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Rentiers, Strategic Public Goods and Financialization in the Periphery

Gabriel Porcile and Gilberto Tadeu Lima

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Rentiers, strategic public goods and financialization in the periphery

Gabriel Porcile
Economic Commission for Latin America and the Caribbean (ECLAC)
jose.porcile@un.org

and
Gilberto Tadeu Lima
University of São Paulo, Brazil
giltadeu@usp.br

This paper revisits a traditional theme in the literature on the political economy of development, namely how to redistribute rents from traditional exporters of natural resources towards capitalists in technology-intensive sectors that have a higher potential for innovation and the creation of higher-productivity jobs. We argue that this conflict has been reshaped in the past three decades by two major transformations in the international economy. The first is the acceleration of technical change and the key role governments play in supporting international competitiveness. This role takes the form of the provision of strategic public goods to foster innovation and the diffusion of technology (what Christopher Freeman called "technological infrastructure"). The second is the impact of financial globalization in limiting the ability of governments in the periphery to tax and/or issue debt to finance those public goods. Capital mobility allows exporters of natural resources to send their foreign exchange abroad to arbitrate between domestic and foreign assets, and to avoid taxation. Using a macroeconomic model for a small open economy, we argue that in this more complex international context the external constraint on output growth assumes different forms. We focus on two polar cases: the "pure financialization" case, in which legal and illegal capital flights prevent the government from financing the provision of strategic public goods; and the "trade deficit" case, in which private firms in the more technology-intensive sector cannot import the capital goods they need to expand industrial production.

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1. Introduction

Domestic conflict between rentiers who own natural resources and capitalists in other sectors of the economy, especially in technology-intensive sectors, is a classic theme of the literature on the political economy of structural change and economic development (Leftwich, 1999; Khan 2000; Khan and Blackenburg, 2009). The state usually mediates this distributive conflict by redistributing rents between agents, subject to institutional and political constraints.[1] In a center-periphery system, in which foreign exchange is critical for sustaining economic growth, the dispute over rents is to a large extent a dispute over the allocation of foreign exchange.[2] This paper revisits the conflictive and complex interactions that emerge between the state, rentiers and technology-intensive industries (HT for short) in the light of two major structural transformations that have been going on in the international economy since at least the late seventies.

The first major transformation is the acceleration of technical change and the critical importance of public goods for sustaining this acceleration: education, infrastructure, scientific and technological networks, R&D investment, and institutions for diffusing and sharing knowledge—what Christopher Freeman (2004) called, in very broad terms, "technological infrastructure". We will dub the flow of technological services that come from the technological infrastructure as "strategic public goods". Technological change is critical for international competitiveness and hence for long run growth. Strategic public goods are especially important in the case of developing economies, whose ability to ease the external constraint on output growth critically depends on catching up with the technological frontier (Fagerberg and Verspagen, 2002; Lundvall et al, 2002; Spinola, 2020).

The second critical transformation to be highlighted is the rise of financial globalization and the binding limits it imposes on the governments' ability to tax and provide strategic public goods. A finance-dominated macroeconomic dynamics has emerged since the late seventies (Stockhammer, 2004; Frenkel and Rapetti, 2009; Hein et al, 2021; Paula and Prates, 2017; Storm, 2018; Kohler and Stockhammer, 2022). Old-style rentiers based on natural resources have gradually morphed into financial rentiers or a combination of both types, as capital accounts have become more open and short-term financial flows greatly intensified. Financial globalization makes it necessary to address the external constraint on output growth from a different perspective (Ocampo, 2016). Capital flights from peripheral economies, which are greatly or fully integrated to global financial markets, not only exacerbate the lack of foreign exchange, but also hamper the ability of the state to collect taxes. UNCTAD (2021) estimates that net financial transfers from developing to developed economies attained USD 496 billion in 2017. If illicit transfers are added to that figure, the amount is higher than USD 800 billion. Ndikumana and Boyce (2022) estimate that capital outflows achieved the value of 2 USD trillions in Africa from 1970 to 2018. Capital outflows are a way of avoiding or evading taxation, thereby constraining the ability of the state to tax the peripheral elites, which carries several important economic and political implications.

[1] See Evans (1995), especially chapters 3 and 6, and Evans and Heller (2019), for a discussion of these constraints.

[2] Distributive conflicts over exports earnings are extensively discussed in the Latin American Structuralist tradition. Influential examples are Sunkel and Paz (1970), O'Donnell (1978), Cardoso and Faletto (1979), and the last Raul Prebisch's book on peripheral capitalism (Prebisch, 1981). Lima and Porcile (2013) explore the macroeconomic implications of a political conflict arising from different preferences on the real exchange rate on the part of capitalists, workers, and the government. A model in which political power and institutions are endogenous variables in the periphery can be found in Porcile and Sánchez Ancochea (2021).

In sum, the focus of the paper is on the redistribution of rents from natural resources to accelerate structural change with a focus on (a) the central role that strategic public goods play in the dynamics of technical change (and hence of international competitiveness), and (b) the more acute limits that financial globalization places on the ability of governments to provide such strategic public goods. The model is in the tradition of the center-periphery theory, in which the periphery is the technologically laggard region specialized mostly in exporting natural resources while importing sophisticated intermediate and capital goods. The considered conflict regarding the redistribution of rents is mostly about redistributing the foreign exchange required for those imports. The technology-intensive sector in the periphery (HT for short) is technologically advanced compared to the commodity sector, but has a gap with respect to the international technological frontier.

The model comprises four economic agents: rentiers that own the natural resources (e.g., land, mines); capitalists who produce technology-intensive goods in the HT sector; the state, which provides free-of-charge strategic public goods that are essential inputs for the expansion of the HT sector; and workers who are hired by the HT sector and the government. The paper is organized in four sections besides this introduction and the concluding remarks. Section 2 offers a brief review of the literature on rents, technology and structural transformation, while section 3 presents the structure of the model, define actors, behavioral rules, and the equilibrium solutions. Section 4 discusses the extreme case in which the external constraint on output growth depends entirely on financial globalization and the limits it imposes on the ability of the government to provide strategic public goods, while the HT sector shows balanced trade. Section 5 extends the model to consider the case in which the HT sector displays a trade deficit with the rest of the world.

2. Rents, public goods and technological change: a brief review of the literature

The classic Lewis model depicts the development process as one of transferring workers from the subsistence sector towards a homogeneous modern, capitalist sector “fructified” by capital (Lewis, 1954; Ros, 2013). Public goods play no role in this process; the engine of growth is the saving rate of the capitalists and the rise of labor productivity stemming from capital accumulation in the modern sector. In the basic Lewis model technology is given, available to all firms and diffuses automatically along with the expansion of the modern sector. Still, this description abstracts from the fact that technical change requires the diversification of the production structure, institutions for R&D and innovation, an increasingly educated labor force, and the capacity to compete in a world in which developing economies are typically far from the technological frontier, which makes more difficult for them to enter to and survive in new industries (Dosi et al., 2015). There are necessary institutional, infrastructure and education preconditions for the Lewisian development story to hold true—preconditions which we henceforth designate as the provision of strategic public goods.

The modern sector is not homogeneous, but usually comprises sectors with very different potential for productivity growth and decent jobs. The relative share of HT in total value added matters for the technical change and income distribution. This is a key tenet of the literature on structural change and development, whose origins can be traced back at least to the classic Joseph Schumpeter’s 1911 book on the theory of economic development, in which innovation and structural change are at the core of the development process (Lee, 2013). A recent offspring of this influential literature are the studies on economic complexity, which measure the degree of sophistication and diversification of export structures

as a reflection of the country's endogenous technological and institutional capabilities (Hartmann et al., 2017).

Building technological capabilities in sophisticated goods out of an initial comparative advantage in natural resources is key for the economic transformation of peripheral economies (Fajnzylber, 1990; Chang and Lebdioui, 2020). This requires the redistribution of rents from commodity producers to the producers of technologically advanced goods—what the literature has labelled cross-subsidization. Such cross-subsidization may take the form of public goods or have significant public goods components or dimensions. Although in some cases private agents may solve the underlying collective action problem, more frequently taxation and state intervention are required. The link between taxes and industrial transformation is highlighted by Besley and Persson (2013: 2), who observe that "(*T)he central question in taxation and development is: how does a government go from raising around 10% of GDP in taxes to raising around 40%*", where the rise in taxation reflects a "*broader range of development goals (including the structural transformation of an economy*)". The literature on "National Systems of Innovation" offers a detailed account of how state policies and cross-subsidization may foster innovation and maximize the impact of learning externalities throughout the economic system (Lundvall, 2007). In the same vein, Mazzucatto (2021) points out that the "entrepreneurial state" and public investment crowding-in private investment have been the ultimate source of path-breaking innovations in advanced economies. Cross-subsidization may take as well the form of the provision of education, health, social protection and the quest for more egalitarian societies. The literature on the economics of inequality has provided theoretical and empirical support to the idea that social protection has a positive impact on productivity growth (Doner and Ross Schneider, 2016; see also Katzenstein, 1985, a classic pioneering work on this topic).

An interesting early paper on the dynamics of rent creation and redistribution is Nochteff (1996), who distinguishes between Ricardian rents (those that accrue to owners of natural resources), political rents (whose source is political power) and Schumpeterian rents (stemming from innovation and/or early catching up in products and processes). Nochteff (1996) argues that economic development requires moving from "growth bubbles"—associated with Ricardian and political rents—to economic development stricto sensu—driven by Schumpeterian rents. In this paper, we argue that one of the challenges to promote structural economic transformation is to ensure the transfer of Ricardian rents to the sectors that generate (or would be capable of generating) Schumpeterian rents. As shown by Reinert (2019, chapter 3) and Dosi et al. (2022), this means moving from the production of homogenous goods sold in competitive (or mostly competitive) markets towards the production of differentiated goods sold under imperfect competition.

In peripheral economies, the provision of strategic public goods typically demands imports of more sophisticated capital goods. Advanced technological and scientific equipment, royalties, training, paying or hiring specialists abroad, are all items paid with foreign exchange. This demand compounds the more general problem of the relative scarcity of foreign exchange as a binding constraint on economic growth in peripheral economies. Access to foreign exchange places a ceiling to capital accumulation, especially in the HT manufacturing sector, which in developing economies usually shows a persistent deficit in its trade balance with the rest of the world. This is the focus of the already well-established literature on the Balance-of-Payments-constraint on output growth (see Thirlwall, 2011, and the excellent review by Blecker, 2022).

International competitiveness and current account deficits are just part of the determinants of the external constraint. Increasingly, capital flights are becoming a heavier burden on peripheral economies. Until the late seventies, the space for capital flights was limited because capital accounts were essentially closed in the Bretton Woods system based on fixed exchange rates with respect to the US dollar. To keep the exchange rate fixed, capital accounts had to remain sufficiently closed to deter speculative short-run capital movements. However, the Bretton Woods system crumbled in the seventies and full financial liberalization advanced to gain momentum from the 1990s (Eichengreen, 2008: 91-126). While some countries kept significant restrictions to short-term capital movements during certain periods of time, the general trend has been in the direction of open capital accounts. The vulnerability and instability of the international system increased with financial globalization (Tooze, 2018) and reduced both the fiscal and policy space for industrial policy, in particular in developing economies (Cimoli et al., 2020; Botta et al, 2022). Indeed, capital controls were more prevalent in countries that succeeded in catching up in the last three decades than in the economies that fell behind (Dooley et al., 2004; Ocampo and Porcile, 2020).

A small peripheral economy greatly or fully integrated to the global financial system will face limits to its ability to tax and provide strategic public goods because rents stemming from natural resources can easily morph into financial rents as financial capital is liable to be sent abroad to arbitrate between domestic and foreign assets, and sometimes to evade taxation by the government. Capital flights chastise the peripheral economy by depriving it of one of its scarcest economic resources, which is not capital, especially physical capital, but foreign exchange. Exports of capital, especially but not only financial capital, mean more exchange rate volatility and less foreign exchange available for supporting capital accumulation in the periphery in the form of either the provision of strategic public goods by the government or the direct imports of capital goods demanded by the HT sector (Bhaduri, 2011; Botta, 2021; Botta et al., 2022).

Taking stock, we would argue that the traditional distributive conflict between rentiers who own and export natural resources and capitalists that invest in new sectors and technologies has been greatly redefined as a result of both financial globalization and the role of strategic public goods in technical change and international competitiveness. Exporters of natural resources can more easily escape taxation by exporting financial capital to become globalized financial rentiers, or may prefer to invest in less risky foreign assets than in risky debt titles issued by an indebted government of HT private investors. This in turn compromises the provision of strategic pubic goods for HT and makes the binding external constraint on economic growth even more acute. As a result, a more complex political economy emerges that poses new challenges to structural change in peripheral economies.

3. Structure, actors and behavior

Actors and behavioral rules

The model comprises four actors. The first actor is a class of *rentiers* who export a commodity intensive in natural resources (say copper, soya or iron ore), extracted at the rate ϵ from a given endowment Z of natural resources. We assume that Z is large enough to ignore the possibility of depletion of the natural resource. The extraction of the commodity does not use labor and is sold in the international market at an exogenous price P^*. The developing economy is small and faces a horizontal demand curve for its exports, which means that it does not face any demand constraint when selling the commodity abroad at price P^*.

The rentiers do not consume, collect rents and decide how to allocate them. This decision process is made in two stages. The first stage is about the amount of rents they will formally declare at home and pay taxes for. Tax avoidance and tax evasion are widespread phenomena, especially in a globalized economy which offers a broad array of instruments for bypassing national regulations and hiding assets. In some cases, these instruments are illegal; in other cases, they are based on loopholes in the tax regulatory system and therefore characterize tax elision. We assume that the rentiers' decision not to internalize some of their foreign exchange exports income (as a form of tax evasion or elision) is a function of the level of the tax rate. The higher the tax rate, the higher the incentives for not internalizing the foreign exchange for a given probability of being caught and penalized —either for engaging in illegal financial dealings or for not finding a loophole in the tax regulatory system allowing tax elision. This probability has tended to fall with financial globalization, and governments are facing more difficulties for effectively tracking financial flows. As a result, actual or potential tax evasion (or tax elision) effectively imposes a cap on the tax burden that can be levied on the rentiers at home.

The second stage in the decision process of the rentiers is what to do with their disposable income, i.e. with what is left after paying taxes. They may use this income to lend to the state or to HT capitalists in the domestic market, or to invest in safe assets abroad. Financial capital can be exported to earn the international interest rate after paying a fee. If there are no barriers to exports of financial capital, the fee is zero. The rentiers allocate rents in such a way as to equalize the rate of return they can obtain from buying bonds abroad at zero risk (say, U.S. treasury bonds) with the rate of return of buying riskier assets at home (titles of public and private debt). The risk premium demanded by the rentiers for lending to the government or to HT capitalists is a function of the debt-to-capital ratio in the public and private sectors, respectively. There is no secondary market for HT sector or government debt bonds, and hence there are no fluctuations in the value of the stock of those bonds in the financial market.

The second actor is a class of *capitalists in the HT sector* (thereafter simply capitalists) who produce a good which is more technology-intensive than the commodity. The production of such good uses labor (l^H) and capital (K^H) in fixed proportions, and demands strategic public goods as a complement to private capital. The HT good is sold domestically and internationally at a price P (denominated in the local currency), determined by a mark-up rule in an imperfectly competitive market. The HT sector does not demand as an input the commodity exported by the natural resources-intensive sector, but demands advanced capital goods imported from center economies. The HT sector needs foreign exchange to buy those goods, which are paid with exports of the HT sector itself, or by contracting a debt denominated in foreign currency with the rentiers. Investment by the capitalist class obeys a Kaleckian investment function with the real interest rate, the debt-to-capital ratio and the profit rate in the argument.

The third actor is *the state* whose objective is to provide strategic public goods G (a flow of technological services) for the capitalist sector using public capital (K^S) and labor (l^S) in a fixed-coefficients production function. To sharpen the focus on our main issues of interest (distributive conflict over available foreign exchange) and keep the model as simple as possible, we assume that all the capital goods required by the state to produce the strategic public good are imported. The production of the strategic public good is financed with taxes and public debt. In setting the tax rate on the rentiers, the state takes into consideration that tax evasion and elision increase with the tax rate. As a key focus of our interest is on cross-subsidization of the HT sector, we assume that all taxes are paid by the rentiers. This scenario does not necessarily come out of the state having been fully captured by the capitalists of the HT sector. To the extent that the HT sector is the main source of formal jobs and productivity growth, the policy of

subsidizing HT production may reflect a broader political alliance which includes at least part of the labor force. In addition, the provision of strategic public goods has a positive impact on learning and productivity growth, not only in the HT sector but also in the commodity sector. This implies that rentiers may be interested in supporting the provision of strategic public goods that represent a positive externality (a technological spillover) for them.

Last but not least, workers are hired by HT capitalists and the state to produce both the HT good and the strategic public goods. We assume that the periphery is endowed with a large labor surplus that is continuously replenished, so that the real wage remains constant and is not affected by changes in labor demand. However, the real wage may vary in response to exogenous changes in social conventions regarding the acceptable value of the real wage in the periphery. This value is a combination of labor productivity in the subsistence or traditional sectors plus a premium which depends on conventions and institutions of that specific society. For this reason, we will not explicitly model the labor market, which is characterized by a perfectly elasticity supply of labor at a given socially-determined real wage.

Basic equations and equilibrium in the goods market

The rentiers' disposable nominal income in the periphery, denominated in foreign currency, is given by the value of exports they internalize in the country, net of variable costs (c) and taxes (t), plus the interests on the money they lent to the government and HT capitalists. The interest rate payments that the rentiers receive for their capital kept or sent legally or illegally abroad remain abroad. Formally:

$$(1)\quad P^*R = P^*\epsilon Z(1-t-c)(1-\gamma t) + i^S P^* D^S + i^H P^* D^H,$$

where ϵZ is the volume of commodity exports, recalling that Z is the endowment of natural resources and ϵ is the extraction rate of the commodity, t is the tax rate on the value of exports ($0 \leq t \leq 1$), c are variable costs of production (made of commodities), $P^* D^S$ and $P^* D^H$ are the accumulated debt in foreign currency issued by the state (S) and the HT sector (H), respectively, and i^P and i^H are the respective nominal interest rates[3]. The term $(1-\gamma t)$ captures foreign exchange not internalized to avoid paying taxes through either evasion or elision, which increase with the level of the tax rate. The parameter $\gamma > 0$ falls when the institutional capabilities of the government (to effective curb illegal transactions or reduce loopholes in the tax regulatory system) increase. In a world of high capital mobility and a diversified set of financial instruments and derivatives, and close interconnection across financial agents, the value of the parameter γ tends to be very high.

The nominal exchange rate is assumed to remain constant and equal to unity. The extraction rate ϵ is a function of the stock of public capital, $\epsilon = \epsilon_1 K^S$, where ϵ_1 is an exogenously given strictly positive constant. This parameter ϵ_1 expresses the productivity of public capital from the point of view of the rentiers and hence plays a role in legitimizing taxes and public investment in the eyes of the rentiers, beyond the political power wielded by the government.

For simplicity we make $c = 0$. Normalizing total rents by the nominal value (in local currency) of the stock of public capital PK^S gives:

[3] Note this is the income of the rentiers in the periphery, not the whole income of the rentiers, since they can keep part of it and of their wealth abroad, as discussed below.

$$(2)\ \frac{P^*R}{PK^S} = q[(1-t)(1-\gamma t)z + i^S d^S + i^H d^H],\quad q = \frac{P^*}{P},\ z = \epsilon_1 Z,\ d^S = \frac{D^S}{K^S},\ d^H = \frac{D^H}{K^S}.$$

In equation (2) z can be understood as the extraction of natural resources amplified by the increase in productivity associated with the expansion of public capital. Rentiers do not consume, hence all their disposable income in the periphery is invested in domestic debt titles (public or private) or foreign bonds. In order to sharpen the focus on the dynamics the real variables, we simplify matters by assuming that the real exchange rate ($q = P/P^*$) is a constant (P^* and P either remain constant or change at the same rate) equal to one (and is not expected to vary), which is equivalent to casting the model in real terms.

The good produced in the HT sector can be sold to formal workers in the domestic market or exported. The production function of HT goods, the available amount of which is given by Y, features labor, the strategic public good G and private capital K^H in fixed proportions:

$$(3)\ Y = min(aK^H u^H, \mu G, lL^H),$$

where a and l are private capital productivity and labor productivity, respectively, $u^H = Y/aK^H$ is the rate of utilization of the stock of private capital, and L^H is the number of workers hired in the HT sector. The market for HT goods is imperfectly competitive and hence firms keep some unused capital capacity to meet sudden increases in demand, and as a barrier to entry against potential competitors (the Kalecki-Steindl rationale in oligopolistic competition). The parameter μ denotes the productivity with which the HT sector uses the strategic public goods, which is a flow of services represented by G.

Public goods are produced according to the following fixed-proportions production function:

$$(4)\ G = \min\,(bK^S u^S, vL^S).$$

In equation (3) K^S is the stock of public capital, b is public capital productivity, u^S is the rate of utilization of the stock of public capital, v is labor productivity, and L^S is the number of workers hired by the government. We will suppose that the demand for public capital is a monotonically increasing function of capital accumulation in HT, and hence we will assume throughout the paper that $u^S = u^H = u$. In other words: short-term fluctuations in the demand for strategic public goods by HT capitalists are met with changes in the rate of utilization of the stock of capital in the public sector, while changes in the rate of private capital accumulation are met by a proportional change in the accumulation of public capital[4].

From equations (3) and (4) it is straightforward that $\mu G = bK^S u = aK^H u$ in equilibrium. Both firms and the government use all the labor they hire (there is no labor hoarding), but not all their own capital stock.

The supply of labor is perfectly elastic at the current wage rate, as mentioned. The total demand for workers in the formal labor market is determined by the stocks of public and private capital and their common rate of utilization; those not employed in the formal sector remain in the subsistence sector, which expands or contracts as a residual of the demand for labor in the formal sector.

Since $\mu G = bK^S u = vL^S$, it follows that total employment in the public sector endogenously adjusts so as to make $L^S = \frac{bK^S u}{v}$; total employment in HT equals $L^H = \frac{aK^H u}{l} = \frac{\mu bK^S}{l}$. Note in addition that since $G =$

[4] An alternative scenario to a varying rate of capital utilization in the public sector is one in which the government fully uses its capital stock, but its productivity varies with changes in the demand for the strategic public goods. We do not explore this possibility in the paper.

$bK^S u$ and $\mu G = aK^H u$ in equilibrium, then $\mu G = \mu b K^S u = aK^H u$, and therefore $\frac{\mu b K^S}{a} = K^H$. Total formal employment in the economy equals $L = L^H + L^S = K^S u \left(\frac{b}{v} + \frac{\mu b}{l}\right)$.

Capitalists in the HT sector save all their profits, and hence their total savings are given by πY, where π is the profit share in the HT sector, which is assumed to be constant due to the constancy of the respective mark-up over unit costs. Workers in the HT sector only consume domestic goods. Therefore. neither such workers nor capitalists demand for any purpose the commodity produced by the rentiers. Goods market equilibrium in the HT sector requires:

$$(5)\ \pi Y = I^H + X^n.$$

In equation (5) I^H is investment in the HT sector and X^n denotes net exports of such sector. In developing economies, the HT sector is prone to exhibit a trade deficit, financed by loans denominated in foreign exchange, hence $X^n = -\dot{D}^H$. To keep the model as simple as possible, and without loss of generality (see below), we assume loans are provided solely by the domestic rentiers. Normalizing equation (5) by K^H, we have:

$$(6)\ \pi u a = g^H + x^n.$$

We plausibly specify normalized net exports x^n as a linear function of the real exchange rate and the rate of capacity utilization in the HT sector:

$$(7)\ x^n = j_0 + j_1 q - mu.$$

In equation (7) j_0 captures the autonomous growth of external demand for HT goods, $m > 0$ captures the effect on imports of an increase in the rate of capital utilization in the HT sector, and $j_1 > 0$ captures the positive impact of an increase in the real exchange rate on net exports (which means that the Marshall-Lerner condition is satisfied and the J-curve is not observed). Since workers do not consume imported goods, all imports of the HT sector are capital goods. Note that the consumption of workers in the public sector is equivalent to "exports" from the HT sector (indirectly paid by the government with the foreign exchange obtained through taxing the rentiers or issuing debt). Since $q = 1$, we simplify notation by writing $j_0 + j_1 q \equiv j > 0$.

Decisions of investment in the HT sector are a positive function of net profits r^n, which is gross profits minus the interests paid on the debt (as a proportion of the private capital stock; see on this Blecker and Setterfield, 2019: chapter 7). The profit rate is $r = \frac{\pi Y}{K^H}$ and the net profit rate is $r^n = \frac{\pi Y - i^H D^H}{K^H} = \frac{\pi a K^H u - i^H D^H}{K^H} = \pi a u - i^H \frac{D^H}{K^H} = r - i^H \frac{D^H}{K^H}$.

In addition, we will argue that it is necessary to include in the argument of the investment function of the private sector the interest rate paid by the public sector on its own debt. This extension of the Kaleckian investment function reflects the dependence of HT capitalists on the provision of the strategic public goods by the government. A higher interest rate paid on the debt of the public sector implies higher financial fragility of the state. All else constant, this also means a possibly lower capacity of the state to provide those goods in the relevant future. As a result, capitalists in the HT sector will expect lower economic growth in the future as i^S increases.

Formally, recalling that the debt-to-capital ratio in HT is $\frac{D^H}{K^H} = \frac{D^H a}{\mu b K^S} = \frac{d^H a}{\mu b}$ (using $\frac{\mu b K^S}{a} = K^H$ and $d^H = D^H/K^S$), we can write the investment function as follows:

$$(8)\ g^H = g(r^n, i^S) = g\left(r - i^H \frac{D^H}{K^H}, i^S\right) = g_0(i^S) + g_1\left(r - i^H \frac{d^H a}{\mu b}\right) = \underbrace{g_0(i^S)}_{A} + \underbrace{g_1\left(\pi a u - i^H \frac{d^H a}{\mu b}\right)}_{B}.$$

The first term on the right-hand-side (A) reflects the negative impact of i^S on expectations over future output growth, which depresses the capitalists' "animal spirits"; the second term (B) expresses the positive impact of the net profit rate on investment decisions[5].

Using equations (6) through (8), we find that goods market equilibrium in the HT sector requires:

$$(9)\ \pi u a = g_0(i^S) + g_1\left(\pi a u - i^H \frac{d^H a}{\mu b}\right) + j - m u.$$

This in turn allows finding the equilibrium rate of capital utilization in the HT sector, u^*:

$$(10)\qquad u^* = \frac{g_0(i^S) + j - g_1\left(i^H \frac{d^H a}{\mu b}\right)}{\pi a(1 - g_1) + m}.$$

For the stability of the solution in equation (10) it is necessary that $\pi a(1 - g_1) + m > 0$, the substance of which is that demand leakages are more responsive than demand injections to changes in capacity utilization in the HT sector. In addition, since an economically relevant value of the considered solution requires that $u^* > 0$, the numerator in equation (10) is assumed to be strictly positive. Equation (10) represents a short-run equilibrium condition assuming that i^S, i^H, and d^H are given in the short run. In the long run these variables adjust to a long-run equilibrium condition discussed in the next sections.

Internalized foreign exchange and equilibrium in the financial market

The rentiers will allocate their internalized rents in bonds at home or abroad in such a way as to obtain the same rate of return corrected by the risk attached to either type of bonds. The mechanism that ensures this equalization are changes in the nominal interest rate at home as a function of the debt-to-capital ratios in the public and HT sectors. Note that this arbitrage mechanism makes irrelevant where the government or the HT capitalists contract their debt, either at home or abroad. What matters is that the interest rate at home should be high enough so as to compensate foreign and domestic lenders of foreign exchange for the higher risk they take when the debt to capital stock increases in the public and HT sectors.

The equalization of the rate of return obtained by the rentiers at home and abroad requires that:

[5] An alternative specification of the investment function might include the ratio of the debt to capital stock of the public sector (d^S), along with or instead of the interest rate. However, this would give rise to a nonlinearity that would make the dynamics considerably more complicated. To avoid excessive complexity, in this paper we included only i^S as argument of the investment function of the HT sector.

$$(11) \qquad \underbrace{f^S\left(d^S - \beta\bar{d}^S, B\right)i^S}_{(1)} = \underbrace{f^H\left(\frac{(a^H - \beta\bar{a}^H)a}{\mu b}, B\right)i^H}_{(2)} = i^*,$$

where $d^S = D^S/K^S$ and $d^H\left(\frac{a}{\mu b}\right) = \frac{D^H}{K^H}$ are the private debt to private capital ratio and the government debt to government capital ratio, respectively, and i^* is the foreign interest rate. The risk of lending is captured by the function $f^{S,H}$, whose argument comprises the debt-to-capital ratio $d^{S,H}$ and the existence of barriers to capital mobility B. This function satisfies certain conditions: $1 > f^{S,H}(\cdot) > 0,\ f'(d) < 0,$ $f'(B) > 0$.

The term (1) in the equality is the interest rate paid by the public sector corrected by the risk of lending to the government; the term (2) is the interest rate paid by the HT sector corrected by the risk of lending to the capitalists in that sector. Both must be equal to the nominal interest rate on foreign bonds i^*, which are assumed to be risk-free. The partial derivatives $f_d^H < 0$ and $f_d^S < 0$ imply that the risk of lending to the government or to the HT sector increases with those sectors' indebtedness. Rentiers demand a higher interest rate to lend at home to the government and to the HT capitalists when d^S and d^H increase. If there is no rise in the interest rates, they will prefer to buy safe foreign bonds. The parameter $\bar{d}^S$ is a critical debt-to-capital ratio such that $f^S\left(d^S - \beta\bar{d}^S, B\right) \to 0$ when $d^S \to \beta\bar{d}^S$, making the risk of lending at home approach infinity when this ratio approaches its critical level (a symmetric result applies to the parameter $\bar{d}^H$ and the function $f^H(\cdot)$).

Finally, B stands for barriers to capital mobility. The closer to zero these barriers are, the more integrated to global financial markets the economy is. The partial derivative $f_B > 0$ denotes that if barriers increases, rentiers have to pay a higher cost to send foreign exchange abroad. If *B* is high, in equilibrium, they will have to accept a lower domestic interest rate for the resources they lent at home.

The qualitative results of the model would not change much if domestic capitalists and the government could borrow at home (from the rentiers) or abroad (from the international capital markets). The risk assessment by foreign lenders would likely be the same as that of domestic rentiers; therefore, they will charge the same interest rate (or higher if foreign lenders incur in additional costs because they need to gather and process information about the country). Taking this into account and for tractability, we will assume that all the debt held by the government and capitalists in the HT sector is contracted with the domestic rentier class.

In the next two sections we develop two simple model specifications. In the first the HT sector is capable of paying for its own imports and its trade balance is in equilibrium ($x^n = j - mu^* = 0$). As a result, HT capitalists do not have to borrow foreign exchange from the rentiers. The profit rate and the net profit rate are one and the same ($r = r^n = \pi ua$). However, the HT sector still depends on the strategic public goods provided by the government to expand and grow. This model specification is an extreme case of an external constraint on output growth explained exclusively by financial globalization: the economy has a positive trade balance in the commodity sector, but legal and illegal capital flights prevent the state from collecting enough taxes and /or enough funds to propel the growth of the HT sector at higher rates. In the second model specification, the government depends on the rentiers for providing strategic public goods, and the HT sector depends on the rentiers for imports of capital goods. In the latter case both the trade balance and financial globalization interact in a complex fashion to make the external constrain on output growth more acute. Financial integration and lack of international competitiveness combine to curb

economic growth in the peripheral economy. The two cases have important implications for the political economy of development that are discussed in the final section of the paper. They can be seen as variations around the same theme of the balance-of-payments-constrained growth dynamics in a small open economy with peripheral characteristics.

4. A pure financialization constraint

Growth in the HT sector and the demand for strategic public goods

In this specification of the model, as mentioned earlier, the HT sector does not need to borrow foreign exchange, carries no debt ($d^S = 0$), and exhibits balanced trade in equilibrium ($\dot{d}^H = x^n = 0$). The investment function HT is given by:

$$g^H = g(r, i^S) = g_0 + g_1 \pi a u - g_2 i^S, \quad (12)$$

where g_0, g_1, g_2 are all strictly positive parameters. The impact of the interest rate paid by the public sector on expectations on future growth in the HT sector is captured by the third term on the right-hand-side of equation (12).

Total savings (as a proportion of the capital stock in the HT sector and recalling that the saving rate out of profits, which is the only source of such savings, is equal to one) are given by $\pi a u$. Therefore, using equation (12), the rate of capital utilization in the HT sector in equilibrium is:

$$u^* = \frac{g_0 - g_2 i^S}{(1-g_1) a \pi} = u^*(i^S). \quad (13)$$

We assume that the denominator in (13) is strictly positive for the equilibrium solution for u to be stable. Moreover, since an economically relevant value of the considered solution requires that $u^* > 0$, the numerator in equation (13) is also assumed to be strictly positive. It is easy to check that (13) is a special case of equation (10) when $i^H \frac{d^H a}{\mu b} = j - mu = 0$.

The equilibrium rate of capital accumulation in the HT sector is:

$$g^H = g_0 + g_1 a \left[\frac{g_0 - g_2 i^S}{1-g_1}\right] - g_2 i^S = \frac{g_0 - g_2 i^S}{1-g_1}. \quad (14)$$

The investment decisions in the public sector interact with those in the HT sector. The state reacts to investment in HT and invests in public capital to exactly match the demand for strategic public goods—in accordance with the equilibrium condition implied by the Leontief production function, $\mu b K^S = a K^H$.

The provision of strategic public goods is financed by means of a tax on the rentiers plus the issue of public debt. The stock of public debt will vary positively (negatively) if the sum of public investment I^S, the interest paid by the state on the existing debt ($i^S D^S$), and the cost of the labor force in the public sector (wL^S) is greater (lower) than the taxes collected by the state by taxing commodity exports. The foreign exchange income of the public sector equals $tz(1 - \gamma t)$, where γ captures the negative effect of tax rate on the foreign exchange that the rentiers bring into the country, as discussed earlier. The higher the domestic taxes are, the higher the incentives for tax evasion and elision in any of the many ways allowed by globalized finance, such as tax havens, underreporting, money laundering, hidden assets, inter-company transfer prices, and tax planning. The higher the parameter γ, the less effective is the regulatory framework for inhibiting tax evasion and elision, and hence the lower the optimal tax rate will be. In the

linear specification suggested above, the optimal tax rate is equal to $t^* = 1/2\gamma$. [6] In the rest of the paper we assume that the government sets the tax rate exactly at the value t^* that maximizes tax revenues.

Recalling that $q = 1$, then we have:

$$I^S = \frac{\epsilon Z}{4\gamma} - wL^S - i^S D^S + \dot{D}^S, \quad (15)$$

where we use $t^*\epsilon Z(1 - t^*) = \frac{\epsilon Z}{4\gamma}$. Wages are assumed to remain constant, which reflects the assumption of a horizontal labor supply curve due to the existence of a labor surplus. From (15) the change in the public debt (using $wL^S = w\left(\frac{b}{v}\right)K^S[u^*(i^S)]$) is given by:[7]

$$\dot{D^S} = I^S + w\left(\frac{b}{v}\right)K^S[u^*(i^S)] + i^S D^S - \frac{\epsilon Z}{4\gamma}. \quad (16)$$

Normalizing equation (16) by the stock of capital of the public sector yields:

$$\frac{\dot{D^S}}{K^S} = g^S + w\left(\frac{b}{v}\right)[u^*(i^S)] + i^S d^S - \frac{z}{4\gamma}. \quad (17)$$

The rate of change of the respective debt-to-capital ratio is:

$$\dot{d^S} = \frac{\dot{D}^S K^S - \dot{K}^S D^S}{(K^S)^2} = \frac{\dot{D^S}}{K^S} - g^S d^S. \quad (18)$$

With constant productivities of both the public and the private capital, using $\mu G = aK^H u = \mu b K^S u$, then in equilibrium it follows that $g^S = g^H(i^S) = \frac{g_0 - g_2 i^S}{1 - g_1}$. Using this result in equation (18) and carrying out some algebraic manipulation we obtain:

$$\dot{d^S} = g^H(i^S) + w\left(\frac{b}{v}\right)[u^*(i^S)] - \frac{z}{4\gamma} + [i^S - g^H(i^S)]d^S. \quad (19)$$

Equation (19) gives the total amount of monetary resources per unit of public capital that the government needs to borrow from the rentiers (in addition to the revenues collected by taxing the rentiers) to finance the provision of the strategic public goods demanded by the HT sector. We will assume that the demand for foreign exchange from the government does not reach the maximum income internalized by the rentiers. In other words, the limits to lending by the government does not come from the exhaustion of the amount of foreign exchange in the hands of the rentiers in the periphery, but from the high risk implied by the level of indebtedness of the public sector. Rentiers will look for a safe haven before they allocate all the foreign exchange in domestic public bonds.

The government manages the domestic interest rate to obtain the amount of credit specified in equation (19). The government will raise the interest rate until it matches what the rentiers would obtain from investing in safe assets abroad, after considering the risk of lending to the government and the difficulties of sending capital abroad. The derivative with respect to time (τ) of the public interest rate is:

[6] The optimal tax rate comes from choosing t so as to maximize the expression $tz(1 - \gamma t)$, which gives total taxes collected by the government per unit of public capital t.

[7] Since $bK^S = vL^S$, it follows that $wL^S = w\left(\frac{b}{v}\right)K^S$.

(20) $$\frac{\partial i^S}{\partial \tau} = \theta^S \left(\frac{i^*}{f(d^S - \beta \bar{d}^S, B)} - i^S \right).$$

The parameter $\theta^S > 0$ is the speed with which the government adjusts the interest rate when a difference between the rate of return of safe foreign assets and the rate of return of risky domestic assets emerges. There are two limits to the increase in the public debt ratio. One comes from the supply side: if d^S is too close to $\beta \bar{d}^S$, financing collapses because the economy is too close to the level of debt considered unsustainable by the rentiers. The other limit comes from the demand side: a rising interest rate leads to a halt in investment if i^S is too close to $\frac{g_0}{g_2}$.

Assume that initially the interest rate is i_1^S and the HT sector and the demand for strategic public goods grows at a rate $g_1^S = g_1^H$. It may happen that at the prevailing debt-to-capital ratio, say d_1^S, the risk attached to lending to the government is so high that not enough lending will come forth at the existing interest rate i_1^S. Rentiers will prefer to send their money abroad. Given B, the government is therefore bound to raise the interest rate so as to attract the new funding it needs. This rise attracts more capital, while the rate of growth of the HT sector falls owing to the perception by HT capitalists that the public sector may soon experience financial difficulties. After successive rounds of increases in i^S, the supply and demand of financing for the provision of strategic public goods will converge. An exception to this case is when the government is already heavily indebted at i_1^S and the debt-to-capital ratio is too close to $\bar{d}^S$. No increase in the interest rates will do the trick in this case.

In sum, in equilibrium the debt to public capital ratio is stable ($\dot{d}^S = 0$), and the interest rate is stable and high enough to secure from the rentiers the funding the government needs to provide the strategic public goods demanded by the HT sector (hence $\frac{\partial i^S}{\partial \tau} = 0$), as long as $d^S < \bar{d}^S$ and $i^S < (g_0/g_2)$, given B (which increases with the barriers to capital outflows) and γ (which falls with the governments' ability to supervise and curb tax evasion and elision). The equilibrium emerges from variations in the rate of economic growth in the HT sector, and arbitrage by the rentiers between safe foreign assets and riskier domestic asset issued by the government.

Outcomes and implications of the model

Equations (19) and (20), reproduced below for clarity, form a 2x2 system of differential equations:

$$\dot{d}^S = g^H(i^S) + w\left(\frac{b}{v}\right)[u^*(i^S)] - \frac{z}{4\gamma} + [i^S - g^H(i^S)]d^S$$

$$\frac{\partial i^S}{\partial \tau} = \theta^S \left(\frac{i^*}{f(d^S - \beta \bar{d}^S,\ B)} - i^S \right)$$

The isocline $\dot{d}^S = 0$ is negatively sloped because a higher d^S requires a lower i^S to reduce interest payments and to boost economic growth with a view to keeping the debt-to-capital ratio stable. On the other hand, the isocline $\partial i^S/\partial \tau = 0$ is positively sloped because the higher d^S is, the higher i^S should be to equalize the risk-adjusted rate of return in the allocation of rents between bonds abroad and at home (see Figure 1).

The equilibrium values of the two state variables (point E1 in Figure 1) satisfy the following equations:

(21) $$d^S = \frac{g(i^S)+w\left(\frac{b}{v}\right)(u^*(i^S))-\frac{z}{4\gamma}}{g(i^S)-i^S}$$

(22) $$i^S = \frac{i^*}{[f(d^S-\bar{d}^S,B)]}$$

We will assume that the underlying parameters and exogenous variables are such that the public debt is in a sustainable path in which $g(i^S) > i^S$ and hence the denominator in equation (21) is strictly positive. In addition, we assume that the underlying parameters and exogenous variables are such that the numerator in equation (21) is also strictly positive, which means that the government is a net debtor instead of net creditor with domestic rentiers. Finally, the zero lower bound for the domestic and foreign nominal interest rates is respected throughout. The Jacobian of the system formed by e Equations (19) and (20) is the following:

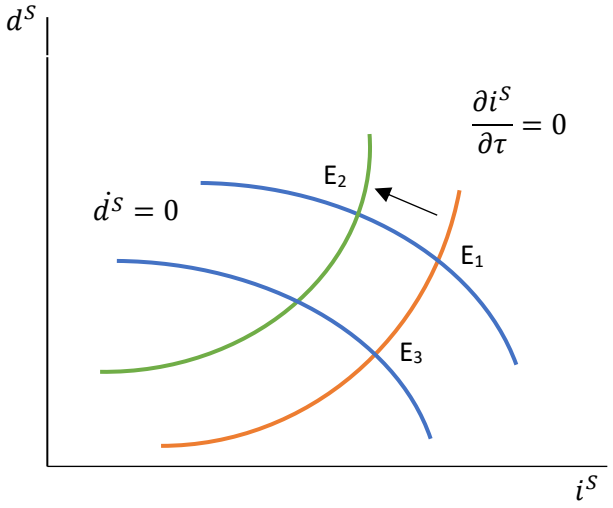
(23) $$J = \begin{vmatrix} -[g(i^S) - i^S] & g'(i^S) + w\left(\frac{b}{v}\right)u'(i^S) - [g'(i^S) - 1]d^S \\ \theta\left\{\frac{-f'(d^S)i^*}{[f(d^S-\beta\bar{d}^S,B)]^2}\right\} & -\theta \end{vmatrix}$$

The trace is negative since $g(i^S) - i^S > 0$ and $\theta > 0$. The sign of the determinant is ambiguous. Since $\theta\left\{\frac{-f'(d^S)i^*}{[f(d^S-\beta\bar{d}^S,t,B)]^2}\right\} < 0$, then a sufficient condition for the determinant to be strictly positive is $g'(i^S) + w\left(\frac{b}{v}\right)u'(i^S) - [g'(i^S) - 1]d^S > 0$. The latter condition implies that an increase in the interest rate has a positive effect on the rate of change of the debt-to-capital ratio in the public sector. In other words, the combined effect of the interest rates paid by the government and the contraction of aggregate output prevails over the fall in the demand for credit by the public sector. This condition will be fulfilled when the debt to capital ratio is above a certain critical level, namely $d^S > \frac{g'(i^S)+\left(\frac{b}{v}\right)u'(i^S)}{[g'(i^S)-1]}$. To limit the number of scenarios that are possible in the model, we will keep this assumption in the rest of the paper, which is consistent with the fact that usually the levels of the public debt are high in the periphery, especially considering that public indebtedness has been aggravated recently by the pandemic and the Ukraine war (Moreno Badia et al., 2021). Note that this is a sufficient but not necessary condition for a strictly positive determinant. Even if the latter inequality is reversed so that $J12 < 0$, the determinant of the Jacobian matrix will be strictly positive if $J11xJ22 > J12xJ21$.

The equilibrium solution represented in equations (21)-(22) implies that the rentiers benefit from a higher interest rate, while the profit rate accruing to HT capitalists depends negatively on the interest rate in equilibrium. The higher the interest rate paid by the public sector, the lower the equilibrium values of capital utilization and hence the profit rate in the HT sector. This conflict affects workers as well, since the

higher i^S, the lower the rate of employment in the public and private sectors. The wage and profit shares in HT remain constant due to the assumption than in this sector the mark up is constant.

Figure 1. Equilibrium in the goods and financial markets after a rise in barriers to capital outflows



There are, however, some space of conciliation and convergence of interests. It was already mentioned that the provision of capital goods increases the productivity of the natural resources over time. This could mollify the resistance of rentiers to taxation. In addition, if the productivity of capital in the HT sector increases with the provision of strategic public goods, then there will be a technological multiplier that reduces the demand for strategic public goods in the HT sector.

A positive externality: from the accumulation of public capital to the productivity of private capital

Assume that a, the productivity of private capital, grows monotonically with K^S, such as in $a = (K^S)^{\alpha}$, where $\alpha > 0$ is the elasticity of learning and $\hat{a} = \alpha g^S$. Recall that in equilibrium $\mu b K^S = a K^H$. The demand for the strategic public good by the HT sector will therefore be $g^S = g^H - (\hat{\mu} + \hat{b} - \hat{a}) = g^H - (\hat{\mu} + \hat{b} - \alpha g^S)$. For simplicity assume $\hat{\mu} = \hat{b} = 0$ (i.e. the only productivity that varies is that of private capital). Therefore, we have that $g^S = \frac{g^H}{1+\alpha}$, where the term $\frac{1}{(1+\alpha)}$ is the technological multiplier of the investment in strategic public goods. Technological spillovers help to reduce the demand for strategic public goods, taxation and debt in the public sector. Interestingly, technical change may make it easier to attain a "divine coincidence" of interests across sectors, one in which the politics of productivity prevails over the redistributive conflict. A similar effect may emerge if there is a rise in ϵ_1, which captures the effect of public capital in the productivity of commodity production.

Barriers to legal and illegal capital flights

Another factor that affects economic growth and distribution between rentiers and HT capitalists in equilibrium are barriers to capital flows. Such barriers were the norm in the Bretton Woods years and pervasive in the successful cases of catching up (Korea and China kept their capital accounts closed in the

periods of rapid industrialization, see Benigno and Fornaro, 2014). The higher B, the lower will be the equilibrium interest rate at each level of debt-to-capital ratio, since the $(\partial i^S/\partial \tau)$ curve shifts to the left (point E_2 in Figure 1). Rentiers will receive a lower interest rate at home and pay a higher fee to export capital, while capitalists will see a rise in their profit rate. Another key parameter for growth is γ. A fall in γ, i.e, a more effective prevention of tax evasion and elision, shifts the $\dot{d}^S = 0$ isocline to the left. Rentiers are compelled to internalize more of the total exports income, leading to a lower interest rate, a lower level of debt in equilibrium and a higher rate of output growth (point E_3 in Figure 1).

The distributive conflict involving rentiers versus HT firms is not the only conflict embedded in the model. To the extent that labor is part of the costs of producing the strategic public good (see equation (21)), rentiers and HT firms may join forces to curb wages and prevent public workers from unionizing and hence raising their bargaining power. Even though rentiers do not demand labor, HT firms and rentiers are jointly interested in reducing the costs of providing those strategic public goods that are key to economic growth and technical change.

There is also a special type of crowding out in the model. It does not come out of excessive absorption of financial capital by the government that makes finance capital scarcer for the HT sector. It comes from the possibility of exporting financial capital abroad and avoiding risk at home. The tax system may be so weak vis-à-vis the demand for strategic public goods that the government is bound to raise public debt up to a point that it becomes too risky for the rentiers to keep on lending in the domestic market. Rentiers will demand higher interest rates which, at the end of the day, curb the incentives to invest in the HT sector. It is not that the private sector cannot find capital to finance its activities, but that the indebted public sector cannot finance the provision of key inputs for economic growth.

An interesting extreme case from the political economy perspective is the total expropriation of the rentiers. If $t = 1$, the government takes all the rents through taxation or state ownership of the natural resources. In this case, the state will be able to use all export earnings to produce strategic public goods with no concern for the interest rate because there will be no public debt. Historically, natural resources have been frequently nationalized and still nowadays remains a central tool for policy makers in many peripheral and center economies. In the same vein, if the ability of rentiers not to internalize foreign exchange is very small due to stricter controls (γ close to zero), then the government will be able to decide over the tax rate considering solely the limits imposed on its political power vis-à-vis that of the rentiers.

5. A model with public and private debt

We will assume now that $x^n < 0$. The foreign exchange earned by the exporters of commodities are used both to pay the expenses of the government and to cover the trade deficit in the HT sector. The dynamics of debt in the HT sector is as follows:

$$\dot{d}^H = \underbrace{mu(i^H, d^H, i^S) - j}_{A} - \underbrace{[g^H(i^H, d^H, i^S) - i^H]d^H}_{B}. \tag{24}$$

In equation (24) the term A represents the impact of the negative trade balance on the debt of the HT sector (see equation 7) and B represents the impact of interest payments vis-à-vis the accumulation of capital. To make the model simpler and tractable, we assume that HT capitalists take the interest rate on the public debt i^S as an exogenous variable.

The interest rate that HT capitalists face is the one that equalizes the rentiers' expected returns on safe assets abroad and risky HT assets at home:

$$\frac{\partial i^H}{\partial t} = \theta^H \left(\frac{i^*}{f^H(d^H - \beta \bar{d}^H, B)} - i^H \right), \tag{25}$$

where θ^H is a strictly positive adjustment parameter.

As discussed in the previous section, the demand for investments by the public sector is driven by investment in the HT sector. Therefore:

$$\dot{d}^S = g(i^H, d^H, i^S) + w\left(\frac{b}{v}\right)[u^*(i^S)] - t^*(1 - t^*)z - [g(i^H, d^H, i^S) - i^S]d^S. \tag{26}$$

And the equation of motion for the interest rate on the public debt is represented by:

$$\frac{\partial i^S}{\partial t} = \theta^S \left(\frac{i^*}{f(d^P - \beta \bar{d}^P, B)} - i^S \right). \tag{27}$$

Quadrants A and B in Figure 2 represent the combinations of interest rate and debt-to-capital ratio which keep the two state variables in equilibrium, in the private and public sectors, respectively; while quadrants C and D show the corresponding rate of capital accumulation in equilibrium.

The left panel in Figure 2 depicts the balance-of-payments constraint on economic growth driven by the limits to indebtedness in the HT sector. The story goes as follows. HT capitalists get indebted in foreign currency in order to pay for the foreign capital goods they need to grow. The interest rate paid by the capitalists and demanded by the rentiers increases with HT debt along with the risk of default. At some combination of (i^H, d^H) at point N, rentiers will prefer to invest in risk-free assets abroad, while investment at home falls in response to the rise of the interest rates. The growth rate of the HT sector reaches a ceiling, which is determined by the lack of further access to foreign exchange. In other words, the balance-of-payments constraint comes out of the combination of debt and interest rates that emerge form equations (28) and (29).[8]

$$d^H = \frac{mu(i^H, d^H) - j}{g^H(i^H, d^H) - i^H}. \tag{28}$$

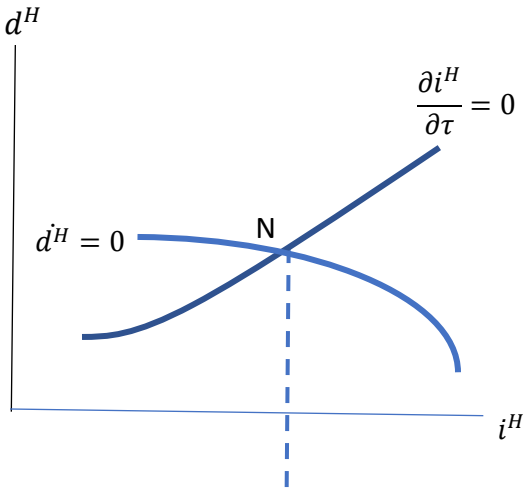
$$i^H\left[f(d^H - \bar{d}^H, B)\right] = i^S\left[f(d^S - \bar{d}^S, B)\right] = i^*. \tag{29}$$

As in equations (21) and (22), we assume that the underlying parameters and exogenous variables are such that the numerator in equation (28) is strictly positive, which means that the HT sector is a net debtor instead of net creditor with domestic rentiers. Moreover, we assume that the zero lower bound for the domestic and foreign nominal interest rates is never achieved.

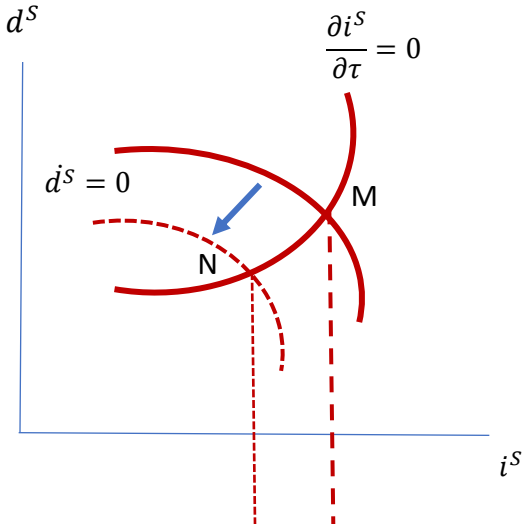
[8] Equation (29) reproduces equation (11).

Figure 2. Equilibrium values of the interest rate and debt-to-capital ratio in the private and public sectors, and respective rates of economic growth

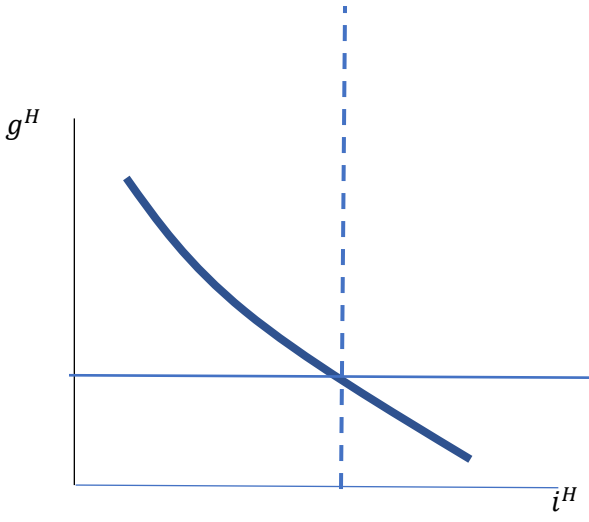
A. Debt and loans, HT sector



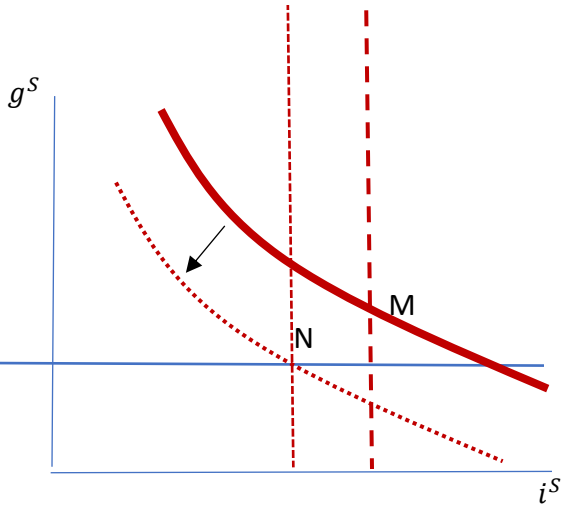
B. Debt and loans, public sector



C. Potential capital accumulation, HT



D. Potential capital accumulation, public sector



Note: the potential rate of growth is the one that the rentiers or the international markets will be willing to finance at the equilibrium values of the interest rate and debt-to-capital ratio in each sector. The effective rate of growth will depend on which one the two rate of growth is the binding constraint.

A symmetric exercise allows us to find the equilibrium values of (i^S, d^S) and the potential rate of growth of public capital (g^S). Note that if the public and private markets for loans were isolated, the combination of equilibrium values of (i^S, d^S), (i^H, d^H) would imply different potential rates of growth of private and public capital. But the two markets are closely interconnected by the arbitrage conditions of the rentiers.

How do these two rates adjust to each other considering this interconnection and that they cannot differ in the steady state?

In Figure 2 it is assumed that the combination of debt-to-capital ratios and interest rates emerging from equations (24) and (25) and (26) and (28) are such that $g^S > g^H$ in equilibrium. This means that in equilibrium (point M in the Northeast panel) rentiers would be willing and able to lend more foreign exchange to finance the accumulation of public capital. However, the public sector will not demand such loans because its demand is defined by capital accumulation in the HT sector (the demand for public goods is a derived demand). The HT sector, in turn, does not demand more strategic public goods because it faces a constraint in the access to foreign exchange, meaning that the HT sector is already highly indebted and hence it is riskier for the rentiers to continue financing the trade deficit of the HT sector. As a result, the public sector will curb the rate of growth of its stock of capital exactly in the proportion needed to match that of the private sector. This shifts the $\dot{d}^S = 0$ isocline to the left in quadrant B, and moves the equilibrium from point M to point N.

The adjustment process goes as follows: as the rate of public capital accumulation falls, a higher share of public investment is financed with taxes. This implies that the public debt-to-capital ratio falls as well. As the public debt becomes less risky, the interest rate falls. The process ends when the public debt-to-capital ratio and the interest rate paid by the public sector satisfy equation (29), which gives the arbitrage parity of (risk-corrected) real rates of returns between foreign and domestic (public and private) debt bonds.

The symmetric case is the one in which the combination of interest rate and debt-to-capital ratio in the public sector prevents the government from supplying the strategic public goods demanded by the private sector. In this case, the HT sector is competitive enough to sustain a higher rate of growth without having to resort to loans in a foreign currency. However, the public sector fails to follow suit and provide the strategic public goods at a rate that matches the potential rate of capital accumulation in the HT sector. The consequence is that HT reduces its rate of growth to converge with the that of the public sector, the trade balance improves (because u falls) and HT firms depend more on their own exports and less on borrowing from rentiers to pay for their imports. The private debt-to-capital ratio therefore starts to fall and the interest rate follows suit. The downward adjustment in the growth rate of the HT sector combines price signals (in particular the rise in i^S depresses growth expectations) and quantitative rationing, since there will be congestion in the use of the strategic public goods as firms seek to expand production beyond what is compatible with the available stock of public capital.

In this scenario, rentiers are willing to lend to firms in the HT sector, but they resist to lend to the public sector, which is already too indebted. Rents that could have been channeled to the HT sector will be sent abroad — a result already presented in our discussion above of the case of pure financial globalization. Typically, criticisms of the inefficiency of the public sector would emerge in the political economy debate. While the efficiency with which the state provides strategic public goods may well be part of the problem (as discussed above in relation to the parameters μ and b), a critical constraint is the state's capacity to tax vis-à-vis the high demand of strategic public goods and the existence of alternative, less risky alternatives for financial capital allocation abroad.

A last point has to do with whether total commodity exports suffice to pay for the all the capital goods demanded by both the public and private sectors, i.e. $\frac{z}{4\gamma} > x^n + g^S$. If this inequality holds, the economy does not need foreign loans and export the "excess" of rents abroad. If, on the other hand, exports are

unable to meet the total demand of imports and hence $zq < x^n + g^S$, then growth is strong enough to absorb all the rents stemming from exports of natural resources (net of taxes). In addition, HT firms and the public sector will have to borrow foreign exchange in the international financial markets to complement what is earned from commodity exports.

6. Concluding remarks

In a world of rapid technological change, the provision of strategic public goods—in particular the flow of technological services stemming from what Christopher Freeman (2004) dubbed 'technological infrastructure'—is critical for easing the balance-of-payments constraint and sustaining economic growth. Technological catching up certainly demands significant investments in endogenous technological capabilities and in industrial transformation in the periphery of the global system. However, the provision of those strategic public goods requires taxation and cross-subsidization, which has become increasingly challenging as financial globalization has made financial capital much more mobile than in the past. Tax heavens and capital flights clearly limit the ability of the state to collect taxes, especially in developing economies.

Through technological flows and trade, globalization could act as a powerful driver of economic development. This is captured in the model by the importance of imported capital goods in the production of the strategic public goods. On the other hand, the model calls attention to the negative consequences that financial globalization may bring about, especially in a context in which it offers ample opportunities for capital flights. Those compromise the provision of strategic public goods which are central to economic development.

A paradox emerges which is the existence of countries that export financial resources while at the same time lack the foreign exchange needed to expand investments in capital goods and technology. Capital flights take out of the country an essential resource badly needed in other sectors of the economy. The key for this paradox is that financial globalization allows the rentiers to allocate their earning of foreign exchanges at home and abroad so as to equalize the rate of return of domestic and foreign financial assets, and also to more easily use tax havens as a shelter for tax evasion and elision.

A distributive conflict emerges between actors in sectors that have a surplus in their trade and financial interactions with the rest of the world and actors in sectors that suffer a deficit. This distributive conflict is at the core of development policy, given that the deficit sectors are usually more dynamic from a technological point of view, and also more dynamic with respect to the creation of formal jobs, than commodity production as a prime example of a typically surplus sector. As a result, cross-subsidization (transferring rents from one sector to the other) is a critical development issue in the complex political economy of development in the periphery.

Such distributive conflict may be solved in different ways. Nationalization of natural resources may allow the government to acquire full or partial control of the leading exporting sector. Export taxes, land taxes, and royalties are as well tools used by governments to capture part of the rents stemming from exports of natural resources. These tools become more effective when barriers to capital mobility reduce the ability of financial capital to escape taxation and arbitrate between different tax and regulation regimes. Barriers to illegal and legal capital flows help the expansion of the HT sector by reducing the domestic interest rate and expanding the domestic supply of foreign exchange.

In some cases, the distributive conflict in question may be lessened by positive externalities created by public investment. If strategic public goods encourage technological change in both the production of commodities and HT goods, then a kind of "divine coincidence" of interests may arise. Rentiers and capitalists may converge to support public investment. On the one hand, rentiers will be less opposed to taxes; on the other hand, the cost of the provision of strategic public goods will fall due to technological change. Moreover, technological change in the HT sector can reduce the demand for strategic public goods, which will be used more efficiently.

The opposite happens if technological change is slow, and in particular if technological spillovers from the public sector to the HT sector or to commodity production is weak. In this scenario the distributive conflict between rentiers and HT capitalists should be expected to be more intense. In particular, rentiers will be mostly or even solely concerned with the ability of the state to pay interests on the debt and will neglect economic growth. The rentiers' demand for a contraction of public investment to reduce the stock of public debt (and reduce the risk of default) will compromise economic growth and exacerbate the clash of interests between rentiers and capitalists in the local economy.

A possible scenario not discussed in the paper, but which cannot be neglected, is one in which rentiers and HT capitalists combine their political power to pass on the costs of adjustment to workers (a polarization strategy). More specifically, they may seek a reduction of social expenditure and a fall in the cost of public goods in general by reducing wages in the public sector. The political economy will be dominated by rentiers and capitalists united in the demand for a reduction of the size of the state. This demand implies that public expenditure should be divided between paying the public debt and financing infrastructure, at the expense of social protection. This scenario may bring short-term benefits to the alliance between rentiers and HT capitalists, but it comes with a cost in the long run. If the weakening of social protection and higher inequality compromise political and institutional stability, then the problem of providing public goods in general will surface again, now in a different form (for instance, higher political instability, lack of incentives for learning at the workplace, less skills and human capital).

The model specifications presented in this paper are consistent with the canonical results of the balance-of-payments-constrained growth models and Thirlwall's Law, but allows for different adjustment mechanisms to the balance-of-payments constraint. When the HT sector is highly intensive in imports, the balance-of-payments constraint takes the shape of a growing debt that eventually hampers the ability of HT firms to continue borrowing from either the domestic rentiers or the international financial markets. The trade deficit is aggravated by capital flights (the rentiers invest in safe assets abroad) and interest payments to foreign creditors.

If the trade deficit in the HT sector is not so high, i.e., growth in the HT sector does not depend so heavily on imports, the external constraint may arise from exports of financial capital that prevent the state from providing the strategic public goods needed by the HT sector to expand and grow. The public debt-to-capital ratio rises and lending at home becomes too risky from the perspective of the rentiers. This is the pure financialization model of the balance-of-payments constraint set forth in Section 4, which helps to explain why the balance-of-payments constraint coexists in some cases with substantial amounts of financial capital going uphill, from the peripheral economies to the center economies or to off-shore accounts and tax havens.

The paper left many important points outside the model for future research. First, the impact of changes in the real exchange rate on dynamics and equilibrium outcomes. A rise in the real exchange rate boosts the price competitiveness of the HT sector, but at the same time implies a heavier burden of the stock of debt denominated in foreign currency. However, we abstracted from important valuation effects that operate through changes in the nominal and real exchange rates to sharpen focus on other channels and effects. Second, the possibility that some strategic public goods could be financed with debt issued in the domestic currency, thereby escaping from (or at least mitigating) the so called original sin problem. The government will have more room for maneuver in this case, in particular because it has other instruments at hand to manage the budget deficit (not necessarily getting in debt). Last but not least, it would be necessary to consider different forms of interactions between HT and commodity producers, beyond financial flows. For instance, commodity production may demand the goods produced in HT and vice-versa, which reshapes interests and the nature of the distributive conflict involving the three main actors of the model (rentiers, government and capitalists).

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