Rentiers, strategic public goods and financialization in the periphery: A demand-led macromodel for a small open economy

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1. Introduction

Domestic conflict between rentiers who own natural resources and capitalists in other sectors of the economy, especially in sectors that are technology-intensive, is a classical 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 conflict by redistributing rents between agents, in response to—and thereby reshaping—institutional and political constraints. While some authors argue that the state is an agent of transformation, others see it as an instrument in the hands of a self-serving bureaucracy that hampers technological innovation (for a discussion of these different views, see Evans, 1995, especially chapters 3 and 6; and Evans and Heller, 2019). The structuralist tradition in Latin America has stressed the conflict between the old agrarian oligarchies, the middle classes and the emerging industrial actors, with a leading role for the state and industrial policy in mediating in this conflict. Classical examples are Cardoso and Faletto (1979), Sunkel and Paz (1970) and the last Prebisch's book on peripheral capitalism (Prebisch, 1981).

This paper revisits the conflictive and complex interactions between the state, rentiers and technology-intensive industries (HT for short) in the light of two major 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 Freeman (2004) in very broad terms calls "technological infrastructure". Meanwhile, technical change is critical for international competitiveness and therefore for easing the Balance-of-Payments (BOP) constraint on growth. "National Systems of Innovation" compete in the international economy as much as private firms do (Lundvall, 2007). The most successful countries in terms of international competitiveness are those in which the

state provides strategic public goods that promote innovation, the diffusion of technology and industrial diversification (Mazzucatto, 2013). Public goods are especially and crucially important in the case of developing economies, whose ability to ease the external constraint on growth depends critically on catching up with the technological frontier (Fagerberg and Verspagen, 2002; Lee, 2013; Spinola, 2020).

The second critical transformation to be highlighted is the rise of financial globalization and the constraint it imposes on the ability of governments to tax and provide strategic public goods. A finance-dominated macroeconomic dynamics has emerged since the late seventies (Stockhammer, 2004; Hein et al, 2013; Paula e Prates, 2017; Storm, 2018; Kohler and Stockhammer, 2021). 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 intensified. Financial globalization makes it necessary to address the external constraint on growth from a different and more complex perspective. In particular, capital flights from peripheral economies which are greatly or fully integrated to global financial markets contribute to the external constraint on growth, not only because they exacerbate the lack of foreign exchange, but also because they hamper the ability of the state to tax and provide strategic public goods that are essential for the much needed diversification of the economy. 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. Capital outflows are a way of avoiding or evading taxation or at the very least of constraining the ability of the state to tax the peripheral elites, which in turn carries several key economic and political implications.

This paper presents a stylized model dealing with the conflict between rentiers, capitalists and the state within the new and more complex context created by financial globalization and the central role that strategic public goods play in the dynamics of technical change (and hence in international competitiveness). The model comprises three economic agents, which are the rentiers that own the natural resources (e.g., land, mines); capitalists who produce more technology-intensive goods in the HT sector; and the state, which provides free-of-charge strategic public goods that are necessary inputs for the expansion of the HT sector. The model is placed in the tradition of the center-periphery systems, in which the periphery is the technological laggard specialized mostly in exporting natural resources and importing sophisticated intermediate and capital goods.

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 economic transformation; section 3 presents the structure of the model, define actors and behavioral rules and the equilibrium solutions; section 4 discusses the case in which the external constraint on growth depends entirely on financial globalization and the limits it imposes on the ability of the government to provide public goods, while the HT sector shows balanced trade; and 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 classical Lewis model depicts the development process as one of transferring workers form the subsistence sector towards a homogenous modern 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 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 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—preconditions which we broadly designate henceforth as provision of strategic public goods (more on this below). These conditions are crucial for encouraging international competitiveness and changing the pattern of specialization, as argued by the structuralist literature (see Fajnzylber, 1990).

The modern sector is not homogeneous, but usually comprises sectors with very different potential for productivity growth and creation of formal jobs. The relative share of HT in total value added matters for the evolution of technical change, output growth and income distribution over time. This is a key tenet of the literature on structural change and development, whose origins can be traced back at least to the classical 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 relevant literature are the works 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 (Hausmann et al., 2013; Hartmann et al., 2017).

Building technological capabilities in the tradable sector out of an initial comparative advantage in natural resources is key for the success of economic transformation in peripheral economies (Chang and Lebdioui, 2020). From a policy perspective, the redistribution of rents from sectors which are less innovative in favor of those more technologically advanced—what the literature has labelled cross-subsidization—has been widely used to encourage structural change. Many of the preconditions for development and instruments for cross-subsidization take the form of public goods or have significant public goods components or dimensions[1]. Although in some cases private agents may solve the collective action problem, more frequently the provision of these public goods requires taxation and state intervention. The link between taxes and industrial transformation is highlighted by Besley and Persson (2013, p. 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 (Edler and Fagerberg, 2017). Meanwhile, Mazzucatto (2013, 2020) points out that the "entrepreneurial state" and public expenditure have been the ultimate source of path-breaking innovations in advanced economies.

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

[1] The public goods content of new ideas has been highlighted even from a more mainstream perspective in economics. For example, Romer (1990) observes that new ideas and new designs are nonrival and represent positive externalities for the rest of the economic system.

stricto sensu—driven by Schumpeterian rents. In this paper, we argue that one of the challenges of economic transformation is to ensure the transfer of Ricardian rents in the form of a strategic public goods 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, and driven by technological innovation.

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. During the transition in which new capabilities are developed, the demand for imported inputs and services tends to rise. 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 manufacturing sector, which in developing economies usually shows a deficit in its trade balance with the rest of the world (especially in high-tech goods); see on this point the already well-established literature on the Balance-of-Payments constraint on growth (Blecker 2020).

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). 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 considerably open capital accounts. The vulnerability and instability of the international system increased with financial globalization (Turner, 2015; Tooze, 2018) and reduced both the fiscal and policy space for industrial policy, in particular in developing economies (Cimoli et al., 2020). 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 public goods because rents stemming from natural resources can easily morph into financial rents as financial capital is liable to be sent abroad and kept outside the jurisdiction of the peripheral government. Capital flights chastise the peripheral economy by depriving it of one of its scarcest 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 public goods by the government or the direct imports of capital goods demanded by the HT sector (Frenkel and Rapetti, 2009; Bhaduri, 2011; Botta, 2021; Botta et al., 2021).

Taking stock, we would argue that the traditional conflict between rentiers who own and export natural resources and capitalists that invest in new sectors and technologies has been redefined as a result of both financial globalization and the role of public goods in technical change. Exporters of natural resources can escape taxation by exporting financial capital to become globalized financial rentiers. This in turn compromises the provision of strategic pubic goods for HT and makes the binding external constraint on

economic growth more acute. As a result, a more complex political economy emerges that poses new and daunting challenges to a development policy of structural change in peripheral economies.

3. Structure, actors and behavior

Actors and behavioral rules

The model comprises three economic actors and two sectors. The first actor is a class of *rentiers* in a developing economy which exports a commodity intensive in natural resources (say copper, soya or iron ore) extracted with productivity ϵ from a given (and fixed) endowment Z of the stock of those natural resources. The production 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^*. For simplicity, rentiers do not consume.

The rentiers pay taxes and then decide how to use their after-tax income. They can either lend their foreign exchange in the domestic market (to the state or to HT capitalists) or buy safe assets abroad. Financial capital can be exported to earn the international interest rate after paying a fee (which is the cost of moving capital abroad). If there are no barriers to the exports of financial capital, this fee is zero. The rentiers will allocate their rents in such a way as to equalize the rate of return they can obtain from buying bonds abroad at zero risk (say US treasury bonds) with the rate of return of riskier assets at home. The risk premium rentiers demand for lending at home to the state or the HT sector is a function of the debt to capital ratio in each of these sectors.

The second actor is a class of *capitalists in HT* (thereafter simply capitalists) who produce a good which is more technology-intensive than the commodity. It 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 in local currency P, which is determined by a mark-up rule in an imperfectly competitive market. The HT sector does not demand as input the commodities exported by the natural resources-intensive sector, but demands imports of advanced capital goods from center economies. The HT sector needs foreign exchange to pay for those goods, which are paid with exports by the HT sector itself, or by contracting a debt denominated in foreign currency with the rentiers. Investment by the capitalist class follows a Kaleckian investment function with the real interest rate, the debt to capital ratio and the profit rate as arguments (more on this below).

A third actor is *the state* whose objective is to provide public goods G 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 and keep the model simple, we assume that all the capital goods required by the state to produce the public good are imported. The production of the public good is financed with taxes and public debt. 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 HT is the main source of formal jobs and productivity growth, the policy of subsidizing HT may reflect a broader political alliance which includes at least part of the labor force. In addition, public goods have an impact on learning and productivity growth, not only in the HT sector but also (albeit indirectly) in the commodity sector. This implies that rentiers may be interested in supporting the provision of public goods as they represent a positive externality (a technological spillover) for them.

Basic equations and equilibrium in the goods market

Using definitions presented earlier, ϵZ is the volume of exports of the commodity whose production requires natural resources, Z is the endowment of natural resources (e.g., land) and ϵ is the productivity with which the commodity is produced. Commodities faces a horizontal demand curve and are sold abroad at an exogenous and constant price P^*, with the nominal exchange rate assumed to be constant and equal to the unity. Rentiers' available nominal income in foreign currency is given by the value of exports net of variable costs (c) and taxes (t) plus the interests on the money they lent to the private and public sectors. Formally:

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

where t is the tax rate on the value of exports, c are variable costs of production, P^*D^S and P^*D^H are the accumulated debt in foreign exchange contracted by the state (S) and the HT sector (H) with the rentiers, and i^P and i^H are the respective nominal interest rates. The level of ϵ is a function of the stock of public capital, $\epsilon = \epsilon_1 K^S$, where ϵ_1 is an exogenously given constant. For simplicity, we assume that the variable cost in equation (1) is equal to zero, $c = 0$. Normalizing the rents determined by equation (1) by the nominal value (in local currency) of the stock of public capital PK^S gives:

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

In equation (2) z can be understood as the amount of the natural resource corrected by the increase in productivity associated with the expansion of public capital. Given that rentiers do not consume, all their available income represented in equation (1) is applied in domestic bonds (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 ($RER = P/P^*$) is constant (P^* and P either remain constant or change at the same rate) and equal to one, and is not expected to vary, which is equivalent to casting the model in real terms".

The strategic public goods, the available amount of which is given by G, is produced according to the following fixed-proportions production function:

$$(3)\ G = \min(bK^S, vL^S),$$

In equation (3) K^S is the stock of public capital, b is public capital productivity, v is labor productivity, and L^S is the number of workers hired by the government.

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:

$$(4)\ Y = min(aK^H u, \mu G, lL^H)$$

where a and l are private capital and labor productivity, respectively, $u = Y/aK^H$ is the rate of utilization of the stock of private capital, and L^H is the number of workers hired in the HT sector. While the public sector fully utilizes its stock of capital, the HT market 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 strategy in oligopolistic competition). From equations (3) and (4) it is straightforward that $\mu G = bK^S$ in equilibrium. The parameter μ represents technological

capabilities in the public sector used in the production of the public goods demanded by HT. Firms use all the labor they hire (there is no labor hoarding) and all the public goods available, but not all their own capital stock.

The supply of labor is unlimited at the current wage rate, an assumption coherent with a center-periphery setting with a large share of the workforce in the subsistence sector in the periphery. The total demand for workers in the formal labor market is determined by the stock of public and private capital and the rate of capacity utilization of private capital; 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 $\mu G = aK^H u$ and G combines in fixed proportions with L^S, it follows that total employment in the public sector endogenously adjusts to make $L^S = \frac{bK^S}{v}$; total employment in HT equals $L^H = \frac{aK^H u}{l} = \frac{\mu bK^S}{l}$. Note in addition that since $G = bK^S$ and $\mu G = aK^H u$ in equilibrium, then $\mu G = \mu bK^S = aK^H u$, and therefore $\frac{\mu bK^S}{au} = K^H$. Total formal employment in the economy will be $L = L^H + L^S = K^S\left(\frac{b}{v} + \frac{\mu b}{l}\right)$.

Capitalists in the HT sector save all their income, and hence total savings are given by $\pi u Y$, where π is the profit share in the HT sector. Workers only consume domestic goods. Neither 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 its net exports. In developing economies, HT sectors are prone to exhibit a trade deficit, financed by loans denominated in foreign exchange, which we assume to be provided solely by the domestic rentiers, so that $X^n = -\dot{D}^H$. Normalizing equation (5) by K^H, we have:

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

We plausibly assume that the normalized net exports x^n are a linear function of the real exchange rate (positively) and the rate of capacity utilization (negatively):

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

In equation (7) j_0 captures the autonomous growth of external demand for HT goods, $m > 0$ captures the effect of an increase in the rate of capital utilization in the HT sector, and $j_1 > 0$ is the impact of a change in the real exchange rate on net exports. Since workers do not consume imported goods, all imports of the HT sector are constituted by capital goods. Note that the consumption of workers in the public sector is equivalent to "exports" from the HT sector (indirectly paid with the foreign exchange obtained through taxing the rentiers or through debt by the state).

Decisions of investment in the HT sector are a positive function of r^n, the profit rate net of the debt service on the stock of debt as a proportion of the private capital stock (see Blecker and Setterfield, 2019, chapter 7). The profit rate is given by $r = \frac{\pi Y}{K^H}$ and the net profit rate is represented by $r^n = \frac{\pi Y - i^H D^H}{K^H} = \frac{\pi a K^H u - i^H D^H}{K^H} = \pi a u - i^H \frac{D^H}{K^H} = r - i^H \frac{D^H}{K^H}$.

In addition, we argue that it is necessary to include as an argument in the investment function of the HT sector the interest rate paid by the public sector on its own debt. The inclusion of the interest rate paid

by the public sector in the investment function of the HT sector reflects the dependence of the capitalists in the HT sector to expand and grow on the provision of the strategic public goods by the state. 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 lower capacity of the state to provide those goods. Capitalists in the HT sector will expect lower economic growth in the future as i^S increases. Note that an alternative specification of the investment function might include the debt to capital stock ratio of the public sector, along with or instead of the interest rate. We deal with this alternative specification in an appendix at the end of the paper. However, for the sake of simplicity, and taking into account that the interest rate and the debt to capital ratio move hand in hand in the model, we have just included the interest rate i^S in the investment function of the HT sector.

The debt to capital ratio in the HT sector (corrected by the degree of utilization of the stock of capital) is $\frac{D^H}{uK^H} = \frac{D^H a}{\mu b K^S} = \frac{d^H a}{\mu b}$ (using $\frac{\mu b K^S}{a} = K^H u$ and $d^H = D^H/K^S$). Therefore:

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

The first term on the right-hand-side (A) reflects the impact of i^S of expectations regarding future growth, that changes the "animal spirit" of the capitalists in the HT sector; the second term (B) expresses the impact of the net profit rate. Using equations (6) through (8), we find that goods market equilibrium in the HT sector requires:

$$(9)\ \pi u a = g_0(i^S) + g_1\left(\pi a u - i^H \frac{d^H a}{\mu b}\right) + j_0 + j_1 q - m u$$

This in turn allows finding the equilibrium rate of capital utilization in the HT sector:

$$(10)\qquad u = \frac{g_0(i^S) + j_0 + j_1 q - g_1\left(i^H \frac{d^H a}{\mu b}\right)}{\pi a (1 - g_1) + m}$$

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) must be positive. Equation (10) represents a short-run equilibrium condition assuming that i^S, i^H, q 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.

The rentiers will allocate their 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 sector. Note that this arbitrage mechanism makes irrelevant where the state 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 the 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:

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

where $d^S = D^S/K^S$, $d^H\left(\frac{a}{\mu b}\right) = \frac{D^H}{K^H u}$ is the private debt to effective private capital ratio, and $1 > f^{S,H}(\cdot) > 0$, $f'(d) < 0, f'(t) < 0, f'(B) > 0$. The term (1) in the equality is the interest rate paid by the public sector corrected by the risk of lending to the government; and the term (2) is the interest rate paid by the HT sector corrected by the risk of lending to the capitalists. Both must be equal to the nominal interest rate of foreign bonds i^*, which are assumed to be risk-free. The partial derivatives $f_d^H < 0$ and $f_d^S < 0$ signals that the risk of lending to the government or to the HT sector increases with the debt to capital ratio: rentiers demand a higher interest rate to lend at home when d^S and d^H increase. If there is no rise in the interest rates, there will be capital flights towards safe foreign bonds. The parameter $\bar{d}^S$ is a critical debt level such that $f^S\left(d^S - \beta\bar{d}^S, t, B\right) \to 0$ when $d^S \to \beta\bar{d}^S$, making the cost of financing domestics agent approach infinity when the debt approaches the critical level (a symmetric result applies to the parameter $\bar{d}^H$ and$f^H(\cdot)$).

The partial derivative $f_t < 0$ captures capital flights due to tax evasion. The higher the domestic taxes are, the higher the incentives to evade in any of the many ways allowed by globalized finance and intrafirm trade. Finally, B are 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 accept a lower domestic interest rate to keep their monetary resources at home.

As mentioned earlier, the qualitative results of the model do not change much if domestic capitalists and the government borrow at home (from the rentiers) or abroad (from the international capital markets). The risk assessment by foreign lenders will 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 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 rentiers.

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 ($x^n = j_0 u^* + j_1 q - mu = 0$). As a result, HT capitalists do not require the foreign exchange of the rentiers or contract debts. The profit rate and the net profit rate are therefore one and the same ($r - r^n = \pi ua$). However, the HT sector still depends on the provision of strategic public goods by the government to expand and grow. This model specification is an extreme case of the constraint on growth associated with financial globalization: the economy has a positive trade balance in the commodity sector, but capital outflows prevent the state from collecting enough taxes to propel the growth of the HT sector at higher rates. In the second model specification the government depends on the rentiers for providing public goods, and the HT sector depends on the rentiers for imports of capital goods. In this case both the trade balance and financial globalization interact in a complex fashion to make the external constrain on growth more acute. 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 theme of the BOP-constrained growth dynamics in a small open economy

Two model specifications are presented below. The first one is a model specification of "pure" financial globalization, in which the HT sector is perfectly capable of growing without facing an external constraint, but capital outflows hamper the ability of the government to provide strategic public goods. This is an economy in which the external constraint comes from financial integration and the gap in the provision of strategic public goods, not from international trade. In the second model specification, financial integration and lack of international competitiveness combine to curb growth in the peripheral economy. The HT sector has a deficit in its trade balance with the rest of the world (in equation (7) we have $x^n < 0$ for any $u > 0$) and needs to issue bonds denominated in foreign currency to finance its inputs, and both the private and public sectors borrow foreign exchange from the rentiers.

4. A pure financialization constraint

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

In this model specification the HT sector does not need to borrow foreign exchange, has no debt and exhibits a balanced trade balance in equilibrium. It hence follows that $d^H = x^n = 0$. The investment function in the HT sector 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 positive parameters. The impact of the in the interest cost on the debt of the public sector on the expectations on future growth in the HT sector is captured by the third term in the right-hand-side of equation (12).

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

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

We assume that the denominator in (13) is strictly positive for the equilibrium solution for u to be stable. It is easy to check that equation (13) is a special case of equation (10) when $i^H \frac{d^H a}{\mu b} = j_0 + j_1 q - m u = 0$.

The equilibrium rate of capital accumulation (assuming that strategic public goods are effectively provided by the government) 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 exactly the amount that matches the demand for strategic public goods—in accordance with the equilibrium condition implied by the Leontief production function, $\mu b K^S = a K^H u$. Public goods are 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 ($w L^S$) is

greater (lower) than the taxes collected by the state by taxing commodity exports, $t\epsilon Z$. Recalling that the nominal exchange rate is a constant normalized to one and keeping the assumption that $q = 1$ we have:

$$(15) \qquad I^S = t\epsilon Z - wL^S - i^S D^S + \dot{D}^S$$

Wages are assumed to remain constant, which reflects the assumption of a horizontal labor supply curve due to the existence of abundant surplus labor. From (15) the change in the public debt (using $wL^S = w\left(\frac{b}{v}\right)K^S$), is given by:[2]

$$(16) \qquad \dot{D^S} = I^S + w\left(\frac{b}{v}\right)K^S + i^S D^S - t\epsilon Z$$

Normalizing by the stock of capital of the public sector yields:

$$(17) \qquad \frac{\dot{D^S}}{K^S} = g^S + w\left(\frac{b}{v}\right) + i^S d^S - tz$$

The rate of growth of the respective debt to capital ratio is:

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

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

$$(19) \qquad \dot{d}^S = (i^S) + w\left(\frac{b}{v}\right) - tz + [i^S - g(i^S)]d^S$$

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 of foreign exchange from the government does not reach the maximum income obtained by the rentiers. In other words, the limits to lending to the government does not come from the exhaustion of the amount of foreign exchange in the hands of the rentiers, but from the high risk implied by the debt to capital ratio in 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 stated 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:

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

The parameter θ^S 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

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

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 $i^S \rightarrow \frac{g_0}{g_2}$.

Assume that initially the interest rate is i_1^S and the HT sector grows at a rate that heightens the demand for strategic public goods. It may happen that at the prevailing debt to capital ratio, say d_1, and at the prevailing levels of taxes and barriers to capital mobility, the risk attached to lending to the government is so high that no new lending will come forth at the existing interest rate i_1^S. Rentiers instead will prefer to send their money abroad. Given B and t, the government is therefore bound to raise the interest rate so as to attract the new funding it needs. The interest rate increases attracting more capital, and the rate of growth of the HT sector falls out of the perception by the HT capitalists that the probability of having financial difficulties in the public sector has increased. After successive rounds of increases in i^S, the supply and demand of financing for the provision of public goods will converge.

Conversely, if growth is sluggish in the HT sector and the debt to capital ratio in the public sector falls, then the fall in i^S will contribute to reinvigorate growth in the HT sector. 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. The willingness of the rentiers to finance the government falters, halting the provision of strategic pubic goods, and compromising growth in the HT sector.

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 public goods demanded by the HT sector (hence $\frac{\partial i^S}{\partial t} = 0$), as long as we have $d^S < \bar{d}^S$ and $i^S < g_0$. The equilibrium comes out of a fall in the rate of economic growth in the HT sector and the rentiers' arbitrage between safe foreign assets and riskier domestic asset issued by the government.

Outcomes and implications of the model

Equations (19) and (20) form a 2x2 system of differential equations. The isocline $\dot{d}^S = 0$ is negatively sloped because a higher d^S requires a lower i^S to reduce interest payments and boost growth to keep the debt to capital ratio stable. On the other hand, the isocline $\partial i^S/\partial t = 0$ 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.

The equilibrium values of the two state variables satisfy the following equations:

$$d^S = \frac{g(i^S) + w\left(\frac{b}{v}\right) - tz}{g(i^S) - i^S} \tag{21}$$

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

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 positive. In addition, we assume that the underlying parameters and exogenous variables are such that the numerator in equation (21) is also positive, which means that the government is a net debtor instead of net creditor

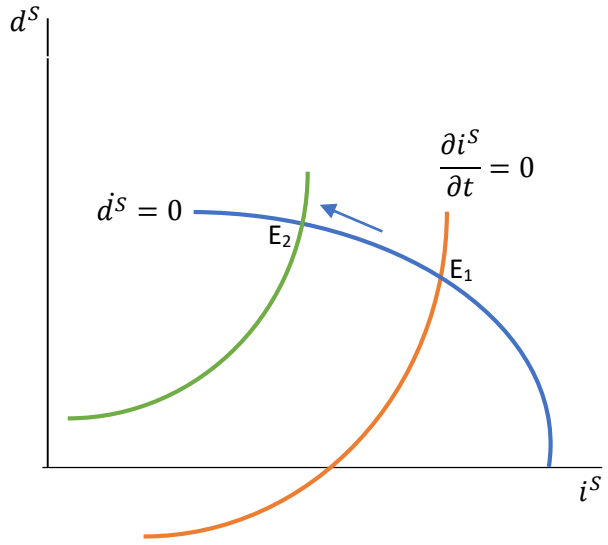
with domestic rentier. Finally, the zero lower bound for the domestic and foreign nominal interest rates is respected throughout. The Jacobian of the system is:

$$(23) \qquad J = \begin{vmatrix} -[g(i^S) - i^S] & g'(i^S) - [g'(i^S) - 1]d^S \\ \theta\left\{\frac{-f'(d^S)i^*}{[f(d^S - \beta\bar{d}^S, t, B)]^2}\right\} & -\theta \end{vmatrix}$$

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 the determinant will be positive if $g'(i^S) - [g'(i^S) - 1]d^S > 0$. The latter condition implies that an increase in the interest rate has a positive effect on the growth rate of the debt to capital ratio in the public sector. In other words, from the standpoint of the public debt to capital ratio, the combined effect of the interest rates paid by the government and the contraction of GDP prevails over the fall in the demand for credit when the interest rate increases. Note that $g'(i^S) - [g'(i^S) - 1]d^S > 0$ is a sufficient but not necessary condition for a positive determinant. Even if the latter inequality is reversed so that J12<0, the determinant of the Jacobian matrix will be positive if J11xJ22 > J12xJ21.

The equilibrium solution represented in equations (21)-(22) implies that the rentiers will always get the same risk-adjusted rate of return at home and abroad. But the profit rate accruing to the capitalists in the HT sector depends negatively on the interest rate in equilibrium: the higher the interest rate paid by the public sector, the lower the equilibrium values of the rates of capital utilization and profit in the HT sector.

Figure 1. Equilibrium in the goods and financial markets



There is a direct conflict between rentiers on one side and HT capitalists and workers on the other. The higher the domestic interest rate, the lower the rate of growth of the HT sector and the lower the rate of growth of employment in the public and private sectors. 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 would 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 demand of the strategic public goods in the HT sector. Assume a 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 $\mu G = \mu b K^S = a K^H u$. The demand of 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 $\hat{\mu} = \hat{b} = 0$. Therefore we have: $g^S = \frac{g^H}{1+\alpha}$, 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.

Another factor that affects growth and distribution 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; Botta et al, 2021). The higher B, the lower will be the equilibrium interest rate at each level of debt to capital ratio, since the (di^P/dt) curve shifts to the left. Even if returns are equalized for rentiers, they will oppose a higher B because it reduces i^P and therefore, per equation (1), this will reduce their after-tax rents: the new equilibrium entails a lower level of the ratio of public debt to capital and a lower interest rate (point E_3 in Figure 1).

The 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. Even though rentiers do not demand labor, HT firms and rentiers are jointly interested in reducing the costs of providing the 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 is so weak vis-à-vis the demand for strategic public goods that the government is bound to raise the public debt to capital ratio 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 both peripheral and center economies.

5. A model with public and private debt

In this second model specification we assume 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 settle the trade balance of the HT sector. The dynamics of debt in the HT sector is as follows:

(24) $$\dot{d}^H = \underbrace{mu(i^H, d^H, i^S) - j_0 - j_1 q}_{A} - \underbrace{[g^H(i^H, d^H, i^S) - i^H]d^H}_{B}$$

In equation (24) the term A represents the impact of the negative trade balance on the debt of the HT sector (see also 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 the capitalists in the HT sector take the interest rate on the public debt i^S as an exogenous variable.

The interest rate demanded by the rentiers should equalize the expected returns of investing in safe assets abroad and risky HT assets at home:

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

Where θ^H is a positive adjustment parameter.

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

(26) $$\dot{d}^S = g(i^H, d^H, i^S) + w\left(\frac{b}{v}\right) - tz - [g(i^H, d^H, i^S) - i^S]d^S$$

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

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

Figure 2 presents in quadrants A and B the combination of interest rate and public debt to capital ratio in equilibrium in the private and public sectors, respectively, while quadrants C and D show the corresponding rates of capital accumulation in these sectors.

The left panel in figure 2 depicts the BOP-constraint on economic growth driven by the limits to indebtedness in the HT sector. The story goes as follows. The HT sector gets indebted in foreign currency in order to pay for part of the capital goods it needs to grow. The interest rate paid by the capitalists in the HT sector and demanded by the rentiers increases with the HT debt so as to take into account the risk of default. At some level of d^H, rentiers will prefer to invest in risk-free assets abroad, while investment at home falls along with 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 this case the BOP constraint takes the shape of a specific combination of debt and interest rates that emerge form equations (28) and (29).[3]

(28) $$d^H = \frac{mu(i^H, d^H) - j_0 - j_1 q}{g^H(i^H, d^H) - i^H}$$

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

As in equations (21) and (22), we assume that the underlying parameters and exogenous variables are such that the numerator in equation (28) is positive, which means that the HT sector is a net debtor

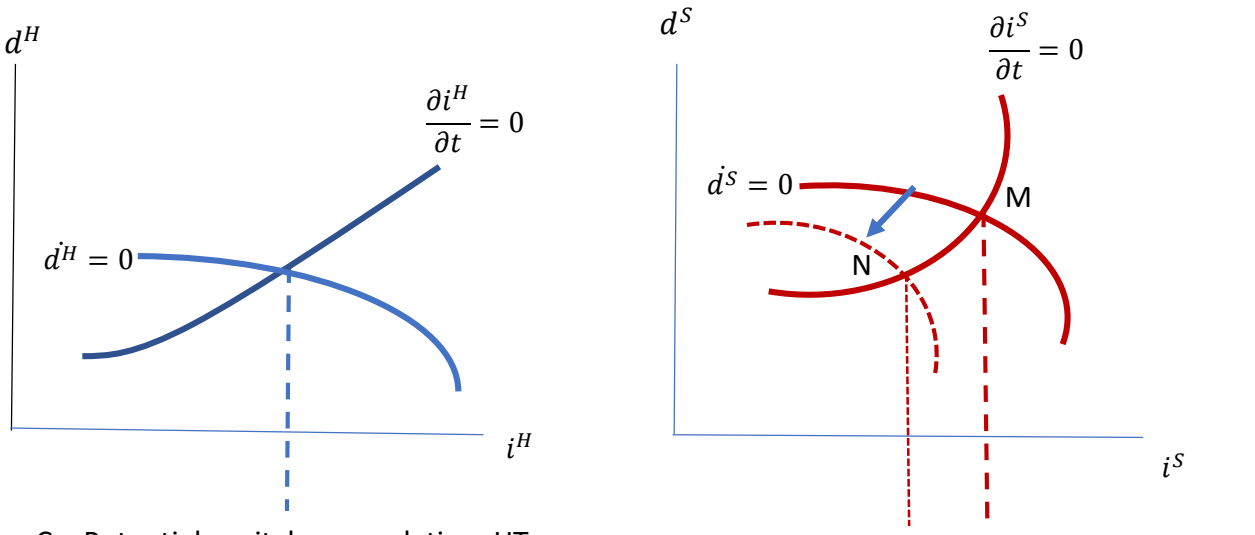
[3] Equation (29) reproduces equation (11).

instead of net creditor with domestic rentiers. Second, with $E = P = P^* = 1$, it the zero lower bound for the domestic and foreign nominal interest rates holds.

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

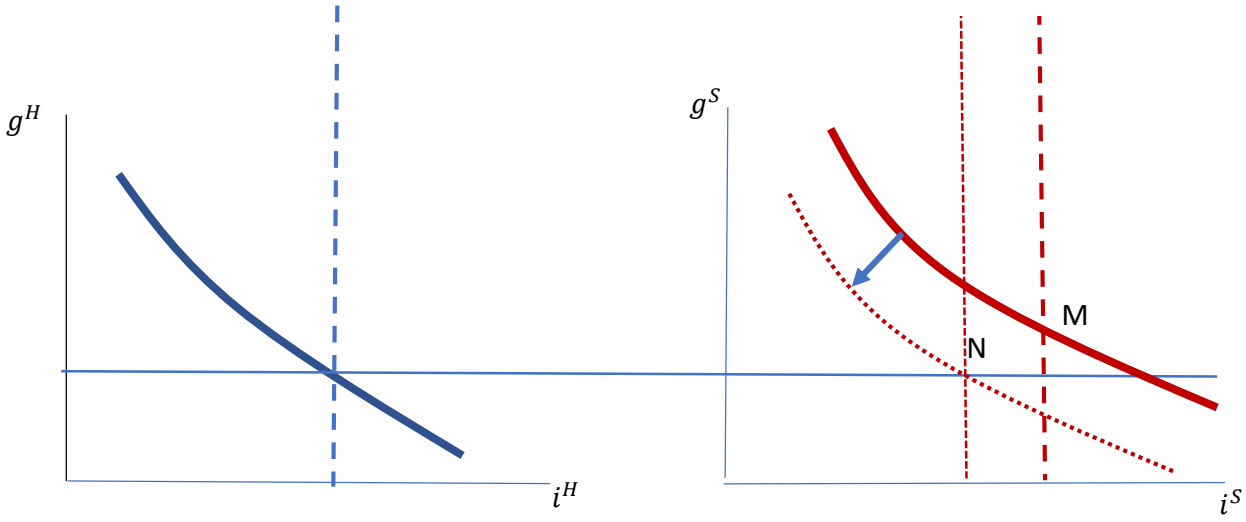
A. Debt and loans, HT sector

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 interest rate and debt to capital ratio of equilibrium in each sector. The effective rate of growth will depend on which the two rates 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 in isolation the combination of equilibrium values of (i^S, d^S), (i^H, d^H) may imply different potential rates of growth of private and public capital. But the two markets cannot

be isolated. How do these two rates adjust to each other considering that they are interconnected and they cannot differ in the steady state?

In Figure 2 it is assumed that the combination of debt to capital ratios and interest emerging from equations (24) and (25) and (26) and (28) are such that $g^S > g^H$ in equilibrium. This means that rentiers would be willing and able to lend more foreign exchange to finance the accumulation of public capital, but the public sector will not demand such loans because its demand is defined by the growth of private capital. The HT sector, in turn, does not demand more 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 stock 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 public debt to capital ratio in prevents the public sector from supplying the strategic public goods demanded by the private sector. In this case, the latter is competitive enough to sustain a higher rate of growth without having to recur to loans in a foreign currency. However, the public sector fails to follow suit and cannot accumulate capital as fast at the potential rate of capital accumulation in the HT sector. The consequence is that the HT sector reduces its rate of growth to converge with the one for 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 will therefore start 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 will depress 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 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. $zq > x^n + g^S$. 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). Ht firms and the public sector will also borrow foreign exchange in the international financial markets to complement that earned from commodity exports.

6. Concluding remarks

In a world of rapid technological change, the provision of strategic public goods—in particular of what Christopher Freeman (2004) dubbed 'technological infrastructure'—is critical for easing the BOP 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.

As a result, a paradox emerges which is the existence of countries that export financial resources while at the same time lack the foreign exchange needed for expanding 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 the foreign exchange is obtained by commodity exporters who receive, in the global financial markets, a higher rate of return for their financial capital in external currency than in the domestic economy.

A conflict therefore 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 conflict is at the core of development policy, since the deficit sectors are usually more dynamic from a technological point of view, and also more dynamic in terms of the creation of formal jobs, than the commodity sector as a prime example of a surplus sector. As a result, cross-subsidization (transferring rents from the first sector to the latter) is a critical development issue in the complex political economy of the periphery.

Such distributional conflict may be solved in different ways. Nationalization of natural resources allows the government to acquire full or partial control of the leading exporting sector. Taxes, multiple exchange rates, 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 flows to arbitrate between different tax and regulation regimes.

In some cases, such conflict between actors in the two sectors are lessened by positive externalities created by public investment flowing from the high-technology (HT) sector towards the sector intensive in natural resources. If the rate of growth of a set of strategic public goods encourages technological change in both the production of commodities and HT goods, then a "divine coincidence" of interests may arise. On the one hand, rentiers will be less opposed to taxes; on the other hand, the provision of strategic public goods will become larger and cheaper due to technological change. Moreover, technological change in the HT sector will reduce the demand for 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 or the HT sector to the natural resource sector is weak. In this scenario the distributional conflict between rentiers and HT capitalists would become more intense. In particular, at some point the rentiers will be more concerned with the ability of the state to pay the interest of the debt than with the ability of the state to sustain economic growth. The demand for a contraction of public investment to

reduce the stock of public debt (and reduce the risk of default) will exacerbate the clash of interests between rentiers and capitalists in the local economy.

A scenario not discussed in the paper, but which cannot be neglected, is when rentiers and HT capitalists combine their political power to pass on the costs of adjustment to the government. More specifically, they may seek a reduction of social expenditure (not directly linked to strategic public goods) or a fall in the cost of public goods (for instances, by reducing wages in the public sector).

The model specifications presented in this paper are consistent with the canonical results of the BOP-constrained growth models and Thirlwall's Law, but allows for different adjustment mechanisms to the BOP constraint. When the HT sector is highly intensive in imports, the BOP constraint takes the shape of a growing debt (with implications for the interest rate paid on it) that eventually hampers the ability of HT firms to continue borrowing from either the domestic rentiers or the international financial markets. The trade deficit in the HT sector 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 HT does not depend so heavily on imports, the external constraint may arise from exports of financial capital that prevents the state from providing the set of 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, who would prefer to invest their financial capital in safe assets abroad. This is the pure financialization model of the BOP constraint set forth in Section 4, which helps to explain why the BOP 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.

Appendix: a variation on the pure financialization model

This version of the pure financialization model set forth in Section 4 assumes that the signal for troubled times in the public sector is the interest rate paid by the government on its debt instead of the public debt to capital ratio. The latter alternative assumption entails changing the argument of the investment function:

$$(1)\ g^H = g(r, d^S) = g_0 + g_1 \pi a u - g_2 d^S$$

where g_0, g_1, g_2 are all positive parameters. The equilibrium rate of capital utilization will be:

$$(2)\ u^* = \frac{g_0 - g_2 d^S}{(1-g_1) a \pi}$$

As a result, the dynamics of the debt to capital ratio in the public sector becomes:

$$(3)\ \dot{d}^S = \underbrace{\frac{g_0 - g_2 d^S}{(1-g_1) a \pi} + w\left(\frac{b}{v}\right) - tz}_{A} + \underbrace{\left[i^S - \frac{g_0 - g_2 d^S}{(1-g_1) a \pi}\right] d^S}_{B}$$

In the expression above *A* is the demand for foreign exchange of the public sector minus what the government collects in foreign exchange; and *B* captures the impact on the debt to capital ratio of interests payments per unit of the stock of capital vis-à-vis economic growth of the public sector.

The change in time of the interest rate paid by the public sector is the same as in equation (20) :

$$(4)\ \frac{\partial i^S}{\partial t} = \theta^S \left(\frac{i^*}{f(d^S - \beta \bar{d}^S, t, B)} - i^S\right)$$

The system is now nonlinear. The Jacobian is as follows, where $b \equiv \frac{g_2}{(1-g_1)a\pi}$:

$$(5)\ J = \begin{vmatrix} b(2d^S - 1) & d^S \\ i * \frac{-f'(d^S)\theta^S}{f(d^S - \beta\bar{d}^S, t, B)^2} & -\theta^S \end{vmatrix}$$

A sufficient condition for having a stable dynamic system is $b < 1/2$. While the results of the model in which d^S instead of i^S is the signal for reducing investments in the private sector, the potential for instability when the signal comes from d^S is higher because stability will depend on the level of the debt to capital ratio in the public sector.

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