign affiliates in the low-wage "South" in order to offshore the production of intermediate goods over time and lower overall labour costs. On the back of this setup follows an analysis of the macroeconomic implications of offshoring in the short and long run. Offshoring through vertical FDI is found to lead to a falling wage share and a simultaneously falling price level and rising mark-up in the North, whereas the effect on equilibrium capacity utilisation may be positive or negative. Interestingly, however, regardless of the effect on capacity utilisation and firm profitability, we can show that the structural change implied by offshoring leads to lower rates of capital accumulation and employment in the North relative to the initial (pre-offshoring) values in the short run. The long-run effects on Northern employment and growth, on the other hand, depend crucially on the long-run accumulation rate of the Northern-owned multinational firms. However, the model shows that, if wages endogenously converge during the transition due to higher unemployment in the North and lower unemployment in the South, then the long-run Northern capacity utilisation and accumulation rates are increasingly likely to fall relative to pre-offshoring values. The model appears well suited to shed light on many real-world macroeconomic phenomena, such as rising FDI flows, falling wage shares, rising mark-ups in an era of low inflation, hysteresis, and secular stagnation.

Keywords: Offshoring, foreign direct investment, distribution, stagnation

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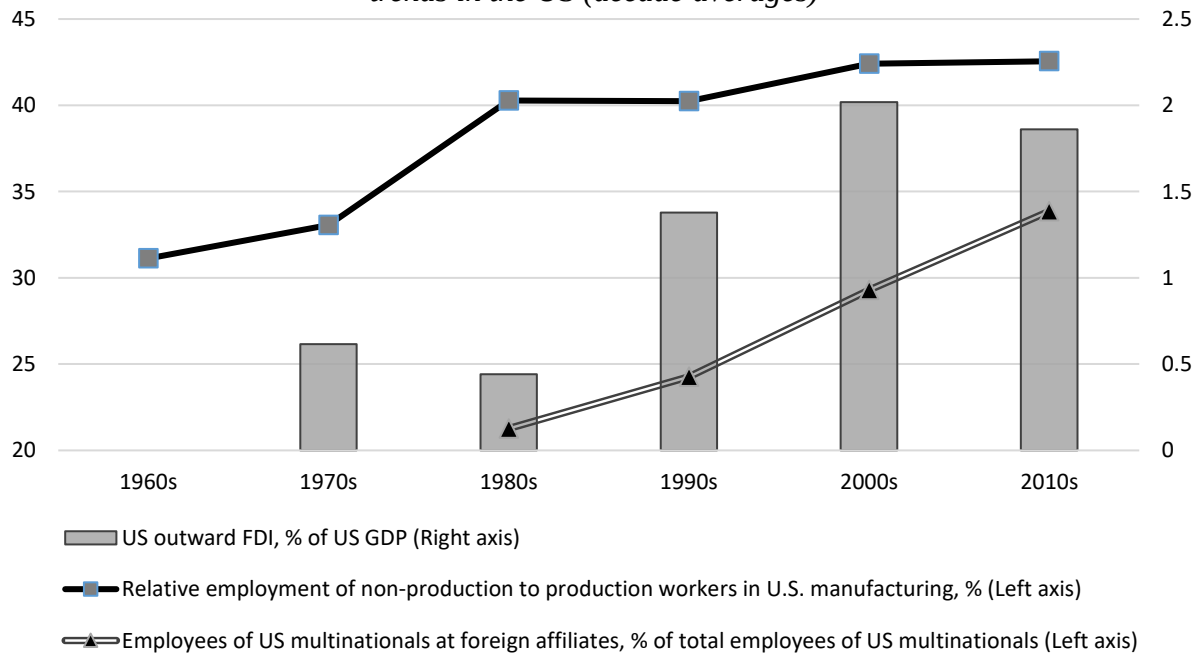
1. Introduction

The phenomenal growth of multinational corporations and global production has largely come to define the current era of neoliberal globalisation (Palley 2015, Woodgate 2021b). According to the OECD (2018, p.6), multinationals were responsible for around half of global trade, a third of global GDP, and a quarter of employment around the world in 2014. Recognition of the size and influence of multinationals in the modern global economy emphasises the need for a post-Keynesian theory of the location of production. While the principle of effective demand may well determine *how much* output and employment takes place, it cannot tell us *where* multinationals decide to locate the resulting production. Seeing as multinationals control a large and growing part of production around the world, the question of location determination becomes all the more pressing.

It would also appear an important undertaking to explain the macroeconomic effects of changes in the location of production, regardless of how such changes in location are determined. The United States, for example, has seen a clear and rising trend, as graphed in Figure 1 with data from NBER-CES (2021), in the ratio of non-production workers to production workers in its manufacturing sector since the 1960s, likely in large part due to the offshoring and outsourcing of labour intensive processes to cheaper production locations (Feenstra 2016). Relatedly, since the 1980s, data from BEA (2021) show a steadily increasing fraction of the total employment of US multinationals has taken place outside of the US. As is also shown in Figure 1, using data from the World Bank (2021), these two trends are concurrent to the approximate quadrupling of the ratio of outward FDI to GDP in the US between the 1970s and 2000s. While other factors, such as technological change, likely also contribute to these trends, there is little doubt that offshoring plays an important role.

Figure 1 *Offshoring-related employment and outward foreign investment trends in the US (decade averages)*



Sources: World Bank (2021), NBER-CES (2021), and BEA (2021) respectively. Author's calculations.

In addition to concerns about employment, offshoring and footloose production have been linked, to one extent or another, to a raft of important modern macroeconomic puzzles and phenomena by a number of authors. Such phenomena include the decline of the wage share in many countries (Milberg & Winkler 2010, 2013, ch. 5; Guschanski & Onaran, 2021), the flattening or disappearance of the Phillips Curve and below-target inflation (Curr 2019, Setterfield & Blecker 2022), global current account imbalances (Palley 2015), and the decoupling of profits and investment (Milberg & Winkler 2010, Auvray & Rabinovich 2019, Rabinovich 2020). However, much of this work is discursive or empirical, and that which is theoretical is mostly based on partial analysis. A full model is presented by Schröder (2020), which captures some of the macroeconomics effects of offshoring via outsourcing, but this is a short-run model and it does not include foreign investment of any kind. Hence, a long-run, demand-led model, in which offshoring leads to the build-up of productive capacity abroad and which may shed light on the effects of offshoring on distribution, inflation, employment, capacity utilisation, and capital accumulation remains outstanding and should prove to be valuable.

With this motivation in mind, this paper enquires into the macroeconomic implications of firms in one country (the "North") building up foreign production capacity by investing a fixed fraction of total investment abroad (in the "South"). The result is that, over time, Northern (now multinational) firms have an increasing fraction of their total capital stock located in the South. In this paper, we refer to this fraction as the "offshoring parameter". In the pre-offshoring period, when this parameter is equal to zero, we assume the Northern and Southern economies are in equilibrium. Then, as the offshoring parameter rises over time, we can observe the effects on key macroeconomic variables and compare them to their pre-offshoring counterparts. The short run is any period where the offshoring parameter can be treated as given, whereas in the long run the offshoring parameter endogenously converges to its upper bound, which we will show is determined by the fraction of total investment abroad.

In this paper, we will suppose the motive behind offshoring is to cut labour costs related to the production of intermediate goods, allowing Northern firms to lower the price of their final good, raise their mark-up, or both. While a sufficiently large wage differential between two countries may be a most obvious determinant of the location of multinational production, it is, of course, not the only one. Tariffs and other taxes, especially corporate taxes, may influence location decisions, as analysed from a post-Keynesian perspective in Woodgate (2020, 2021a, 2021b). Exchange rates and the related monetary policy objectives may also matter, as may financial conditions and a whole host of other factors, such as the skill level of the labour force and so on (Dunning & Lundan 2008, ch. 3-4). However, given the centrality of labour costs in production, it seems especially salient to focus on cross-border wage differentials.

Based on the model developed in this paper, the basis of which is essentially post-Kaleckian, we arrive at a number of interesting conclusions. First, offshoring is found to lead to a falling wage share as well as, in the general case, a falling price level and a rising mark-up in the North. Special cases, similar to Schröder (2020), with either a constant mark-up or a constant price level, are also entertained. The effect of offshoring on equilibrium capacity utilisation may be either negative or positive depending on the size of the effects on unit gross profits, which boost investment and hinders consumption, and on net exports, which are boosted by increased price competitiveness but hindered by higher imported inputs. However, contrary to a typical post-Kaleckian model, we find that the Northern accumulation and employment

rates may still be below their pre-offshoring counterpart values in the short run, even if offshoring has a positive effect on capacity utilisation and profitability in the North. The lower growth and employment rates, in this scenario, are a result of the structural change implied by offshoring, which essentially represents a negative shock to the Northern economy and a positive shock to the Southern economy. Moreover, even if the accumulation rate in the Northern economy recovers to its pre-offshoring rate in the long run, we can observe hysteresis in the capital stock. The long run effects on the Northern and Southern accumulation and employment rates are found to depend crucially on the effect of offshoring on the multinationals' accumulation rate. Though, if we allow for wages to react endogenously to changes in employment rates, then Northern capacity utilisation and unit gross profits are likely to shrink, increasing the likelihood of stagnation tendencies in the North in the long run.

With these results in mind, the model seems well suited to shed light on some important modern macroeconomic trends seen across many advanced economies, such as falling wage shares, low and stable inflation rates, hysteresis, and secular stagnation. While the focus in this paper is on the FDI outflow country (the "North"), we also note how growth and employment is boosted in the FDI recipient country (the "South") in the short run and possibly in the long run too, which may also help explain the growth experiences of certain emerging economies.

The paper proceeds by discussing some of the related literature in section two. As there is not much model theoretical work on the topic of offshoring from a post-Keynesian perspective, this short part mainly summarises the approach and results of Schröder (2020), though, different to Schröder, we do so by employing a more standard neo-Kaleckian model and by introducing offshoring in a more mathematically tractable way. Since Schröder (2020) contains what is essentially a model of offshoring via outsourcing in the short run, we argue that to bring the analysis into the long run, we must allow for the accumulation of a foreign capital stock, since firms would rather avoid the fundamental uncertainty that arises from outsourcing to third-party firms in the long run. Section three presents our long-run model of offshoring and its findings, and, finally, section four concludes with a brief discussion of the relevance, implications, and limitations of this model.

2. Related literature: Offshoring via outsourcing in the short run

Schröder (2020) is one of the few papers published to date—if not the only one—that formally models the effects of offshoring in a post-Keynesian model. The author, somewhat ambiguously, refers to his model as a "standard Keynes-Kalecki model" (p. 181). In essence, however, it is very similar to a kind of short-run, open-economy variant of the neo-Kaleckian model given Schröder's assumptions regarding, for example, mark-up pricing and wage-led demand. Indeed, it will be shown here that by employing a more standardised neo-Kaleckian model expressed in levels and by representing offshoring in a more straightforward way, we can arrive at the essence of Schröder's results in a very concise manner without, it is hoped, any undue loss. Doing so will also nicely motivate and contextualise the long-run model developed in this paper in the next section.

2.1 An alternative exposition of the results of Schröder's (2020) model

We begin our exposition of Schröder's results with the price level (p) equation, where prices are determined by a mark-up (m) on unit variable costs (UVC), which are comprised of unit direct labour costs (ULC) and unit material costs (UMC). The former can be written as the

product of the nominal wage rate (w) and the unit labour requirement (a) and the latter as the product of the import price (p_m) and the unit import requirement (μ):

$$p = (1+m)UVC = (1+m)(ULC + UMC) = (1+m)(wa + p_m\mu). \quad (1)$$

Here we are assuming that all material inputs are imported from abroad. As in Hein (2014), we denote the ratio of unit material costs to unit labour costs by

$$z = \frac{p_m\mu}{wa}, \quad (2)$$

and can therefore express the profit share (h) in gross value added, where the latter is the sum of the wage bill (W) and the profit level (Π), as follows:

$$h = \frac{\Pi}{W+\Pi} = \frac{mwa(1+z)}{wa + mwa(1+z)} = \frac{1}{1+\frac{1}{m(1+z)}}. \quad (3)$$

Any increase in the mark-up or the ratio of unit material costs to unit labour costs has an unambiguously positive effect on the profit share.

Schröder (2020) introduces offshoring as a kind of labour-saving and import-using technical change, represented by a decrease in the unit labour requirement, *a*, and an increase in the unit import requirement, μ. This reflects the fact that as more production is offshored, less variable labour is required domestically as it is embodied in the greater quantity of intermediate goods that are imported. Unlike Schröder (2020), however, who analyses concurrent but separate changes in the unit import requirement and the unit labour requirement, here we find it simpler to represent Schröder's notion of offshoring technical change (ζ) by the *ratio* of the former to the latter:

$$\zeta \equiv \frac{\mu}{a} = \frac{M_{IG}}{L}. \quad (4)$$

Since ζ can be reduced to the ratio of imported input goods (M_{IG}) to domestic labour employed, we can call this the "import-per-worker requirement". Doing so will also help us distinguish this notion of offshoring from the one to be introduced later, which we will simply call the offshoring parameter.

Clearly, increases in the import-per-worker requirement have a positive effect on the ratio of unit material costs to unit labour costs (*z*), as can be seen in equation (2). As Schröder (2020) also points out, an increase in offshoring may also positively affect the mark-up by weakening labour's bargaining power, via the direct effect of lower domestic employment or via the "threat effect", where wage demands are tempered by workers' fear that higher wages will lead to their jobs being moved abroad (e.g. Milberg & Winkler, 2010, p. 279). In the approach we take here, it is straightforward to show that the effect of offshoring on the gross profit share is unambiguously positive:

$$\frac{\partial h}{\partial \zeta} = \frac{\frac{\partial m}{\partial \zeta}(1+z) + \frac{p_m}{w}m}{[1+m(1+z)]^2} > 0 \qquad \frac{\partial m}{\partial \theta} \geq 0. \quad (5)$$

In the context of the wage-led model that Schröder (2020) employs, an increase in the profit share can only dampen private domestic demand. This follows if we employ the conventional functional forms for the levels of saving (S) and investment (I), given in equations (6) and (7) respectively. Unlike Schröder (2020), we model saving explicitly rather than

consumption, impose the simplifying assumption that workers do not save, and employ a neo-Kaleckian investment function, where firm profitability has no direct effect on investment.[1]

$$S = s_\pi hY \tag{6}$$

$$I = i_A + i_Y Y \tag{7}$$

Equation (6) shows that saving is seen as a function of the propensity to save out of profits (s_π), the profit share, and the level of output. Investment, given by equation (7), is determined by an autonomous part that supposedly reflects animal spirits (i_A) and by an induced part, where i_Y is the responsiveness of investment to changes in output. From this setup it is clear that increases in the profit share caused by an increase in the offshoring parameter reduce consumption (increase saving) without any compensating effect on investment, and so domestic demand is clearly negatively affected by offshoring.

Thus, according to Schröder's approach, total private demand—and thereby output and employment—can only be positively affected if the effect of offshoring on net exports is positive enough to compensate for the negative effect on domestic demand. Again adopting a fairly standard modelling approach, let us suppose net exports depend negatively on domestic output, and positively on foreign output (Y_f) and the real exchange rate (e^R), where the latter is the ratio of foreign prices (p^f) expressed in domestic currency units using the nominal exchange rate (e) to domestic prices ($e^R = e * p^f/p$). The coefficients n_e, n_x, and n_m are treated as exogenously given and represent the responsiveness of net exports to the real exchange rate, foreign output, and domestic output respectively.

$$NX = n_e e^R + n_x Y_f - n_m Y. \tag{8}$$

Offshoring influences the indicator of international price competiveness, namely the real exchange rate, through its effects on domestic prices. On this matter, Schröder (2020, p.189) supposes that "offshoring is viable only if it leads to a fall in unit [variable] costs".[2] However, offshoring may also lead to an increase in mark-ups, leaving the effect on the price level and thus on the real exchange rate ambiguous, at least in an a priori theoretical sense. Given this, Schröder allows for two alternative closures to his model: One with constant prices and the other with a constant mark-up. Given constant prices, offshoring leads to higher profitability through a higher mark-up and the real exchange rate is left unaffected ($\partial e^R/\partial\zeta = 0$). Given a constant mark-up, offshoring allows for a more internationally competitive price of domestically produced goods, implying a positive effect on the real exchange rate $\partial e^R/\partial\zeta > 0$). It is this second case, where prices fall given an increase in offshoring, that is necessary for total private demand to be boosted by offshoring.

In sum, then, the equilibrium condition

[1] Schröder (2020) allows profits to have a positive effect on investment under the assumption that the effect of profits on consumption and investment is smaller than the effect of the wage bill on consumption, i.e. domestic demand is wage-led by assumption. We reach the same qualitative result here by simply employing the neo-Kaleckian investment function.

[2] Arguably, however, one could conceive of a firm that decides to engage in offshoring even if unit variable costs do not fall. For example, a firm that wishes to increase its mark-up by reducing labour union power may decide to offshore production even if a fall in unit labour costs does not result.

$$S = I + NX \tag{9}$$

is satisfied at the equilibrium level of output (Y^*)

$$Y^* = \frac{i_A + n_e e^R + n_x Y_f}{s_\pi h + n_m - i_Y}, \tag{10}$$

where the usual Keynesian stability condition is assumed to hold such that the denominator in equation (10) is positive. The effect of offshoring on equilibrium output is therefore

$$\frac{\partial Y^*}{\partial \zeta} = \frac{n_e \frac{\partial e^R}{\partial \zeta} - s_\pi Y^* \frac{\partial h}{\partial \zeta}}{s_\pi h + n_m - i_Y} \tag{11}$$

Hence, we arrive at the Schröder's (2020, p.179) result regarding the effect of offshoring on demand, output, and employment: "If higher markups absorb the competitiveness gain … offshoring unambiguously reduces [total private] demand and employment. If the markup remains constant, the net effect of offshoring on [total private] demand and employment is ambiguous; it depends crucially on the price elasticity of exports." Restated with the use of the simplified model presented here, in the former case, $\partial e^R/\partial \zeta = 0$ and equation (11) is clearly negative. In the latter case, $\partial e^R/\partial \zeta > 0$ and the effect of offshoring on demand, output and employment depends on whether the increase in net exports ($n_e[\partial e^R/\partial \zeta]$) is large enough to compensate for the fall in consumption ($s_\pi Y^*[\partial h/\partial \zeta]$).

2.2 From a short-run, static model of outsourcing to a long-run, dynamic model of offshoring

As insightful as the approach taken in Schröder (2020) is, the main limitations ought to be stressed. Firstly, it is more specifically a model of *offshore outsourcing*, whereby domestic firms are increasingly reliant upon foreign, *external* firms for intermediate goods. The question of what happens if domestic firms engage in *in-house offshoring*, where domestic firms establish foreign affiliates through foreign direct investment (whether in the form of greenfield investment or through merging with or acquiring a foreign firm), is not addressed.[3] Secondly, and very much relatedly, it is a short-run static model rather than a long-run dynamic one. For the reasons to be outlined below, firms may be more likely to engage in in-house offshoring rather than offshore outsourcing in the long run, and this is likely to have a number of important macroeconomic implications. Third, offshoring may have a number of further effects on aggregate demand that have hitherto not been considered. For example, profit-led domestic demand could be incorporated, which would seem important, since higher profits resulting from offshoring may, in principle, spur domestic investment to a greater extent than any fall in consumption.[4] Lastly, all else being equal, a greater degree of in-house offshoring may increase foreign income and decrease domestic income as revenue generated by domestic firms increasingly flows out of the domestic economy to pay foreign workers. The induced changes in income may have implications for net exports, as we will see.

[3] For a more elaborate definition of offshoring and its various distinctions, see OECD (2007).

[4] This point is mentioned elsewhere in the literature, such as in Milberg & Winkler (2010) and Auvray & Rabinovich (2019), however, these authors argue that financialisation redirects the increased profits from offshoring away from investment and towards shareholder value maximisation. While we take no issue with that explanation and its empirical relevance for many countries, it would be interesting, nonetheless, to understand whether the process of offshoring alone could lead to higher profits and lower domestic investment without invoking financialisation.

Before moving on to the model, it is worth briefly elaborating on why, from a post-Keynesian perspective, it is quite unreasonable to suppose that oligopolistic firms engage exclusively in offshore outsourcing in the long run. Without a sufficient degree of control over the suppliers of crucial input goods, domestic firms that outsource production to foreign firms effectively increase the degree of fundamental uncertainty they face. This is contrary to what is widely considered within post-Keynesian economics to be one of the main objectives of the firm, namely *power*. For example, it is the view of Lavoie (2014, p. 128) that, "power is the ultimate objective of the firm: power over its environment, whether it be economic, social or political", including "power over [a firm's] suppliers of materials". Given that firms want to increase their degree of power or decrease their exposure to fundamental uncertainty, it is no wonder that offshoring largely takes place through M&A or greenfield FDI flows that establish control in the foreign location of production. Firms that engage purely in outsourcing, whether through contract manufacturing or simply buying the output of third-party firms, face undesirable dependency and uncertainty in the long run, however profitable it may be in the short run. Indeed, by absorbing the profit margin of supplier firms through vertical integration, in-house offshoring may be the more profitable option in the long run as well, regardless of the desire to minimise exposure to fundamental uncertainty. But even if the required input or intermediate goods are low-profit, primary goods, it may still be worth ensuring the production of such goods remains (or becomes) in-house because, as John Kenneth Galbraith (1967, p.45-46) puts it, "to have control of supply—to not rely on the market but its own sources of supply—is an elementary safeguard".[5]

As we already saw in Schröder's (2020) model, and has been described in detail elsewhere in the literature (e.g. Milberg 2006, Milberg and Winkler 2013, ch.4), offshoring implies a kind of cost cutting. Cutting variable (especially labour) costs allows for higher mark-ups without higher prices, lower prices without lower mark-ups, or some lesser degree of both lower prices and higher mark-ups simultaneously. In the model to be developed here, we will allow for the general case of lower prices and higher mark-ups, alongside the two extreme cases of constant mark-ups or constant prices seen above.

3. Model

3.1 Setup and assumptions

Consider a two-country model of North and South, where the nominal wage rate in the former (w_N) is higher than that of the latter (w_S) when converted into Northern currency units by the nominal exchange rate (e). We will define the difference between the wages rates as

$$w_\Delta = w_N - ew_S > 0. \tag{12}$$

Throughout most of this paper, we will consider these variables to be exogenously given and fixed. Also, suppose that the two economies are in equilibrium in period $t = 0$ before any offshoring of Northern firms' production occurs in period $t \geq 1$. Importantly, in this paper, we are only considering the case where Northern firms are engaged in offshoring to avail of cheaper labour in the South. Southern firms do not offshore any production at any point. In this paper,

[5] Indeed, as Dunn (2005) argues, the theory of the firm advanced by John Kenneth Galbraith, grounded in uncertainty, power, and planning, helps explain why multinational corporations emerged in the first place.

all output of foreign affiliates is exclusively used by Northern domestic firms as inputs into the production of Northern final goods.

After offshoring begins, Northern firms (which are now multinational firms) have a total of capital (K), labour (L), output (Y), and potential output (Y^P) which is located in either the North (denoted by a subscript *N*) or at foreign affiliates in the South (denoted by a subscript *FA*), such that

$$Z_t = Z_{N,t} + Z_{FA,t}, \text{ where } Z = L, K, Y, or\ Y^P. \tag{13}$$

Total labour, capital, output and potential output in the South is thus the sum of each variable at the Northern-owned foreign affiliates and at Southern-owned, non-affiliates (denoted by a subscript *NA*) in any time period *t*:

$$Z_{S,t} = Z_{NA,t} + Z_{FA,t}, \text{ where } Z = L, K, Y, or\ Y^P. \tag{14}$$

Note that, before offshoring,

$$Z_{FA,0} = 0 \quad \rightarrow \quad Z_0 = Z_{N,0} \text{ and } Z_{S,0} = Z_{NA,0} \text{ where } Z = L, K, Y, or\ Y^P. \tag{15}$$

Let us now introduce some simplifying assumptions about the nature of the multinationals' production at home and at their foreign affiliates. We will suppose that the capital-potential output ratio ($v = K_t/Y_t^P$) and the unit labour requirement ($a = L_t/Y_t$) are the same at home and abroad and do not change over time:

$$v_N = v_{FA} \text{ and } a_N = a_{FA}. \tag{16}$$

We assume that the capital intensity ($k_t = K_t/L_t$) is the same at home and at the foreign affiliates, though may vary over time in response to changes in demand:

$$k_{N,t} = k_{FA,t}. \tag{17}$$

Of course, these assumptions are large simplifications.[6] In the real world, it is likely the case that low-skilled, labour intensive tasks are the first to be offshored. That being said, given the fact that a long-run Kaleckian model of offshoring has not been hitherto attempted, it seems natural to start with the simplest case before introducing extensions that may better reflect reality as we know it. Moreover, a very general—and thus very useful—notion of offshoring can be introduced based on these assumptions.

Let us define the offshoring parameter (θ_t) by the ratio of the capital stock held at the foreign affiliates to the northern firms' total capital stock,

$$\theta_t \equiv \frac{K_{FA,t}}{K_t}. \tag{18}$$

[6] Since productivity is the same abroad as at home but labour is cheaper abroad, one may wonder why Northern firms do not simply offshore *all* production. In fact, our model does not preclude the possibility. However, it is worth keeping in mind that time and finance constraints as well as fundamental uncertainty and perceptions of risk and affect the degree and pace of offshoring. Endogenous wages, as we will see in the final part, may also present a reason to not offshore all production, as might a number of other factors not considered here, such as productivity differentials, transport costs, and the natural geography of resources.

Notice that given our assumptions, this offshoring parameter is also equal to the ratio of labour, output, and potential output at the foreign affiliates to the multinationals' overall labour, output, and potential output respectively:

$$\theta_t = \frac{K_{FA,t}}{K_t} = \frac{L_{FA,t}}{L_t} = \frac{Y_{FA,t}}{Y_t} = \frac{Y^P_{FA,t}}{Y^P_t}. \tag{19}$$

Hence, it is rather arbitrary how we initially define the offshoring parameter since the assumptions imply all of the ratios in equation (19), which could each be thought of as reflecting the degree of offshoring, are one and the same.

Besides the convenient representation of offshoring in our model, the assumptions above imply three further corollaries. First, it must be the case that the domestic and foreign affiliates' technical parameters are equal to the multinationals' overall technical parameters:

$$v_N = v_{FA} = v, \quad a_N = a_{FA} = a, \quad \text{and} \quad k_{N,t} = k_{FA,t} = k_t. \tag{20}$$

Second, we can now make the connection between the offshoring parameter and the import-per-worker requirement (ζ) introduced above. As the production of intermediate goods moves offshore and are thus imported from foreign affiliates such that $M^{IG}_{N,t} = Y_{FA,t}$, it follows that

$$\zeta_t = \frac{M^{IG}_{N,t}}{L_{N,t}} = \frac{\theta_t Y_t}{(1-\theta_t)L_t} = \frac{\theta_t}{(1-\theta_t)a}. \tag{21}$$

Clearly, the import-per-worker requirement rises with the offshoring parameter. Lastly, it follows from this setup that the multinational's overall capacity utilisation ($u_t = Y_t/Y^P_t$) is equal to that of its domestic affiliates ($u_{N,t} = Y_{N,t}/Y^P_{N,t}$) and foreign affiliates ($u_{FA,t} = Y_{FA,t}/Y^P_{FA,t}$)

$$u_{N,t} = u_{FA,t} = u_t. \tag{22}$$

Now we are ready to describe how offshoring is brought about. Of course, given the type of offshoring we are interested in, Northern firms must invest abroad to engage in offshoring. Northern firms' total investment (I_t) is thus split between the North ($I_{N,t}$) and foreign affiliates in the South ($I_{FA,t}$), such that

$$I_t = I_{N,t} + I_{FA,t}. \tag{23}$$

In order to offshore a desired fraction of its workforce in the long run, Northern firms locate a fraction of annual investment in foreign affiliates in the South ($\phi \equiv I_{FA,t}/I_t$). Assuming this foreign fraction of total investment (ϕ) is constant over time, it follows that

$$\theta_t = \frac{K_{FA,t}}{K_t} = \frac{\sum_{i=1}^{t} \phi I_i}{K_t} = \frac{\phi \sum_{i=1}^{t} I_i}{K_t} = \frac{\phi(K_t - K_0)}{K_t} = \phi\left(1 - \frac{K_0}{K_t}\right), \tag{24}$$

where K_0 is the total capital stock before offshoring starts in period $t = 1$. Since K_0 is a constant and K_t has no upper bound, it follows that the offshoring parameter tends to the foreign investment ratio in the long run. Viewed another way, we know that the offshoring parameter must be constant in the long run, such that the growth rate of the offshoring parameter

$$\widehat{\theta_t} = \widehat{K_{FA,t}} - \widehat{K_t} = g_{FA,t} - g_t = \frac{I_{FA,t}}{K_{FA,t}} - \frac{I_t}{K_t} = \frac{\phi I_t}{\theta K_t} - \frac{I_t}{K_t} = g_t\left(\frac{\phi}{\theta} - 1\right), \tag{25}$$

must tend to zero in the long-run equilibrium. Therefore, in the long run, under the usual ceteris paribus conditions, the offshoring parameter must tend to the foreign investment ratio,

$$\theta^{LR} \to \phi. \tag{26}$$

Offshoring has important implications for the growth rates of the multinationals' total capital stock (g), the Northern capital stock (g_N), foreign affiliate capital stock (g_{FA}), and Southern capital stock (g_S). For convenience, we now omit the time subscript, t. The growth rate of the multinationals' total capital stock will be determined by the usual post-Kaleckian determinants, namely exogenously determined animal spirits (γ), capacity utilisation as an indicator of demand, and unit gross profits (π)

$$g = \gamma + \gamma_u u + \gamma_\pi \pi, \tag{27}$$

where γ_u and γ_π are the exogenously given coefficients that reflect the responsiveness of the accumulation rate to changes in capacity utilisation and unit gross profits respectively.

The growth rate of the Northern capital stock is

$$g_N = \frac{I_N}{K_N} = \frac{(1-\phi)I}{(1-\theta)K} = \frac{(1-\phi)}{(1-\theta)}g, \tag{28}$$

and that of the foreign affiliate capital stock is

$$g_{FA} = \frac{I_{FA}}{K_{FA}} = \frac{\phi I}{\theta K} = \frac{\phi}{\theta}g. \tag{29}$$

Hence, the growth rate of the Northern capital stock may be affected by offshoring through three channels: Through the demand channel ($\partial u/\partial\theta$), the profitability channel ($\partial\pi/\partial\theta$), or through what we will call the offshoring channel, reflected in the term $(1-\phi)/(1-\theta)$. While the first two channels are common to any post-Kaleckian model, the offshoring channel is unique to this one and arises because Northern firms may choose to locate a part of productive capacity outside of the North. In the short run, we know $\theta < \phi$ and so it must be that $g_N < g$ and $g_{FA} > g$. In the long run, however, $\theta = \phi$, and so $g_N = g_{FA} = g$. In order to understand whether the long-run growth rate in the North is higher or lower than the pre-offshoring growth rate, we will need to understand how offshoring affects profitability and aggregate demand.

3.2 Prices and distribution

Suppose Northern firms produce their own intermediate goods in the North before offshoring commences. Assuming the price level in the North (p_N) is determined by a mark-up (m_N) on unit labour costs, which is the product of the Northern wage rate and the unit labour requirement, we arrive at a familiar expression for the price level

$$p_N = (1+m_N)aw_N, \tag{30}$$

and for the nominal value of Northern output ($p_N Y_N$):

$$p_N Y_N = (1+m_N)L_N w_N, \tag{31}$$

Since we are assuming that the technical conditions (a and v) are the same across production of intermediate goods and final goods, changes in the relative quantity of labour used in

intermediate good production and final good production do not affect the price or nominal value of total output. However, once offshoring begins, unit labour costs will fall since workers at foreign affiliates in the South are paid a lower wage rate. We will assume throughout that transport costs are negligible. The nominal value of Northern output is now

$$p_N Y_N = (1 + m_N)(w_N L_N + e w_s L_{FA}) = (1 + m_N) L (w_N (1 - \theta) + e w_s \theta). \quad (32)$$

Here an implicit but important assumption has been made, namely that Northern firms—now multinationals—do not apply a mark-up upon intermediate goods twice. Again to keep matters simple, this is achieved by assuming that foreign affiliates under Northern control export intermediate goods at cost price, such that the nominal value of intermediate goods ($p_{FA} Y_{FA}$) is equal to total labour costs at the foreign affiliate [7]

$$e p_{FA} Y_{FA} = e w_s L_{FA} \quad \rightarrow \quad p_{FA} = \frac{w_s L_{FA}}{Y_{FA}} = w_s a. \quad (33)$$

Hence, prices are now a function of the average wage rate across the two countries, weighted by the fraction of labour employed abroad, i.e. by the offshoring parameter. Putting this more explicitly in terms of the offshoring parameter, the Northern price level is given by

$$p_N = (1 + m_N) a (w_N - \theta w_\Delta). \quad (34)$$

Recall that, by construction, $w_\Delta = w_N - e w_S > 0$, so an increase in offshoring must lead to a lower Northern price level if the mark-up is unchanged. However, the mark-up is likely to increase in response to increased offshoring of production for at least three reasons. First, as mentioned above, offshoring weakens labour bargaining power as firms can credibly threaten to relocate many aspects of production in the face of higher wage demands (Bronfenbrenner 2000; Milberg & Winkler 2010). Second, total overhead costs will likely increase, as the overhead costs at the foreign affiliate (rent, managerial labour, etc.) must be covered by the multinational firms' overall mark-up. Third, offshoring reflects a shift from price competition to cost competition, whereby a firm that can reduce unit costs through offshoring to a greater extent than rival firms can enjoy higher unit gross profits at the same price level as its competitors. In the words of Milberg (2006, p.3), "U.S. firms have successfully used global production networks to reduce costs and raise markups without pushing up final goods and services prices. The concern with cost control as opposed to prices *per se* constitutes a shift in firm strategy."

With these arguments in mind, we will suppose that the reduction in overall unit labour costs due to offshoring may lead to a higher mark-up but not to higher prices. This is similar to the approach found in Schröder (2020), where two scenarios are analysed, one of a constant mark-up (and thus falling prices) and one of a constant price (and thus rising mark-up). However, here we will also allow for intermediate effects of both an increase in the mark-up

[7] Alternatively, one can allow the foreign affiliate to apply the northern mark-up upon foreign affiliate unit labour costs and arrive at much the same outcome, so long as the mark-up is not applied a second time in the North. The main difference would then be that the model would have to account for net income receipts in the form of repatriated profits. Apart from this, the outcomes to be described in this paper are essentially the same, hence the more convenient notion that the foreign affiliate prices its output (i.e. the intermediate good) at cost price. Lastly, note that, by applying the mark-up only in the second stage of production in the North, the Northern multinationals are essentially engaged in profit shifting. In reality, this would have implications for tax revenues and public policy, but it does not matter for our purposes since our model does not include a government sector.

and a fall in the price. We can analyse the interactions between increased offshoring, a falling price level, and a rising mark-up in the following way. Differentiating equation (34) with respect to the offshoring parameter and ensuring that it is always less than or equal to zero

$$\frac{\partial p_N}{\partial \theta} = a\left[\frac{\partial m_N}{\partial \theta}(w_N - \theta w_\Delta) - w_\Delta(1 + m_N)\right] \leq 0, \tag{35}$$

implies an upper bound for the effect of offshoring on the Northern mark-up

$$\frac{\partial m_N}{\partial \theta} = \frac{(1 + m_N)w_\Delta}{w_N - \theta w_\Delta}\rho, \tag{36}$$

where $0 \leq \rho \leq 1$. The parameter ρ reflects the extent to which a greater degree of offshoring leads to a higher mark-up rather than lower prices. For example, when $\rho = 1$, the gains from offshoring are completely absorbed into higher gross profits while the price stays the same. When $\rho = 0$ there is no effect on the mark-up and prices fall to their greatest extent. Values of ρ between these two extremes of a constant price or a constant mark-up represent all the possible intermediate cases.

Moving on to matters of distribution, the wage share of national income in the North (ω_N) is given by

$$\omega_N = \frac{L_N w_N}{L_N w_N + m_N(L_N w_N + L_{FA} e w_S)} = \frac{1}{1 + m_N(1 + \frac{\theta e w_S}{(1-\theta)w_N})}. \tag{37}$$

The effect of offshoring on the wage share is thus unambiguously negative

$$\frac{\partial \omega_N}{\partial \theta} = \frac{-\left[\frac{\partial m_N}{\partial \theta}\left(1 + \frac{\theta e w_S}{(1-\theta)w_N}\right) + m_N \frac{e w_S w_N}{[(1-\theta)w_N]^2}\right]}{\left[1 + m_N\left(1 + \frac{\theta e w_S}{(1-\theta)w_N}\right)\right]^2} < 0. \tag{38}$$

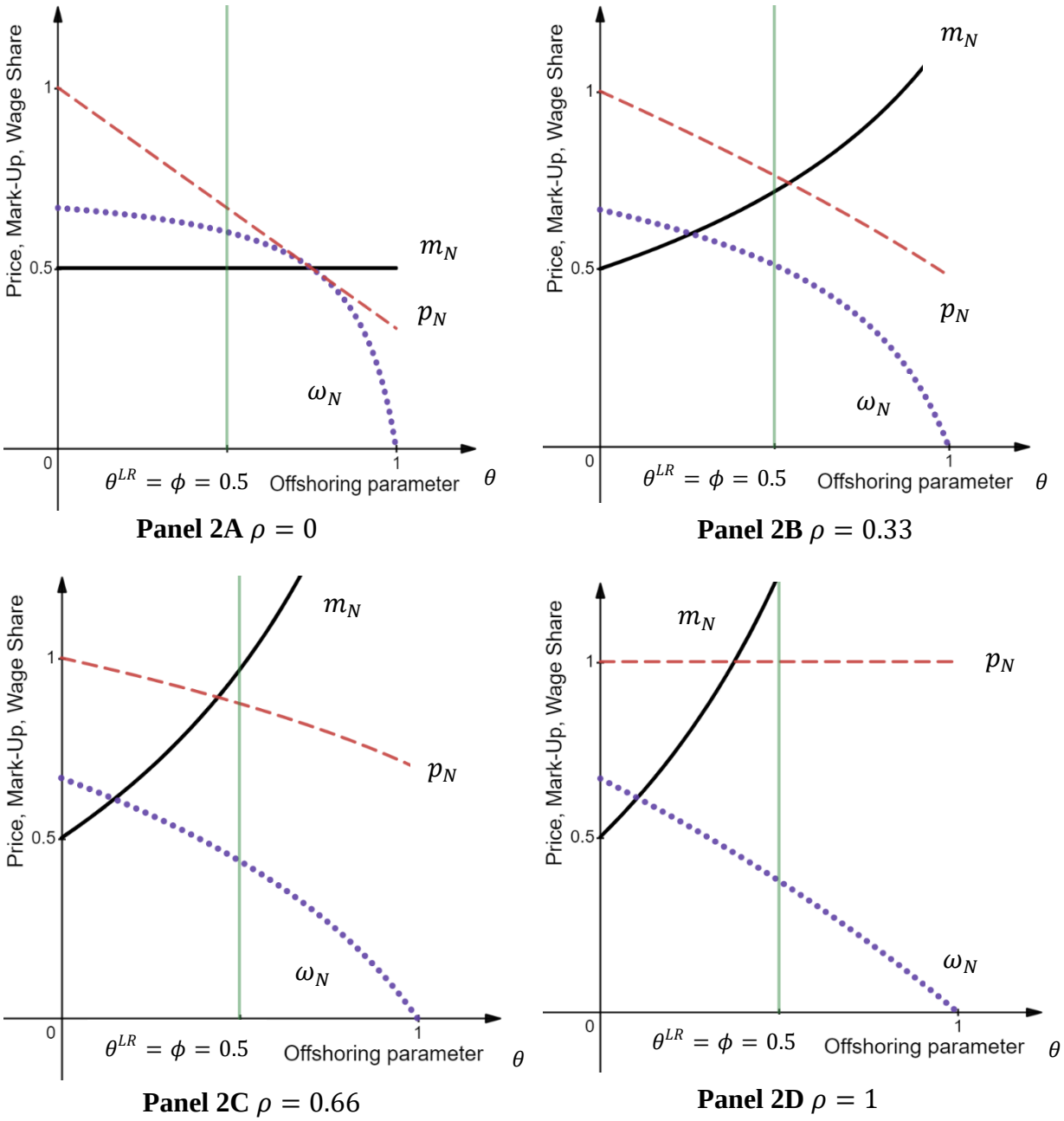
Note that, by equation (21), we know that the ratio of unit material costs to unit labour costs, denoted in the previous section by z, must rise with increases in offshoring parameter.

By solving the differential equation (36) for the Northern mark-up, we get

$$m_N = \frac{(m_0 + 1)(w_N)^\rho}{(w_N - \theta w_\Delta)^\rho} - 1, \tag{39}$$

where m_0 is the mark-up before offshoring. We can use equation (39), alongside equations (37) and (34), to observe the responses of Northern mark-up, wage share of income, and price level to increases in the offshoring parameter, as is done in Figure 2. Since the gradient of the curves depend on the value of ρ, four example cases are offered in the four panels, where ρ initially at zero (implying a constant mark-up) and increases to one (which implies a constant price level) by one third in each panel. For the purposes of illustration, the unit labour requirement,a, and wage differential, w^Δ, are set such that the initial (i.e. pre-offshoring) values of the price level, wage share, and mark-up are $p_0 = 1$, $\omega_0 = 2/3$, and $m_0 = 0.5$ respectively. As before, the long-run value of the offshoring parameter is determined by the foreign share of total investment, ϕ, which for the sake of illustration is set equal to 0.5 here. Clearly, the higher the value of ρ, the lower the value of the wage share, the higher the value of the mark-up, and the smaller the decrease in the price level for any given value of the offshoring parameter.

Figure 2 *Effect of offshoring on the price level, mark-up, and wage share in the North*



Panel 2A $\rho = 0$ **Panel 2B** $\rho = 0.33$

Panel 2C $\rho = 0.66$ **Panel 2D** $\rho = 1$

Given the presence of intermediate goods in our model, it follows that the profit share is not generally equal to unit gross profits (π_N), where the latter is given by

$$\pi_N = \frac{\Pi_N}{p_N Y} = \frac{m_N}{1 + m_N}. \tag{40}$$

Indeed, it can be shown that the profit share is greater than unit gross profits for all positive values of the offshoring parameter, i.e.

$$1 - \omega_N > \pi_N \qquad \forall\, \theta > 0. \tag{41}$$

Unit gross profits increase in response to increases in the offshoring parameter, such that

$$\frac{\partial \pi_N}{\partial \theta} = \frac{\partial m_N / \partial \theta}{(1+m_N)^2} = \frac{w_\Delta \rho}{(1+m_N)(w_N - \theta w_\Delta)}. \quad (42)$$

The effect of offshoring on the North's international price competiveness—captured, as before, in the real exchange rate—is the last effect to be considered before we move on to consider the effects on aggregate demand. Assuming offshoring does not affect the nominal exchange rate nor the prices of non-affiliated firms in the south, we arrive at

$$\frac{\partial e_N^R}{\partial \theta} = -\frac{e p_{NA}}{{p_N}^2}\frac{\partial p_N}{\partial \theta} = \frac{e^R w_\Delta (1-\rho)}{(1+m_N)(w_N - \theta w_\Delta)}. \quad (43)$$

Reflected in equations (42) and (43) is the simple fact that if offshoring has no effect on prices and a maximum effect on the mark-up such that $\rho = 1$, the effect of offshoring on unit gross profits will be at its greatest while there will be no effect on international price competitiveness. Of course, if $\rho = 0$, the opposite is true.

3.3 Effective demand

The accumulation rate in the North has already been determined and is given in equations (27) and (28). Hence, we will need to determine the saving rate ($\sigma_N = S_N / p_N K_N$) and the net export rate ($b_N = NX_N / p_N K_N$) before we can examine the conditions under which the Northern economy comes into equilibrium, which is given by

$$\sigma_N = g_N + b_N. \quad (44)$$

The saving rate is a rather straightforward matter, and is given by

$$\sigma_N = \frac{s_\pi \Pi}{p_N K_N} = s_\pi \frac{\Pi}{p_N Y}\frac{Y}{Y^P}\frac{Y^P}{K(1-\theta)} = \frac{s_\pi \pi u}{v(1-\theta)}. \quad (45)$$

Again, we retain the classical saving hypothesis that workers do not save, purely for convenience.

The net export rate is somewhat more involved and inevitably a bit more stylised. We will proceed as follows. Starting with the same net export demand function used in the previous section, we now explicitly subtract the imported intermediate goods, M_N^{IG}:

$$NX_N = n_e e^R + n_x Y_S - n_m Y_N - M_N^{IG}. \quad (46)$$

Recalling that $Y_S = Y_{NA} + \theta Y$, $Y_N = (1-\theta)Y$, and $M_N^{IG} = \theta Y$, we get

$$NX_N = n_e e^R + n_x Y_{NA} + n_x \theta Y - n_m (1-\theta) Y - \theta Y. \quad (47)$$

For non-zero values of the offshoring parameter, real total output of Northern multinationals affects Northern net exports through a number of channels. First, greater multinational output implies more production at foreign affiliates, which creates income that, to an extent dictated by n_x, leads to more exports of final goods from the North. Second, larger values of Y mean higher incomes for Northerners that can be used to import from non-affiliates in the South, which is implied by the term $n_m(1-\theta)Y$. Lastly, reflected in the term θY is the fact that all final good output requires intermediate goods that are imported. Throughout we maintain the simplifying assumption that offshoring does not affect the output of non-affiliated firms in the South, which means that the term $n_x Y_{NA}$, which captures the exports due to increases in real

output at non-affiliated Southern firms, is unaffected by Y or θ. Rewriting equation (47) more explicitly in terms of the offshoring parameter, we get

$$NX_N = n_e e^R + n_x Y_{NA} - Y[n_m + \theta(1 - n_x - n_m)]. \tag{48}$$

Having motivated the functional form, we follow the usual convention and define the ratio of Northern net exports to the multinationals' capital stock ($b = NX_N/p_N K$) in terms of capacity utilisation, rather than output levels. The net-export-rate responsiveness coefficients ($\beta_e, \beta_x, \beta_m$), which are analogous to the net-export-level responsiveness coefficients (n_e, n_x, n_m), are similarly considered fixed and exogenously given:

$$b = \beta_e e^R + \beta_x u_{NA} - u[\beta_m + \theta(1 - \beta_x - \beta_m)]. \tag{49}$$

Since $u = u_{FA} = u_N$, this definition of the net export rate function retains the intuitive justification of net export level function developed above. Finally, the Northern net export rate ($b_N = NX_N/p_N K_N$), denominated by the Northern capital stock rather than the multinationals' total capital stock, is thus

$$b_N = \frac{b}{1-\theta}. \tag{50}$$

We are now in a position to solve for the equilibrium capacity utilisation rate of Northern firms. Inserting equations (28), (45), and (50) into (44), equilibrium is thus defined by

$$\frac{s_\pi \pi u}{v(1-\theta)} = \frac{(1-\phi)}{(1-\theta)} g + \frac{b}{(1-\theta)}. \tag{51}$$

Inserting equations (27) and (49) for g and b, and then simplifying and rearranging yields the equilibrium capacity utilisation rate of the multinationals' productive capacity (u), which is equal to the equilibrium capacity utilisation rate in the North and at foreign affiliates in the South

$$u^* = u_N^* = u_{FA}^* = \frac{(1-\phi)(\gamma + \gamma_\pi \pi) + \beta_e e^R + \beta_x u_{NA}}{s_\pi \pi / v + \beta_m + \theta(1 - \beta_x - \beta_m) - (1-\phi)\gamma_u}. \tag{52}$$

As before, we assume the Keynesian stability condition holds throughout, implying the denominator is always positive. The effect of offshoring on equilibrium capacity utilisation is

$$\frac{\partial u^*}{\partial \theta} = \frac{\frac{\partial \pi_N}{\partial \theta}\left[\gamma_\pi(1-\phi) - \frac{s_\pi u^*}{v}\right] + \frac{\partial e^R}{\partial \theta}\beta_e - (1 - \beta_x - \beta_m)u^*}{s_\pi \pi / v + \beta_m + \theta(1 - \beta_x - \beta_m) - (1-\phi)\gamma_u}, \tag{53}$$

Offshoring thus affects equilibrium aggregate demand, as proxied by capacity utilisation, through two channels. First, the profitability channel, reflected in the first term of the numerator, arises when offshoring leads to higher mark-ups. If $\gamma_\pi(1-\phi) > s_\pi u^*/v$, then higher profitability of Northern firms leads to higher capacity utilisation, since the positive effect on Northern investment is greater than the negative effect on consumption. If $\gamma_\pi(1-\phi) < s_\pi u^*/v$, then the opposite is true, which is more likely for higher fractions of foreign investment (ϕ). The sign of the second channel, which we will call the trade channel, is also ambiguous from a purely theoretical perspective. If $\beta_e(\partial e^R/\partial\theta) > (1 - \beta_x - \beta_m)u^*$, then offshoring leads to higher net exports through lower prices and higher international price competitiveness, despite the negative effect (assuming $\beta_x + \beta_m < 1$) on net exports due to the

changes in location of intermediate good production. If $\beta_e(\partial e^R/\partial\theta) < (1-\beta_x-\beta_m)u^*$, net exports, and thus equilibrium capacity utilisation, are negatively affected by offshoring.

Inserting the expressions in equations (39), (42), and (43) for m_N, $\partial\pi_N/\partial\theta$, and $\partial e_N^R/\partial\theta$ respectively, we can express the numerator of $\partial u^*/\partial\theta$, which determines the sign of the effect of offshoring on equilibrium capacity utilisation, as follows:

$$\frac{w_\Delta\left[\rho(\gamma_\pi(1-\phi)-\frac{s_\pi u^*}{v})+\beta_e e^R(1-\rho)\right]}{(1+m_0)(w_N)^\rho(w_N-\theta w_\Delta)^{(1-\rho)}}-(1-\beta_x-\beta_m)u^*. \tag{54}$$

The parameter ρ, which determines the extent to which lower unit labour costs lead to a higher mark-up rather than a lower price, clearly influences the composition, size, and sign of the first term. More interesting, though, is the wage rate differential between North and South, w_Δ. The smaller the wage differential, the more likely it is that the effect of offshoring on capacity utilisation is negative (assuming $\beta_x+\beta_m<1$). We must keep this in mind when we return to the possibility of wage convergence later.

While not the focus of this paper, it is worth commenting briefly on the equilibrium profit rate, saving rate, and net export rate in the North, which are as follows:

$$r_N^* = \frac{\pi u^*}{(1-\theta)v}\ , \tag{55}$$

$$\sigma_N^* = s_\pi r_N^*\ , \tag{56}$$

$$b_N^* = \frac{\beta_e e^R+\beta_x u_{NA}-u^*[\beta_m+\theta(1-\beta_x-\beta_m)]}{(1-\theta)}. \tag{57}$$

It can be shown that these equilibrium values may respond positively or negatively to changes in the offshoring parameter. If $\partial u^*/\partial\theta$ is positive, the Northern profit and saving rates increase with higher values of the offshoring parameter. Furthermore, the North may turn from a net exporter to a net importer with a higher offshoring intensity, especially if β_e and β_x are small and $\beta_x+\beta_m<1$. If $\partial u^*/\partial\theta$ is negative, matters are less straightforward and the signs of r_N^* and σ_N^* depend crucially on the size of the exogenous parameters.

3.4 Growth and hysteresis

The various equilibrium capital stock growth rates deserve special attention. We begin with the multinationals', Northern, and foreign affiliates' accumulation rates in any given equilibrium:

$$g^* = \gamma+\gamma_u u^*+\gamma_\pi\pi, \tag{58}$$

$$g_N^* = \left(\frac{1-\phi}{1-\theta}\right)g^*, \tag{59}$$

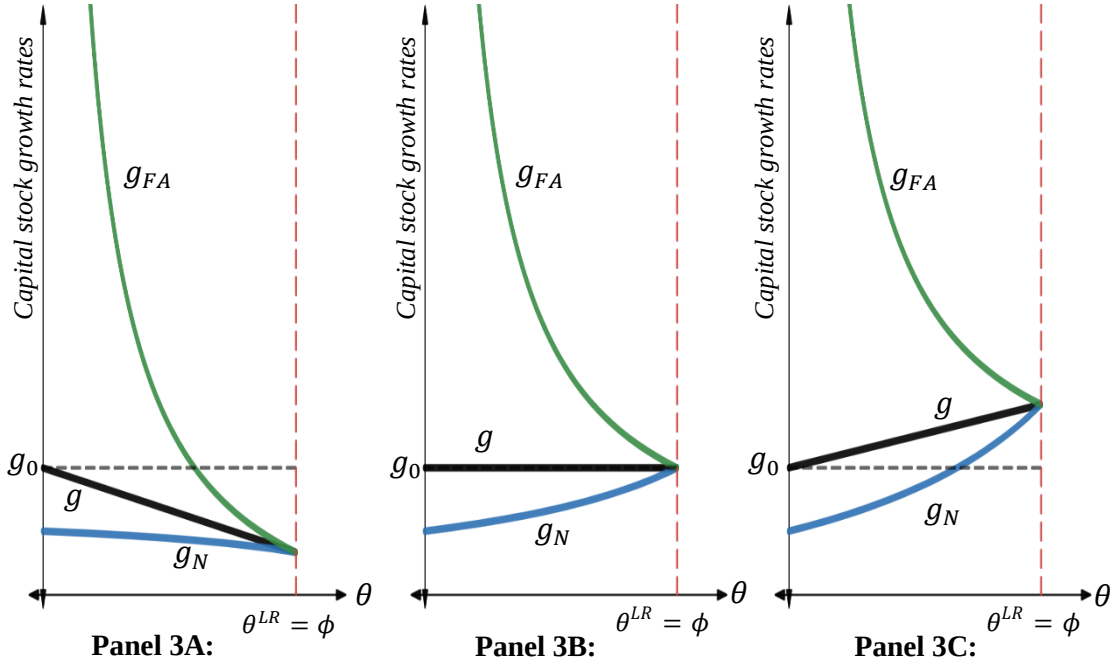
$$g_{FA} = \frac{\phi}{\theta}g^* \tag{60}$$

It follows that $\partial g^*/\partial\theta$ is positive if $\partial u^*/\partial\theta>0$ and may be negative or zero if $\partial u^*/\partial\theta<0$. Denoting the accumulation rate of Northern firms before offshoring by g_0, Figure 3 depicts how the Northern, multinational, and foreign affiliate accumulation rates are related and how

they are each affected by offshoring. For simplicity, the graphs show g as a linear function of θ, though we know from the preceding section that this is a simplification.

We begin with the most interesting observation, which is that the Northern accumulation rate suffers a negative shock in the first period when offshoring begins, no matter how the multinational accumulation rate is affected. In the proceeding periods, unless the multinational accumulation rate is very negatively affected by offshoring, as in Panel 3A, the Northern accumulation rate responds positively to increases in the offshoring parameter. In the long run, when $\theta = \phi$, both g_N and g_{FA} converge to g. If $\partial g/\partial\theta < 0$, as in Panel 3A, then the long-run Northern growth rate will be lower than the pre-offshoring rate. If $\partial g/\partial\theta = 0$, as in Panel 3B, the long-run Northern growth rate will converge back to its initial (pre-offshoring) value. Lastly, if $\partial g/\partial\theta > 0$, as in Panel 3C, the long-run Northern growth rate will exceed the pre-offshoring rate.

Figure 3 *Effect of offshoring on multinationals', Northern, and foreign affiliates' accumulation rates*



Panel 3A: $\frac{\partial g}{\partial \theta} < 0$ **Panel 3B:** $\frac{\partial g}{\partial \theta} = 0$ **Panel 3C:** $\frac{\partial g}{\partial \theta} > 0$

Thinking in terms of levels rather than growth rates, we can see that offshoring can give rise to hysteresis. To make this explicit, let us consider the simple case of Panel 3B, where $\partial g/\partial\theta = 0$, such that Northern firms' capital stock at any given time can be represented by

$$K_t = K_0 e^{g_0 t}, \tag{61}$$

where K_0 is the northern firms' capital stock before offshoring begins. Contrariwise, the capital stock *located* in the North is given by

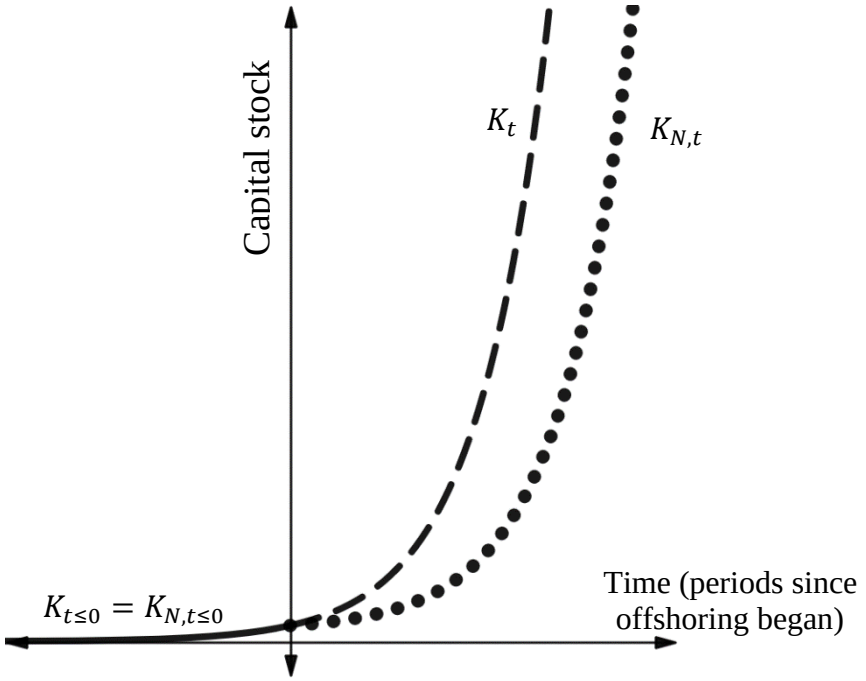
$$K_{N,t} = (1 - \theta_t) K_0 e^{g_0 t}. \tag{62}$$

To show how K_t diverges from $K_{N,t}$ over the long run, we must express θ_t as a function of time, which, by using equations (24) and (61), is given by

$$\theta_t = \phi(1 - e^{-g_0 t}). \tag{63}$$

Inserting equation (63) into (62), and graphing it alongside (61) in Figure 4, we can see how the Northern capital stock permanently diverges from its pre-offshoring trend after period zero. Of course, for a fixed rate of capacity utilisation, hysteresis will also be found for the level of output and of labour employed in the North, though we will return to the question of employment in more detail in the next section.

Figure 4 Hysteresis of the Northern capital stock due to offshoring



If we assume the growth rate of the non-affiliated capital stock in the South is constant and unaffected by offshoring,[8] then the growth rate of the total Southern capital stock (g_S) is given by a weighted average of the foreign affiliate and non-affiliate growth rates:

$$g_S = \frac{I_{NA} + I_{FA}}{K_{NA} + K_{FA}} = \frac{g_{NA}K_{NA} + g_{FA}K_{FA}}{K_{NA} + K_{FA}} = g_{NA} + \kappa\left(\frac{\phi}{\theta}g - g_{NA}\right), \tag{64}$$

Where the weighting term is $\kappa \equiv K_{FA}/(K_{NA} + K_{FA})$, i.e. the fraction of foreign affiliate capital in the total capital stock of the South. The time rate of change, denoted by a dot, of this endogenous fraction is given by

$$\dot{\kappa} = (g_{FA} - g_S)\kappa = \kappa(1 - \kappa)(\tfrac{\phi}{\theta}g - g_{NA}). \tag{65}$$

If $g > g_{NA}$ in all periods, then equations (64) and (65) tell us that the Southern growth rate is positively affected by offshoring. In this case, the fraction of foreign affiliate capital in total Southern capital will tend to one ($\kappa \to 1$) and the southern growth rate will tend to the multinational growth rate in the long run ($g_S^{LR} \to g^{LR}$). If $g < g_{NA}$, then the Southern growth rate is initially positively affected by offshoring (for low values of θ), but converges back to the growth rate of non-affiliate firms in the long run ($g_S^{LR} \to g_{NA} = g_{s,0}$). In sum, the Southern

[8] Of course, this is a large simplification stemming from the fact that our focus in this paper is on the effects of offshoring on the source of FDI rather than the recipient.

accumulation rate always benefits from offshoring in the short run. In the long run, g_s may remain permanently higher or converge back to its pre-offshoring rate, depending on how the multinational and non-affiliate growth rates compare.

As captured in Figure 5, this general result holds regardless of how the multinational accumulation rate is affected by offshoring, though the gradient of the g_s-curve is affected by the sign of $\partial g/\partial\theta$. In order to visualise the g_s-curve, an explicit form of κ in terms of θ is needed. From equations (61) and (63), we know that

$$K_{FA,t} = \theta K_t = \theta_t K_0 (\frac{\phi}{\phi-\theta}). \tag{66}$$

As non-affiliates' capital stock can be expressed similarly by

$$K_{NA,t} = K_{NA,0} e^{g_{NA} * t} = K_{NA,0} \left(\frac{\phi}{\phi-\theta}\right)^{\frac{g_{NA}}{g}}, \tag{67}$$

it follows that κ can be expressed as

$$\kappa(\theta) = \frac{K_{FA}}{K_{NA} + K_{FA}} = \frac{1}{1 + \frac{K_{NA,0}}{K_0 \theta}\left(\frac{\phi}{\phi-\theta}\right)^{\left(\frac{g_{NA}}{g}-1\right)}}. \tag{68}$$

From this expression we also note that the ratio of Southern firms' capital stock to that of Northern firms in the period before offshoring began ($K_{NA,0}/K_0 = K_{S,0}/K_{N,0}$) clearly matters for g_s. Generally, the higher this ratio is, the smaller κ will be, and thus the closer g_s will be to g_{NA} in any period. At an intuitive level, this makes perfect sense: The accumulation rate of a very large economy that receives a fraction of the capital stock from a very small economy through offshoring will not be greatly affected. However, if roles are reversed such that the large economy offshores production to the smaller one, then the growth rate of the latter may be strongly affected. This point about the macroeconomic importance of the relative size of the FDI source and recipient economies is also emphasised in Woodgate (2020, 2021b). In Figure 5, it is assumed in all panels that this ratio is one, implying the capital stock of the North and the South are equal before offshoring begins.

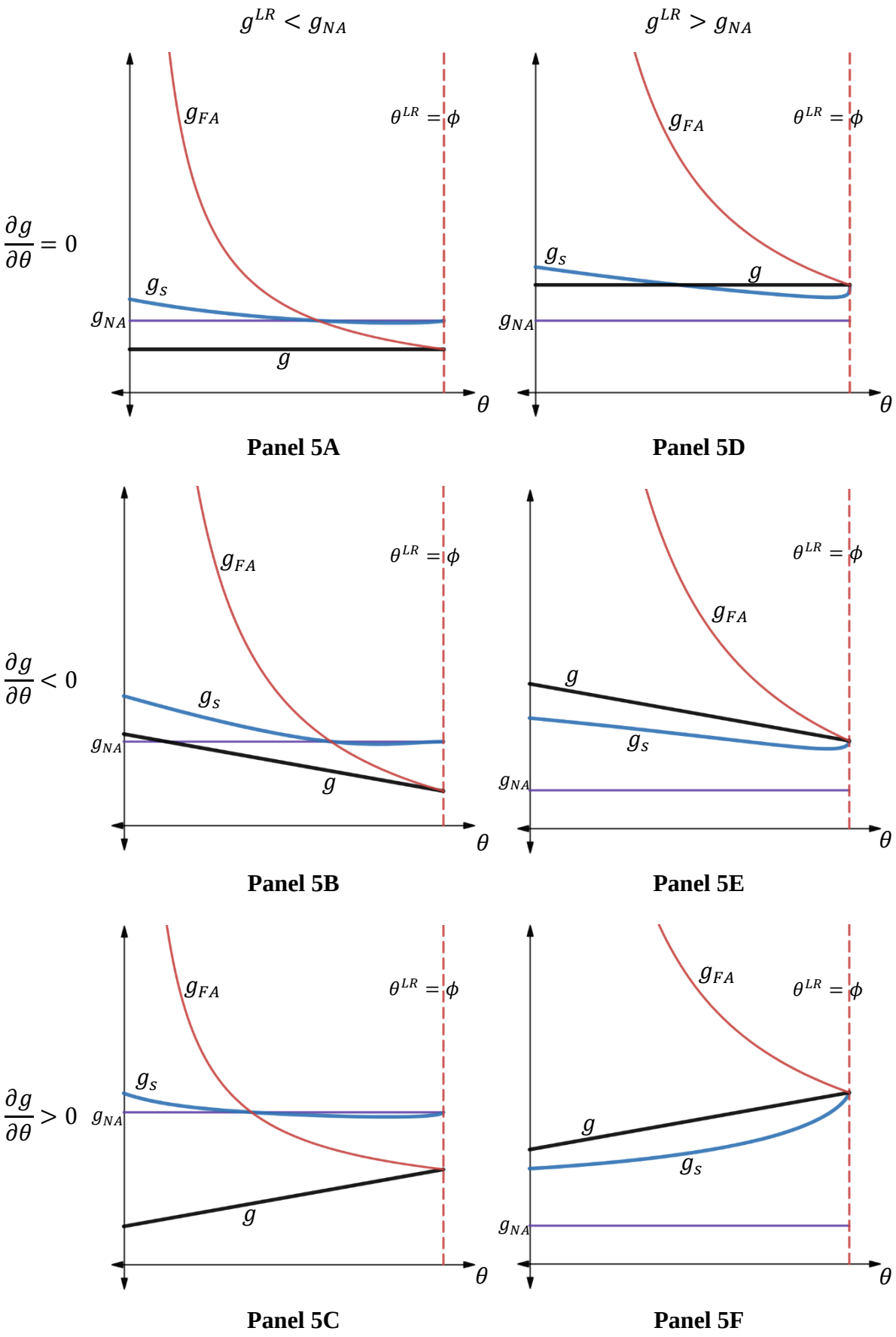
3.5 Employment

The long-run growth rates discussed in the preceding section have relatively straightforward implications for employment in the long run. However, it would also be of interest to understand how the employment rates in the North and South behave in the transition to the long run. The difficulty in doing so is that employment depends on variations in capacity utilisation before the long run, and, as we saw in section 3.2, the response of capacity utilisation to changes in the offshoring parameter is nonlinear and thus rather unwieldy. Therefore, let us simplify our analysis of the effects of offshoring on the employment rate by supposing that capacity utilisation and the multinational accumulation rates respond in a linear fashion to changes in the offshoring parameter:

$$u(\theta) = u_0 + u_\theta \theta, \tag{69}$$

$$g(\theta) = g_0 + g_\theta \theta. \tag{70}$$

Figure 5 *Effects of offshoring on the Southern accumulation rate*



The coefficients u_θ and g_θ, which represent simplified versions of $\partial u^*/\partial\theta$ and $\partial g^*/\partial\theta$ respectively, may—based on the analysis in the preceding sections—be negative, zero, or positive. However, it is impossible to have a case where $g_\theta < 0$ and $u_\theta \geq 0$ since our model tells us that $\partial g^*/\partial\theta$ can only be negative if $\partial u^*/\partial\theta$ is negative. All other combinations of u_θ and g_θ are possible, but we will limit our analysis, for reasons of space, to the more realistic cases where both functions are positive for any value of the offshoring parameter, i.e. we assume that $u(\theta) > 0$ and $g(\theta) > 0$ for all θ.

The employment rate in the North, defined by

$$\varepsilon_N = \frac{(1-\theta)L}{LF_N}, \tag{71}$$

requires expressions for L and LF_N, where the latter denotes the labour force in the North. Supposing LF_N continues to grow at its pre-offshoring equilibrium rate g_0, we can write

$$LF_N = LF_{N,0}e^{g_0 t}. \tag{72}$$

Given the fixed coefficients of production and the expression for K in equation (61), we know

$$L = \frac{au}{v}K = \frac{au}{v}K_0 e^{gt}. \tag{73}$$

Thus, the employment rate in the North is given by

$$\varepsilon_N = \frac{(1-\theta)auK_0 e^{(g-g_0)t}}{vLF_{N,0}}. \tag{74}$$

Since the pre-offshoring Northern employment rate, $\varepsilon_{N,0}$, is given by $\varepsilon_{N,0} = au_0K_0/v\,LF_{N,0}$, and since equation (63) can be rearranged to yield an expression for the time parameter in terms of the offshoring parameter, we can express equation (74) purely as a function of the offshoring parameter:

$$\varepsilon_N = \varepsilon_{N,0}(1-\theta)\left(1+\frac{u_\theta}{u_0}\theta\right)\left(\frac{\phi}{\phi-\theta}\right)^{\left[\frac{g_\theta\theta}{g_0+g_\theta\theta}\right]}. \tag{75}$$

To analyse the sign of the derivative of the Northern employment rate with respect to the offshoring parameter, we make use of the much simpler logarithmic derivative:

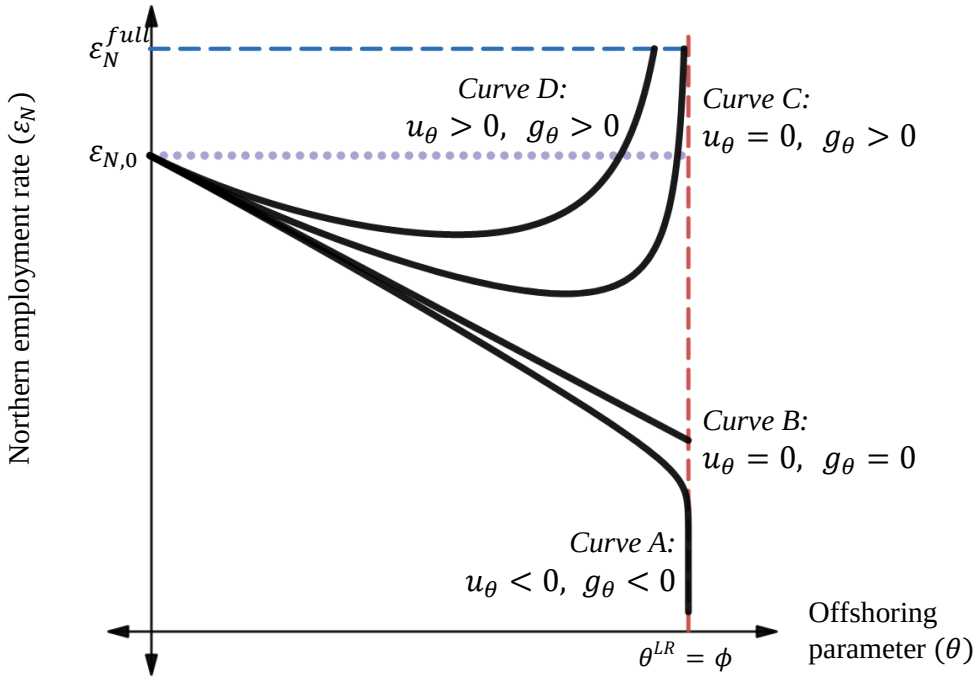
$$\frac{\partial \ln\varepsilon_N}{\partial\theta} = \frac{u_\theta/u_0}{1+u_\theta\theta/u_0} - \frac{1}{1-\theta} + \frac{g_\theta}{g_0+g_\theta\theta}\left[\frac{\theta}{\phi-\theta} + \frac{g_0}{g_0+g_\theta\theta}\ln\left(\frac{\phi}{\phi-\theta}\right)\right] \tag{76}$$

From this follows a number of interesting results. In the very short run, when the offshoring parameter is close to zero, offshoring leads to a lower employment rate even if capacity utilisation and the multinational accumulation rate are positively affected by offshoring. To see this, we evaluate the logarithmic derivative of the employment rate at $\theta = 0$ and get

$$\frac{\partial \ln\varepsilon_N}{\partial\theta}\Big|_{\theta=0} = \frac{u_\theta}{u_0} - 1 \quad < 0 \tag{77}$$

Since $u_\theta < u_0$ by construction, $\partial\varepsilon_N/\partial\theta$ is negative when the offshoring process begins, regardless of the effect on accumulation rates and even if the effect on capacity utilisation is positive. As can also be seen in equation (75), the Northern employment rate will continue to fall in the long run if the effect of offshoring on the multinational accumulation rate is negative, i.e. if $g_\theta < 0$. In this case, represented by Curve A in Figure 6, the employment rate will tend

Figure 6 *Effects of offshoring on the Northern employment rate*



to zero in the long run, ceteris paribus. If $g_\theta = 0$ and $u_\theta = 0$, ε_N will tend to $\varepsilon_{N,0}(1-\phi)$ in the long run, as shown in Curve B in Figure 6, whereas if $g_\theta = 0$ and $u_\theta < 0$ then ε_N will tend to $\varepsilon_{N,0}(1-\theta)(1+u_\theta\theta/u_0)$.[9] Lastly, if $g_\theta > 0$, the employment rate will tend to full employment in the long run (e_N^{full}). In this scenario, the size and sign of u_θ determines how quickly full employment is reached. In Figure 6, both Curve C and Curve D reflect a situation where $g_\theta > 0$, but the former is such that $u_\theta = 0$ and the latter is such that $u_\theta > 0$.

While the effect on employment in the long run may be positive or negative, the model shows that offshoring will have an unambiguously negative effect on employment in the North in the short run. It is worth pointing out, however, that this "short" run may not be so short in historical time. For example, given that ϕ is the fraction of Northern firms' annual foreign investment, Equation (63) tells us that it would take around 16.5 years for the Northern employment rate to recover back to its pre-offshoring rate of $\varepsilon_{N,0}$ in Curve D in Figure 6, and in the case of Curve C, it would take around 29.5 years.[10] Of course, this is not to say our simple model that relies on ceteris paribus conditions and the exclusion of many variables can generate accurate predictions about the timing of real events. However, the simple exercise emphasises how the transition in logical time may take quite a considerable number of years in historical time. Hence, "short run" unemployment due to offshoring should not be neglected as just some temporary blip of little importance.

[9] This scenario, where $g_\theta = 0$ and $u_\theta < 0$, is not graphed in Figure 6 because it looks similar to Curve B.

[10] More specifically, these are the non-zero values of the time parameter for which $\varepsilon_N(\theta) = \varepsilon_{N,0}$ for Curves C and D, where the former is graphed using the values $u_0 = 0.8$, $u_\theta = 0$, $g_0 = 0.1$ and $g_\theta = 0.05$ and the latter $u_0 = 0.8$, $u_\theta = 0.05$, $g_0 = 0.1$ and $g_\theta = 0.1$. These values are purely for the sake of illustration, of course.

Regarding the reaction of the Southern employment rate to increases in the offshoring parameter, it is quite straightforward, under the assumptions that the Southern labour force grows at its pre-offshoring equilibrium rate of g_{NA} and that the non-affiliate sector is unaffected by offshoring, to show that the employment rate increases in the South in the short run. It tends to full employment in the long run as well if $g^{LR} > g_{NA}$. If $g^{LR} < g_{NA}$, however, the higher Southern employment rate is not permanent—it will tend back to the pre-offshoring employment rate in the long run.

3.6 Endogenous wage convergence

A final point to consider in this analysis concerns the assumption with which we began, namely the assumption that the wage differential between the North and the South is positive and constant ($w_\Delta = w_N - ew_S > 0$). In the face of falling employment in the South and rising employment in the North—whether in the long run or just the transition to the long run—we can consider the implications of wages reacting endogenously to changes in the employment rate. We might suppose that the wage rate is a positive function of the employment rate for the usual reasons, such as firms bidding up wages when labour is scarce or labour bargaining power being strengthened in times of low unemployment:

$$w = f\left(\overset{+}{\varepsilon}\right) \tag{78}$$

Thus, a falling wage differential, w_Δ, may result from a falling Northern employment rate and rising Southern employment rate, both caused by offshoring:

$$\frac{\partial w_\Delta}{\partial \theta} < 0 \quad in\ periods\ when\ \frac{\partial \varepsilon_N}{\partial \theta} < 0\ and\ \frac{\partial \varepsilon_S}{\partial \theta} > 0. \tag{79}$$

However, if we recall the result found in expression (54), a smaller value of w_Δ means capacity utilisation in the North is more likely to be negatively affected by offshoring. This follows because a smaller wage differential undermines the only basis on which offshoring can benefit the Northern economy, namely by improving Northern firms' price competitiveness and by increasing mark-ups and thereby profitability. Without the resulting boosts to net exports and investment, aggregate demand and capacity utilisation in the North is more likely to suffer from the leakage of income from the North to pay employees in the South (reflected in the $-(1 - \beta_x - \beta_m)u^*$ term in expression 54). Hence, if offshoring leads to a smaller wage differential in this way, the effects of offshoring on capacity utilisation (u_θ) and capital accumulation (g_θ)—and thus employment—is more likely to become negative. Of course, this may lead to further feedback effects on the wage differential, complicating matters further. Suffice it to say here, however, that it is possible that a Northern economy, which would have enjoyed higher long run utilisation, accumulation, and employment rates were the wage differential to remain constant, may in fact suffer lower utilisation, accumulation, and employment rates in the long run due to the effect of "transitionary" changes in employment on the wage differential. In other words, with an endogenous wage differential, "transitionary" unemployment and stagnation may become permanent. Graphically, this can be represented in Figure 6 by endogenous shifts of the ε_N-curve from, say, Curve D to C, B, or A, depending on the size of decrease in the wage differential, capacity utilisation, unit gross profits, and the multinational accumulation rate.

4. Concluding remarks: Relevance, Implications, and Limitations

A number of macroeconomic phenomena characterise the modern age of neoliberal globalisation in advanced economies, such as rising FDI flows, falling wage shares, low and stable rates of inflation, shifts of bargaining power from labour to capital, an increased reliance on trade, hysteresis and stagnation tendencies. The model developed in this paper shows how each of these phenomena may be causally related to offshoring. Of course, this is not to say that offshoring is the only relevant causal factor behind these phenomena. Stockhammer (2004), Palley (2013), Skott & Ryoo (2008), and Hein (2012)—to give but a few examples of the large body of work on financialisation—are also highly pertinent in providing a theoretical explanation for many of these developments. Moreover, as Milberg & Winkler (2010, 2013) and Auvray & Rabinovich (2019) argue, it is likely that the twin forces of financialisation and globalisation are mutually dependent and reinforcing. Nonetheless, it is interesting to note that offshoring alone could still give rise to many of the same modern macroeconomic issues in a counterfactual world where no financialisation took place.

Although the focus has been on the FDI-outflow economy in this paper, it also has clear implications for the FDI-inflow economy, given that the South experiences higher rates of growth in the short and, possibly, long run. This may help explain the high rates of growth of countries with high FDI inflows in the era of neoliberal globalisation.[11] Potentially relevant economies in this respect may include the so-called Asian Tigers (Hong Kong, Singapore, South Korea, and Taiwan), the Celtic Tiger (Ireland), and some central and eastern European countries (e.g. Hungary, Czechia, Slovakia, and Estonia), among many other possible candidate countries.

Besides the empirical relevance of this model, it also has important implications for both theory and policy. For example, suppose an economy exhibits a falling wage share and growth rate due to offshoring. Any econometric work on the demand regime of this hypothetical economy that fails to control for the effects of offshoring is likely to find that it is wage-led.[12] A policy prescription of increasing the wage rate may thus follow on the basis that it may help achieve the twin goals of lower inequality and higher demand and growth. Yet, if multinationals base their location decisions partly on wage differentials as posited in this paper, this push for higher wages may backfire if domestic-owned multinationals increase their foreign investment and foreign-owned multinationals reduce investment in the domestic economy as a result. Hence, offshoring likely presents deep-seated structural issues for the effective macroeconomic governance of any given economy.

Of course, this does not imply that policymakers in our hypothetical economy ought to accept this threat and throw in the towel. Nor does it imply that policymakers should seek to align their macroeconomic goals with the goals of the multinationals, as has been popular in recent decades, and engage in the "commercialisation of state sovereignty" (Palan, 2002) by, for example, seeking to lower or moderate wages and corporate tax rates, or by offering state aid incentives. As argued by Woodgate (2020, 2021b), such beggar-thy-neighbour growth

[11] This finding complements, using a long-run model, the argument found in Woodgate (2021b), which is on a short-run basis.

[12] Of course, it is very rare to see empirical work on demand regimes control for aspects of offshoring. Presumably, this is partly because the theoretical case for doing so has been hitherto underdeveloped and partly because data to construct offshoring control variable on a long-run basis may be hard to come by. This point is emphasised and elaborated upon in Woodgate (2021a).

strategies may work for one country acting alone, but are not likely to work for multiple countries enacting such strategies in unison.

Offshoring does imply, however, that there may be a renewed logic for a kind of protectionist policy, not aimed at foreign firms *per se* but at domestic firms that may be considered to be moving an excessive degree of business activity to foreign affiliates. Yet, one country acting alone to limit the degree of cheap imported intermediate goods from foreign affiliates is likely to suffer from worsened international price competiveness and lower external demand. Hence, as in the related issue of tax competition, there are strong grounds for international cooperation and simultaneous, coordinated policy action in any attempt to reign in offshoring. For the reasons discussed by Palley (2015, p.61), efforts to reign in offshoring are enormously difficult to achieve from a political economy perspective. Yet, as shown in this paper, failure to do likely implies not only worsening inequality in all periods but also lower unemployment and growth in the short run, if not the long run as well, not to mention the socio-political issues tied up in deindustrialisation and growing imbalance of bargaining power between workers and capitalists.

Final remarks are reserved for the limitations of the model presented here, the emphasis of which it is hoped may spur further research on offshoring from a post-Keynesian perspective. Firstly, we assumed throughout that labour productivity was the same in the Northern firms as it was at foreign affiliates, despite experience telling us that it is the most labour intensive tasks that get offshored first. Second, the non-affiliate sector in the South is unaffected by offshoring in this paper, which is also a simplification. Third, it could also be of great interest to understand the macroeconomic effects of offshoring via *horizontal* FDI, where foreign affiliates produce final goods rather than intermediate goods. One presumes this kind of offshoring would lower exports from the "North" as external demand is met from abroad rather than at home, and could thus have consequences for trade imbalances. Fourth, we supposed that Northern firms achieved their desired fraction of offshore production in the long run (θ^{LR}) by investing a fixed fraction of annual total investment ($\phi = \theta^{LR}$) indefinitely. On one hand, this setup reflects the fact that the offshoring process takes time and does not happen overnight. However, on the other hand, it may be more realistic to suppose that multinationals, especially those that are not financially constrained, are not willing to wait so long. The may therefore set $\phi > \theta^{LR}$ and decrease ϕ when θ approaches or is at θ^{LR}. A flexible foreign investment fraction (ϕ) may thus also warrant some attention—perhaps from a simulated approach, as the matter may become intractable or at least severely complicated from a purely analytical approach. Finally, we took the nominal exchange rate to be exogenously fixed in this analysis, which is an assumption that may wish to be relaxed in future research. In any case, it is hoped that the theory developed here can shed light upon and spur further work on the determinants and macroeconomic implications of the location of multinational production.

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