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FDI-led Growth Models: Sraffian Supermultiplier Models of Export Platforms and Tax Havens

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Abstract

This paper develops two Sraffian supermultiplier models of two different kinds of economies that are dependent upon foreign direct investment (FDI): the "export platform FDI-led" growth model and the "tax haven FDI-led" growth model. The former is driven by the growth of the exports of foreign-owned firms and is associated with greenfield FDI inflows, whereas the latter is driven by the growth of profits booked at foreign-owned shell companies that are partly absorbed through taxation and is associated with intangible FDI inflows. The two models achieve demand, output, and income growth via fundamentally different channels yet appear similarly export-led given how profit shifting artificially inflates the net exports of tax havens. Based on these models, a set of empirical indicators are proposed to differentiate export-platform from tax haven economies. In contrast to Bohle/Regan (2021), who characterise output growth in both Hungary and Ireland as being led by the exports of foreign-owned firms, the model and indicators proposed here support the hypothesis that Ireland is closer to the tax haven FDI-led growth model.

Keywords: Foreign direct investment, growth model, multinational corporation, tax haven

JEL: E12, P44, F21, F23, F62

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1. Introduction

Post-Keynesian economics (PKE) has come to serve as the macroeconomic theoretical basis for a great deal of growth regime analysis in comparative political economy (CPE) in recent years. However, the notion of FDI-led growth, which has been invoked and described within the CPE literature on numerous occasions, has received relatively little attention within PKE. This paper attempts to address this gap by developing post-Keynesian macroeconomic models of what can be described as FDI-led growth. In so doing, the goal is twofold. On one hand, we aim to expand post-Keynesian macroeconomic theory to analyse the macroeconomic effects of FDI and a growing foreign-owned sector in a host economy. On the other hand, by using such theory, the intention is to contribute to debates within CPE regarding the growth models of economies dominated by FDI and cross-border income flows

Numerous authors have employed a variety of names within the CPE literature to refer to different but related kinds of growth models led or driven by foreign-owned multinational corporations (MNCs). These include "export-oriented, FDI-led development" (Fink 2006), "dependent market economies" (Nölke/Vliegenthart 2009), "foreign-led" (Drahokoupil 2009), "dependent catching-up" (Stockhammer et al. 2016), "dependent export-led" (Bohle 2017), and "FDI-led growth" (Brazys/Regan 2017, Regan/Brazys 2018, Bohle/Regan 2021). Though the focus of each work differs, they tend to coalesce around a common set of example economies, most typically those of central and eastern European countries as well as Ireland.

The strengths of this literature lie in the identification and analysis of the socio-political determinants and institutional complementarities inherent in economies dominated by foreign MNCs. As such, there is a rich understanding of the *growth drivers* of such economies, particularly with regard to their historical path dependency and the role of policymakers in attracting and facilitating foreign MNCs. Hence, the roles of relatively low labour costs, proximity to advanced economies, capital mobility, trade openness, and, in particular, a vast variety of state-led investment incentives are understood to be among some of the important drivers of FDI-led growth.

Less well understood is the *demand and growth regime* of such economies.[1] How exactly does foreign direct investment lead to demand and thereby output growth in economies dependent on foreign MNCs? One of the clearest and most specific answers to this central question is provided by Bohle/Regan (2021: 82), who write that

> FDI-led growth models are particular cases of export-oriented growth, because the major exporting firms are foreign-owned. This is typically the case in small and late-developing countries, which rely on foreign investment to modernize their industry … FDI-led growth implies that countries, rather than having to develop their industrial base from their own resources, import raw material, components, or other parts of the value chain; process them; and export them to bigger or more developed markets. It thus differs from the export-led growth model of advanced capitalist countries, such as Germany, where the export industry is less import-dependent.

The authors offer the cases of Ireland and Hungary as examples of the FDI-led growth model. They do so with the slight caveat that "both countries are part of a broader universe of cases" in which they are similar in that "they attract FDI to generate the conditions for export-led

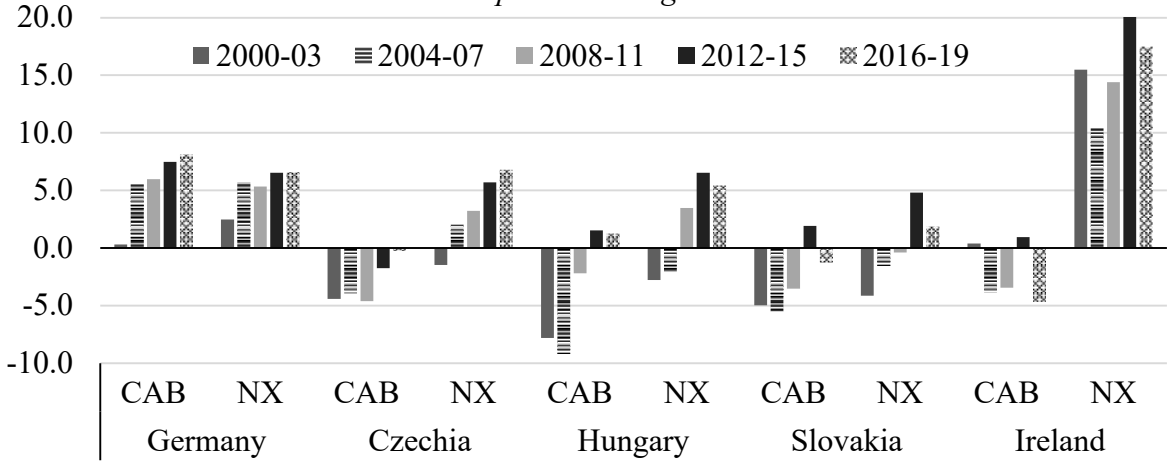
[1] For an extended discussion on the difference between growth drivers and growth regimes, see Eckhard Hein's contribution to this special issue, a working paper version of which can be found under Hein (2022).

growth", but "differ in the *type* of FDI they attract and the *extent* to which FDI has penetrated the broader economy" (ibid. p.97, emphasis in original). According to Bohle/Regan, one of the main difference is of capital intensity, where Ireland attracts high value-added industries such as computer services, pharmaceuticals, and finance while Hungary attracts more labour-intensive manufacturing processes, especially in the automobile industry.

This definition of the FDI-led growth model as a subtype of the export-led growth model seems reasonable. After all, most empirical work based on the analysis of financial balances and growth contributions of the components of demand over the last decade tends to find Ireland and central European countries such as Hungary, Slovakia, Czechia, and Slovenia are export-led (Akcay et al. 2022). Hence, it is more than tempting to accept that these "FDI-led" economies grow due to the growth of external demand for domestically produced output, just like in traditionally export-led economies. Unlike the traditional export-led growth model, however, the drivers of such growth rely on the attraction and retention of foreign MNCs.

As reasonable and useful as this definition of the FDI-led growth model is, it raises at least two questions. First, contrary to a traditional export-led economy like Germany, the economies identified in the literature as FDI-led tend to exhibit *negative* current account balances. This is displayed in Figure 1, where net exports tend to be positive in Germany, Czechia, Hungary, Slovakia, and Ireland, but only the German current account balance is persistently positive and large whereas the current account balances of the other economies are negative or small. Since gross national income rather than gross domestic product tends to be a better indicator of material wellbeing in economies with large foreign sectors, it is not self-evident that the growth of foreign affiliate exports is leading to higher incomes if net income receipts are so strongly negative.

Figure 1. *Current account balances and net exports (% of GDP), period averages*



Data Source: AMECO (2021)

The second issue concerns Ireland in particular. The Irish national accounts are known to suffer from a variety of distortions due to the tax avoidance strategies of foreign MNCs.[2] At least two forms of profit shifting are known to massively inflate the trade balance of tax havens like Ireland (Tørsløv et al. 2018). First, there is transfer mispricing, where finished goods are imported from another affiliate at (close to) cost price and exported for sale at (close to) market

[2] For an extended discussion on the distortions of the Irish national accounts, see Woodgate (2022).

price, allowing the Irish subsidiary to book the profits without any true value added taking place in Ireland. Second, by simply locating its intellectual property (IP) at an Irish holding company, worldwide affiliates of any given MNC may shift profits to Irish subsidiaries by paying royalties and license fees for use of such IP, which may count as the export of a service from Ireland. In both cases, profits that are artificially shifted into Ireland inflate the Irish trade balance. Correcting for these distortions, the estimates of Tørsløv et al. (2018) reveal that Ireland is in fact a net importer. It is thus unclear whether Ireland can be meaningfully described as being led by export growth, whether such exports arise from the foreign sector or not.

Against this backdrop, this paper develops two post-Keynesian models of FDI-led growth, which we will call the "export platform FDI-led" model and the "tax haven FDI-led model" to build upon the terminology seen in Woodgate (2021). As Section 2 explains, both models incorporate a threat to sustained growth that a traditional export-led model does not face, namely the problem of income leakage (Singer 1950). The export platform FDI-led model, presented in Section 3, offers a more formal and more rigorous macroeconomic treatment of what Bohle/Regan (2021) are describing, namely an export-led economy where the major exporting firms are foreign-owned. The tax haven FDI-led model, presented in Section 4, is also dominated by foreign-owned firms, but these firms are shell companies that facilitate the shifting of foreign MNC profits rather than engage in genuine production. The former growth model is shown to be driven by the growth of foreign affiliate exports with direct positive effects on investment, employment, and tax revenues. The latter, on the other hand, is driven by the growth of foreign affiliate profits with direct effect on just tax revenues that are injected into the domestic economy to some extent through government spending.

Despite the nature of production and means of demand generation being fundamentally different in the export platform and tax haven models, the aforementioned national accounts distortions mean they can be easily conflated. Section 5 therefore proposes a set of empirical indicators that may be used to better identify and categorise the growth models of real economies. Returning to the case study countries seen in Bohle/Regan (2021), the theory and empirical indicators presented here suggest that Hungary is indeed well approximated by the export platform FDI-led model but Ireland can be more usefully considered as tax haven FDI-led. The implications of these findings are discussed in the conclusion in Section 6.

2. Macroeconomic foundations for FDI-led growth models

Though few post-Keynesian macroeconomic models have, in recent decades, focussed on the notion of FDI-led growth and the caveats that may go with it, the early and influential work of Hans Singer is highly salient in this regard. Singer (1950: 484) writes, "the main requirement [for the FDI-led growth] of underdeveloped countries would seem to be to provide for some method of income absorption". As we shall show, without a sufficient degree of absorption of the income arising from FDI by domestic residents, output in an economy may be export-led but national income may be FDI-burdened.

To understand this point, let us consider two key examples. First, consider Singer's main concern of FDI into the production and export of primary goods. In the case where a dominant MNC from an advanced economy buys out a producer of primary goods in a developing economy, the FDI inflows may only serve to establish an income leakage from the developing economy. This follows insofar as the subsidiary profits are now retained, repatriated, or

reduced[3] rather than reinvested or paid out to local capitalists who would have used part of this income for consumption demand. Even in the scenario where it is greenfield rather than merger and acquisition FDI that flows into the developing economy primary sector, it may still represent an income leakage when compared with the counterfactual where the foreign advanced MNC engages in trade with a primary producer owned by residents in the developing economy. For these reasons, Singer (1950) rightly points out that the failure to ensure a sufficient degree of income absorption from foreign investment may mean the host economy does not benefit from FDI inflows and may in fact suffer as a result.

A second example on the significance of income absorption concerns tax havens. Tax havens are often the recipient of enormous FDI inflows as MNCs establish special purposes entities (SPEs), engage in intrafirm financing, and move intangibles between affiliates. This non-productive and largely distortionary kind of FDI has been usefully dubbed "phantom FDI" by Damgaard et al. (2019), who find that around 40% of global FDI is phantom in nature and is predominantly hosted by a few well known tax havens. If MNC profits pass through a tax haven without any means of income absorption and if FDI does not result in any real demand generation in the tax haven, then the tax haven economy cannot be expected to benefit in any way.

Of course, tax havens typically *do* have a means of income absorption. Small rates of corporation tax on large inflows of MNC profits can produce substantial tax revenues for a tax haven government. Even tax havens with no corporation tax usually have some form of income absorption, such as annually recurring business registration fees (Saez/ Zucman 2019) or a local "professional services" sector that thrives off MNCs' demand for the accounting, legal, and financial services required to minimise their global tax bill (Damgaard et al. 2019). Therefore, as argued in Woodgate (2021), a tax haven must also ensure a sufficient degree of income absorption—typically via taxation in this case—if it is to experience FDI-led growth.

Singer (1950) suggested three ways in which foreign incomes may be absorbed such that growth may follow FDI. First, rather than be retained or repatriated, profits of foreign affiliates may be absorbed in the sense that they are reinvested in the host economy.[4] Second, the profits of foreign affiliates may be taxed and injected into the local economy though government spending. Third, Singer (1950: 484) notes that FDI-led growth may result via "the absorption of rising productivity in primary production in rising real wages and other real incomes". This may lend itself to a supply-side interpretation, whereby advanced foreign production processes have positive spillover effects on local firms (Grossman/Rossi-Hansberg 2012). In addition, it may have a demand-side interpretation, to the extent that any increase in productivity encourages further investment (Hein 2014: ch. 8) and to the extent that any increase in real wages spurs local consumption demand. We might thus expect aggregate demand to benefit via at least one of these three channels in an FDI-led growth model.

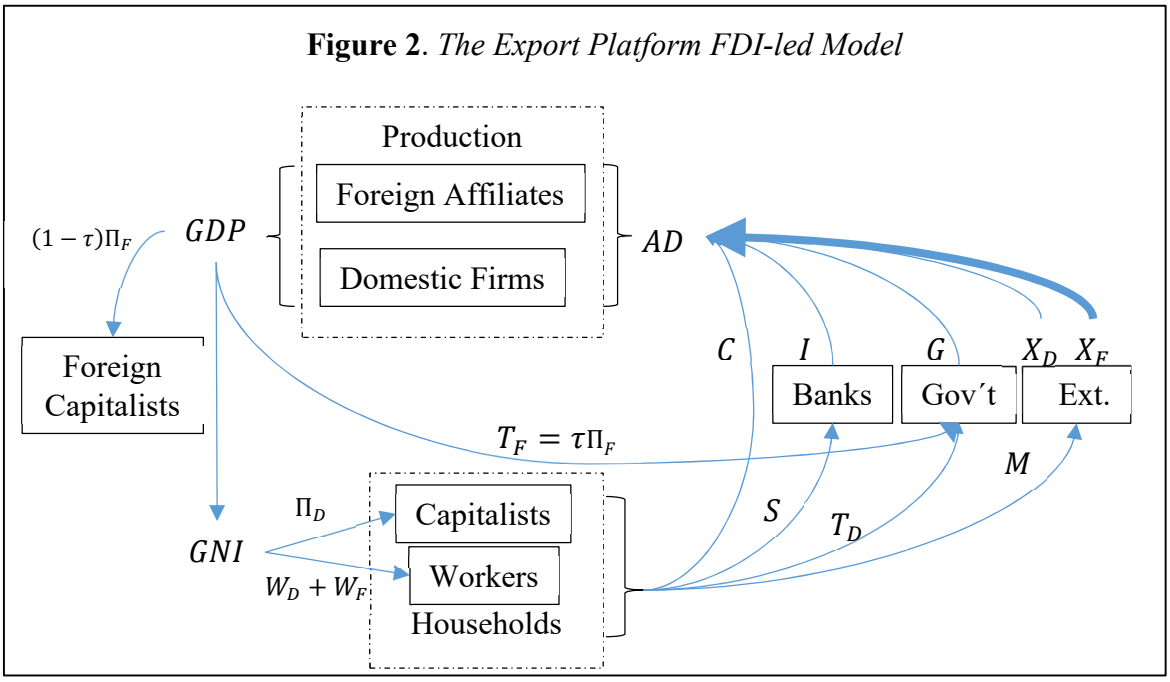
From this analysis it follows that there may be different kinds of FDI-led growth models depending on the nature and purpose of the FDI inflows, on the ways in which FDI income is absorbed, and on the channels through which the foreign sector boosts or hinders demand. To allow for a more detailed analysis of the different kinds of FDI-led growth regimes, let us

[3] Should the foreign MNC treat the output of the acquired subsidiary as an input good, it may follow that the MNC lowers its price and thereby reduces the profitability its subsidiary. Of course, this undermines the principle of arm's length pricing and constitutes profit shifting, but is nonetheless prevalent (Zucman 2014).
[4] For a Kaleckian model of growth via tax-sensitive greenfield FDI, see Woodgate (2020).

broaden the sense of the term "FDI-led" from the way in which it is used by Bohle/Regan (2021). Building on the terms seen in Woodgate (2021), let us now redefine an economy whose aggregate demand is driven by the exports of foreign affiliates as "export platform FDI-led" or simply "foreign export-led". Now, in addition, let us define a "tax haven FDI-led" economy as one where government expenditures are largely financed through tax revenues collected from foreign-owned firms.[5] We can most clearly differentiate between the export platform FDI-led model and the tax haven FDI-led model through simplified circular flow diagrams. These will also help motivate the structure of the models in the proceeding sections.

We begin with what Bohle/Regan (2021) referred to as the FDI-led model and what we call the export platform FDI-led model. The circular flow diagram of this growth model is displayed in Figure 2. Here we see a part of production is carried out by foreign affiliates that have been established to meet external demand from the rest of the world, represented by the bold arrow labelled X_F. Here foreign affiliate exports are assumed to grow at a faster rate than the exports of domestic firms, such that $\widehat{X_F} > \widehat{X_D}$. The income generated by foreign affiliates is split three ways: Foreign affiliate wages (W_F) go to domestic worker households, while profits net of tax ($[1-\tau]\Pi_F$) accrue to foreign capitalists, and the foreign affiliate tax bill ($\tau\Pi_F$) is paid to the local government. Naturally, given the presence of negative net income receipts, the size of the gross domestic product (GDP) exceeds that of gross national income (GNI). An increasing level of foreign affiliate output has feedback effects on consumption (to the extent that W_F is consumed), investment (to the extent that increases in output spur investment), government spending (to the extent that tax from foreign profits are reinjected into the economy), and imports (to an extent determined by the marginal propensity to import). Crucially, and in typical post-Keynesian fashion, we will assume sufficient slack in the economy throughout our analysis (meaning that we will not run up against labour or resource constraints) and that investment is demand-led and enabled by endogenously created credit. For simplicity, foreign investment is assumed to be financed by local rather than foreign banks.

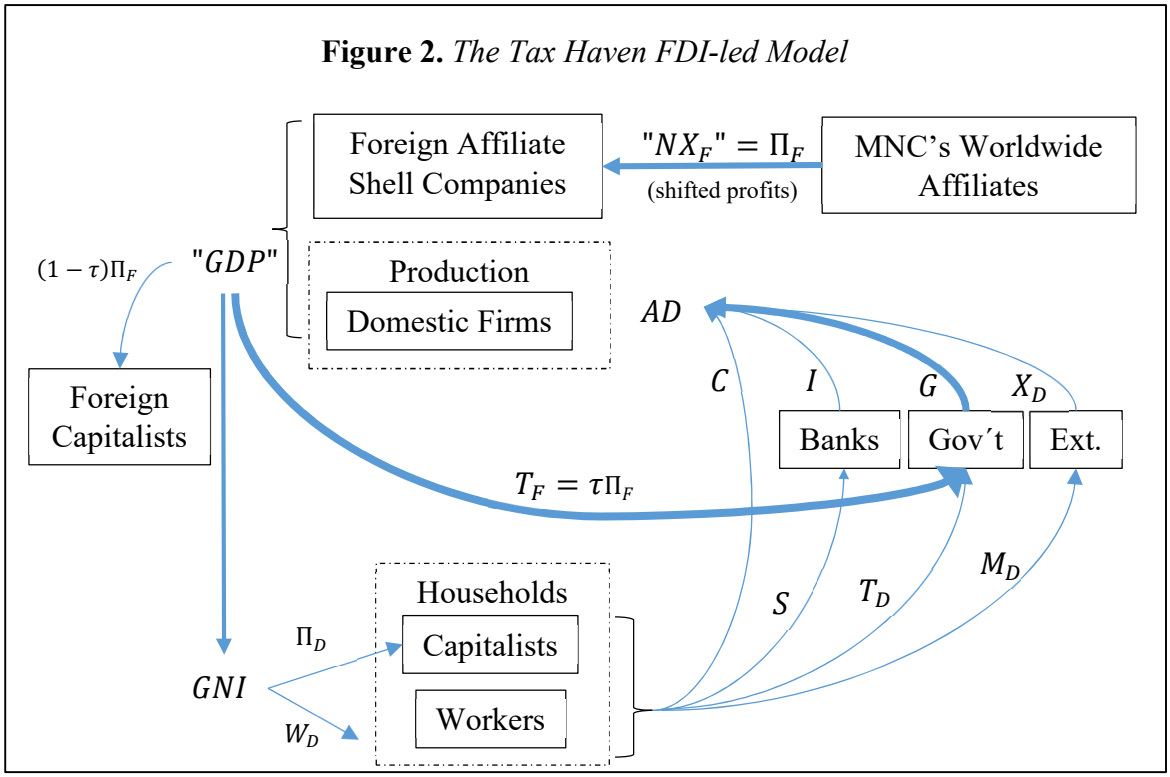
Figure 2. *The Export Platform FDI-led Model*



[5] Theoretically, demand in a tax haven FDI-led economy could also be generated without growing government expenditures if the tax burden on domestic residents falls continuously, thereby stimulating consumption through higher disposable incomes.

In contrast, while the tax haven FDI-led growth model may *appear* to be driven by the net exports of foreign firms, it is in fact driven by the profits of foreign MNCs. Since the foreign affiliates are actually mere shell companies, they are now separated from the genuinely productive domestic companies in Figure 2. They act as a conduit through which MNCs can pass worldwide profits to shield such profits from tax authorities elsewhere. For the privilege of saving on worldwide taxes, they have to pay a very low rate of tax (τ_F) on profits that pass through the tax haven. This is merely a tribute of sorts—relatively little for any given MNC but part of a potentially substantial "free lunch" for the government of the tax haven economy, especially a small economy. The vast majority of the MNC profits that enter the tax haven economy via "net exports" leave via net income payments. The part that is absorbed by taxes is injected into the economy as government expenditures. Hence, the main driver of demand here is government spending financed through taxation of inward shifted profits, reflected in the bold arrows in Figure 2. However, it appears as the net exports of foreign affiliates given the ways profit shifting affects the national accounts. In comparison to the export platform FDI-led economy, no wages are paid by foreign affiliates and no tangible investment is undertaken. All genuine value added is created by domestic firms. However, the demand faced by domestic firms is generated in the public sector, which is financed without increasing the tax burden on domestic households nor without the potential political or economic problems that may arise from running persistent deficits. As before, investment is assumed to be demand-led and enabled by endogenously created credit money and we will assume that there are no pressing resource constraints.

Figure 2. *The Tax Haven FDI-led Model*



With the structure of these two FDI-led growth models differentiated and clarified, we move on in the next two sections to analyse the dynamics and outcomes of the two models in more detail. To do so, we will adopt the Sraffian supermultiplier modelling approach.[6] This

[6] The origins of this approach lie in Serrano (1995). For an overview, see Morlin et al. (2022) or Hein (2022).

approach is taken since we agree with Morlin et al. (2022: 6) who argue that it is "particularly useful for CPE studies, inasmuch the ultimate causes of growth in the supermultiplier are not found in the intricacies of economic modeling but in the political and social determinants of autonomous demand components." As mentioned in the introduction, much has been written in CPE about the growth drivers of foreign-dominated economies. Here we build upon that literature by focusing on the demand and growth regimes of FDI-led growth models.

3. The export platform FDI-led growth model

We are now in position to develop the first of the two FDI-led growth models described in this paper. Consumption (C) in the export platform FDI-led growth model is viewed as a function of a fixed marginal propensity to consume (c) and national income ($Y - \Pi_F$) net of tax, where τ is the tax rate applied to all value added

$$C = c(1 - \tau)(Y - \Pi_F). \quad (1)$$

The profits of foreign affiliates (Π_F) can be expressed as a function of foreign affiliate gross value added (Y_F) and the profit share in foreign affiliate value added (π_F). For our purposes, we will assume that the foreign affiliate profit share is a constant, and that all value added is exported to foreign markets such that $Y_F = X_F$. From this setup, it follows that the profits of foreign affiliates are proportional to the level of their exports[7],

$$\Pi_F = \pi_F Y_F = \pi_F X_F. \quad (2)$$

We now define the share of foreign affiliate exports in total exports by

$$\sigma = X_F / X, \quad (3)$$

where the σ notation mirrors that found elsewhere in the literature with two autonomous growth drivers (e.g. Freitas/Christianes 2020, Morlin 2022). The consumption function can thus be expressed as follows

$$C = (1 - s)(1 - \tau)(Y - \pi_F \sigma X). \quad (4)$$

We will employ the same simplified investment function seen elsewhere in the Sraffian supermultiplier literature (Freitas/Serrano 2015, Freitas/Christianes 2020, Morlin 2022), whereby investment (I) is induced by changes in output. In the short run, the marginal propensity to invest (h where $0 \leq h < 1$) is given, but, as we will see later, it will vary over the long run depending on the difference between actual and normal capacity utilisation

$$I = hY. \quad (5)$$

Moving to the public sector, we have a simplified tax revenue function, where taxes collected (T) is a product of the tax rate and gross domestic value added

$$T = \tau Y. \quad (6)$$

Note that this implies that all income streams are taxed at the same rate. To maintain our focus on the area of interest, government expenditures (G) are seen as being dependent upon tax revenue and the fiscal budget parameter (b),

$$G = bT = b\tau Y \quad (7)$$

[7] One could reasonably argue that Π_F, which accrues to foreign capitalists, may fuel demand for X_F to a certain extent. As true as that may be, we would expect any such feedback effect to be small. For simplicity, it is ignored.

where b is taken to be an exogenously determined and fixed policy parameter. A primary surplus is represented by $b < 1$, a balanced budget rule by $b = 1$, and a primary deficit by $b > 1$. We ignore debt dynamics by assuming any deficits are financed through money emission.

Net exports are given by the difference between total exports of domestic and foreign firms ($X = X_D + X_F$) and total imports, which are the product of the marginal propensity to import (m where $0 \leq m < 1$) and total value added

$$NX = X - mY. \tag{8}$$

The exports of foreign affiliates and domestic firms are both autonomous and exogenously given. Here we will entertain the case where foreign affiliate exports grow faster than domestic exports in all periods, i.e. $\widehat{X_F} > \widehat{X_D}$.[8]

Through equating the total product with aggregate demand, comprised of consumption, investment, government spending and net exports, we are now in a position to solve for the short-run equilibrium. As usual for this class of model, the short-run equilibrium level of gross value added (Y^*) is determined by the product of autonomous demand—in our case total exports of foreign-owned and domestic firms—and the supermultipler (μ)

$$Y^* = \mu X, \quad \text{where } \mu = \frac{1-c(1-\tau)\pi_F\sigma}{1-c(1-\tau)-b\tau-h+m}. \tag{9}$$

Unlike many other supermultiplier models, however, the numerator of the supermultiplier here is less than one. This reflects the fact there is an income leakage in the circular flow. As total exports, and thereby the whole economy, is increasingly dominated by foreign affiliate exports, represented by a rising σ, more of the proceeds from the gross domestic product accrue to foreign capitalists. Net foreign affiliate profits therefore reduce the supermultiplier. As usual, the denominator of the supermultiplier is thought to be positive since the marginal propensity to spend is positive but less than one, such that

$$0 < c(1-\tau) + b\tau + h - m < 1. \tag{10}$$

Gross domestic product and gross national income (Y_{GNI}) are not equal in our foreign-dominated economy. Therefore, total wages and profits accruing to domestic households in the short-run equilibrium are

$$Y^*_{GNI} = lX, \quad \text{where } l = \frac{1-\pi_F\sigma(1-b\tau-h+m)}{1-c(1-\tau)-b\tau-h+m}. \tag{11}$$

Given the Keynesian stability condition expressed in Condition 10, the national income supermultiplier l must be positive but less than the output supermultiplier μ in any period. This implies that Y^*_{GNI} is less than Y^*, as expected in a model with negative net income receipts.

3.1 Dynamics

We will ignore depreciation such that the accumulation rate (g_K) is a function of the marginal propensity to invest, the ratio of capital to full-capacity output ($v = K/Y_K$), and the capacity utilisation rate ($u = Y/Y_K$)

$$g_K = I/K = hu/v. \tag{12}$$

While h and u are endogenously determined variables, the capital-potential output ratio is considered constant. The growth rate of output ($g = \hat{Y}$) in any period is, by Equation 9, the sum of the growth rate of the supermultiplier and the growth rate of exports

[8] One could instead assume that foreign exports grow at a faster rate than domestic exports only for a definite period, such that σ does not tend to one in the long run. For example, in related models with different autonomous demand expenditures, Freitas/Christianes (2020) and Morlin (2022) posit a long-run value of σ between one and zero, though without developing a mechanism through which it is obtained. Here the simpler assumption is preferred as it still appears to approximate within reason the experience of countries like Hungary, where data from the OECD Analytical Activities of MNCs Database shows that the share of foreign affiliate exports in total exports rose from 64% in 2005 to 77% in 2015 without much sign of slowing down.

$$g = \hat{Y} = \hat{\mu} + \hat{X}. \tag{13}$$

In turn, the growth rate of exports is the sum of the growth rates of foreign affiliate exports and domestic firms' exports, weighted by the share of each in total exports

$$\hat{X} = \sigma\widehat{X_F} + (1-\sigma)\widehat{X_D}. \tag{14}$$

The time rate of change (denoted by a dot) of the share of foreign exports in total exports is given by

$$\dot{\sigma} = \sigma(1-\sigma)(\widehat{X_F} - \widehat{X_D}). \tag{15}$$

This reflects the fact that σ is a logistic function of time bounded between 0 and 1. Since we assume that the exports of foreign affiliates grow at a faster rate than those of domestically owned firms $\widehat{X_F} > \widehat{X_D}$, it naturally follows that σ will tend to one in the long run.

Given the definition of capacity utilisation, it follows that the rate of change of capacity utilisation can be expressed as

$$\dot{u} = u(g - g_K). \tag{16}$$

Similar to much of the related literature, the rate of change of the propensity to invest is primarily dependent upon the responsiveness of investment, reflected in the parameter γ, to deviations of capacity utilisation from its normal or planned degree of utilisation (u_n)

$$\dot{h} = h\gamma(u - u_n). \tag{17}$$

With the rates of changes of the key variables so defined, we can now express the growth rate of the supermultiplier as follows

$$\hat{\mu} = \frac{\dot{h} - c\pi_F(1-\tau)\dot{\sigma}/\mu}{1 - c(1-\tau) - b\tau - h + m}. \tag{18}$$

Similarly, the growth rate of national income, which follows from Equation 11, is

$$g_{GNI} = \widehat{Y_{GNI}} = \hat{l} + \hat{X}, \tag{19}$$

where the income supermultiplier, l, grows at a rate determined by

$$\hat{l} = \frac{\dot{h} - \pi_F\,[\dot{h}\sigma - (1 - b\tau - h + m)\dot{\sigma}]/l}{1 - c(1-\tau) - b\tau - h + m}. \tag{20}$$

3.2 Steady state and its stability

The system tends to its long-run equilibrium, where $\dot{\sigma} = \dot{u} = \dot{h} = 0$, as

$$\sigma^{**} \to 1 \tag{21}$$

$$u^{**} \to u_n \tag{22}$$

$$h^{**} \to \widehat{X_F}v/u_n, \tag{23}$$

where two asterisks denote the long-run equilibrium values. From Equations 18 and 19 it can be observed that the growth rates of the output and income supermultipliers, $\hat{\mu}$ and $\hat{l}$ respectively, are zero in the long run. This implies that the long-run growth rates of output and income are given by the growth rate of foreign affiliate exports.

$$g^{**} \to \widehat{X_F}. \tag{24}$$

$$g_{GNI}^{**} \to \widehat{X_F}. \tag{25}$$

By examination of Equation 12, it also follows that the long-run accumulation rate is also determined by the growth rate of foreign exports

$$g_K^{**} \to \widehat{X_F}. \tag{26}$$

As shown in the appendix, the long-run equilibrium is locally stable if the product of the Harrodian instability parameter (i.e. the responsiveness of the rate of change of the propensity to invest to deviations of capacity utilisation from its normal rate, γ) and the capital-potential output ratio (v) plus the marginal propensity to spend is less than one:

$$\gamma v + c(1-\tau) + h + b\tau - m < 1. \tag{27}$$

Note that this is essentially the same stability condition seen elsewhere in the literature (e.g. Freitas/Serrano 2015, Morlin 2022). As Freitas/Serrano (2015: 14) explain, the left-hand side of Condition 27 can be interpreted as the "expanded marginal propensity to spend" which includes the adjustment term (γv) that determines induced investment outside of the steady state.

3.3 Macroeconomic effects of an increasingly dominant foreign sector

Regarding the traverse to the long run, Equation 28 shows that the growth rate of the domestic product is positively affected in every period in which the share of foreign affiliate exports in total exports rises

$$\frac{\partial g}{\partial \sigma} = \frac{\left(\widehat{X_F} - \widehat{X_D}\right)\left(1 - c\pi_F(1-\tau)\right)}{\left(1 - c\pi_F(1-\tau)\sigma\right)^2} > 0. \tag{28}$$

The effect of increases in the share of foreign affiliate exports on the growth rate of national income

$$\frac{\partial g_{GNI}}{\partial \sigma} = \frac{\dot{h}\pi_F + \left(\widehat{X_F} - \widehat{X_D}\right)[1 - \pi_F(1 - b\tau - h + m)]}{[1 - \pi_F\sigma(1 - b\tau - h + m)]^2} \tag{29}$$

is positive if capacity utilisation is at or above its normal rate such that the rate of change of the propensity to invest ($\dot{h}$) is zero or positive respectively.[9] It is conceivable that if $\dot{h}$ is sufficiently negative in some period and the difference between the two autonomous growth drivers $\left(\widehat{X_F} - \widehat{X_D}\right)$ is sufficiently small, then $\partial g_{GNI}/\partial\sigma$ may be negative in that period. However, any negative effect on national income must be temporary as the propensity to invest is positively affected by increases by the share of foreign exports.[10] Hence, barring any strong disequilibrium effects, national income is positively affected by an increasing share of foreign exports in total exports.

Lastly, note that the a simultaneous trade surplus and current account deficit is not only possible in our simple model, but becomes more likely as the share of foreign affiliate exports grows. Net exports can be expressed by

$$NX = X[1 - m\mu] \tag{30}$$

and the current account balance is given by

[9] Note that by Condition 10, the second term in the numerator of Equation 29 is always positive.

[10] This follows because h is a positive function of u which is a positive function of g, and Equation 28 shows that g is positively affected by σ.

$$CAB = X[1 - m\mu - (1 - \tau)\pi_F\sigma]. \quad (31)$$

Net exports are positive and the current account is negative when the following condition holds

$$-mc(1 - \tau)\pi_F\sigma \; < \; 1 - c(1 - \tau) - b\tau - h^{**} \; < \; \frac{m(1 - \tau)(1 - c)\pi_F\sigma}{1 - (1 - \tau)\pi_F\sigma}. \quad (32)$$

This is possible only for non-zero values of the share of profits in foreign affiliate value added (π_F) and of the share of foreign affiliate exports (σ), and becomes increasingly likely as the latter rises to its long-run value of one. The intuition behind this effect is that as more of the income generated domestically accrues to foreign capitalists (reflected in a higher value of $\pi_F\sigma$) it follows that net income payments rise (pushing the current account balance towards deficit), and less income flows to domestic households whose demand fall (thereby boosting net exports). Clearly relevant here as well is the propensity to import, *m*, especially in relation to the other components of the marginal propensity to spend, which are in the middle term of Condition 32. A simultaneous trade surplus and current account deficit becomes more likely with a higher propensity to import since it effectively amplifies the aforementioned effects of a greater degree of profits accruing to foreign capitalists.

4. The tax haven FDI-led growth model

We now turn to the second FDI-led growth model presented here, namely the tax haven FDI-led model. As explained in section two, reported GDP in a tax haven suffers from distortions arising from the profits of foreign affiliate shell companies being recorded as their "net exports". Here, we will model the underlying economy of the tax haven, where all variables are undistorted. For example, total value added, Y, reflects genuine value added in the economy, which is created exclusively by domestically owned firms. All foreign firms are assumed to be shell companies that facilitate profit shifting and that their net exports purely reflect inward shifted profits (via transfer mispricing or IP relocation). Therefore, the only way such shell companies affect the underlying economy is via the government's spending of their taxed profits.

For simplicity and for comparison's sake, the structure of the tax haven model presented here is similar to the preceding model. A central difference is that we will now allow for two different tax rates rather than one: a tax rate on value added created by domestic firms, τ_D, and a tax rate on the "value added" of the foreign affiliates, τ_F, which, given our setup, is the same as a tax on foreign affiliate profits. The foreign affiliate tax rate, τ_F, is set especially low to attract the attention of foreign MNCs.[11] Hence, total tax revenue collected in the tax haven is given by

$$T = \tau_D Y + \tau_F \Pi_F. \quad (33)$$

Maintaining the assumption that government expenditure is determined by the fiscal budget parameter, b, and total tax revenue, we get

$$G = b(\tau_D Y + \tau_F \Pi_F). \quad (34)$$

[11] In reality, a low targeted foreign affiliate tax rate may be achieved through the use of any number of policy instruments, including special economic zones, so-called "sweetheart deals" that are typically brokered by an investment promotion agency, tax exemptions and carve-outs (e.g. for intellectual property), or simply through setting a low statutory rate of corporate tax relative to other taxes. For more on this, see Woodgate (2021).

As before, consumption is simply given by the product of the marginal propensity consume and disposable income

$$C = c(1 - \tau_D)Y. \tag{35}$$

Investment is, as before, determined by genuine value added and the marginal propensity to invest

$$I = hY. \tag{36}$$

Lastly, net exports are, as in the previous model, given by the difference between autonomous exports and induced imports

$$NX = X - mY. \tag{37}$$

Here, however, exports come purely from the domestic sector since this is the only sector engaged in genuine production, i.e. $X = X_D$.

Given these behavioural equations, the short-run level of output is determined by the product of the supermultiplier, μ, and autonomous demand

$$Y^* = \mu(b\tau_F\Pi_F + X), \quad \text{where } \mu = \frac{1}{1 - c(1-\tau_D) - h + m} > 0. \tag{38}$$

Note that, contrary to the export platform FDI-led model, there is no leakage of income arising from production since all output is created by domestically owned firms. Hence, the supermultiplier differs to the previous one. Similar to the previous model, there are two sources of autonomous demand (Z), one of which being the exports of the domestic sector.

$$Y^* = \mu Z, \quad \text{where } Z = b\tau_F\Pi_F + X. \tag{39}$$

However, rather than the exports of foreign affiliates, the second autonomous demand component is the government spending induced by the taxation of foreign profits ($b\tau_F\Pi_F$). For convenience, we will refer to this autonomous growth component as *tribute-induced government spending*, the share of which in autonomous expenditures, denoted again by σ, is given by

$$\sigma = b\tau_F\Pi_F/Z. \tag{40}$$

4.1 Dynamics

Moving on to the dynamics of the tax haven FDI-led model, we note that the growth rate of output is given by the sum of the growth rates of the tax haven supermultiplier and autonomous demand, where the latter is the average of foreign profits growth rate and the export growth rate, weighted by σ

$$g = \hat{\mu} + \hat{Z} = \hat{\mu} + \sigma\widehat{\Pi_F} + (1 - \sigma)\hat{X}. \tag{41}$$

The growth rate of the tax haven supermultiplier is

$$\hat{\mu} = \frac{\dot{h}}{1 - c(1 - \tau_D) - h + m}. \tag{42}$$

Since the rate of change of capacity utilisation and the propensity to invest are specified as before, namely by Equations 16 and 17

$$\dot{u} = u(g - g_K) \tag{16}$$

$$\dot{h} = h\gamma(u - u_n), \tag{17}$$

it follows that the supermultiplier growth rate is nonzero only when capacity utilisation deviates from its normal rate. Lastly, the share of tribute-induced government spending in total autonomous demand has a rate of change given by

$$\dot{\sigma} = \sigma(1 - \sigma)\left(\widehat{\Pi_F} - \hat{X}\right). \tag{43}$$

4.2 Steady state and its stability

Since we assume that foreign affiliate profits grow at a faster rate than domestic exports ($\widehat{\Pi_F} > \hat{X}$) in every period, the economy tends to its long-run equilibrium given by

$$u^{**} \to u_n \tag{44}$$

$$\sigma^{**} \to 1 \tag{45}$$

$$h^{**} = \hat{Z}v/u_n \to \widehat{\Pi_F}v/u_n \tag{46}$$

$$g^{**} = g_K^{**} \to \widehat{\Pi_F}. \tag{47}$$

As shown in the appendix, the long-run equilibrium is locally stable given essentially the same condition seen before and elsewhere in the related literature, namely when

$$\gamma v + c(1 - \tau_D) + h + b\tau_D - m < 1. \tag{48}$$

4.3 Macroeconomic effects of an increasingly dominant foreign sector

The growth rate of value added and national income in the tax haven FDI-led model is positively affected by increases in the share tribute-induced government spending in autonomous demand, σ. This is true of every period in the traverse to the long run

$$\frac{\partial g}{\partial \sigma} = \left(\widehat{\Pi_F} - \widehat{X_D}\right) > 0. \tag{49}$$

As in the export platform FDI-led model, we finish our investigation here by examining the role of the increasingly dominant foreign sector in explaining the concurrence of trade surpluses and current account deficits in the tax haven FDI-led model. To do so, we must differentiate between *genuine* net exports (NX_G) and *reported* net exports (NX_R), where, as shown in Equations 50 and 51, the latter includes the "net exports" of foreign affiliates, which are in truth simply the foreign profits shifted inwards. The reported current account balance (CAB_R) is the reported net exports plus the net income receipts ($NY = -(1 - \tau_F)\Pi_F$), as shown in Equation 52.

$$NX_G = X - M \tag{50}$$

$$NX_R = X - M + NX_F = NX_G + \Pi_F \tag{51}$$

$$CAB_R = NX_R + NY = NX_G + \Pi_F - (1 - \tau_F)\Pi_F = NX_G + \tau_F\Pi_F \tag{52}$$

Expressing genuine net exports in terms of Z and σ

$$NX_G = Z(1 - \sigma - m\mu), \tag{53}$$

we note than the tax haven FDI-led model is more likely to be a net importer (in genuine terms) as autonomous demand is increasing dominated by government spending financed through the taxation of shifted profits (i.e. as σ rises). Intuitively, this follows from the fact that increased government spending relative to exports will generate income that is partly spend on imports.

The concurrence of reported trade surpluses and current account deficits in the tax haven FDI-led model is therefore possible when

$$\tau_F \Pi_F < -NX_G < \Pi_F. \tag{54}$$

Hence, genuine net exports must be negative (i.e. the tax haven must be a net importer once profit-shifting distortions are removed) in order to explain a simultaneous reported trade surplus and current account deficit. Condition 54 says the size of these net imports must be greater than the size of tax revenue collected from foreign affiliates ($\tau_F \Pi_F$) and less than the size of profits shifted inward (Π_F). Since τ_F is extremely low in tax havens, the corridor around the level of net imports may be very wide.

As σ tends to its long-run equilibrium value of one, this condition, now expressed in terms of the model's exogenous parameters, becomes

$$1 < bm\mu^{**} < 1/\tau_F, \tag{55}$$

where μ^{**} is the tax haven supermultiplier in the steady state. Again, since τ_F is extremely low in tax havens, it seems very likely that $bm\mu^{**} < 1/\tau_F$. The first inequality, where $1 < bm\mu^{**}$, is more likely to hold when the tax haven government tends to run deficits ($b > 1$) as this implies tax revenue collected from foreign affiliates is used to boost aggregate demand to a greater extent, thereby increasing imports. Since μ^{**} rises with increases in in the long-run propensity to invest, where $h^{**} = \widehat{\Pi_F} v/u_n$, it also follows that a higher rate of growth of foreign profits makes the fulfilment of this condition more likely. Hence, the concurrence of a reported trade surplus and current account deficit in tax havens may be explained by the nature of growth in the tax haven FDI-led model.

5. Empirical Indicators for the Type of FDI-led Growth

Motivated by the theory of the proceeding sections, it would be useful to establish empirical indicators that may help us identify which national economies are better described by which of these two FDI-led growth models. As mentioned in section two, differentiating between a traditional export-led economy, like that of Germany, and an FDI-led economy is relatively easy. We would expect the latter to exhibit relatively high FDI/GDP ratios and strongly negative net income receipts. Data on output, trade, investment, or employment by nationality of the ultimate owner of the firm or sector is obviously also helpful in differentiating between export-led and FDI-led economies. Growth drivers should also differ in key regards, reflected in, for example, the extent to which governments of FDI-led economies engages in policy competition in matters of tax, subsidies and other forms of foreign-oriented state aid (Woodgate 2021).

Differentiating between an export platform FDI-led economy and a tax haven FDI-led economy is more difficult given the distortions that particularly affect the latter. Nonetheless, we can offer a number of differentiating indicators that are based on the theory developed above that we will apply to Ireland and Hungary, to use the example countries put forward by

Bohle/Regan (2021), as a final application. For the sake of comparison to a traditional export-led economy, these two countries will be compared to Germany throughout.

5.1 Undistorted national accounts indicators

Both export platforms and tax havens report strong trade surpluses, but net exports in tax havens are largely inflated by inward shifted profits. Removing the profit-shifting distortion, we would expect to find a much smaller trade surplus, if not a trade deficit, in a tax haven FDI-led economy. Similarly, the profit share of GDP is inflated by profit shifting in tax havens, such that the undistorted measure of profits in genuine domestic product should be much lower.

While there has not been a great deal of work on estimates of the national accounts corrected for profit shifting, that which we can use by Tørsløv et al. (2018), which was estimated based on 2015 data, supports the idea that Ireland and Hungary have significantly different growth models. As shown in Table 1, Ireland's trade surplus shrinks by 37 percentage points (p.p.) and its profit share is reduced by 20 p.p. when correcting for the effects of profit shifting, whereas Hungary's and Germany's corrected statistics increase, though not by much. Undistorted, genuine net exports in Ireland are found to be negative, which, by Condition 54 above, helps explain Ireland's reported trade surplus and current account deficit.

Table 1. *National accounts statistics corrected for profit shifting in 2015*

	Net Exports/GDP			***Profit Share of GDP***		
	Reported	*Corrected*	*Difference*	*Reported*	*Corrected*	*Difference*
Germany	8%	9%	1 p.p.	29%	31%	2 p.p.
Hungary	9%	10%	1 p.p.	36%	39%	3 p.p.
Ireland	31%	-6%	-37 p.p.	62%	42%	-20 p.p.

Data Source: Tørsløv et al. (2018, appendix tables C5 and C5b)

5.2 FDI indicators

Since the export platform FDI-led model is associated with greenfield FDI and the tax haven FDI-led model is associated with intangible FDI, we would expect to find high ratios of greenfield to total FDI in the former and low ratios in the latter. However, data on annual greenfield FDI is hard to come by. Instead, we can make use of the more readily available value of *announced* greenfield FDI. The value of announced greenfield FDI may exceed total FDI in any given year, since announced FDI may take many years to complete. Hence, the ratio of announced greenfield FDI to total FDI is not ideal, but it is nonetheless informative for our purposes

Table 2 compares the same three countries on the average ratio of announced greenfield FDI to total FDI inflows over the years of data availability, 2003-2021. As expected, Hungary exhibits a higher ratio than that of Germany, our benchmark traditional export-led economy, and a much higher ratio than that of Ireland. This further supports the hypothesis that the tax haven FDI-led growth model is more relevant for Ireland whereas the export platform FDI-led model appears more relevant for Hungary.

Table 2. *Average Ratio of Announced Greenfield FDI to Total FDI Inflows, 2003-2021*

Germany	***Hungary***	***Ireland***
46%	136%	18%

Data Source: UNCTAD (2021, annex tables)

5.3 Tax revenue indicators

Given the centrality of tribute-induced government spending in the tax haven FDI-led model, we would expect economies that are described by this growth model to rely on foreign affiliates for a relatively large part of their tax revenues. Table 3 shows that this is indeed the case for Ireland over the years of data availability, namely 2016-2017. According to data from the OECD (2020, 2021), Ireland collects around 63% of its total corporate tax revenue from foreign-owned firms. Expressed as a percentage of total tax revenue, corporate taxes paid by foreign affiliates makes up about 7.5%. This is more than seven times the ratio seen in Hungary and more than ten times that of Germany.

Table 3. *Average Corporate Tax Revenue Collected from Foreign Affiliates, 2016-2017*

	Germany	***Hungary***	***Ireland***
…as a percentage of total corporate tax revenue	13.5%	19%	63%
…as a percentage of total tax revenue	0.7%	1.1%	7.5%

Data Source: OECD (2020,2021)

5.4 Indicators based on foreign affiliate statistics

A last set of indicators that can be offered here are based on foreign affiliate statistics. The theory developed above suggests that foreign affiliates in tax haven FDI-led models face particularly low rates of tax and report extremely high degrees of profitability. Using related data from the Bureau of Economic Analysis on US majority-owned foreign affiliates (MOFAs) in Germany, Hungary, and Ireland again suggests, as expected, that Ireland is closest to the tax haven FDI-led model. As reported in Table 4, the foreign affiliate effective corporate tax rate in Ireland was much lower than that of Hungary and Germany at just 7% on average between 1999 and 2019—the longest period of data availability for comparison purposes between the three countries in question.[12] The last two measures in Table 4 reflect the degree of reported profitability of US MOFAs in each country. The ratio of profits to labour compensation of US MOFAs is extremely high in Ireland, resulting in an implied wage share that is extremely low (relative to common national wage shares of about two thirds).[13] Hungary, on the other hand, exhibits a MOFA implied wage share of 62%, similar to usual national wage shares. Lastly, Germany exhibits low profitability ratio and high implied wage share, which likely suggests US MOFAs shift profits out of Germany to low-tax jurisdictions like Ireland. In sum, this data further supports the notion that the growth model of Ireland differs to of Hungary, which differs to that of Germany.

Table 4. *Selected Statistics of US-Owned Affiliates, Averaged Across 1999-2019*

	Germany	***Hungary***	***Ireland***
Foreign affiliate effective corporate tax rate	39%	20%	7%
Profits to labour compensation ratio at foreign affiliates	24%	73%	682%
Implied wage share at foreign affiliates	81%	62%	13%

Data Source: BEA (2021)

[12] The average effective corporate tax rate (AECTR) here is defined by the ratio of foreign income tax paid to profit-type return of US majority-owned foreign affiliates (MOFA) in each respective country. As it is an effective rather than statutory rate, it best captures to true tax burden experienced by US MOFAs in each country. Of course, a better measure would capture the AECTR of all MOFAs, regardless of ultimate nationality, but as it stands foreign affiliate statistics, besides those reported by the US, lack the sufficient degree of detail for this purpose.

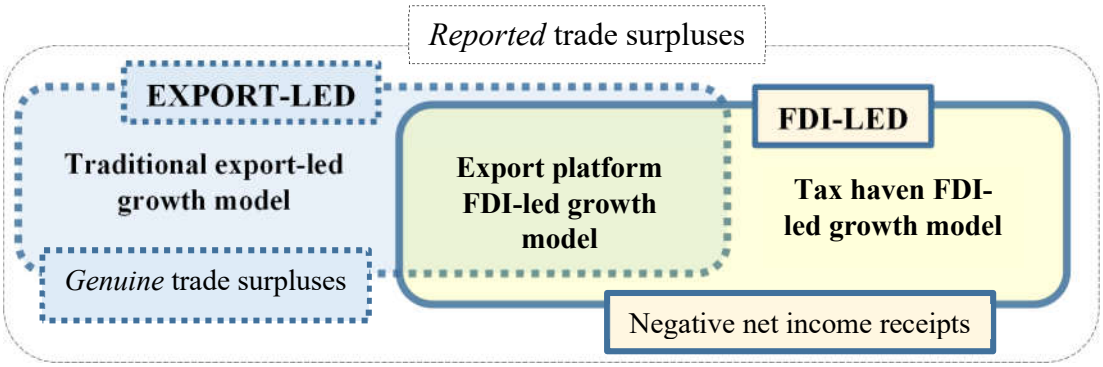
[13] Denoting the MOFA profit-wage ratio by Π_F/W_F, the implied MOFA wage share is $1/(1+\Pi_F/W_F)$.

The extremely high degree of reported MOFA profitability in Ireland relative to Hungary (and Germany) suggests their growth models do not differ merely by degree of capital intensity of MOFA production. The indicators developed in this section, taken as a whole, suggest the growth models of Ireland and Hungary differ at a more fundamental level, where the former may be better approximated by the tax haven FDI-led model and the latter by the export platform FDI-led model.

6. Conclusion

Building on notions of FDI-led growth seen in the CPE literature, this paper uses the Sraffian Supermultiplier approach to develop the theoretical basis for two related but distinct growth models, namely the export platform FDI-led model and the tax haven FDI-led model. These models help clarify the channels from a growing foreign sector to output and income growth. The export platform FDI-led model, in which foreign-owned firms engage in genuine production, ultimately grows via the exports of these foreign affiliates. Foreign affiliate export growth coincides with greater greenfield FDI, employment of labour (which leads to higher consumption), and tax revenues (which leads to higher government expenditure). In the tax haven FDI-led model, however, it is only the last of these channels that has a direct effect on demand, output, and income. It is ultimately driven the profits of foreign affiliates, which are shifted into the economy through methods such as transfer mispricing and IP relocation, which artificially increase net exports without any genuine value added taking place. Hence, while the two FDI-led models appear similar, they achieve demand and output growth through different channels. These differences are visualised in Figure 3.

Figure 3. *Differentiating between export-led and FDI-led growth models*



It is due to these distortions that it is easy to misrepresent or misdiagnose the tax haven FDI-led model as a kind of export-led model. National accounts data from tax havens are often so skewed that growth regime categorisation based on the usual analysis of growth contributions and financial balances will tend to over emphasise the role of "exports". Similarly, tax havens are more likely to be misdiagnosed as profit-led given the way profit shifting inflates GDP, an argument that is demonstrated for the case of Ireland in Woodgate (2022). Hence, to differentiate between export-platform and tax haven growth models, one must rely on different indicators to those provided by the conventional national accounts. A number of indicators are provided in Section 5 of this paper, the intuition and justification for which is based on the theory developed in Sections 3 and 4.

Applying these indicators to Ireland and Hungary, to re-examine the cases brought forward by Bohle/Regan (2021), and Germany, for contrast with a traditional export-led economy, we find that each indicator supports the hypothesis that Ireland is better approximated by the tax haven FDI-led model rather than the (export platform) FDI-led model suggested by Bohle/Regan (2021). Of course, one could possibly better approximate the reality of the Irish growth model in a number of ways. First, one could allow for the fact that there *is* some genuine production in the foreign sector or by adding a "professional services" sector that facilitates the profit shifting of foreign MNCs through providing the requisite accounting, legal and consulting advice. Second, one could alternatively suppose that higher tax revenues collected from foreign affiliates need not result in higher government expenditure, but in lower rates of tax on domestic residents, which would also be expected to boost demand and growth. Third, one could examine the possibility that a growing foreign sector may have a *negative* effect on the domestic sector if the latter suffers from foreign-biased (e.g. industrial) policy or an inability to attract labour and expertise from the dominant foreign sector.[14] Despite all these meaningful possible extensions, it is nonetheless contended that the tax haven FDI-led model put forward here helps explain the otherwise puzzling data that are associated with economies like that of Ireland, which the traditional export-led and even the export platform FDI-led models cannot explain.

Finally, we note that the two different FDI-led growth models seen here imply a need for different institutions and policies for a successful growth outcome. For example, the export platform FDI-led model is more likely to run into tensions in and around wage restraint to remain attractive to foreign MNCs, whereas wage growth is less likely to present a threat to the tax haven FDI-led model. A tax haven FDI-led economy, however, must often walk the political tightrope of facilitating tax avoidance and evasion without admitting that it is doing so. A tax haven that is internationally recognised as such and is added to the tax blacklists of major economies may undermine the taxation treaties by which this growth strategy works. Hence, certain institutions and social blocs are necessary to maintain support for this quintessentially beggar-thy-neighbour growth model (Kneafsey/Regan 2020, Bohle/Regan 2021). Hence, the exact nature of the underlying growth model is relevant for understanding the sustainability of the model, as well as the suitability of certain policies that may be proposed in public discourse.

[14] Generally, both FDI-led models presented here could be further developed to allow for negative effects of a growing foreign sector on the domestic sector in order to analyse more comprehensively the notion of an FDI-*burdened* regime, which was mentioned in Section 2.

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Appendix: Stability analysis of the two FDI-led growth models

A system is considered locally stable around its steady state if its Jacobian evaluated at the long-run equilibrium values (J^{**}) fulfils the following three Routh-Hurwitz (RH) conditions:

1. $Det(J^{**}) < 0$,
2. $Tr(J^{**}) < 0$, and
3. $-Tr(J^{**})[Det(J_1^{**}) + Det(J_2^{**}) + Det(J_3^{**})] + Det(J^{**}) > 0$.

While some authors in the related literature mention a fourth RH condition, it is easy to show this extra condition is in fact redundant, as pointed out by Hein and Woodgate (2021).

J^{**} of the export platform FDI-led model developed in section three is given by

$$J_{EP}^{**} = \begin{pmatrix} \widehat{X_F} v[\frac{\gamma}{1-c(1-\tau)-b\tau-h+m} - \frac{1}{v}] & -\frac{u_n^2}{v} & \frac{(\widehat{X_F}-\widehat{X_D})u_n}{1-c(1-\tau)\pi_F} \\ \frac{\widehat{X_F} v\gamma}{u_n} & 0 & 0 \\ 0 & 0 & -(\widehat{X_F} - \widehat{X_D}) \end{pmatrix}. \tag{A1}$$

It follows that

$$Det(J_{EP}^{**}) = -\widehat{X_F} u_n \gamma\left(\widehat{X_F} - \widehat{X_D}\right) \tag{A2}$$

$$Tr(J_{EP}^{**}) = \widehat{X_F} v[\frac{\gamma}{1-c(1-\tau)-b\tau-h+m} - \frac{1}{v}] - (\widehat{X_F} - \widehat{X_D}) \tag{A3}$$

$$\begin{aligned} &-Tr(J_{EP}^{**})\left[Det\left(J_{EP,1}^{**}\right) + Det\left(J_{EP,2}^{**}\right) + Det\left(J_{EP,3}^{**}\right)\right] + Det(J_{EP}^{**}) \\ &= v\left[\frac{\gamma}{1-c(1-\tau)-b\tau-h+m} - \frac{1}{v}\right]\left\{(\widehat{X_F} - \widehat{X_D})Tr(J_{EP}^{**}) - \widehat{X_F} u_n \gamma\right\} \end{aligned} \tag{A4}$$

Equation A2 is negative so the first RH condition is fulfilled. RH conditions 2 and 3 are fulfilled if and only if the term in square brackets in Equations A3 and A4 are negative, i.e. when

$$\gamma v + c(1-\tau) + h + b\tau - m < 1. \tag{27}$$

Very similarly, J^{**} of the tax haven FDI-led model developed in section four is given by

$$J_{TH}^{**} = \begin{pmatrix} \widehat{\Pi_F} v[\frac{\gamma}{1-c(1-\tau_D)-b\tau_D-h+m} - \frac{1}{v}] & -\frac{u_n^2}{v} & (\widehat{\Pi_F} - \hat{X})u_n \\ \frac{\widehat{\Pi_F} v\gamma}{u_n} & 0 & 0 \\ 0 & 0 & -(\widehat{\Pi_F} - \hat{X}) \end{pmatrix}, \tag{A5}$$

and so it follows that

$$Det(J_{TH}^{**}) = -\widehat{\Pi_F} u_n \gamma\left(\widehat{\Pi_F} - \widehat{X_D}\right) \tag{A6}$$

$$Tr(J_{TH}^{**}) = \widehat{\Pi_F} v[\frac{\gamma}{1-c(1-\tau_D)-b\tau_D-h+m} - \frac{1}{v}] - (\widehat{\Pi_F} - \hat{X}) \tag{A7}$$

$$\begin{aligned} &-Tr(J_{TH}^{**})\left[Det\left(J_{TH,1}^{**}\right) + Det\left(J_{TH,2}^{**}\right) + Det\left(J_{TH,3}^{**}\right)\right] + Det(J_{TH}^{**}) \\ &= v\left[\frac{\gamma}{1-c(1-\tau_D)-b\tau_D-h+m} - \frac{1}{v}\right]\left\{(\widehat{\Pi_F} - \hat{X})Tr(J_{TH}^{**}) - \widehat{\Pi_F} u_n \gamma\right\} \end{aligned} \tag{A8}$$

Again, equation A6 is negative so the first RH condition is fulfilled, whereas RH conditions 2 and 3 are fulfilled if the term in square brackets in Equations A7 and A8 are negative, i.e. when

$$\gamma v + c(1-\tau_D) + h + b\tau_D - m < 1. \tag{48}$$

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