The Political Economy of An Exclusive Trading Company: Comparative Advantage, Terms of Trade, and Distributive Conflict

Sebastian Galiani
University of Maryland and NBER

Ivan Lopez Cruz
Sabanci University

Alessandra Anna Palazzo
University of Maryland

Gustavo Torrens
Indiana University

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Abstract

We examine the effects on a metropolis and its colony of an exclusive trading company that monopolizes the foreign trade of the colony, using Great Britain, India, and the East India Company as the central historical illustration. Theoretically, we show that such a company has incentives to impose a tax on colonial exports; that this tax may improve or deteriorate the metropolis's terms of trade, depending on whether the colonial economy is a rival or a complement to the metropolis, and these shifts in the terms of trade create both winners and losers within the metropolis. Additionally, we show that these changes influence the metropolis's GDP and income distribution, thereby shaping political support for the exclusive trading company. Our analysis sheds light on the rise and eventual dismantling of the East India Company, with the British Industrial Revolution playing a transformative role. More broadly, the paper suggests that colonial policies might be particularly burdensome for colonies with rival economies, a situation often overlooked in studies of the New World, where colonies were typically complementary to their metropolises.

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1 Introduction

The operations of the East India Company in India have been extensively studied as an important historical example of colonial activities. There is, however, no systematic formal theoretical analysis of the economic mechanisms through which these operations effected India and Great Britain or the political economy associated with the rise and demise of the East India Company. In this paper, we treat the East India Company as an exclusive trading company that monopolized the foreign trade of India and develop a simple 3-countries (Great Britain, India, and the rest of world) and 2-sectors (textiles and raw materials) trade model to study the effects of an exclusive trading company on the mother country (i.e., Great Britain) and the colony (i.e., India).

In a nutshell, we argue that an exclusive trading company has an incentive to impose the equivalent of a tax on colonial exports and then use the trade model to characterize the effects of such a tax on terms of trade and factor prices, with a focus on the mother country, given its preponderance to determine the faith of the East India Company. Crucially, we show that comparative advantage is key, with two main scenarios to consider. First, the mother country and the colony might be economically rivals, i.e., when both countries have a comparative advantage in the same sector and, hence, export the same product. We argue that this scenario is more likely to hold before the British Industrial Revolution, when both, Great Britain and India, exported textile products. Second, the mother country and the colony might be economically complementary, i.e., when they have a comparative advantage in different sectors and, hence, they export different products. We argue that this scenario is more likely to hold after the Industrial Revolution, when Great Britain gained enormous advantage in the textile industry, India's textile industry was wipe-out by British imports, and India began exporting raw materials.

In both scenarios the exclusive trading company has an incentive to impose an export tax on the colony, but the effects on the terms of trade of the mother country are dramatically different. When the mother country and the colony are economically rivals (e.g., Great Britain and India before the Industrial Revolution), the export tax induces an increase in the terms of trade of the mother country. In more detail, the export tax reduces the global supply of the commodity exported by the colony, which increases its world relative price. Since the mother country also exports the same commodity, it benefits from a rise in its terms of trade. Intuitively, the tax on colonial exports reduces the competition of colonial products in the world markets. On the contrary, when the mother country and the colony are economically complementary, the export tax induces a decline in the terms of trade of the mother country. Once again, the export tax reduces the global supply of the commodity exported by the colony, which increases its world relative price. However, now the mother country is an importer of this commodity. Thus, the tax on colonial exports harms the mother country, deteriorating its terms of the trade. These differential effects of the export tax on the mother country's terms of trade, might help explaining the rise and demise of the East India Company. While before the Industrial Revolution, the East India Company was inducing an improvement in Great Britain's terms of trade, the opposite happened after the Industrial Revolution.

There is, however, a more compelling political economy explanation for the demise of the East India Company. As a long tradition in international economics has stressed (e.g., Ricardo specific factor model, Stolper, Samuelson), changes in the terms of trade are not distributionally neutral. Factors intensively employed in the export sectors are better off when the terms of trade improve and worse off when they decline. On the contrary, factors intensively employed in the import-competing sectors are worse off when the terms of trade rise and better off when they decrease. This implies that distributive conflict within the mother country might have been the dominant force behind the demise of the East India Company. Specifically, we argue that before the Industrial Revolution, British textile manufacturers tolerated the East India Company because, although it was bringing competitive products from India, at least it was restricting its supply compared with full competitive free trade. Indeed, British textile manufacturers managed to obtain a tariff on Indian textiles to restrict competition in the British market, but they were not powerful enough to avoid the East India Company to sell Indian textiles in foreign markets. After the Industrial Revolution, Great Britain took over foreign markets and eventually reversed the comparative advantage of India, making it an exporter of raw materials and an importer of textiles (among other British manufactures). In such a context, the East India Company had an incentive to impose the equivalent of a tax on raw materials exported by India, which would have deteriorated Great Britain's terms of trade and, more importantly, reduced the profits of British textile manufactures. By this time, British manufactures had gained enough influence to block this, which precipitated the dismantling of the East India Company.

Four important comments are called for here. First, while most of the literature on colonialism focuses on its effects on the colonies or the long shadow of colonialism on the development path of the former colonies, we emphasize distributive conflict within the metropolis, which we argue it is crucial to understand the political economy of colonialism, such as the path followed by the East India Company. Our analysis of an exclusive trading company also illustrates that the interests of the mother country might not always be aligned with the interests of the organizations in charge of the colony. Thus, it is not immediately the case that a policy that negatively affected a colony was automatically beneficial for the metropolis.

Second, most of the literature on colonialism focuses on New World colonies, which were all complementary with their metropolises. On the contrary, we study a case in which the colony was, for at least some period, an economic rival of the mother country. This is key, because we show that exactly the same colonial organization (i.e., an exclusive trading company) produces dramatically different effects on the terms of trade of the mother country as well as on the distribution of winners and losers within the mother country depending on the rivalry/complementarity of the metropolitan and colonial economies.

Third, we have attributed the change in comparative advantage of India from a textile exporter to a raw material exporter to the British Industrial Revolution rather than to any colonial policy directed to destroy or discourage the Indian textile industry. In other words, we are implicitly assuming that Great Britain had no other lever to influence India than the East India Company, whose only goal was to maximize its profits from holding a monopoly on India's foreign trade. There is a long historical debate on this issue, including historians that consider that mainly market forces explained the decline of India's textile industry (CITE), others that argue that Great Britain actively discouraged India's textile industry beyond the export tax imposed by the East India Company (CITE), and yet another group that stresses that India did not have the ability to use tariffs to temporary protect its textile industry from British competition (CITE). Superficially, it seems that our model is perfectly aligned with those historians emphasizing markets forces. Note, however, that technically speaking we do not model the forces behind the change in India's comparative advantage, but rather study the effect of the East India Company under two alternative scenarios (one in which Great Britain and India are both exporting textiles and another in which India becomes an exporter of raw materials). Moreover, our political economy analysis of the East India Company suggests that its demise was triggered by the change in India's comparative advantage, which implies that even when the main force behind such a change was the British Industrial Revolution, dismantling the East India Company intensified the pressure on Indian textile industry because otherwise an export tax on raw materials would have been levied.

Finally, and closely related to the previous comment, we show that our analysis of an exclusive trading company suggests a more general theory of colonialism in which the comparative advantage of the colony viz a viz the metropolis plays a critical role. In particular, when the metropolis and the colony economies are rivals (as it was the case of Great Britain and India before the Industrial Revolution) the metropolis has strong incentives to manipulate the economic structure of the colony. Indeed, it is not difficult to see that Great Britain's terms of trade would have been higher if instead of the East India Company imposing an export tax on Indian textiles, the whole Indian textile industry would have been eliminated, for example, completely banning the activity in India.

The rest of the paper is organized as follows. Section 2 briefly reviews the history of the textile industry in India. Section 3 develops the model. Section 4 summarizes and further discusses the theoretical argument and elaborates on the political-economy implications. Section 5 pushes the argument beyond the analysis of the effects of an exclusive trading company and presents the rudiments of a theory of differential colonial policies shaped by comparative advantage/factor endowments. Section 6 concludes.

2 India Textiles Industry Decline under the British Empire

This section briefly outlines the history of India's textile industry, highlighting its transformation under the British rule and in response to the Industrial Revolution.

Until the 17th century, India cotton dominated the textile industry and trade in the Indian Ocean: its cotton products' were of incomparable beauty and quality and were traded in all Southeast Asia in exchange for spices, silver, gold, and copper (Parthasarathi, 2011). During the 17th century, European merchants started to enter the Indian Ocean trade, opening new markets for Indian exports in Europe, West Africa, and the Americas. European countries, including Britain, France, Portugal, and the Netherlands, created trading companies called East India Companies to establish exclusive trade relationships with India. These companies were granted monopoly rights by their respective governments, making them the only merchants from their countries allowed to trade with India.

The English East India Company (E.I.C.) was the first to focus on the cotton trade and quickly became the dominant trading entity in India, gaining increasing power even from the Empire. In 1717, the E.I.C. received a royal decree (Firman) from the Mughal Empire, granting the Company exemption from paying inland duties on imports and exports (Dutt 1916). This allowed goods traded by the Company to transit freely while Indian merchants remained subject to duties and taxes. The E.I.C. extended these benefits to its employees, who began conducting private trade claiming duty exemptions under the Company's protection. This private trade is an essential aspect of the E.I.C., which allowed it to differentiate itself from other European trading companies and acquire more power (Erikson 2014). The more its merchants became deeply embedded in local politics, the more the Company could expand its influence and reach of operation (Roy 2018, 2019).

During this period, Indian cotton textiles rapidly gained popularity in Europe, particularly England. The E.I.C strategically promoted these textiles among the upper classes of English society. However, at the same time, they were highly attractive to the middle and lower classes since they were cheaper than silk garments (Parthasarathi, 2011). European silk and wool producers started to perceive Indian cotton as a threat to their business. In 1700, Britain banned the imports of dyed, painted, and printed fabric with the First Calico Act. The ban did not include Indian white cloth, employed as the "raw material" for British printing industries. The Second Calico Act in 1721 further restricted imports of all Indian textiles. Despite these measures, Indian textiles remained a significant proportion of British trade with West Africa between 1720 and 1740. Overall, Indian textile exports "both legal and illicit" continued to grow until 1750.

The period from 1740 to 1757 significantly affected India's history, particularly its textile industry. In 1740, the collapse of the Mughal Empire left India without a ruling authority, creating an opportunity that the East India Company (E.I.C.) quickly exploited. The Company defeated its French rivals during the Carnatic Wars and the local ruler of Bengal (the Nawab) at the Battle of Plassey in 1757. This victory transformed the Company from a trading entity into a de facto ruling authority. By 1765, the Company secured the right to collect revenues, gaining legal status and administrative powers in Bengal. Between 1775 and 1818, the Company acquired additional territories through various military campaigns and established itself as the main political authority in India.

The decline of Indian textiles industry can be traced back to this period, from 1750 and 1850, coinciding with the E.I.C.'s rise to power and the advent of the Industrial Revolution in England. Historians differ on whether the primary cause was British colonial rule or the natural shifts in competitive advantage brought about by the Industrial Revolution. We summarize the key historical developments and policy implemented by the E.I.C and the British government.

From 1756 to 1772, the E.I.C. was India's main ruling authority, with little involvement from the British State. Several critical policies characterized its governance:

First, the E.I.C. began using Indian revenues to pay for Indian exports to Britain, effectively transferring wealth from India to Britain (Bhattacharya 2021).

Second, they established a monopoly, pushing out foreign competitors and cutting off Indian access to traditional export markets. Local weavers and merchants were forced to work exclusively for the Company, often at wages well below market rates (Prakash 2009).

In 1784, the Parliament established the Board of Directors to control the operations of the E.I.C. in India. The Company's charter was renewed in 1793 with clear directives from the British government. The British policy objectives were threefold: to protect British manufacturers from foreign competition, increase the importation of raw materials from India to Britain, and boost the exportation of British goods to India. (Gandhi 2015). In order to achieve these objectives, the British government and the E.I.C. implemented the following policies:

First, they imposed heavy tariffs on Indian imports into Britain. At the same time, they favored British goods in the Indian market. British ships were subject to low or no duties, while foreign ships faced tariffs as high as 10% (Gandhi 2015). Additionally, British goods moved freely between Indian provinces while Indian goods were taxed. These policies significantly reduced the foreign market and domestic market for Indian Products.

Second, export duties on Indian raw materials, mainly cotton and silk, were lowered or eliminated to encourage their supply to British industries (Gandhi 2015). Indian farmers were forced to cultivate cotton, opium, and indigo. The increased raw material cultivation led to land over-exploitation, reduced food production, and recurring famines (Tharoor 2017).

Finally, the Industrial Revolution in Britain significantly improved the quality of British cotton textiles and reduced production costs. Indian products, which previously were more competitive due to their low labor costs and higher quality, began losing market share as cheaper British textiles invaded global markets. British cotton cloth also started to be imported into India in the 1820s, with imports rising from zero in 1820 to 825 million yards by 1860 and comprising nearly 40% of total cloth consumption in India (Roy 2019). Keeping India open for British exports and generating a trade surplus with India became central to British policy (Bhattacharya 2021).

In 1813, the E.I.C.'s trade monopoly was restricted, and it was finally abolished in 1833, shifting trades to private English merchants. By 1850, Britain became the world's leading textile manufacturer, while India shifted to an agricultural economy and became a net importer of textiles. Some historians argue that India's captive market was essential for Britain's continued textile industry growth. Had India been an independent nation, it likely would have protected its domestic cotton industry, but British political control ensured the expansion of Britain's textile sector.

3 A Simple 2-sector Model

In this section, we develop a simple two sector model, that matches the historical contexts discussed in the previous section. We describe a pre-industrial revolution scenario and a post-industrial revolution one. We begin by listing the main elements of the model:

Consider three regions, Great Britain, India and the Rest of the World ($j \in \{GB, IN, RW\}$) and two sectors: textiles and raw materials denoted by T and R, respectively. Raw materials are required to produce textiles (e.g., wool, cotton). Production functions in country j are given by:

$$Q_T^j = A_T^j \left(D_R^j\right)^{1-\alpha_{N,T}} \left(N_T^j\right)^{\alpha_{N,T}}, \; Q_R^j = A_R^j \left(L^j\right)^{1-\alpha_{N,R}} \left(N_R^j\right)^{\alpha_{N,R}}$$

where Q_T^j is production of textiles in country j, D_R^j is demand of raw materials in country j, N_T^j is labor employed in sector T in country j, Q_R^j is production of raw materials in country j, L^j is land employed in the production of raw materials in country j, and N_R^j is labor employed in sector R in country j. We assume that the Rest of the World can only produce raw materials (formally, $A_T^{RW} = 0$ and $A_R^{RW} > 0$), while Great Britain and India can produce both goods (formally, $A_T^j > 0$ and $A_R^j > 0$ for $j \in \{GB, IN\}$).

Each country is endowed with labor and land:

$$L^j = \bar{L}^j, \; N_T^j + N_R^j = \bar{N}^j$$

That is, land is a factor specific to sector R, while labor is employed in both sectors.

Let $\left(p_T^j, p_R^j\right)$ denote the price vector in country j. Only T has a final demand. Thus,

$$D_T^j = \frac{w_N^j \bar{N}^j + w_L^j \bar{L}^j + Z^j + F^j}{p_T^j}$$

where $w_N^j > 0$ is the wage rate in country j, $w_L^j > 0$ is the rental price of land in country j, and $Z^j \geq 0$ are the revenues from tariffs/export taxes collected in country j and F^j are foreign transfers received (when $F^j > 0$) or paid (when $F^j < 0$) by country j. Alternatively,

$$D_T^j = \frac{Y^j}{p_T^j} = \frac{Q^j}{p_T^j} + \frac{F^j}{p_T^j} = \frac{p_T^j Q_T^j - p_R^j D_R^j + p_R^j Q_R^j + T^j + F^j}{p_T^j}$$

where Y^j/p_T^j is the Real Gross National Income of country j and Q^j/p_T^j is the Real Gross National Product of country j.

In accordance with the historical overview presented in the previous section we introduce the following trade policies. Suppose that Great Britain imposes an ad valorem tariff $\tau_{m,T} \geq 0$ on Indian textiles, the East India Company imposes an export tax $\tau_{e,T} \in [0,1]$ on Indian exports, and the rest of world does not impose any trade policy. Then, prices of T and R in each country must be given by:

$$p_T^{GB} = \begin{cases} (1+\tau_{m,T})\, p_T & \text{if } D_T^{GB} > Q_T^{GB} \\ p_T & \text{if } D_T^{GB} \leq Q_T^{GB} \end{cases}, \; p_T^{RW} = p_T, \; p_T^{IN} = \begin{cases} (1-\tau_{e,T})\, p_T & \text{if } Q_T^{IN} > D_T^{IN} \\ p_T & \text{if } Q_T^{IN} \leq D_T^{IN} \end{cases},$$

$$p_R^{GB} = p_R^{RW} = p_R = 1, \; p_R^{IN} = \begin{cases} (1-\tau_{e,R})\, p_R & \text{if } Q_R^{IN} > D_R^{IN} \\ p_R & \text{if } Q_R^{IN} \leq D_R^{IN} \end{cases}$$

where $p_T > 0$ is the international price of T, $p_R > 0$ is the international price of R, and we have taken R as the numeraire.

Given these trade policies, revenues from tariffs/export taxes collected in country j are given by:

$$Z^{GB} = \tau_{m,T} p_T \max\left\{\left(D_T^{GB} - Q_T^{GB}\right), 0\right\}$$
$$Z^{IN} = \sum_{i\in\{T,R\}} \tau_{e,i} p_i \max\left\{\left(Q_i^{IN} - D_i^{IN}\right), 0\right\}, \; Z^{RW} = 0$$

That is, import tariffs to Indian textiles are collected in Great Britain (by the British Government), export taxes on Indian exports are collected in India (by the East India Company), and no tariffs and/or export taxes are imposed in the rest of the world. Regarding foreign transfers, we have:

$$F^{GB} = Z^{IN}, \; F^{IN} = -Z^{IN}, \; F^{RW} = 0$$

That is, export taxes on Indian exports are collected by the East Indian Company and transfered to Great Britain. Thus, the revenue of the East India Company is given by Z^{IN}.

3.1 Equilibrium

It is easy to show that (see Appendix A.1 for details):

- The supply of raw materials in country $j \in \{GB, IN, RW\}$ is given by:

$$Q_R^j\left(\frac{p_T^j}{p_R^j}\right) = \begin{cases} (\alpha)^{\frac{\alpha_{N,R}}{\alpha_{N,T}(1-\alpha_{N,R})}} \left[\frac{(A_R^j)^{\alpha_{N,T}}}{(A_T^j)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}(1-\alpha_{N,R})}} \left(\frac{p_R^j}{p_T^j}\right)^{\frac{\alpha_{N,R}}{\alpha_{N,T}(1-\alpha_{N,R})}} \bar{L}^j & if\ \frac{p_T^j}{p_R^j} \geq \bar{p}^{s,j} \\ \bar{Q}_R^j = A_R^j \left(\bar{L}^j\right)^{1-\alpha_{N,R}} \left(\bar{N}^j\right)^{\alpha_{N,R}} & if\ \frac{p_T^j}{p_R^j} \leq \bar{p}^{s,j} \end{cases}$$

  where $\alpha = \frac{(\alpha_{N,R})^{\alpha_{N,T}}}{(\alpha_{N,T})^{\alpha_{N,T}}(1-\alpha_{N,T})^{1-\alpha_{N,T}}}$ and $\bar{p}^{s,j} = \alpha \frac{(A_R^j)^{\alpha_{N,T}}}{A_T^j} \left(\frac{\bar{L}^j}{\bar{N}^j}\right)^{\alpha_{N,T}(1-\alpha_{N,R})}$. Note that for RW, it is always the case that $Q_R^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right) = \bar{Q}_R^{RW}$ because $A_T^{RW} = 0$.

- The supply of textiles in country $j \in \{GB, IN\}$ is given by:

$$Q_T^j\left(\frac{p_T^j}{p_R^j}\right) = \begin{cases} (1-\alpha_{N,T})^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}} \left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}} \left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}} \bar{N}^j & \\ - \left[\frac{\alpha (A_R^j)^{\alpha_{N,T}}}{(A_T^j)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}(1-\alpha_{N,R})}} \left(\frac{p_R^j}{p_T^j}\right)^{\frac{1-(1-\alpha_{N,T})(1-\alpha_{N,R})}{\alpha_{N,T}(1-\alpha_{N,R})}} \bar{L}^j & if\ \frac{p_T^j}{p_R^j} \geq \bar{p}^{s,j} \\ 0 & if\ \frac{p_T^j}{p_R^j} \leq \bar{p}^{s,j} \end{cases}$$

  Thus, country j is specialized in R if and only if $\frac{p_T^j}{p_R^j} \leq \bar{p}^{s,j}$. Note that for RW, it is always the case that $Q_T^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right) = 0$ because $A_T^{RW} = 0$.

- The excess demand of raw materials in country j is given by:

$$ED_R^j\left(\frac{p_T^j}{p_R^j}\right) = \begin{cases} (1-\alpha_{N,T}) \frac{p_T^j}{p_R^j} Q_T^j\left(\frac{p_T^j}{p_R^j}\right) - Q_R^j\left(\frac{p_T^j}{p_R^j}\right) & if\ \frac{p_T^j}{p_R^j} \geq \bar{p}^{s,j} \\ -\bar{Q}_R^j & if\ \frac{p_T^j}{p_R^j} \leq \bar{p}^{s,j} \end{cases}$$

  is the excess demand function of R. Note that for RW, we always have $ED_R^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right) = -\bar{Q}_R^{RW}$.

- Country $j \in \{GB, IN\}$ imports R if and only if $\frac{p_T^j}{p_R^j} > \bar{p}^{m,j}$, where

$$\bar{p}^{m,j} = \left[\frac{(1-\alpha_{N,T})\,\alpha_{N,R} + \alpha_{N,T}}{(1-\alpha_{N,T})\,\alpha_{N,R}}\right]^{\alpha_{N,T}(1-\alpha_{N,R})} \bar{p}^{s,j}\ for\ j \in \{GB, IN\}$$

For IN importing R means exporting T and vise versa. For GB we must be more careful because the EIC is also collecting revenue in IN, which at the end is transferred to GB. Since RW does produce T, it always exports R and imports T.

To characterize the equilibrium, it is useful to separate the analysis in several scenarios.

1. ***No trade with India scenario***: This is a situation in which Great Britain and India do not trade at all and each country is integrated into a separated trade network. In particular, let $\beta \in (0,1)$ indicates the share of RW that only trades with Great Britain, while $1-\beta$ is the share of RW that only trades with India. Then, the equilibrium price of textiles in Great Britain is given by $ED_R^{GB}\left(p_T^{GB}/p_R^{GB}\right) = \beta \bar{Q}_R^{s,RW}$, while the equilibrium price of textiles in India is given by $ED_R^{IN}\left(p_T^{IN}/p_R^{IN}\right) = (1-\beta)\,\bar{Q}_R^{s,RW}$.

2. ***Pre industrial revolution scenario I***: This is a situation in which India is exporting textiles and Great Britain is importing textiles.

3. ***Pre industrial revolution scenario II***: This is a situation in which India and Great Britain are both exporting textiles.

4. ***Post industrial revolution scenario***: This is a situation in which India is importing textiles and Great Britain is exporting textiles.

3.2 Pre Industrial Revolution Scenario I

In this section, we study pre industrial revolution scenario I, which captures a situation in which trade opening with India makes Great Britain an importer of textiles. Given that without trading with India, Great Britain would be an exporter of textiles, this is an scenario in which trade with India reverses the comparative advantage of Great Britain.

Proposition 1 ***Pre industrial revolution scenario I.a.*** *Suppose that* $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $\tau_{e,T} < \frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$, *and* $ED_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW} + \bar{Q}_R^{s,GB}$. *Then,* IN *imports* R *and exports* T*, while* GB *is specialized in* R*. Moreover, an increase in* $\tau_{e,T}$*, increases the equilibrium price of* T*, the real revenue of the* EIC*, the real revenue collected by* GB*'s government, and* *the real national income of GB, while it reduces the real gross domestic product of GB if and only if* $\bar{Q}_R^{s,GB} > \tau_{m,T}\bar{Q}_R^{s,RW}$*, and makes workers and landlords in GB worse off.* ***Proof****: See Appendix A (Work in Progress).* ■

Proposition 1 considers an extreme scenario in which trading with India pushes Great Britain to specialize in raw materials. In such an scenario, the export tax on Indian textiles imposed by the EIC has a negative impact on Great Britain terms of trade. Moreover, given that Great Britain becomes specialized in raw materials, workers and landlords in Great Britain are negatively affected by the EIC export tax. India, on the contrary, is not affected. The rest of the world pays for the EIC profits.

Proposition 2 ***Pre industrial revolution scenario I.b.***

1. *Suppose that* $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW}$ *and either of the following conditions hold:*

   (a) $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $\tau_{e,T} \leq \frac{\bar{p}^{s,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$ *and* $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) < \bar{Q}_R^{s,RW} + \bar{Q}_R^{s,GB}$.

   (b) $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$ *and* $\frac{\bar{p}^{s,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{s,GB}} < \tau_{e,T} < \frac{\bar{p}^{m,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

   (c) $\frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}} \leq \tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$*, and* $\tau_{e,T} < \frac{\bar{p}^{m,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

2. *Alternatively, suppose that* $\bar{p}^{m,IN} \in [\bar{p}^{s,GB}, \bar{p}^{m,GB})$, $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW}$, $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$*, and* $\tau_{e,T} < \frac{\bar{p}^{m,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

   Then, IN imports R and exports T, while GB is diversified, it exports R and imports T. Moreover, an increase in $\tau_{e,T}$ $(\tau_{m,T})$*, increases (reduces) the equilibrium price of T, reduces (increase) the real income of GB (excluding profits from EIC), it makes workers in GB worse (better) off and landlords in GB better (worse) off.* ***Proof****: See Appendix A (Work in Progress).* ■

Proposition 2 considers a more reasonable scenario in which trade opening with India does not fully wipe-out British textile industry. In this case, an export tax on Indian textiles deteriorates Great Britain's terms of trade as it increases the equilibrium price of textiles, i.e., British imports. This reduction in Great Britain's terms of trade reduces the real income of Great Britain (excluding profits from EIC) and also has an impact on Great Britain's income difference; in particular, it makes workers worse off and landlords better off. On the contrary, an increase in Great Britain's import tariff on textiles improves Great Britain's terms of trade and the real income of Great Britain (excluding profits from EIC). In other words, this is the typical situation emphasized by the modern literature on trade agreements. Countries use trade policies to improve their terms of trade. The only distinction is that a foreign agent (i.e., the EIC) collects the revenue from India's export tax.

Proposition 3 ***Pre industrial revolution scenario I.c.*** *Suppose that* $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\hat{p}^{m,GB}}{1+\tau_{m,T}}\right) \geq (1-\tau_{e,T})\bar{Q}_R^{s,RW}$*, where* $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ *is the unique solution to* $ED_R^{GB}(p_T) = \tau_{e,T}\bar{Q}_R^{s,RW}$ *and one of the following conditions hold:*

1. $\bar{p}^{m,GB} > \bar{p}^{m,IN}$*,* $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$*,* $\tau_{e,T} < \frac{\bar{p}^{m,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$ *and* $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) < \bar{Q}_R^{s,RW}$.
2. $\tau_{e,T} \geq \frac{\bar{p}^{m,GB}-(1+\tau_{m,T})\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$ *and* $ED_R^{GB}\left(\frac{(1+\tau_{m,T})\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) < \bar{Q}_R^{s,RW}$.

Then, IN imports R and exports T, while GB is diversified and imports R and T. ***Proof:*** *See Appendix A (Work in Progress).* ■

Proposition 3 also considers an scenario in which trade opening with India does not fully wipe-out British textile industry, but this time Great Britain becomes an importer of both textiles (from India) and raw materials (from the rest of world). How is this possible? British imports are financed with the revenue from the export tax on Indian textiles collected by the EIC.

One important remark about Propositions 1-3 is the role played by Great Britain's tariff on Indian textiles for the pre industrial revolution scenario I to exist. In particular, if $\tau_{m,T} \geq \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, then trade opening with India will never push Great Britain to specialize in raw materials, while if $\tau_{m,T} \geq \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, Great Britain will not become an importer of textiles.

3.3 Pre Industrial Revolution Scenario II

Next, we consider a pre industrial revolution scenario in which both countries become exporters of textiles.

Proposition 4 ***Pre industrial revolution scenario II.*** *Suppose that* $\bar{p}^{m,GB} > \bar{p}^{m,IN}$*,* $ED_R^{IN}\left((1-\tau_{e,T})\,\hat{p}^{m,GB}\right) < (1-\tau_{e,T})\,\bar{Q}_R^{s,RW}$*, where* $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ *is the unique solution to* $ED_R^{GB}(p_T) = \tau_{e,T}\bar{Q}_R^{s,RW}$ *and either of the following set of conditions hold:*

1. $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$ *and* $ED_R^{IN}\left((1-\tau_{e,T})\,\bar{p}^{m,GB}\right) < \bar{Q}_R^{s,RW}$*.*
2. $\tau_{e,T} \geq \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$ *and* $ED_R^{GB}\left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) < \bar{Q}_R^{s,RW}$*.*

Then, both countries are diversified, import R and export T. Moreover, an increase in $\tau_{e,T}$*, increases the equilibrium price of T and the real income of GB (excluding profits from EIC), it makes workers in GB better off and landlords in GB worse off.*

Proof: *See Appendix A (Work in Progress).* ■

Proposition 4 captures the following situation. First, the Indian textile industry is more competitive than the British textile industry in the sense that in the absense of any trade restriction, India requires a lower relative price of textiles in order to become a textile exporter than Great Britain (formally, $\bar{p}^{m,GB} > \bar{p}^{m,IN}$). Second, this difference is not enough to make Great Britain a textile importer even when no export tax is imposed on Indian textiles (formally, $ED_R^{IN}\left(\bar{p}^{m,GB}\right) < \bar{Q}_R^{s,RW}$). Third, the export tax on Indian textiles might make British textiles more competitive than Indian textiles in the sense that $\bar{p}^{m,IN}(1-\tau_{e,T}) \geq \bar{p}^{m,GB}$ (formally, this occurs when $\tau_{e,T} \geq \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$), but it is never the case that $\tau_{e,T}$ is high enough to make India an importer of textiles (formally, $ED_R^{GB}\left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) < \bar{Q}_R^{s,RW}$).

Under such circumstances, the EIC has two effects on Great Britain and its textile industry. On the one hand, it brings new competition to British textiles in export markets. More precisely, if we assume that without the EIC some of the Indian textiles would have not entered into the European, African and American markets, then the equilibrium price of textiles would have been higher without the EIC. Formally, if we shutdown trade with India, the world equilibrium price of textiles will be higher than the equilibrium price of textile in Proposition 4. [$ED_R^{GB}(p_T) = \bar{Q}_R^{s,RW}$] On the other hand, pure free trade would have been even worse for the British textile industry, as the EIC imposes an export tax on Indian exports, which, ceteris paribus, increases the world equilibrium price of textiles. In other words, because India had a comparative advantage in the same industry as Great Britain, opening trade with

India induced a reduction in the terms of trade of Great Britain, but the monopolization of foreign trade by the EIC ameliorated this effect imposing an export tax Indian exports.

The EIC also produces distributive effects in Great Britain. Trade opening with India makes workers worse off and landlords better off. However, trade monopolization (i.e., the export tax imposed by the EIC on Indian textiles) has the opposite effect, partially ameliorating the negative impact of Indian textiles on British workers and the positive impact on British landlords. Note also an important difference with Propositions 1-3. While in Propositions 1-3, the British textile industry can lobby for tariffs to deal with Indian textiles imports, in Proposition 4 dealing with Indian competition in export markets would require to interfere with the EIC's decisions. In particular, the British textile industry would prefer to rise export taxes on Indian exports beyond the point preferred by the EIC.

3.4 Post Industrial Revolution Scenario

In this section we study the post industrial revolution scenario. That is, we assume that Great Britain has a comparative advantage in textile production and, therefore, it exports textiles.

Proposition 5 ***Post industrial revolution scenario.***

1. *Suppose that* $ED_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{m,IN}\right) > \bar{Q}_R^{s,RW}$ *and either of the following conditions hold:*

   (a) $\bar{p}^{m,GB} < \bar{p}^{s,IN}$, $\tau_{e,R} \leq \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}$ *and* $ED_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) < \sum_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$.

   (b) $\bar{p}^{m,GB} < \bar{p}^{s,IN}$ *and* $\frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}} < \tau_{e,R} < \frac{\bar{p}^{m,IN}-\bar{p}^{m,GB}}{\bar{p}^{m,IN}}$.

   (c) $\bar{p}^{s,IN} < \bar{p}^{m,GB} < \bar{p}^{m,IN}$ *and* $\tau_{e,R} < \frac{\bar{p}^{m,IN}-\bar{p}^{m,GB}}{\bar{p}^{m,IN}}$.

   Then, IN is diversified, it exports R and imports T, while GB exports T and imports R. Moreover, an increase in $\tau_{e,R}$, decreases the equilibrium price of T and the real income of GB (excluding profits from EIC), it makes workers in GB worse off and landlords in GB better off. Finally, the $\tau_{e,R}$ that maximizes the profits of EIC is strictly positive.

2. *Suppose that* $\bar{p}^{s,IN} < \bar{p}^{m,GB}$, $\tau_{e,R} < \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}$ *and* $ED_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) \geq \sum_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$. *Then, IN is specialized in R, while GB exports T and imports R. Moreover, neither the equilibrium price of T nor the real income or the distribution of income in GB (excluding profits*

from EIC) is affected by $\tau_{e,R}$. Finally, the $\tau_{e,R}$ that maximizes the profits of EIC is the unique $\tau_{e,R} \in \left(0, \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}\right)$ such that $ED_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) = \sum_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$.

***Proof**: See Appendix A (Work in Progress).* ■

Proposition 5 captures a situation in which Great Britain gained productivity in its textile industry to the point that India became an importer of textile and an exporter of raw materials. In Proposition 5.1, India still keeps an import competing textile industry. In such a case, workers in Great Britain lose from the activities of the EIC in the sense that they will be better off under free trade (i.e., setting $\tau_{e,R} = 0$). Indeed, excluding the profits from the EIC the whole country is worse off as $\tau_{e,R}$ rises. The only winners in Great Britain are landlords, who are now a factor specific to an import competing industry. This explains the political push to dismantle the EIC. Once India became an exporter of raw materials, it was in the interest of workers and the whole country to do not allow the EIC to rise the price of raw materials coming from India.

Proposition 5.2 considers an extreme scenario in which India's textile industry is fully wiped out and, hence, it does not demand raw materials. As a consequence, Indian exports of raw materials are given and they do not react to the export tax set by the EIC, which implies that the EIC activities in India has no effect on the international price of textiles, nor factor prices in Gret Britain. In other words, the export tax on Indian raw materials is a pure transfer from the colony to the metropolis.

4 An Exclusive Trading Company: Theory, Extensions, and Political Economy Implications

In this section we recapitulate the logic behind the monopolization of a colony's foreign trade, further elaborate on it, and briefly discuss possible extensions. Then, we discuss some political-economy implications.

4.1 The Theoretical Argument

4.1.1 An exclusive trading company leads to an export tax

The starting point of the analysis is to consider the behavior of a company that monopolizes the foreign trade of a country. What should such a company do to maximize its profits? Which instruments should it employ? Since we are studying an intermediary, its revenue will come from the spread between the buy and sell prices and its costs will be the operating costs required to facilitate the foreign trade transactions (e.g., logistics and transportation). To keep the analysis as simple as possible we have assumed that foreign trade intermediation is costless and, hence, the profits of the intermediary industry are identical to its revenues. Then, under perfect competition, the equilibrium price of foreign trade intermediation would be zero and the equilibrium spread between the buy and sell prices would disappear. In other words, there would be perfect price equalization for tradeable commodities, the standard assumption in traditional models of international trade.

On the contrary, if only one company monopolizes foreign trade, it will select a positive spread, generating positive revenues/profits. Now, foreign trade can be seen as the exchange of exports for imports, which means that although the company can impose one spread for exports and another for imports, all that matters is the spread between domestic and international relative prices of exports and imports: in other words, the terms of trade. Thus, using only one instrument (either an export tax or an import tariff) is enough. More formally, Lerner's theorem shows the equivalence between a tariff and an export tax. Without loss of generality, we have assumed that an export tax is the instrument employed to price foreign trade intermediation. This is also historically accurate given that Great Britain did not allow the East India Company to impose a tariff on Indian imports coming from Britain.

Summing up, a company that monopolizes the foreign trade of a colony has an incentive to impose an export tax to collect a rent given by the spread between domestic and external prices of the exported good. The revenue collected by the company is given by the export tax rate times the value of exports.

Two comments apply. First, in the model there are only two industries (textiles and raw materials) and, therefore, there is no room for differential export tax rates for different commodities. With multiple exported commodities, the company might find it profitable to charge different spreads. The essence of the problem, however, does not change. Second, and more importantly, note the difference with classical mercantilist policies toward colonies, which often involved some form of exclusive foreign trade with the mother country (see Lopez Cruz and Torrens, 2022) but not necessarily an exclusive trading company. Indeed, exclusive foreign trade with the mother country is equivalent to an export ban (i.e., a prohibitive export tax) to other countries (including re-exports from the mother country) and free trade (i.e., zero export tax) with the mother country. Thus, under this exclusive trade regime, in equilibrium, there is no profits for companies involved in carrying out foreign trade. On the contrary, under an exclusive trading company, the colony might export to any group of countries, but a non-prohibitive export tax is imposed on exports. Of course, both regimes can and, historically, sometimes have been combined. The point is that these regimes are conceptually different, and, in this paper, we have focused on studying the case of an exclusive foreign trade company, which we believe accurately captures the case of the East India Company.

4.1.2 Export Tax and Terms of Trade of the Mother Country

Having established that a company that monopolizes the foreign trade of a colony will impose an export tax, we proceed by analyzing its effects on the colony, the mother country and the exclusive trading company. From standard trade theory we know that an export tax induces a rise in the external price of the exported good and, hence, an increase in the terms of trade of the country. The colony of course does not benefit from this improvement in its terms of trade because the rent is collected by a foreign agent (the East India Company in the case of India). Indeed, domestic agents in the colony experience the equivalent of a reduction in the terms of trade. Not surprisingly, an exclusive trading company is detrimental for the colony. Perhaps, more surprising is that, for the mother country, the export tax on colonial exports might be beneficial or detrimental depending on its comparative advantage. If the mother country also exports the same commodity as the colony (textiles in the case of Great Britain and India), the export tax is beneficial for the mother country because it induces a rise in its terms of trade. More intuitively, an export tax on Indian textiles reduced the global supply of textiles, rising its international price and, hence, improving the terms of trade of any textile exporter. We think that this scenario captures the situation before the Industrial Revolution in Great Britain. On the contrary, if the mother country imports the commodity exported by the colony (i.e., raw materials for the textile industry), the export tax is detrimental because it induces a decline in its terms of trade. More intuitively, an export tax on Indian cotton would reduce the global supply of cotton, rising its international price and, hence, deteriorating the terms of trade of any cotton importer. We think that this scenario captures the situation after the Industrial Revolution in Great Britain.

Two comments apply. First, the calculations for the effect that a tax on colonial exports produces on the mother country's aggregate income, implicitly exclude from the mother country's income, the revenue collected by exclusive trading company. If the rents collected by the exclusive trading company (i.e., the revenue from the tax on colonial exports) are added to the mother country's income, the extra income will augment the gain obtained by the mother country (when the export tax induces a rise in its terms of trade) or, at least counterbalance the negative effect of a decline in its terms of trade (when the export tax induces a decline in the mother country's terms of trade). Second, note that Great Britain cannot use its own trade policy (e.g., a tariff on imports from India) to replicate the effect of an export tax on Indian exports. The reason is that an export tax affects all Indian exports, including those not shipped to Great Britain, while a British tariff does not tax Indian exports to other destinations. Thus, it was key for Great Britain that the East India Company had the control of India's trade policy, and that Great Britain could influence the East India Company's choice.

4.1.3 Terms of Trade and Internal Distributive Effects in the Mother Country

From standard trade theory, we also know that a change in the terms of trade induces domestic distributive effects (provided that the country is diversified). In general, a rise (decline) in the terms of trade benefits (hurts) factors of production intensively employed in the export industries and hurts (benefits) factors of production intensively employed in the import competing industries. This implies that the distributive impact on the mother country of an export tax in the colony will depend on comparative advantage considerations. If the mother country is exporting the same commodity as the colony (e.g., textiles before the British Industrial Revolution), the export tax in the colony benefits factors intensively employed in the export industry in the mother country (i.e., British workers in our simple model) and hurts the factors intensively employed in the import competing industry in the mother country (i.e., British landlords in our simple model). On the contrary, if the mother country is an importer of the commodity exported by the colony (e.g., cotton after the British Industrial Revolution), the export tax in the colony benefits factors intensively employed in the import competing industry in the mother country (i.e., British landlords in our simple model) and hurts the factors intensively employed in the export industry in the mother country (i.e., British workers in our simple model).

The following table summarizes the effects of an exclusive trading company that monopolies the foreign trade of a colony on the terms of trade and rental factor prices in the mother country.

Table 1: Effect on the mother country of an export tax in the colonies

Mother country and colonial economies are	Terms of trade	Factor intensively used in export industries	Factor intensively used in import industries
(1)	(2)	(3)	(4)
Rival (comparative advantage in the same sectors)	Improve	Wins	Loses
Complementary (comparative advantage in different sectors)	Deteriorate	Loses	Wins

4.1.4 Generalizations and Possible Extensions

The model presented in Section 2 is very simple (only three countries and two commodities), but the key message should extend to more general trade models. The critical required ingredients are the following. First, there must be at least another country or region beyond the mother country and the colony. Otherwise, the mother country and the colony cannot have a comparative advantage in the same industry. Second, exports should depend on the terms of trade, so trade policies (in particular, an export tax) can affect the equilibrium terms of trade. Otherwise, collecting an export tax is equivalent to pure extraction with no impact on the terms of trade. This second requirement is very mild because, even when a country is fully specialized and, hence, its supply of the exported commodity is vertical, the domestic demand reacts to the terms of trade. In our model, however, there is no domestic demand for raw materials if a country is fully specialized in raw materials, which is clearly an extreme case.

The following are three possible extensions that should add interesting new features without affecting current results. First, consider introducing a third commodity, say silver. Indeed, during this period India imported silver. A reasonable assumption would be that the rest of the world produces raw materials and silver while neither Great Britain nor India can produce silver. The interesting case is an equilibrium in which Great Britain and India export textiles and import raw materials and silver. This extension can add realism to the pattern of trade without changing the key argument. An export tax on Indian textiles would reduce the global supply of textiles and, hence, increase its price (relative to raw materials and silver), inducing a rise in the terms of trade of any textile exporter.

Second, consider adding a non-tradeable food production sector. Then, one possible extra result is that if land is employed in the production of raw materials and food, then when India switched from exporting textiles to exporting raw materials (due to the British Industrial Revolution), the domestic price of food might have increased significantly, making Indian workers worse off through two channels: labor demand declined as the tradeable labor-intensive sector contracted and food supply contracted as the land-intensive tradeable sector expanded. In other words, it is possible to add a fully market-based mechanism that exacerbates the unequalizing effects in India of the export tax on textiles before the Industrial Revolution, the Industrial Revolution itself, and the prohibition of an export tax on raw materials after the Industrial Revolution.

Finally, we can consider that Indian and British textiles were different, but they competed. When both countries export textiles, the export tax might increase the terms of trade of India and Great Britain in general but reduce the bilateral terms of trade of Great Britain with respect to India. Some British consumers must import the Indian variety at a higher price. But British exporters can charge a higher price in export markets because the export tax would limit competition from Indian exports.

4.2 Political Economy Implications

4.2.1 An Exclusive Trading Company and Domestic Politics in the Mother Country

Columns (3) and (4) in Table suggest that an exclusive trading company might exacerbate domestic political cleavages in the mother country with some groups favoring and others opposing it. More importantly, which domestic group aligns with the exclusive trading company and which group opposes it depends on whether the colonial economy is rival or complementary with the mother country. Indeed, factors of production intensively used in the export industry of the mother country tend to favor the exclusive trading company when the colonial economy is rival but clash with it when the colonial economy is complementary. The opposite applies to factors of production intensively used in the import competing industry of the mother country.

This might explain why the British manufactures tolerated the East Indian Company before the Industrial Revolution when Indian textiles were competing with British products in European markets (at least the East India Company monopoly was making Indian textiles less competitive in foreign markets), but they supported dismantling the East India Company after the Industrial Revolution when India became an exporter of raw materials. In other words, the observed historical path of the East India Company is compatible with a distribution of political power within Great Britain in which British manufactures were able to maintain (and probably increase) a significant level of influence in British trade and colonial policies. Initially, import tariffs were lifted to avoid the competition of Indian textiles brought by the East India Company and making Great Britain a textile importer. The East India Company also made Indian textiles less competitive in foreign markets, limiting the competition faced by British products. Completing banning any textile exports from India would have been better for the British textile industry but probably the East Indian Company was powerful enough to block such extreme policy. When the Industrial Revolution significantly improved the productivity of the British textile industry, India became an exporter of raw materials and British manufactures gained political influence to stop the East Indian Company imposing an export tax on Indian raw materials.

4.2.2 An Exclusive Trading Company, Mercantilism and Terms of Trade

Mercantilist policies toward colonies often manipulated the terms of trade in favor of the metropolis (e.g., Lopez Cruz and Torrens, 2022). The idea is that the mother country can ban its colony from exporting to other countries, engineering an increase in its terms of trade. Column (2) in Table 1, however, suggests that an exclusive trading company might produce a decline in the terms of trade of the mother country when the colonial economy is complementary to its metropolis. Why should a metropolis allow an exclusive trading company when it deteriorates the terms of trade? In other words, can an exclusive trading company survive when the colonial and mother country economies are complementary? The case of the East India Company casts some doubts.

Before the Industrial Revolution, the Indian and British economies were rivals and, hence, the effect of the East India Company was to improve the terms of trade of Great Britain. In this context, the company survived. On the contrary, after the Industrial Revolution, the Indian and British economies became complementary and, hence, the East India Company would have produced a decline in Great Britain's terms of trade. Coincidentally, the company was dismantled. Note the difference with the previous section, where we have attributed the East India Company's faith to its distributive effects on Great Britain and the domestic distribution of political power. Here, in contrast, we focus on Great Britain's terms of trade and aggregate welfare (excluding the East India Company). More precisely, an improvement in the terms of trade makes everybody in Great Britain potentially better off (one factor of production wins and other loses but the winners can always compensate the losers and still be better off), while a decline in the terms of trade makes everybody in Great Britain potentially worse off (one factor of production wins and the other loses but winners cannot compensate losers and still win) (Samuelson 1962). In other words, the implicit idea is that Great Britain allowed the East India Company only when the country benefited from the company's benign effects on Britain's terms of trade. When the circumstances changed, and the East India Company would have produced a decline in Great Britain terms of trade, the company was dismantled.

4.2.3 Who Benefited From an Exclusive Trading Company?

There are two main historical perspectives on the effect that colonial policies had on European metropolis (see, among others, Hodgart, 1977). On the one hand, some historians emphasize that metropolises extracted significant resources from their colonies. Perhaps the most well-known version of this perspective is the Marxist notion of primitive accumulation. That is, the idea that resources extracted from America provided the required initial capital for modern capitalism to take off in Europe. Other historians, however, stress that only a small elite within the European metropolises benefited from the colonies, while overall colonial policies were a net burden. A famous example of this perspective is Adam Smith's views on North American colonies, which he argued did not bring any tax revenue to Great Britain, were expensive to defend, and only afforded a relative advantage with respect to other European nations (associated with trade restrictions) at the cost of an absolute disadvantage (associated with excessive colonial trade viz a viz other foreign trades). Moreover, Smith also recognized that colonial policies, although overall detrimental for Great Britain, were very lucrative for the business engaged in colonial trade.[1]

How does our analysis of an exclusive trading company connect with these broader views on colonial policies? Related to the colonial extraction perspective, we study a specific mechanism through which a group from a metropolis can extract resources from a colony. This is clearly a more sophisticated and subtle mechanism than pure plundering of gold and silver. More importantly, we show that the interests of the groups extracting from a colony might not be aligned with the interests of the mother country as a whole or at least that there might be domestic winners and losers in the mother country. In other words, it is not the case that all forms of colonial extraction were automatically welcome in the metropolis. Related to the perspective that colonial policies only benefited an elite from the mother country, our study suggests some political economy limits to this view, at least in the case of Great Britain. If the extractive colonial activities deteriorate the terms of trade of the mother country, the group conducting extraction might not be able to survive domestic politics in the mother country.

5 Beyond the East India Company: Rival versus Complementary Colonies

In this section we extend the logic behind the analysis of the East India Company (or an exclusive trading company in general) and explore how the relation between the mother country and the colony factor endowments might affect colonial policies. First, we briefly review Adam Smith's analysis of mercantilist restrictions on manufacturing activities in American colonies. Second, we review Engerman and Sokoloff's classification of American colonies according to their factor endowments at the beginning of the colonization period and show that all were complementary with their metropolises. Finally, we explore the differential implications for colonial policy when a colony has factor endowments that compete versus complement with the mother country's factor endowments.

[1] Indeed, Smith favored that in return of paying their fair share of the cost of defending the empire, the North American colonies should elect representatives to the British parliament in proportion to their population. This arrangement, however, proved not to be a political equilibrium, leading to the American Revolution (see Galiani and Torrens 2019).

5.1 Adam Smith on Manufactures in the Colonies

In The Wealth of Nations (Book IV, Chapter VII: Of Colonies), Adam Smith develops a meticulous analysis of mercantilist policies in the colonies. Regarding manufacturing activities in the American colonies, Smith made the following two points:

First, Great Britain was the metropolis that had the most liberal trade policy toward its American colonies. However, this liberty did not extend to manufactures. On this issue, he writes:

"*The liberality of England, however, towards the trade of her colonies has been confined chiefly to what concerns the market for their produce, either in its rude state, or in what may be called the very first stage of manufacture. The more advanced or more refined manufactures even of the colony produce, the merchants and manufacturers of Great Britain chuse to reserve to themselves, and have prevailed upon the legislature to prevent their establishment in the colonies, sometimes by high duties, and sometimes by absolute prohibitions.*" Adam Smith, Wealth of Nations, Book IV, Volume 2, Chapter VII: Of Colonies, Page 93.

Second, while this prohibition might have affected the establishment of some industries, given that American colonies were land abundant and labor scarce, the prohibition was mostly non-binding. On this, Smith writes:

"*To prohibit a great people, however, from making all that they can of every part of their own produce, or from employing their stock and industry in the way that they judge most advantageous to themselves, is a manifest violation of the most sacred rights of mankind. Unjust, however, as such prohibitions may be, they have not hitherto been very hurtful to the colonies. Land is still so cheap, and, consequently, labour so dear among them, that they can import from the mother country, almost all the more refined or more advanced manufactures cheaper than they could make them for themselves. Though they had not, therefore, been prohibited from establishing such manufactures, yet in their present state of improvement, a regard to their own interest would, probably, have prevented them from doing so. In their present state of improvement, those prohibitions, perhaps, without cramping their industry, or restraining it from any employment to which it would have gone of its own accord, are only impertinent badges of slavery imposed upon them, without any sufficient reason, by the groundless jealousy of the merchants and manufacturers of the mother country. In a more advanced state they might be really oppressive and insupportable.*"

Adam Smith, Wealth of Nations, Book IV, Volume 2, Chapter VII: Of Colonies, Page 95.

Reframing Smith's argument using standard trade theory we can say that Great Britain was labor abundant while the American colonies were land abundant. Thus, Great Britain had a comparative advantage in manufactures (labor-intensive industries) and the American colonies in rural products and raw materials (land-intensive industries). Moreover, we can even interpret Smith's argument as asserting that, given the land-labor ratio of the colonies, under free trade they would been fully specialized in land-intensive industries. In this context, the restrictions imposed by Great Britain on manufacturing activities in the American colonies were largely non-binding. In other words, given that Great Britain and American colonies were complementary rather than rival economies (i.e., they have comparative advantage in different industries), Great Britain did not have any incentives to distort the economic structure of the colonies. Furthermore, any attempt to protect British industries with a comparative advantage (i.e. manufactures) or discourage those industries in the colonies would be irrelevant. Conversely, any attempt to encourage manufacturing activities in the colonies or discourage land-abundant activities would be clearly detrimental for Great Britain as it would reduce Britain's terms of trade. The obvious question, of course, is what would happen with a labor abundant colony, such as India.

5.2 The Missing Engerman and Sokoloff Case

In an important contribution Engerman and Sokoloff (2003, 2012) connected the initial factor endowments of American colonies with colonial institutions and the differential path of economic development experienced by countries in the Americas. They start their analysis arguing that the primary aims of establishing colonies were typically economic, whether for individual settlers or for the colonizing nation and that colonial institutions reflected a combination of the colonial power's objectives and the resource and endowment characteristics of the colonized regions. In particular, they distinguish three types of colonies in the Americas:

Plantation colonies: These colonies, such as those in the Caribbean or Brazil, had climates and soil conditions ideal for cultivating high-value crops like sugar. These crops were most efficiently produced on large slave plantations. Consequently, these colonies had large populations of slaves brought through the international slave trade, leading to highly unequal distributions of wealth, human capital, and political power.

Spanish America: This category includes colonies with substantial native populations and rich mineral resources, such as Mexico and Peru. In these areas, Spanish practices "heavily influenced by preexisting Native American institutions" resulted in awarding land, native labor, and mineral wealth to elite members. This led to extreme inequality due to the concentration of resources and power.

Settler Colonies: Colonies like those in the U.S. and Canada had relatively few Native Americans and climates conducive to mixed farming with grains and livestock. These colonies had limited economies of scale and used few slaves. Although initially less attractive to Europeans, eventually they were settled by Europeans and developed more homogeneous populations with relatively equitable distributions of human capital and wealth.

This classification helps explain how different colonial environments influenced social and economic outcomes in the Americas. The key idea is that, given high levels of institutional persistence, in plantation and Spanish America colonies highly unequal economic and political institutions consolidated, which negatively affected long-run economic development. On the contrary, in settler colonies, more equal economic and political institutions emerged and consolidated, which favored long-run economic development.

It is worth noting, however, that in all these cases the colonies had comparative advantage distinct from those of the colonizers. In other words, the colonies were complementary rather than rival economies with their mother countries. This does not imply that metropolises did not have incentives to manipulate the foreign trade of their colonies. Indeed, a key mechanism that all metropolises employed in America was imposing on their colonies a regime of exclusive foreign trade, through which they manipulated the terms of trade in favor of the mother country (see Lopez Cruz and Torrens 2022). The point is that European metropolises did not have an incentive to modify the comparative advantage of their colonies in America because, given differences in factor endowments, none of these colonies had rival economies to their mother countries. If anything, European metropolises had incentives to encourage the development of staple products in the Americas, an export-led growth that improved the terms of trade of the metropolis.

The case of India, on the contrary, presents a distinct scenario. Unlike the Americas, Great Britain and India were global competitors in the textile industry, which implies that Indian exports had the potential to reduce Great Britain's terms of trade. We have already seen that the East India Company ameliorated this problem imposing the equivalent of an export tax on Indian textiles, which limited Indian competition in European and American markets for British products. An interesting open question is why did Great Britain do not fully ban the Indian textile industry? One possibility is that the East India Company was powerful enough to resist this. Another possible explanation is that for Great Britain as a whole (i.e., including the profits from the East India Company) was a better deal to allow the East India Company rather than to fully shutting it down and forcing India to become an exporter of raw materials. In any case, this is exactly what the Industrial Revolution caused but mainly through market forces. In other words, the Industrial Revolution made Great Britain and India much more complementary.

5.3 Toward a Theory of Colonial Policy: Extraction, Encouragement or Destruction?

The previous sections suggest a theory of colonial policy in which factor endowments play a central role. Next, we briefly sketch such a theory. The idea is that a metropolis can gain control of a colony with an economy that is rival or complementary with the metropolis. If the colony has a complementary economy with the metropolis (e.g., the Americas), then the mother country does not have incentives to significantly change the economic structure of the colony or to modify the pattern of trade that would otherwise emerge under free trade. In the extreme case, if the colony is fully specialized in say raw materials, a metropolis with comparative advantage in manufactures will have no incentive to modify the colonial economy. If some import competing manufactures develop in this colony, the metropolis will have incentives to ban these industries that compete with the mother country's products but as pointed out by Smith, these distortions will probably be minor. The main restriction faced by the colony will be the imposition of exclusive foreign trade with the metropolis. Moreover, we can envision situations in which the metropolis is willing to encourage or even subsidize the development of infrastructure that supports the export-led growth of the colony. After all, the mother country will benefit from an increase in the supply of colonial commodities, which are imports for the mother country. Also note that the metropolis will never allow its colony to restrict the supply of its exports to improve its terms of trade.

If, on the contrary, the colony has a rival economy with the metropolis, then the situation will be different. The metropolis might consider shutting down the export industries of the colony and force the colony to specialize in sectors that do not compete with metropolitan exports but rather expand the supply of commodities imported by the metropolis. For example, a metropolis with comparative advantage in manufactures that takes control of a colony that also has a comparative advantage in manufactures will force its colony to relocate all its resources to the production of raw materials, dramatically reshaping the colonial economy and its patterns of trade.

In the model presented in Section 3, the metropolis can neither destroy the textile sector of the colony nor encourage the production of raw materials. Indeed, we have ruled out this possibility assuming that the exclusive trading company is the only colonial policy available for the mother country. It is not difficult to see, however, that in *Pre industrial revolution scenario II* (Proposition 4), Great Britain (excluding profits from the EIC) would be better off fully shutting down the Indian textile industry rather than with the non prohibitive export tax imposed by the EIC. Formally, from Proposition 4, we know that an increase in $\tau_{e,T}$, increases the equilibrium price of T (an improvement in Britain's terms of trade) and, hence, the real income of Great Britain (excluding profits from the EIC). More generally, we can formalize the incentives of a mother country to modify the economic structure of its colony using the following trade model (Ventura 1997).

Suppose that the world economy is integrated by J countries indexed by $j \in J$. Each country is endowed with $\bar{N}^j > 0$ units of labor, $\bar{K}^j > 0$ units of capital, and $\bar{L}^j > 0$ units of land, which are employed to produce three tradeable inputs using the following production functions: $Q_N^j = A^j \bar{N}^j$, $Q_K^j = A^j \bar{K}^j$, and $Q_L^j = A^j \bar{L}^j$. Tradeable inputs are employed to produce a non-tradeable final good using the following producton function $Q^j = \left(D_N^j\right)^{\alpha_N} \left(D_K^j\right)^{\alpha_K} \left(D_L^j\right)^{\alpha_L}$ with $\sum_{z \in N,K,L} \alpha_Z = 1$. D_Z^j, is the amount of tradeable input $Z \in \{N, K, L\}$ demanded by country j. Let $\left(w_N^j, w_K^j, w_L^j\right)$ denote primary factor prices, $\left(p_N^j, p_K^j, p_L^j\right)$ tradeable input prices, and p^j the final good price in country j. Under free trade, $\left(p_N^j, p_K^j, p_L^j\right) = (p_N, p_K, p_L)$ for all $j \in J$. Let $s_Z^j = A^j \bar{Z}^j / \sum_{j \in J} A^j \bar{Z}^j$. It is easy to show that, under free trade, the equilibrium is given by

$$D_Z^j = \left(\sum_{Z \in \in N,K,L} \alpha_Z s_Z^j \right) \left(\sum_{j \in J} A^j \bar{Z}^j \right), \; Q_Z^j = A^j \bar{Z}^j, \; w_Z^j = A^j p_Z, \; p_Z = \frac{\alpha_Z \bar{Q}^W}{\sum_{j \in J} A^j \bar{Z}^j} for \; Z = N, K, L$$

$$\bar{Q}^W = \prod_{Z \in N,K,L} \left(\sum_{j \in J} A^j \bar{Z}^j \right)^{\alpha_Z}, \; Q^j = \left(\alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j \right) \bar{Q}^W, \; p^j = 1 \; for \; j \in J$$

Note that we have taken $p^j = 1$, i.e., the final output in each country is the numeraire.[2] Moreover, country

[2] This is possible because profit maximization in the non-tradeable final good in country j implies that $p^j = \frac{(p_N)^{\alpha_N} (p_K)^{\alpha_K} (p_L)^{\alpha_L}}{(\alpha_N)^{\alpha_N} (\alpha_K)^{\alpha_K} (\alpha_L)^{\alpha_L}}$.

j exports (inports) input $Z \in \{N, K, L\}$ if and only if $Q_Z^j > D_Z^j$ ($Q_Z^j < D_Z^j$) or, which is equivalent, $s_Z^j > \alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j$ ($s_Z^j < \alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j$).

We are interesting in studying how a change in the endowment of factor Z in a country different from j affects the output of country j. To do so, take the derivative of Q^j with respect to $\bar{Z}^{-j}$:

$$\frac{\partial Q^j}{\partial \bar{Z}^{-j}} = \alpha_Z \frac{\partial s_Z^j}{\partial \bar{Z}^{-j}} + \left(\alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j\right) \frac{\partial \bar{Q}^W}{\partial \bar{Z}^{-j}} = \frac{\alpha_Z \bar{Q}^W \left(-s_Z^j + \alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j\right)}{\sum_j A^j \bar{Z}^j}$$

$\frac{\partial Q^j}{\partial \bar{Z}^{-j}} < 0$ if and only if $s_Z^j > \alpha_N s_N^j + \alpha_K s_K^j + \alpha_L s_L^j$. Thus, if country j is an exporter (importer) of input Z, then its output is decreasing (increasing) in the endowment of factor Z in other countries. In other words, a country gains with the reduction in the supply of another country's industries that compete with its exports, while the opposite happens with its imports, i.e., a country gains with the expansion of another country's industries supplying its imports.[3] This result has important implications for colonial policies. If a manufacturing country colonizes a country specialized in raw materials, it has no incentives to reshape the economic structure of the colony. If anything, the mother country will reinforce the comparative advantage of its colony and encourage its export-biased growth. On the other hand, if a manufacturing country colonizes a country exporting manufactures, it has incentives to destroy the export industries of the colony and transform it into an exporter of raw materials.

6 Conclusions

We have studied the effects of an exclusive trading company that monopolizes the foreign trade of a colony and shown that, although the instrument employed to collect revenue from its monopolistic position is always an export tax, comparative advantage dramatically affects the results. When the mother country and the colony economies are rivals (i.e., they export the same products), the export tax imposed by the exclusive trading company, induces a rise in the terms of trade of the mother country, the factor intensively used in the mother country's exporting industry is better off and the factor intensively used in the import competing industry is worse off. On the contrary, when the mother country and the colony economies are complementary (i.e., they export different products), the export tax imposed by the exclusive trading company, induces a decline in terms of trade of the mother country, the factor

[3] This is a well-known result in trade theory. See, for example, Krugman, Obstfeld and Melitz (2012), chapter 6.

intensively used in the mother country's exporting industry is worse off and the factor intensively used in the import competing industry is better off. These effects on the mother country's terms of trade as well as its distributive impacts suggest a political economy behind the support and opposition in the mother country to the activities of the exclusive trading company.

There are several paths to expand the analysis. We will only mention two. First, as we discussed in Section 5, the idea that comparative advantage shapes colonial policy and its effects can be generalized and even transformed into the key building block for a revised theory of colonial policy. For example, such a theory should explain under what conditions a metropolis reinforces and/or modifies the comparative advantage of a colony and what are the implications for the metropolis as well as for the colony. Second, we have completely disregarded conflict among different metropolises to take control of the colony and independence movements within the colony. Given the historical importance of both phenomena, it would be critical to link them with our approach of colonial policies shaped by comparative advantage.

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A. Online Appendix (Work in Progress)

In this appendix we present the proofs of Propositions 1-5. We begin by characterizing the equilibrium in each country given prices of T and R and trade policies.

A.1 Equilibrium

Given $\left(p_T^j, p_R^j\right)$, from profit maximization in each sector and factor markets equilibrium conditions we can compute the supply of T and R, the demand of R, and factor prices $\left(w_N^j, w_L^j\right)$ in each country. Profit maximization conditions in sector T are given by:

$$Q_T^j = A_T^j \left(D_R^j\right)^{1-\alpha_{N,T}} \left(N_T^j\right)^{\alpha_{N,T}}$$

$$p_T^j \left(1-\alpha_{N,T}\right) \frac{Q_T^j}{D_R^j} - p_R^j + \lambda_{D,T}^j = 0,\ \lambda_{D,T}^j \geq 0,\ \left[p_T^j \left(1-\alpha_{N,T}\right) \frac{Q_T^j}{D_R^j} - p_R^j\right] \lambda_{D,T}^j = 0$$

$$p_T^j \alpha_{N,T} \frac{Q_T^j}{N_T^j} - w_N^j + \lambda_{N,T}^j = 0,\ \lambda_{N,T}^j \geq 0,\ \left[p_T^j \alpha_{N,T} \frac{Q_T^j}{N_T^j} - w_N^j + \lambda_{N,T}^j\right] \lambda_{N,T}^j = 0$$

Profit maximization conditions in sector R are given by:

$$Q_R^j = A_R^j \left(L^j\right)^{1-\alpha_{N,R}} \left(N_R^j\right)^{\alpha_{N,R}}$$

$$p_R^j \left(1-\alpha_{N,R}\right) \frac{Q_R^j}{L^j} - w_L^j = 0,\ p_R^j \alpha_{N,R} \frac{Q_R^j}{N_R^j} - w_N^j = 0$$

Factor markets equilibrium conditions are given by:

$$L^j = \bar{L}^j,\ N_T^j + N_R^j = \bar{N}^j$$

Output supplies and raw materials demands: Let

$$\bar{p}^{s,j} = \frac{\alpha \left(A_R^j\right)^{\alpha_{N,T}}}{A_T^j} \left(\frac{\bar{L}^j}{\bar{N}^j}\right)^{\alpha_{N,T}\left(1-\alpha_{N,R}\right)},$$

where $\alpha = \frac{\left(\alpha_{N,R}\right)^{\alpha_{N,T}}}{\left(\alpha_{N,T}\right)^{\alpha_{N,T}}\left(1-\alpha_{N,T}\right)^{1-\alpha_{N,T}}}$. Solving, for Q_T^j. Q_R^j, and D_T^j we obtain:

- The supply of T:

$$Q_T^j\left(\frac{p_T^j}{p_R^j}\right)=\begin{cases} \left(1-\alpha_{N,T}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}\left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}}\left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}\bar{N}^j & \\ -\left(1-\alpha_{N,T}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}\left[\frac{\alpha\left(A_R^j\right)^{\alpha_{N,T}}}{\left(A_T^j\right)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}}\left(\frac{p_R^j}{p_T^j}\right)^{\frac{1-\left(1-\alpha_{N,T}\right)\left(1-\alpha_{N,R}\right)}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}}\bar{L}^j & \text{if } \frac{p_T^j}{p_R^j}\geq\bar{p}^{s,j} \\ 0 & \text{if } \frac{p_T^j}{p_R^j}\leq\bar{p}^{s,j}\end{cases}$$

which is strictly increasing in p_T^j/p_R^j for all $p_T^j/p_R^j\geq\bar{p}^{s,j}$.

- The supply of R:

$$Q_R^j\left(\frac{p_T^j}{p_R^j}\right)=\begin{cases}(\alpha)^{\frac{\alpha_{N,R}}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}}\left[\frac{\left(A_R^j\right)^{\alpha_{N,T}}}{\left(A_T^j\right)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}}\left(\frac{p_R^j}{p_T^j}\right)^{\frac{\alpha_{N,R}}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}}\bar{L}^j & \text{if } \frac{p_T^j}{p_R^j}\geq\bar{p}^{s,j} \\ \bar{Q}_R^{s,j}=A_R^j\left(\bar{L}^j\right)^{1-\alpha_{N,R}}\left(\bar{N}^j\right)^{\alpha_{N,R}} & \text{if } \frac{p_T^j}{p_R^j}\leq\bar{p}^{s,j}\end{cases}$$

which is strictly decreasing in p_T^j/p_R^j for all $p_T^j/p_R^j\geq\bar{p}^{s,j}$.

- The demand of R:

$$D_R^j\left(\frac{p_T^j}{p_R^j}\right)=\frac{\left(1-\alpha_{N,T}\right)p_T^jQ_T^j\left(\frac{p_T^j}{p_R^j}\right)}{p_R^j}$$

which is strictly increasing in p_T^j/p_R^j for all $p_T^j/p_R^j\geq\bar{p}^{s,j}$.

Pattern of trade: For RW, we have $A_T^{RW}=0$ and, hence,

$$Q_T^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right)=0,\ Q_R^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right)=\bar{Q}_R^{s,RW}=A_R^{RW}\left(\bar{L}^{RW}\right)^{1-\alpha_{N,R}}\left(\bar{N}^{RW}\right)^{\alpha_{N,R}},\ D_R^{RW}\left(\frac{p_T^{RW}}{p_R^{RW}}\right)=0$$

Clearly, the rest of the world always export R (raw materials) and import T (textiles). Regarding GB and IN, we have that $D_R^j>Q_R^j$ if and only if

$$\frac{p_T^j}{p_R^j}>\bar{p}^{m,j}=\left[\frac{\left(1-\alpha_{N,T}\right)\alpha_{N,R}+\alpha_{N,T}}{\left(1-\alpha_{N,T}\right)\alpha_{N,R}}\right]^{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}\bar{p}^{s,j}$$

Thus, country $j\in\{GB,IN\}$ imports R if and only if $\frac{p_T^j}{p_R^j}>\bar{p}^{m,j}$.

Factor prices: Given $Q_R^j\left(\frac{p_T^j}{p_R^j}\right)$ and $Q_T^j\left(\frac{p_T^j}{p_R^j}\right)$, factor prices are given by:

$$\frac{w_N^j \bar{N}^j}{p_T^j} = \alpha_{N,R}\frac{p_R^j}{p_T^j}Q_R^j\left(\frac{p_T^j}{p_R^j}\right) + \alpha_{N,T}Q_T^j\left(\frac{p_T^j}{p_R^j}\right)$$
$$\frac{w_L^j \bar{L}^j}{p_T^j} = \left(1-\alpha_{N,R}\right)\frac{p_R^j}{p_T^j}Q_R^j\left(\frac{p_T^j}{p_R^j}\right)$$

Given $\left(p_T^j, p_R^j\right)$ are trade policies $(\tau_{e,T}, \tau_{e,R}, \tau_{m,T})$ we can also compute the real national income and real gross domestic product of country j, as well as, the real renevues of the EIC and the British government.

East India Company's real revenue: The real revenue of the East India Company is given by:

$$\frac{Z^{IN}}{p_T^{GB}} = \frac{\tau_{e,T}p_T^{IN}}{\left(1-\tau_{e,T}\right)p_T^{GB}}\max\left\{Q_T^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right) - D_T^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right), 0\right\}$$
$$+ \frac{\tau_{e,R}p_R^{IN}}{\left(1-\tau_{e,R}\right)p_T^{GB}}\max\left\{Q_R^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right) - D_R^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right), 0\right\}$$

British Government's real revenue: Tariff real revenue collected by the British Government is given by:

$$\frac{Z^{GB}}{p_T^{GB}} = \frac{\tau_{m,T}}{1+\tau_{m,T}}\max\left\{D_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) - Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right), 0\right\}$$

Real National Income (or Gross National Product) and real Gross Domestic Product: The real national income and the real gross domestic production of country j is given by:

$$\frac{Y^j}{p_T^j} = \frac{p_R^j}{p_T^j}Q_R^j\left(\frac{p_T^j}{p_R^j}\right) + \alpha_{N,T}Q_T^j\left(\frac{p_T^j}{p_R^j}\right) + \frac{Z^j + F^j}{p_T^j}$$
$$\frac{Q^j}{p_T^j} = \frac{p_R^j}{p_T^j}Q_R^j\left(\frac{p_T^j}{p_R^j}\right) + \alpha_{N,T}Q_T^j\left(\frac{p_T^j}{p_R^j}\right) + \frac{Z^j}{p_T^j}$$

where

$$Z^{GB} = \tau_{m,T}p_T\max\left\{\left(D_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) - Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right)\right), 0\right\}$$
$$Z^{IN} = \sum_{i\in\{T,R\}}\tau_{e,i}p_i\max\left\{\left(Q_i^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right) - D_i^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right)\right), 0\right\},\ Z^{RW} = 0$$
$$F^{GB} = Z^{IN},\ F^{IN} = -Z^{IN},\ F^{RW} = 0$$

World equilibrium: World market clearing conditions for T and R are given by:

$$\sum_j D_R^j \left(\frac{p_T^j}{p_R^j} \right) = \sum_j Q_R^j \left(\frac{p_T^j}{p_R^j} \right) \ and \sum_j D_T^j \left(\frac{p_T^j}{p_R^j} \right) = \sum_j Q_T^j \left(\frac{p_T^j}{p_R^j} \right)$$

where:

$$p_T^{GB} = \begin{cases} (1+\tau_{m,T})\, p_T & if\ D_T^{GB} > Q_T^{GB} \\ p_T & if\ D_T^{GB} \leq Q_T^{GB} \end{cases},\ p_T^{RW} = p_T,\ p_T^{IN} = \begin{cases} (1-\tau_{e,T})\, p_T & if\ Q_T^{IN} > D_T^{IN} \\ p_T & if\ Q_T^{IN} \leq D_T^{IN} \end{cases},$$

$$p_R^{GB} = p_R^{RW} = p_R = 1,\ p_R^{IN} = \begin{cases} (1-\tau_{e,R})\, p_R & if\ Q_R^{IN} > D_R^{IN} \\ p_R & if\ Q_R^{IN} \leq D_R^{IN} \end{cases}$$

It is also useful to write the balanced trade condition for each country at international prices:

$$p_T \left[\left(Q_T^{GB} - D_T^{GB} \right) + \tau_{e,T} \max\left\{ Q_T^{IN} - D_T^{IN}, 0 \right\} \right] + \left[Q_R^{GB} - D_R^{GB} + \tau_{e,R} \max\left\{ Q_R^{IN} - D_R^{IN}, 0 \right\} \right] = 0$$

$$p_T \left[\left(Q_T^{IN} - D_T^{IN} \right) - \tau_{e,T} \max\left\{ Q_T^{IN} - D_T^{IN}, 0 \right\} \right] + \left[Q_R^{IN} - D_R^{IN} - \tau_{e,R} \max\left\{ Q_R^{IN} - D_R^{IN}, 0 \right\} \right] = 0$$

$$Q_R^{RW} - p_T D_T^{RW} = 0$$

It is easier to work with the market clearing condition for R because the demand of T is affected by the income from Great Britain's tariff as well as the EIC's revenue. We consider six possible cases. Proposition 1 corresponds to cases 1, 2, and 3; Proposition 2 to case 4; and Proposition 3 to cases 5 and 6.

Proposition 1: We look for equilibria in which IN imports R and exports T, while GB is specialized in R. Thus, we look for an equilibrium in which $D_R^{IN} > Q_R^{IN}$, $Q_R^{GB} = \bar{Q}_R^{s,GB}$, and $Q_T^{GB} = D_R^{GB} = 0$. Since IN is importing R, the balanced trade condition for IN implies that $Q_T^{IN} > D_T^{IN}$. Moreover, $D_T^{GB} > Q_T^{GB} = 0$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = p_R^{IN} = 1$, $p_T^{RW} = p_T$, $p_T^{IN} = (1-\tau_{e,T})\, p_T$, and $p_T^{GB} = (1+\tau_{m,T})\, p_T$. Since $D_R^{IN} > Q_R^{IN}$ if and only if $p_T^{IN} > \bar{p}^{m,IN}$, this equilibrium requires $(1-\tau_{e,T})\, p_T > \bar{p}^{m,IN}$. Since $Q_T^{GB} = 0$ and $Q_T^{GB} = D_R^{GB} = 0$ if and only if $p_T^{GB} \leq \bar{p}^{s,GB}$, this equilibrium requires $(1+\tau_{m,T})\, p_T \leq \bar{p}^{s,GB}$. Thus, we need $p_T \in \left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}, \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}} \right]$, which requires that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} < \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$, which holds if and only if $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, $\tau_{m,T} < \frac{\bar{p}^{s,GB} - \bar{p}^{m,IN}}{\bar{p}^{m,IN}}$ and $\tau_{e,T} < \frac{\bar{p}^{s,GB} - \left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$.

The excess demand of R becomes:

$$
\begin{aligned}
ED_R(p_T) &= ED_R^{IN}((1-\tau_{e,T})p_T) - \sum\nolimits_{j=RW,GB}\bar{Q}_R^{s,j} \\
&= (1-\alpha_{N,T})(1-\tau_{e,T})p_T Q_T^{IN}((1-\tau_{e,T})p_T) - Q_R^{IN}((1-\tau_{e,T})p_T) - \sum\nolimits_{j=RW,GB}\bar{Q}_R^{s,j}
\end{aligned}
$$

which is continuous and strictly increasing in p_T. Then, there is a unique $p_T^* \in \left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}, \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}\right]$ such $ED_R(p_T^*) = 0$ if and only if the following conditions hold:

$$
\begin{aligned}
ED_R\left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) &= ED_R^{IN}\left(\bar{p}^{m,IN}\right) - \sum\nolimits_{j=RW,GB}\bar{Q}_R^{s,j} < 0 \\
ED_R\left(\frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) &= ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - \sum\nolimits_{j=RW,GB}\bar{Q}_R^{s,j} \geq 0
\end{aligned}
$$

The first inequality always holds because $ED_R^{IN}\left(\bar{p}^{m,IN}\right) = 0$. Finally, we need that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} < \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$. For, $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, this requires $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, and $\tau_{e,T} < \frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$. For $\bar{p}^{s,GB} \leq \bar{p}^{m,IN} < \bar{p}^{m,GB}$, $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} < \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$ never holds. Summing up, this equilibrium requires that $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $\tau_{e,T} \leq \frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$, and $ED_R^{IN}\left(\frac{(1-\tau_{e,T})\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW} + \bar{Q}_R^{s,GB}$.

Proposition 2: We look for an equilibrium in which IN imports R and exports T, GB is diversified and exports R and imports T. Thus, we look for an equilibrium in which $D_R^{IN} > Q_R^{IN}$, $D_R^{GB} \leq Q_R^{GB} < \bar{Q}_R^{s,GB}$, $Q_T^{GB} > 0$, and $D_R^{GB} > 0$. Since IN is importing R, we have $p_R^{IN} = 1$. Moreover, the balanced trade condition for IN implies that $Q_T^{IN} > D_T^{IN}$ and, hence, $p_T^{IN} = (1-\tau_{e,T})p_T$. From the balanced trade condition for GB we have $\left(Q_T^{GB} - D_T^{GB}\right) + \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right) \leq 0$, which implies that $Q_T^{GB} \leq D_T^{GB}$ and, hence, $p_T^{GB} = (1+\tau_{m,T})p_T$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = p_R^{IN} = 1$, $p_T^{RW} = p_T$, $p_T^{IN} = (1-\tau_{e,T})p_T$, and $p_T^{GB} = (1+\tau_{m,T})p_T$. Since $D_R^{IN} > Q_R^{IN}$ if and only if $p_T^{IN} > \bar{p}^{m,IN}$, this equilibrium requires $(1-\tau_{e,T})p_T > \bar{p}^{m,IN}$. Since $D_R^{GB} \leq Q_R^{GB} < \bar{Q}_R^{s,GB}$ if and only if $\bar{p}^{s,GB} < p_T^{GB} \leq \bar{p}^{m,GB}$, this equilibrium requires that $\bar{p}^{s,GB} < (1+\tau_{m,T})p_T \leq \bar{p}^{m,GB}$. The excess demand of R becomes:

$$
\begin{aligned}
ED_R(p_T) = (1-\alpha_{N,T})p_T\left[(1+\tau_{m,T})Q_T^{GB}((1+\tau_{m,T})p_T) + (1-\tau_{e,T})Q_T^{IN}((1-\tau_{e,T})p_T)\right] \\
-Q_R^{GB}((1+\tau_{m,T})p_T) - Q_R^{IN}((1-\tau_{e,T})p_T) - \bar{Q}_R^{s,RW}
\end{aligned}
$$

which is continuous and strictly increasing in p_T.

$$
\frac{\bar{p}^{s,GB}}{1+\tau_{m,T}} < p_T \leq \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}} \text{ and } p_T > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}
$$

There are three possible cases to consider:

Case a: Suppose that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \leq \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$. Then, there is a unique $p_T^* \in \left(\frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}, \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}\right]$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following conditions hold:

$$\frac{\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - \sum\nolimits_{j=RW,GB}\bar{Q}_R^{s,j} < 0$$

$$\frac{\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{\left(1+\tau_{m,T}\right)}Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) - Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) - \bar{Q}_R^{s,RW} \geq 0$$

Finally, we need that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \leq \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$. For, $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, this requires $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, and $\tau_{e,T} \leq \frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$. For $\bar{p}^{s,GB} \leq \bar{p}^{m,IN} < \bar{p}^{m,GB}$, it never holds. Summing up, this equilibrium requires that $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, $\tau_{m,T} < \frac{\bar{p}^{s,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $\tau_{e,T} \leq \frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}}$, $ED_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) < \bar{Q}_R^{s,RW} + \bar{Q}_R^{s,GB}$, and $ED_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW}$.

Case b: Suppose that $\frac{\bar{p}^{s,GB}}{1+\tau_{m,T}} < \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} < \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$. Then, there is a unique $p_T^* \in \left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}, \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}\right]$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following condition holds:

$$\frac{\left(1-\alpha_{N,T}\right)\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{1-\tau_{e,T}}Q_T^{GB}\left(\frac{\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) - Q_R^{GB}\left(\frac{\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) - \bar{Q}_R^{s,RW} < 0$$

$$\frac{\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{\left(1+\tau_{m,T}\right)}Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) - Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) - \bar{Q}_R^{s,RW} \geq 0$$

Note that if $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$, the first inequality always holds. Finally, we need $\frac{\bar{p}^{s,GB}}{1+\tau_{m,T}} < \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} < \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$. For $\bar{p}^{m,IN} < \bar{p}^{s,GB}$, this requires $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $\frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}} < \tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$. For $\bar{p}^{s,GB} \leq \bar{p}^{m,IN} < \bar{p}^{m,GB}$, it requires $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, and $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$. Summing up, this equilibrium requires that: $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$, $ED_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) \geq \bar{Q}_R^{s,RW}$ and [$\bar{p}^{m,IN} < \bar{p}^{s,GB}$ and $\frac{\bar{p}^{s,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{s,GB}} < \tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$] or [$\bar{p}^{s,GB} \leq \bar{p}^{m,IN} < \bar{p}^{m,GB}$ and $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$].

Case c: Suppose that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \geq \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$. Then, there is no p_T^* such that $\left(1-\tau_{e,T}\right)p_T > \bar{p}^{m,IN}$ and $\bar{p}^{s,GB} < \left(1+\tau_{m,T}\right)p_T \leq \bar{p}^{m,GB}$.

Proposition 3: We look equilibria in which IN imports R and exports T, GB is diversified and imports R and T. Thus, we look for an equilibrium in which $D_R^{IN} > Q_R^{IN}$, $D_R^{GB} > Q_R^{GB}$ and $D_T^{GB} - \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right) < Q_T^{GB} \leq D_T^{GB}$. Since IN is importing R, we have $p_R^{IN} = 1$. The balanced trade condition for IN implies that $Q_T^{IN} > D_T^{IN}$ and, hence, $p_T^{IN} = \left(1-\tau_{e,T}\right)p_T$. Since $Q_T^{GB} \leq D_T^{GB}$, we have $p_T^{GB} = (1+\tau_{m,T})\, p_T$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = p_R^{IN} = 1$, $p_T^{RW} = p_T$, $p_T^{IN} = (1-\tau_{e,T})\, p_T$, and $p_T^{GB} = (1+\tau_{m,T})\, p_T$. Since $D_R^{IN} > Q_R^{IN}$ if and only if $p_T^{IN} > \bar{p}^{m,IN}$, this equilibrium requires $(1-\tau_{e,T})\, p_T > \bar{p}^{m,IN}$. From the balanced trade condition for GB we have $p_T\left[\left(Q_T^{GB} - D_T^{GB}\right) + \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right)\right] + Q_R^{GB} - D_R^{GB} = 0$. Therefore, $D_R^{GB} > Q_R^{GB}$ if and only if $\left(Q_T^{GB} - D_T^{GB}\right) + \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right) > 0$ or, which is equivalent, $Q_T^{GB} > D_T^{GB} - \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right)$. Since $D_R^{GB} > Q_R^{GB}$ if and only if $p_T^{GB} > \bar{p}^{m,GB}$, this equilibrium requires $(1+\tau_{m,T})\, p_T > \bar{p}^{m,GB}$. Finally, $Q_T^{GB} \leq D_T^{GB}$ if and only if

$$\begin{aligned} &(1-\alpha_{N,T})(1+\tau_{m,T})\, p_T Q_T^{GB}\left((1+\tau_{m,T})\, p_T\right) - Q_R^{GB}\left((1+\tau_{m,T})\, p_T\right) \\ \leq\; &\frac{\tau_{e,T}}{1-\tau_{e,T}}\left[(1-\alpha_{N,T})(1-\tau_{e,T})\, p_T Q_T^{IN}\left((1-\tau_{e,T})\, p_T\right) - Q_R^{IN}\left((1-\tau_{e,T})\, p_T\right)\right] \end{aligned}$$

where we have used that $D_T^{GB}\left((1+\tau_{m,T})\, p_T\right) = \frac{\left[(1+\tau_{m,T})\alpha_{N,T} + \tau_{m,T}\right] p_T Q_T^{GB} + Q_R^{GB} + p_T \tau_{e,T}\left(Q_T^{IN} - D_T^{IN}\right)}{p_T}$ and $D_T^{IN}\left((1-\tau_{e,T})\, p_T\right) = \frac{\alpha_{N,T}(1-\tau_{e,T}) p_T Q_T^{IN}\left((1-\tau_{e,T}) p_T\right) + Q_R^{IN}\left((1-\tau_{e,T}) p_T\right)}{(1-\tau_{e,T}) p_T}$. The excess demand of R is given by:

$$\begin{aligned} ED_R(p_T) = &(1-\alpha_{N,T})\left[(1+\tau_{m,T})\, p_T Q_T^{GB}\left((1+\tau_{m,T})\, p_T\right) + (1-\tau_{e,T})\, p_T Q_T^{IN}\left((1-\tau_{e,T})\, p_T\right)\right] \\ &- Q_R^{GB}\left((1+\tau_{m,T})\, p_T\right) - Q_R^{IN}\left((1-\tau_{e,T})\, p_T\right) - \bar{Q}_R^{s,RW} \end{aligned}$$

which is continuous and strictly increasing in p_T. There are two cases to consider:

Case a: Suppose that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \geq \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$. Then, there is a unique $p_T^* > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$ such $ED_R(p_T^*) = 0$ if and only if the following condition holds:

$$\frac{(1-\alpha_{N,T})(1+\tau_{m,T})\,\bar{p}^{m,IN}}{1-\tau_{e,T}} Q_T^{GB}\left(\frac{(1+\tau_{m,T})\,\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) < Q_R^{GB}\left(\frac{(1+\tau_{m,T})\,\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) + \bar{Q}_R^{s,RW}$$

We must still check that when $ED_R(p_T^*) = 0$ we have $Q_T^{GB} \leq D_T^{GB}$ or, which is equivalent, that

$$(1-\alpha_{N,T})(1+\tau_{m,T})\, p_T^* Q_T^{GB}\left((1+\tau_{m,T})\, p_T^*\right) - Q_R^{GB}\left((1+\tau_{m,T})\, p_T^*\right) \leq \tau_{e,T}\bar{Q}_R^{s,RW}$$

The above inequality holds if and only if $(1+\tau_{m,T})\, p_T^* \leq \hat{p}^{m,GB}$, where $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ is the unique solution to $(1-\alpha_{N,T})\, p_T Q_T^{GB}(p_T) - Q_R^{GB}(p_T) = \tau_{e,T}\bar{Q}_R^{s,RW}$. Moreover, $(1+\tau_{m,T})\, p_T^* \leq \hat{p}^{m,GB}$ if and only if

$$\frac{(1-\alpha_{N,T})(1-\tau_{e,T})\,\hat{p}^{m,GB}}{(1+\tau_{m,T})} Q_T^{IN}\left(\frac{(1-\tau_{e,T})\,\hat{p}^{m,GB}}{(1+\tau_{m,T})}\right) \geq Q_R^{IN}\left(\frac{(1-\tau_{e,T})\,\hat{p}^{m,GB}}{(1+\tau_{m,T})}\right) + (1-\tau_{e,T})\,\bar{Q}_R^{s,RW}$$

Finally, we need that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \geq \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$, which always holds for $\tau_{e,T} \geq \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}\left(1+\tau_{m,T}\right)}{\bar{p}^{m,GB}}$.

Case b: Suppose that $\frac{\bar{p}^{m,GB}}{1+\tau_{m,T}} > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$. Then, there is a unique $p_T^* > \frac{\bar{p}^{m,GB}}{1+\tau_{m,T}}$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following condition holds:

$$\frac{\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}} Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) < Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\bar{p}^{m,GB}}{1+\tau_{m,T}}\right) + \bar{Q}_R^{s,RW}$$

We must still check that when $ED_R\left(p_T^*\right) = 0$ we have $Q_T^{GB} \leq D_T^{GB}$ or, which equivalent, that

$$\left(1-\alpha_{N,T}\right)\left(1+\tau_{m,T}\right)p_T^* Q_T^{GB}\left(\left(1+\tau_{m,T}\right)p_T^*\right) - Q_R^{GB}\left(\left(1+\tau_{m,T}\right)p_T^*\right) \leq \tau_{e,T}\bar{Q}_R^{s,RW}$$

The above inequality holds if and only if $\left(1+\tau_{m,T}\right)p_T^* \leq \hat{p}^{m,GB}$, where $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ is the unique solution to $\left(1-\alpha_{N,T}\right)p_T Q_T^{GB}\left(p_T\right) - Q_R^{GB}\left(p_T\right) = \tau_{e,T}\bar{Q}_R^{s,RW}$. Moreover, $\left(1+\tau_{m,T}\right)p_T^* \leq \hat{p}^{m,GB}$ if and only if

$$\frac{\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)\hat{p}^{m,GB}}{\left(1+\tau_{m,T}\right)} Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\hat{p}^{m,GB}}{\left(1+\tau_{m,T}\right)}\right) \geq Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}\right)\hat{p}^{m,GB}}{\left(1+\tau_{m,T}\right)}\right) + \left(1-\tau_{e,T}\right)\bar{Q}_R^{s,RW}$$

Finally, we need that $\frac{\bar{p}^{m,GB}}{1+\tau_{m,T}} > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$, which always holds provided that $\tau_{m,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,IN}}$ and $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\left(1+\tau_{m,T}\right)\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

Proposition 4: We look for equilibria in which IN and GB imports R and exports T. Thus, we look for an equilibrium in which $D_R^{IN} > Q_R^{IN}$, $D_R^{GB} > Q_R^{GB}$ and $Q_T^{GB} > D_T^{GB}$. Since IN is importing R, we have $p_R^{IN} = p_R$. The balanced trade condition for IN implies that $Q_T^{IN} > D_T^{IN}$ and, hence, $p_T^{IN} = \left(1-\tau_{e,T}\right)p_T$. Since $Q_T^{GB} > D_T^{GB}$, we have $p_T^{GB} = \left(1+\tau_{m,T}\right)p_T$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = p_R^{IN} = 1$, $p_T^{RW} = p_T$, $p_T^{IN} = \left(1-\tau_{e,T}\right)p_T$, and $p_T^{GB} = p_T$. Since $D_R^{IN} > Q_R^{IN}$ if and only if $p_T^{IN} > \bar{p}^{m,IN}$, this equilibrium requires $\left(1-\tau_{e,T}\right)p_T > \bar{p}^{m,IN}$. Since $D_R^{GB} > Q_R^{GB}$ if and only if $p_T > \bar{p}^{m,GB}$, this equilibrium requires $p_T > \bar{p}^{m,GB}$. Finally, $Q_T^{GB} > D_T^{GB}$ if and only if

$$\begin{aligned}&\left(1-\alpha_{N,T}\right)p_T Q_T^{GB}\left(p_T\right) - Q_R^{GB}\left(p_T\right)\\ &> \frac{\tau_{e,T}}{1-\tau_{e,T}}\left[\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,T}\right)p_T Q_T^{IN}\left(\left(1-\tau_{e,T}\right)p_T\right) - Q_R^{IN}\left(\left(1-\tau_{e,T}\right)p_T\right)\right]\end{aligned}$$

The excess demand of R is given by:

$$\begin{aligned}ED_R\left(p_T\right) = &\left(1-\alpha_{N,T}\right)\left[p_T Q_T^{GB}\left(p_T\right) + \left(1-\tau_{e,T}\right)p_T Q_T^{IN}\left(\left(1-\tau_{e,T}\right)p_T\right)\right]\\ &- Q_R^{GB}\left(p_T\right) - Q_R^{IN}\left(\left(1-\tau_{e,T}\right)p_T\right) - \bar{Q}_R^{s,RW}\end{aligned}$$

which is continuous and strictly increasing in p_T. There are two cases to consider:

Case a: Suppose that $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \geq \bar{p}^{m,GB}$. Then, there is a unique $p_T^* > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$ such $ED_R(p_T^*) = 0$ if and only if the following condition holds:

$$(1-\alpha_{N,T})\left[\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}Q_T^{GB}\left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}\right)\right] < Q_R^{GB}\left(\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}\right) + \bar{Q}_R^{s,RW}$$

We must still check that when $ED_R(p_T^*) = 0$ we have $Q_T^{GB} > D_T^{GB}$ or, which equivalent, that

$$(1-\alpha_{N,T})\, p_T^* Q_T^{GB}(p_T^*) - Q_R^{GB}(p_T^*) > \tau_{e,T}\bar{Q}_R^{s,RW}$$

The above inequality holds if and only if $p_T^* > \hat{p}^{m,GB}$, where $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ is the unique solution to $(1-\alpha_{N,T})\, p_T Q_T^{GB}(p_T) - Q_R^{GB}(p_T) = \tau_{e,T}\bar{Q}_R^{s,RW}$. Moreover, $p_T^* > \hat{p}^{m,GB}$ if and only if

$$(1-\alpha_{N,T})(1-\tau_{e,T})\,\hat{p}^{m,GB} Q_T^{IN}\left((1-\tau_{e,T})\,\hat{p}^{m,GB}\right) < Q_R^{IN}\left((1-\tau_{e,T})\,\hat{p}^{m,GB}\right) + (1-\tau_{e,T})\,\bar{Q}_R^{s,RW}$$

Finally, we need $\frac{\bar{p}^{m,IN}}{1-\tau_{e,T}} \geq \bar{p}^{m,GB}$, which always holds provided that $\tau_{e,T} \geq \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

Case b: Suppose that $\bar{p}^{m,GB} > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$. Then, there is a unique $p_T^* > \bar{p}^{m,GB}$ such $ED_R(p_T^*) = 0$ if and only if the following condition holds:

$$(1-\alpha_{N,T})(1-\tau_{e,T})\,\bar{p}^{m,GB} Q_T^{IN}\left((1-\tau_{e,T})\,\bar{p}^{m,GB}\right) < Q_R^{IN}\left((1-\tau_{e,T})\,\bar{p}^{m,GB}\right) + \bar{Q}_R^{s,RW}$$

We must still check that when $ED_R(p_T^*) = 0$ we have $Q_T^{GB} > D_T^{GB}$ or, which equivalent, that

$$(1-\alpha_{N,T})\, p_T^* Q_T^{GB}(p_T^*) - Q_R^{GB}(p_T^*) > \tau_{e,T}\bar{Q}_R^{s,RW}$$

The above inequality holds if and only if $p_T^* > \hat{p}^{m,GB}$, where $\hat{p}^{m,GB} > \bar{p}^{m,GB}$ is the unique solution to $(1-\alpha_{N,T})\, p_T Q_T^{GB}(p_T) - Q_R^{GB}(p_T) = \tau_{e,T}\bar{Q}_R^{s,RW}$. Moreover, $p_T^* > \hat{p}^{m,GB}$ if and only if

$$(1-\alpha_{N,T})(1-\tau_{e,T})\,\hat{p}^{m,GB} Q_T^{IN}\left((1-\tau_{e,T})\,\hat{p}^{m,GB}\right) < Q_R^{IN}\left((1-\tau_{e,T})\,\hat{p}^{m,GB}\right) + (1-\tau_{e,T})\,\bar{Q}_R^{s,RW}$$

Finally, we need $\bar{p}^{m,GB} > \frac{\bar{p}^{m,IN}}{1-\tau_{e,T}}$. For $\bar{p}^{m,GB} > \bar{p}^{m,IN}$, this requires that $\tau_{e,T} < \frac{\bar{p}^{m,GB}-\bar{p}^{m,IN}}{\bar{p}^{m,GB}}$.

$$(1-\alpha_{N,T})\, p_T^* Q_T^{GB}(p_T^*) - Q_R^{GB}(p_T^*) > \tau_{e,T}\bar{Q}_R^{s,RW}$$

$$(1-\alpha_{N,T})(1-\tau_{e,T})\, p_T^* Q_T^{IN}((1-\tau_{e,T})\, p_T^*) - Q_R^{IN}((1-\tau_{e,T})\, p_T^*) < (1-\tau_{e,T})\,\bar{Q}_R^{s,RW}$$

Proposition 5: We look for equilibria in which IN imports T and exports R, while GB imports R and exports T.

Case 1: (IN is diversified, exports R and imports T, GB exports T and import R). We look for an equilibrium in which $Q_R^{IN} > D_R^{IN} > 0$. Since $Q_R^{IN} > D_R^{IN} > 0$, we have $\tau_{e,R} \geq 0$, and the balanced trade condition for IN implies that $D_T^{IN} > Q_T^{IN}$. Hence, $p_T^{IN} = p_T$. Moreover, $Q_T^{GB} > D_T^{GB}$ because RW does not produce T and $D_T^{IN} > Q_T^{IN}$, which implies $p_T^{GB} = p_T$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = 1$, $p_R^{IN} = 1 - \tau_{e,R}$ and $p_T^{GB} = p_T^{IN} = p_T^{RW} = p_T$. Since $Q_R^{IN} > D_R^{IN} > 0$ if and only if $\bar{p}^{s,IN} < \frac{p_T^{IN}}{p_R^{IN}} < \bar{p}^{m,IN}$, this equilibrium requires $(1 - \tau_{e,R})\,\bar{p}^{s,IN} < p_T < (1 - \tau_{e,R})\,\bar{p}^{m,IN}$. From the balanced trade condition for GB we have $p_T\left(Q_T^{GB} - D_T^{GB}\right) + \left[Q_R^{GB} - D_R^{GB} + \tau_{e,R}\left(Q_R^{IN} - D_R^{IN}\right)\right] = 0$. Since $Q_R^{IN} > D_R^{IN}$, we have $Q_T^{GB} > D_T^{GB}$ if and only if $Q_R^{GB} < D_R^{GB}$. Since $Q_R^{GB} < D_R^{GB}$ if and only if $\frac{p_T^{GB}}{p_R^{GB}} > \bar{p}^{m,GB}$, this equilibrium requires $p_T > \bar{p}^{m,GB}$. The excess demand of R becomes:

$$ED_R\left(p_T\right) = \left(1 - \alpha_{N,T}\right) p_T \left[Q_T^{GB}\left(p_T\right) + \frac{Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{1 - \tau_{e,R}}\right] - Q_R^{GB}\left(p_T\right) - Q_R^{IN}\left(\frac{p_T}{1 - \tau_{e,R}}\right) - \bar{Q}_R^{s,RW}$$

which is continuous and strictly increasing in p_T. There are 3 cases to consider:

Case 1.a: Suppose that $\bar{p}^{m,GB} \leq (1 - \tau_{e,R})\,\bar{p}^{s,IN}$. Then there is a unique $p_T^* \in \left((1 - \tau_{e,R})\,\bar{p}^{s,IN}, (1 - \tau_{e,R})\,\bar{p}^{m,IN}\right)$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following conditions hold:

$$\left(1 - \alpha_{N,T}\right)\left(1 - \tau_{e,R}\right)\bar{p}^{s,IN} Q_T^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{s,IN}\right) < Q_R^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{s,IN}\right) + \sum\nolimits_{j \in \{IN,RW\}} \bar{Q}_R^{s,j}$$

$$\left(1 - \alpha_{N,T}\right)\left(1 - \tau_{e,R}\right)\bar{p}^{m,IN} Q_T^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{m,IN}\right) > Q_R^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{m,IN}\right) + \bar{Q}_R^{s,RW}$$

Finally, we need $\bar{p}^{m,GB} \leq (1 - \tau_{e,R})\,\bar{p}^{s,IN}$. For $\bar{p}^{m,GB} < \bar{p}^{s,IN}$, this requires $\tau_{e,R} \leq \frac{\bar{p}^{s,IN} - \bar{p}^{m,GB}}{\bar{p}^{s,IN}}$. For $\bar{p}^{s,IN} < \bar{p}^{m,GB} < \bar{p}^{m,IN}$, it never holds.

Case 1.b: Suppose that $(1 - \tau_{e,R})\,\bar{p}^{s,IN} < \bar{p}^{m,GB} < (1 - \tau_{e,R})\,\bar{p}^{m,IN}$. Then there is a unique $p_T^* \in \left(\bar{p}^{m,GB}, (1 - \tau_{e,R})\,\bar{p}^{m,IN}\right)$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following conditions hold:

$$\frac{\left(1 - \alpha_{N,T}\right)\bar{p}^{m,GB} Q_T^{IN}\left(\frac{\bar{p}^{m,GB}}{1-\tau_{e,R}}\right)}{1 - \tau_{e,R}} < Q_R^{IN}\left(\frac{\bar{p}^{m,GB}}{1 - \tau_{e,R}}\right) + \bar{Q}_R^{s,RW}$$

$$\left(1 - \alpha_{N,T}\right)\left(1 - \tau_{e,R}\right)\bar{p}^{m,IN} Q_T^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{m,IN}\right) > Q_R^{GB}\left((1 - \tau_{e,R})\,\bar{p}^{m,IN}\right) + \bar{Q}_R^{s,RW}$$

Moreover, the first inequality always holds because $\frac{\bar{p}^{m,GB}}{1-\tau_{e,R}} < \bar{p}^{m,IN}$ implies $Q_R^{IN}\left(\frac{\bar{p}^{m,GB}}{1-\tau_{e,R}}\right) > \frac{(1-\alpha_{N,T})\bar{p}^{m,GB} Q_T^{IN}\left(\frac{\bar{p}^{m,GB}}{1-\tau_{e,R}}\right)}{1-\tau_{e,R}}$. Finally, we need $(1 - \tau_{e,R})\,\bar{p}^{s,IN} < \bar{p}^{m,GB} < (1 - \tau_{e,R})\,\bar{p}^{m,IN}$. For $\bar{p}^{m,GB} <$

$\bar{p}^{s,IN}$, this requires $\frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}} < \tau_{e,R} < \frac{\bar{p}^{m,IN}-\bar{p}^{m,GB}}{\bar{p}^{m,IN}}$. For $\bar{p}^{s,IN} < \bar{p}^{m,GB} < \bar{p}^{m,IN}$, it only requires $\tau_{e,R} < \frac{\bar{p}^{m,IN}-\bar{p}^{m,GB}}{\bar{p}^{m,IN}}$.

Case 1.c: Suppose that $\bar{p}^{m,GB} > (1-\tau_{e,R})\,\bar{p}^{m,IN}$. Then, there is no p_T such that $(1-\tau_{e,R})\,\bar{p}^{s,IN} < p_T < (1-\tau_{e,R})\,\bar{p}^{m,IN}$ and $p_T > \bar{p}^{m,GB}$.

Case 2: (IN is specialized, GB exports T and import R). We look for an equilibrium in which $Q_T^{IN} = D_T^{IN} = 0$, and $Q_R^{IN} = \bar{Q}_R^{s,IN}$. Since $Q_R^{IN} > D_R^{IN} = 0$, we have $\tau_{e,R} \geq 0$. From the balanced trade condition for IN we have $D_T^{IN} > Q_T^{IN}$. Hence, $p_T^{IN} = 0$. Moreover, $Q_T^{GB} > D_T^{GB}$ because neither RW nor IN produce T. Thus, $p_T^{GB} = p_T$. Thus, in this equilibrium it must be the case that $p_R^{GB} = p_R^{RW} = 1$, $p_R^{IN} = 1-\tau_{e,R}$ and $p_T^{GB} = p_T^{IN} = p_T^{RW} = p_T$. Since $Q_R^{IN} = \bar{Q}_R^{s,IN}$ if and only if $\frac{p_T^{IN}}{p_R^{IN}} \leq \bar{p}^{s,IN}$, this equilibrium requires that $p_T \leq (1-\tau_{e,R})\,\bar{p}^{s,IN}$. From the balanced trade condition for GB we have $p_T\left(Q_T^{GB} - D_T^{GB}\right) + \left(Q_R^{GB} - D_R^{GB} + \tau_{e,R}Q_R^{IN}\right) = 0$. Thus, $Q_T^{GB} > D_T^{GB}$ if and only if $Q_R^{GB} < D_R^{GB}$. Since $Q_R^{GB} < D_R^{GB}$ if and only if $\frac{p_T^{GB}}{p_R^{GB}} > \bar{p}^{m,GB}$, this equilibrium requires $p_T > \bar{p}^{m,GB}$. The excess demand of R becomes:

$$ED_R\left(p_T\right) = \left(1-\alpha_{N,T}\right) p_T Q_T^{GB}\left(p_T\right) - Q_R^{GB}\left(p_T\right) - \sum\nolimits_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$$

which is continuous and strictly increasing in p_T. There are 2 cases to consider:

Case 2.a: Suppose that $\bar{p}^{m,GB} < (1-\tau_{e,R})\,\bar{p}^{s,IN}$. Then there is a unique $p_T^* \in \left(\bar{p}^{m,GB}, (1-\tau_{e,R})\,\bar{p}^{s,IN}\right]$ such $ED_R\left(p_T^*\right) = 0$ if and only if the following conditions hold:

$$\left(1-\alpha_{N,T}\right)\left(1-\tau_{e,R}\right)\bar{p}^{s,IN} Q_T^{GB}\left(\left(1-\tau_{e,R}\right)\bar{p}^{s,IN}\right) - Q_R^{GB}\left(\left(1-\tau_{e,R}\right)\bar{p}^{s,IN}\right) \geq \sum\nolimits_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$$

Finally, we need $\bar{p}^{m,GB} < (1-\tau_{e,R})\,\bar{p}^{s,IN}$. For $\bar{p}^{m,GB} < \bar{p}^{s,IN}$, this requires $\tau_{e,R} < \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}$. For $\bar{p}^{s,IN} < \bar{p}^{m,GB} < \bar{p}^{m,IN}$, it never holds.

Case 2.b: Suppose that $\bar{p}^{m,GB} \geq (1-\tau_{e,R})\,\bar{p}^{s,IN}$. Then, there is no p_T such that $p_T \leq (1-\tau_{e,R})\,\bar{p}^{s,IN}$ and $p_T > \bar{p}^{m,GB}$.

6.1 A.3 Terms of trade and factor prices

The following Lemma characterizes the effect of $\frac{p_T^j}{p_R^j}$ on factor prices.

Lemma 1 ***(Effect of*** $\frac{p_T^j}{p_R^j}$ ***on factor prices).***

1. *Suppose that* $\frac{p_T^j}{p_R^j} < \bar{p}^{s,j}$. *Then,* $\frac{w_L^j \bar{L}^j}{p_T^j}$ *and* $\frac{w_L^j \bar{L}^j}{p_T^j}$ *are strictly decreasing in* $\frac{p_T^j}{p_R^j}$.

2. *Suppose that* $\frac{p_T^j}{p_R^j} \geq \bar{p}^{s,j}$. *Then,* $\frac{w_L^j \bar{L}^j}{p_T^j}$ *is strictly decreasing in* $\frac{p_T^j}{p_R^j}$, *while* $\frac{w_N^j \bar{N}^j}{p_T^j}$ *is strictly increasing in* $\frac{p_T^j}{p_R^j}$.

Proof of Part 1: Suppose that $p_T^j/p_R^j < \bar{p}^{s,j}$. Then,

$$\frac{w_L^j \bar{L}^j}{p_T^j} = (1-\alpha_{N,R}) \frac{p_R^j}{p_T^j} \bar{Q}_R^{s,j}, \quad \frac{w_N^j \bar{N}^j}{p_T^j} = \alpha_{N,R} \frac{p_R^j}{p_T^j} \bar{Q}_R^{s,j}$$

Thus, $w_L^j \bar{L}^j/p_T^j$ and $w_L^j \bar{L}^j/p_T^j$ are strictly decreasing in p_T^j/p_R^j for all $p_T^j/p_R^j < \bar{p}^{s,j}$

Proof of Part 2: Suppose that $p_T^j/p_R^j \geq \bar{p}^{s,j}$. Then,

$$\frac{w_L^j \bar{L}^j}{p_T^j} = (1-\alpha_{N,R}) \frac{p_R^j}{p_T^j} Q_R^j \left(\frac{p_T^j}{p_R^j}\right), \quad \frac{w_N^j \bar{N}^j}{p_T^j} = \alpha_{N,R} \frac{p_R^j}{p_T^j} Q_R^j \left(\frac{p_T^j}{p_R^j}\right) + \alpha_{N,T} Q_T^j \left(\frac{p_T^j}{p_R^j}\right)$$

where

$$Q_T^j \left(\frac{p_T^j}{p_R^j}\right) = (1-\alpha_{N,T})^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}} \left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}} \left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}} \bar{N}^j$$
$$- (1-\alpha_{N,T})^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}} \left[\frac{\alpha \left(A_R^j\right)^{\alpha_{N,T}}}{\left(A_T^j\right)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}} \left(\frac{p_R^j}{p_T^j}\right)^{\frac{1-\left(1-\alpha_{N,T}\right)\left(1-\alpha_{N,R}\right)}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}} \bar{L}^j$$

and

$$Q_R^j \left(\frac{p_T^j}{p_R^j}\right) = (\alpha)^{\frac{\alpha_{N,R}}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}} \left[\frac{\left(A_R^j\right)^{\alpha_{N,T}}}{\left(A_T^j\right)^{\alpha_{N,R}}}\right]^{\frac{1}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}} \left(\frac{p_R^j}{p_T^j}\right)^{\frac{\alpha_{N,R}}{\alpha_{N,T}\left(1-\alpha_{N,R}\right)}} \bar{L}^j$$

Taking the derivative of $w_L^j \bar{L}^j/p_T^j$ with respect to p_T^j/p_R^j we obtain:

$$\frac{\partial \left(\frac{w_L^j \bar{L}^j}{p_T^j}\right)}{\partial \left(p_T^j/p_R^j\right)} = \alpha_{N,R} \left[\frac{\partial Q_R^j \left(\frac{p_T^j}{p_R^j}\right)}{\partial \left(p_T^j/p_R^j\right)} - \frac{p_R^j}{p_T^j} Q_R^j \left(\frac{p_T^j}{p_R^j}\right)\right] \frac{p_R^j}{p_T^j}$$

Since $\partial Q_R^j \left(\frac{p_T^j}{p_R^j}\right) / \partial \left(p_T^j/p_R^j\right) < 0$, we have that $\partial \left(\frac{w_L^j \bar{L}^j}{p_T^j}\right) / \partial \left(p_T^j/p_R^j\right) < 0$. Thus, $w_L^j \bar{L}^j/\, p_T^j$ is strictly decreasing in p_T^j/p_R^j.

Taking the derivative of $w_N^j \bar{N}^j/p_T^j$ with respect to p_T^j/p_R^j we obtain:

$$\frac{\partial \left(\frac{w_N^j \bar{N}^j}{p_T^j}\right)}{\partial \left(p_T^j/p_R^j\right)} = \alpha_{N,R} \left[\frac{\partial Q_R^j \left(\frac{p_T^j}{p_R^j}\right)}{\partial \left(p_T^j/p_R^j\right)} - \frac{p_R^j}{p_T^j} Q_R^j \left(\frac{p_T^j}{p_R^j}\right)\right] \frac{p_R^j}{p_T^j} + \alpha_{N,T} \frac{\partial Q_T^j \left(\frac{p_T^j}{p_R^j}\right)}{\partial \left(p_T^j/p_R^j\right)}$$

Since

$$Q_T^j\left(\frac{p_T^j}{p_R^j}\right) = (1-\alpha_{N,T})^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}\left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}}\left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}\bar{N}^j - (1-\alpha_{N,T})^{\frac{1-\alpha_{N,T}}{\alpha_{N,T}}}(\alpha)^{\frac{1}{\alpha_{N,T}}}\left(\frac{p_R^j}{p_T^j}\right)Q_R^j\left(\frac{p_T^j}{p_R^j}\right)$$

we have:

$$\alpha_{N,T}\frac{\partial Q_T^j\left(\frac{p_T^j}{p_R^j}\right)}{\partial\left(p_T^j/p_R^j\right)} = (1-\alpha_{N,T})^{\frac{1}{\alpha_{N,T}}}\left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}}\left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-2\alpha_{N,T}}{\alpha_{N,T}}}\bar{N}^j - \alpha_{N,R}\frac{p_R^j}{p_T^j}\left[\frac{\partial Q_R^j\left(\frac{p_T^j}{p_R^j}\right)}{\partial\left(p_T^j/p_R^j\right)} - \frac{p_R^j}{p_T^j}Q_R^j\left(\frac{p_T^j}{p_R^j}\right)\right]$$

Therefore:

$$\frac{\partial\left(\frac{w_N^j\bar{N}^j}{p_T^j}\right)}{\partial\left(p_T^j/p_R^j\right)} = (1-\alpha_{N,T})^{\frac{1}{\alpha_{N,T}}}\left(A_T^j\right)^{\frac{1}{\alpha_{N,T}}}\left(\frac{p_T^j}{p_R^j}\right)^{\frac{1-2\alpha_{N,T}}{\alpha_{N,T}}}\bar{N}^j > 0$$

Thus, $w_N^j\bar{N}^j/p_T^j$ is strictly increasing in p_T^j/p_R^j. ■

A.3 Effects of EIC and trade policies

Under the assumptions in Proposition 1:

Terms of trade: From the Implicit Function Theorem, we have:

$$\frac{\partial p_T^*}{\partial\tau_{e,T}} = \frac{-\frac{\partial ED_R\left(p_T^*\right)}{\partial\tau_{e,T}}}{\frac{\partial ED_R\left(p_T^*\right)}{\partial p_T}} = \frac{p_T^*}{1-\tau_{e,T}} > 0$$

Thus, p_T^* is strictly increasing in $\tau_{e,T}$. Moreover, $(1-\tau_{e,T})\,p_T^*$ is not affected by $\tau_{e,T}$ since $\frac{\partial(1-\tau_{e,T})p_T^*}{\partial\tau_{e,T}} = -p_T^* + (1-\tau_{e,T})\frac{\partial p_T^*}{\partial\tau_{e,T}} = 0$.

Factor prices in Great Britain: w_N^{GB}/p_T^{GB} and w_L^{GB}/p_T^{GB} are given by:

$$\frac{w_N^{GB}}{p_T^{GB}} = \alpha_{N,R}\frac{p_R^{GB}}{p_T^{GB}}Q_R^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) + \alpha_{N,T}Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) = \frac{\alpha_{N,R}\bar{Q}_R^{s,GB}}{(1+\tau_{m,T})\,p_T^*\bar{N}^{GB}}$$

$$\frac{w_L^{GB}}{p_T^{GB}} = (1-\alpha_{N,R})\frac{p_R^{GB}}{p_T^{GB}}Q_R^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) = \frac{(1-\alpha_{N,R})\,\bar{Q}_R^{s,GB}}{(1+\tau_{m,T})\,p_T^*\bar{L}^{GB}}$$

Since p_T^* is strictly increasing in $\tau_{e,T}$, w_N^{GB}/p_T^{GB} and w_L^{GB}/p_T^{GB} are strictly decreasing in $\tau_{e,T}$.

British Government's real revenue: The real revenue collected by the British Government is given by:

$$\begin{aligned}
\frac{Z^{GB}}{p_T^{GB}} &= \frac{\tau_{m,T}}{1+\tau_{m,T}} \max\left\{ D_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) - Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right), 0 \right\} = \frac{\tau_{m,T} p_T^* D_T^{GB}\left((1+\tau_{m,T}) p_T^*\right)}{p_T^*(1+\tau_{m,T})} \\
&= \frac{\tau_{m,T}}{1+\tau_{m,T}} \left[\tau_{e,T}\left[Q_T^{IN}\left((1-\tau_{e,T}) p_T^*\right) - D_T^{IN}\left((1-\tau_{e,T}) p_T^*\right)\right] + \frac{\bar{Q}_R^{s,GB}}{p_T^*} \right] \\
&= \frac{\tau_{m,T}}{1+\tau_{m,T}} \left[\tau_{e,T} \frac{D_R^{IN}\left((1-\tau_{e,T}) p_T^*\right) - Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)}{p_T^*(1-\tau_{e,T})} + \frac{\bar{Q}_R^{s,GB}}{p_T^*} \right] \\
&= \frac{\tau_{m,T}}{1+\tau_{m,T}} \left[\tau_{e,T} \frac{(1-\alpha_{N,T})(1-\tau_e) p_T^* Q_T^{IN}\left((1-\tau_e) p_T^*\right) - Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)}{(1-\tau_{e,T}) p_T^*} + \frac{\bar{Q}_R^{s,GB}}{p_T^*} \right] \\
&= \frac{\tau_{m,T}}{1+\tau_{m,T}} \left[\frac{\tau_{e,T} \sum_{j=RW,GB} \bar{Q}_R^{s,j}}{(1-\tau_{e,T}) p_T^*} + \frac{\bar{Q}_R^{s,GB}}{p_T^*} \right]
\end{aligned}$$

where the second line uses the balanced trade condition for GB, the third line the balanced trade condition of IN, the fourth line the definition of $D_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)$ and $Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)$, and the last line the equilibrium condition $ED_R\left(p_T^*\right) = 0$. $\frac{Z^{GB}}{p_T^{GB}}$ is strictly increasing in $\tau_{e,T}$ since

$$\frac{\partial\left(\frac{Z^{GB}}{p_T^{GB}}\right)}{\partial \tau_{e,T}} = \frac{\tau_{m,T}}{1+\tau_{m,T}} \left[\frac{\sum_{j=RW,GB} \bar{Q}_R^{s,j}}{(1-\tau_{e,T}) p_T^*} - \frac{\bar{Q}_R^{s,GB}}{\left(p_T^*\right)^2} \frac{\partial p_T^*}{\partial \tau_{e,T}} \right] = \frac{\tau_{m,T} \bar{Q}_R^{s,RW}}{(1+\tau_{m,T})(1-\tau_{e,T}) p_T^*} > 0$$

East India Company's real revenue: The real revenue collected by the EIC is given by:

$$\begin{aligned}
\frac{Z^{IN}}{p_T^{GB}} &= \frac{\tau_{e,T} p_T^{IN}}{(1-\tau_{e,T}) p_T^{GB}} \max\left\{ Q_T^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right) - D_T^{IN}\left(\frac{p_T^{IN}}{p_R^{IN}}\right), 0 \right\} \\
&= \frac{\tau_{e,T} p_T^* \left[Q_T^{IN}\left((1-\tau_{e,T}) p_T^*\right) - D_T^{IN}\left((1-\tau_{e,T}) p_T^*\right)\right]}{p_T^*(1+\tau_{m,T})} \\
&= \tau_{e,T} \left[\frac{D_R^{IN}\left((1-\tau_{e,T}) p_T^*\right) - Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)}{(1-\tau_{e,T}) p_T^* (1+\tau_{m,T})} \right] \\
&= \tau_{e,T} \left[\frac{(1-\alpha_{N,T})(1-\tau_{e,T}) p_T^* Q_T^{IN}\left((1-\tau_{e,T}) p_T^*\right) - Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)}{(1-\tau_{e,T}) p_T^* (1+\tau_{m,T})} \right] \\
&= \frac{\tau_{e,T} \sum_{j=RW,GB} \bar{Q}_R^{s,j}}{(1-\tau_{e,T}) p_T^* (1+\tau_{m,T})}
\end{aligned}$$

where the third line uses the balanced trade condition for IN, the fourth line the definition of $D_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)$ and $Q_R^{IN}\left((1-\tau_{e,T}) p_T^*\right)$, and the last line the equilibrium condition $ED_R\left(p_T^*\right) = 0$. Thus, $\frac{Z^{IN}}{p_T^{GB}}$ is strictly increasing in $\tau_{e,T}$, which implies that the value of $\tau_{e,T}$ that maximizes $\frac{Z^{IN}}{p_T^{GB}}$ for this equilibrium is such that $p_T^* = \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$ or, which equivalent, the unique solutition to $\tau_{e,T}^*$:

$$\frac{(1-\alpha_{N,T})\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}} Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - \sum_{j=RW,GB} \bar{Q}_R^{s,j} = 0$$

Real National Income (or Gross National Product) in Great Britain: Y^{GB}/p_T^{GB} is given by:

$$\begin{aligned}\frac{Y^{GB}}{p_T^{GB}} &= \frac{p_R^{GB}}{p_T^{GB}} Q_R^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) + \alpha_{N,T} Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) + \frac{Z^{GB}+Z^{IN}}{p_T^{GB}} \\ &= \frac{\bar{Q}_R^{s,GB}}{p_T^*} + \frac{\tau_{e,T}\sum_{j=RW,GB}\bar{Q}_R^{s,j}}{(1-\tau_{e,T})\,p_T^*}\end{aligned}$$

Note that

$$\frac{\partial\left(\frac{Y^{GB}}{p_T^{GB}}\right)}{\partial \tau_{e,T}} = \frac{\sum_{j=RW,GB}\bar{Q}_R^{s,j}}{(1-\tau_{e,T})\,p_T^*} - \frac{\bar{Q}_R^{s,GB}}{\left(p_T^*\right)^2}\frac{\partial p_T^*}{\partial \tau_{e,T}} = \frac{\bar{Q}_R^{s,RW}}{(1-\tau_{e,T})\,p_T^*} > 0$$

Thus, Y^{GB}/p_T^{GB} is strictly increasing in $\tau_{e,T}$.

Real Gross Domestic Product in Great Britain: Q^{GB}/p_T^{GB} is given by:

$$\begin{aligned}\frac{Q^{GB}}{p_T^{GB}} &= \frac{p_R^{GB}}{p_T^{GB}} Q_R^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) + \alpha_{N,T} Q_T^{GB}\left(\frac{p_T^{GB}}{p_R^{GB}}\right) + \frac{Z^{GB}}{p_T^{GB}} \\ &= \frac{\bar{Q}_R^{s,GB}}{p_T^*} + \frac{\tau_{m,T}\tau_{e,T}\sum_{j=RW,GB}\bar{Q}_R^{s,j}}{(1+\tau_{m,T})(1-\tau_{e,T})\,p_T^*}\end{aligned}$$

Note that

$$\frac{\partial\left(\frac{Q^{GB}}{p_T^{GB}}\right)}{\partial \tau_{e,T}} = \frac{-\bar{Q}_R^{s,GB}}{\left(p_T^*\right)^2}\frac{\partial p_T^*}{\partial \tau_{e,T}} + \frac{\tau_{m,T}\sum_{j=RW,GB}\bar{Q}_R^{s,j}}{(1+\tau_{m,T})(1-\tau_{e,T})\,p_T^*} = \frac{\tau_{m,T}\bar{Q}_R^{s,RW} - \bar{Q}_R^{s,GB}}{(1+\tau_{m,T})(1-\tau_{e,T})\,p_T^*}$$

Thus, Q^{GB}/p_T^{GB} is strictly decreasing in $\tau_{e,T}$ if and only if $\bar{Q}_R^{s,GB} > \tau_{m,T}\bar{Q}_R^{s,RW}$.

Summing up, an increase in $\tau_{e,T}$, reduces Great Britain's terms of trade, makes British workers and landlords worse off, raises the real revenue of the *EIC*, increases the revenue collected by the British government, reduces Great Britain's real gross domestic product if and only if $\bar{Q}_R^{s,GB} > \tau_{m,T}\bar{Q}_R^{s,RW}$, and increases Great Britain's real national income. Moreover, for this equilibrium, the tax rate that maximizes the *EIC* real revenues is $\tau_{e,T}^*$ such that

$$\frac{(1-\alpha_{N,T})\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}} Q_T^{IN}\left(\frac{\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - Q_R^{IN}\left(\frac{\left(1-\tau_{e,T}^*\right)\bar{p}^{s,GB}}{1+\tau_{m,T}}\right) - \sum_{j=RW,GB} \bar{Q}_R^{s,j} = 0$$

which implies that $p_T^* = \frac{\bar{p}^{s,GB}}{1+\tau_{m,T}}$.

Under the Assumptions in Proposition 3:

Terms of trade: From the Implicit Function Theorem, we have:

$$\frac{\partial p_T^*}{\partial \tau_{e,T}} = \frac{-\frac{\partial ED_R(p_T^*)}{\partial \tau_{e,T}}}{\frac{\partial ED_R(p_T^*)}{\partial p_T}} > 0$$

since

$$\frac{\partial ED_R(p_T^*)}{\partial \tau_{e,T}} = (1-\alpha_{N,T})\, p_T^* \left[-Q_T^{IN}\left((1-\tau_{e,T})\, p_T^*\right) - (1-\tau_{e,T})\, p_T^* \frac{\partial Q_T^{IN}\left((1-\tau_{e,T})\, p_T^*\right)}{\partial\left[(1-\tau_{e,T})\, p_T\right]}\right] + p_T^* \frac{\partial Q_R^{IN}\left((1-\tau_{e,T})\, p_T^*\right)}{\partial\left[(1-\tau_{e,T})\, p_T\right]} < 0$$

$$\begin{aligned}\frac{\partial ED_R(p_T^*)}{\partial p_T} &= (1-\alpha_{N,T})\left[(1+\tau_{m,T})\, Q_T^{GB}\left((1+\tau_{m,T})\, p_T^*\right) + (1-\tau_{e,T})\, Q_T^{IN}\left((1-\tau_{e,T})\, p_T^*\right)\right] \\ &+ (1-\alpha_{N,T})\, p_T^* \left[(1+\tau_{m,T})^2 \frac{\partial Q_T^{GB}\left((1+\tau_{m,T})\, p_T^*\right)}{\partial\left[(1+\tau_{m,T})\, p_T\right]} + (1-\tau_{e,T})^2 \frac{\partial Q_T^{IN}\left((1-\tau_{e,T})\, p_T^*\right)}{\partial\left[(1-\tau_{e,T})\, p_T\right]}\right] \\ &- (1+\tau_{m,T}) \frac{\partial Q_R^{GB}\left((1+\tau_{m,T})\, p_T^*\right)}{\partial\left[(1+\tau_{m,T})\, p_T\right]} - (1-\tau_{e,T}) \frac{\partial Q_R^{IN}\left((1-\tau_{e,T})\, p_T^*\right)}{\partial\left[(1-\tau_{e,T})\, p_T\right]} > 0\end{aligned}$$

Thus, p_T^* is strictly increasing in $\tau_{e,T}$. Moreover,

$$\frac{\partial (1-\tau_{e,T})\, p_T^*}{\partial \tau_{e,T}} = -p_T^* + (1-\tau_{e,T}) \frac{\partial p_T^*}{\partial \tau_{e,T}} < 0$$

if and only if

$$(1-\alpha_{N,T}) \left[Q_T^{GB}\left((1+\tau_{m,T})\, p_T^*\right) + p_T^* (1+\tau_{m,T}) \frac{\partial Q_T^{GB}\left((1+\tau_{m,T})\, p_T^*\right)}{\partial\left[(1+\tau_{m,T})\, p_T\right]}\right] > \frac{\partial Q_R^{GB}\left((1+\tau_{m,T})\, p_T^*\right)}{\partial\left[(1+\tau_{m,T})\, p_T\right]}$$

which always holds.

Factor prices in Great Britain: Note that $p_T^{GB}/p_R^{GB} = (1+\tau_{m,T})\, p_T^* \geq \bar{p}^{s,GB}$ and $(1+\tau_{m,T})\, p_T^*$ is strictly increasing in $\tau_{e,T}$. Thus, from Lemma 1, w_L^{GB}/p_T^{GB} is strictly decreasing in $\tau_{e,T}$, while w_N^{GB}/p_T^{GB} is strictly increasing in $\tau_{e,T}$.

Under the assumptions in Proposition 5.1

Proof that p_T is decreasing in $\tau_{e,R}$: From case 5 in section A.2, there is a unique p_T^* such $ED_R(p_T^*) = 0$ where

$$ED_R(p_T) = (1-\alpha_{N,T})\, p_T \left[Q_T^{GB}(p_T) + \frac{Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{1-\tau_{e,R}}\right] - Q_R^{GB}(p_T) - Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right) - \bar{Q}_R^{s,RW}$$

From the implicit function theorem we have:

$$\frac{\partial p_T^*}{\partial \tau_{e,R}} = \frac{-\frac{\partial ED_R(p_T^*)}{\partial \tau_{e,R}}}{\frac{\partial ED_R(p_T^*)}{\partial p_T}}$$

where

$$\frac{\partial ED_R(p_T^*)}{\partial \tau_{e,R}} = \left\{(1-\alpha_{N,T})\left[Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right) + \frac{p_T}{1-\tau_{e,R}}\frac{\partial Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\right] - \frac{\partial Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\right\}\frac{p_T}{(1-\tau_{e,R})^2} > 0$$

and

$$\frac{\partial ED_R(p_T^*)}{\partial p_T} = (1-\alpha_{N,T})\left[Q_T^{GB}(p_T) + p_T\frac{\partial Q_T^{GB}(p_T)}{\partial p_T}\right] - \frac{\partial Q_R^{GB}(p_T)}{\partial p_T} +$$

$$\left\{(1-\alpha_{N,T})\left[Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right) + \frac{p_T}{1-\tau_{e,R}}\frac{\partial Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\right] - \frac{\partial Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\right\}\frac{1}{(1-\tau_{e,R})} > 0$$

Thus, $\frac{\partial p_T^*}{\partial \tau_{e,R}} < 0$.

Proof that $\frac{p_T}{1-\tau_{e,R}}$ *is increasing in* $\tau_{e,R}$: Take the derivative of $\frac{p_T}{1-\tau_{e,R}}$ with respect to $\tau_{e,R}$: $\frac{\partial\left(\frac{p_T^*}{1-\tau_{e,R}}\right)}{\partial \tau_{e,R}} > 0$.

$$\frac{\partial}{\partial \tau_{e,R}}\left(\frac{p_T^*}{1-\tau_{e,R}}\right) = \frac{\frac{\partial p_T}{\partial \tau_{e,R}}(1-\tau_{e,R}) + p_T^*}{(1-\tau_{e,R})^2}$$

It is tedious but easy to show that $\frac{\partial p_T}{\partial \tau_{e,R}}(1-\tau_{e,R}) + p_T^* > 0$ if and only if

$$(1-\alpha_{N,T})\left[Q_T^{GB}(p_T^*) + p_T^*\frac{\partial Q_T^{GB}(p_T^*)}{\partial p_T}\right] - \frac{\partial Q_R^{GB}(p_T^*)}{\partial p_T} > 0$$

which holds.

Proof that $\frac{Y^{GB}-\Omega^{EIC}}{p_T^{GB}}$ *is decreasing in* $\tau_{e,R}$: The real income of Great Britain excluding the profits from the EIC is given by:

$$\begin{aligned}\frac{Y^{GB}-\Omega^{EIC}}{p_T^{GB}} &= \frac{p_T^{GB}Q_T^{GB} - p_R^{GB}D_R^{GB} + p_R^{GB}Q_R^{GB}}{p_T^{GB}} \\ &= \alpha_{N,T}Q_T^{GB}(p_T) + \frac{Q_R^{GB}(p_T)}{p_T}\end{aligned}$$

Therefore,

$$\frac{\partial\left(\frac{Y^{GB}-\Omega^{EIC}}{p_T^{GB}}\right)}{\partial \tau_{e,R}} = \left[\alpha_{N,T}\frac{\partial Q_T^{GB}(p_T^*)}{\partial p_T} + \frac{\partial}{\partial p_T}\left(\frac{Q_R^{GB}(p_T^*)}{p_T^*}\right)\right]\frac{\partial p_T^*}{\partial \tau_{e,R}}$$

It is tedious but easy to verify that $\alpha_{N,T}\frac{\partial Q_T^{GB}(p_T^*)}{\partial p_T}+\frac{\partial}{\partial p_T}\left(\frac{Q_R^{GB}(p_T^*)}{p_T^*}\right)>0$ if and only if $p_T^*>\bar{p}^{m,GB}$, which always holds because either $\bar{p}^{m,GB}\leq(1-\tau_{e,R})\,\bar{p}^{s,IN}$ and, hence, $p_T^*\in\left((1-\tau_{e,R})\,\bar{p}^{s,IN},(1-\tau_{e,R})\,\bar{p}^{m,IN}\right)$ or $(1-\tau_{e,R})\,\bar{p}^{s,IN}<\bar{p}^{m,GB}<(1-\tau_{e,R})\,\bar{p}^{m,IN}$ and, hence, $p_T^*\in\left(\bar{p}^{m,GB},(1-\tau_{e,R})\,\bar{p}^{m,IN}\right)$. We have already proved that $\frac{\partial p_T^*}{\partial\tau_{e,R}}<0$. Then, $\frac{\partial}{\partial\tau_{e,R}}\left(\frac{Y^{GB}-\Omega^{EIC}}{p_T^{GB}}\right)<0$.

Proof that $\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}}=\frac{(1-\alpha_{N,R})Q_R^{GB}(p_T)}{p_T}$ *is increasing in* $\tau_{e,R}$ *while* $\frac{w_N^{GB}\bar{N}^{GB}}{p_T^{GB}}=\alpha_{N,T}Q_T^{GB}(p_T)+\alpha_{N,R}\frac{Q_R^{GB}(p_T)}{p_T}$ *is decreasing in* $\tau_{e,R}$: Take the derivative of $\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}}$ with respect to $\tau_{e,R}$:

$$\frac{\partial}{\partial\tau_{e,R}}\left(\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}}\right)=\left[(1-\alpha_{N,R})\frac{\partial}{\partial p_T}\left(\frac{Q_R^{GB}(p_T^*)}{p_T^*}\right)\right]\frac{\partial p_T^*}{\partial\tau_{e,R}}$$

Note that $\frac{\partial}{\partial p_T}\left(\frac{Q_R^{GB}(p_T^*)}{p_T^*}\right)<0$. We have already proved that $\frac{\partial p_T^*}{\partial\tau_{e,R}}<0$. Thus, $\frac{\partial}{\partial\tau_{e,R}}\left(\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}}\right)>0$. Since $\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}}+\frac{w_N^{GB}\bar{N}^{GB}}{p_T^{GB}}=\alpha_{N,T}Q_T^{GB}(p_T)+\frac{Q_R^{GB}(p_T)}{p_T}$ which is decreasing in $\tau_{e,R}$, it must be the case that $\frac{w_N^{GB}\bar{N}^{GB}}{p_T^{GB}}$ is decreasing in $\tau_{e,R}$.

Proof that $\arg\max_{\tau_{e,R}}\left\{\frac{\Omega^{EIC}}{p_T^{GB}}\right\}>0$. The profits of the EIC are given by:

$$\begin{aligned}\frac{\Omega^{EIC}}{p_T^{GB}}&=\frac{\tau_{e,R}}{p_T}\left[Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)-D_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)\right]\\&=\frac{\tau_{e,R}}{1-\tau_{e,R}}\left[\frac{(1-\tau_{e,R})}{p_T}Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)-(1-\alpha_{N,T})\,Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)\right]\end{aligned}$$

Taking the derivative of $\frac{\Omega^{EIC}}{p_T^{GB}}$ with respecto to $\tau_{e,R}$ we have:

$$\frac{\partial}{\partial\tau_{e,R}}\left(\frac{\Omega^{EIC}}{p_T^{GB}}\right)=\frac{1}{(1-\tau_{e,R})^2}\left\{\begin{array}{l}\left[\frac{(1-\tau_{e,R})}{p_T}Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)-(1-\alpha_{N,T})\,Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)\right]\\+\tau_{e,R}\left[\frac{\partial}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\left(\frac{Q_R^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\frac{p_T}{1-\tau_{e,R}}}\right)-(1-\alpha_{N,T})\frac{\partial Q_T^{IN}\left(\frac{p_T}{1-\tau_{e,R}}\right)}{\partial\left(\frac{p_T}{1-\tau_{e,R}}\right)}\right]\frac{\frac{\partial p_T}{\partial\tau_{e,R}}(1-\tau_{e,R})+p_T}{1-\tau_{e,R}}\end{array}\right.$$

Evaluting this derivative at $\tau_{e,R}=0$, we have:

$$\frac{\partial}{\partial\tau_{e,R}}\left(\frac{\Omega^{EIC}}{p_T^{GB}}\right)(\tau_{e,R}=0)=\frac{Q_R^{IN}(p_T)}{p_T}-(1-\alpha_{N,T})\,Q_T^{IN}(p_T)>0$$

Under the assumptions in Proposition 5.2:

From Proposition 5, there is a unique p_T^* such $ED_R(p_T^*)=0$, where

$$ED_R(p_T)=(1-\alpha_{N,T})\,p_TQ_T^{GB}(p_T)-Q_R^{GB}(p_T)-\sum\nolimits_{j\in\{IN,RW\}}\bar{Q}_R^{s,j}$$

Since ED_R does not depend on $\tau_{e,R}$, p_T^* is not affected by $\tau_{e,R}$. Therefore, $\frac{p_T}{1-\tau_{e,R}}$ is increasing in $\tau_{e,R}$. The real income of Great Britain excluding the profits from the EIC is given by $\frac{Y^{GB}-\Omega^{EIC}}{p_T^{GB}} = \alpha_{N,T} Q_T^{GB}(p_T) + \frac{Q_R^{GB}(p_T)}{p_T}$, which does not depend on $\tau_{e,R}$. Similarly, the real income of landlords is given by $\frac{w_L^{GB}\bar{L}^{GB}}{p_T^{GB}} = \frac{(1-\alpha_{N,R})Q_R^{GB}(p_T)}{p_T}$, while the real income of workers is given by $\frac{w_N^{GB}\bar{N}^{GB}}{p_T^{GB}} = \alpha_{N,T} Q_T^{GB}(p_T) + \alpha_{N,R}\frac{Q_R^{GB}(p_T)}{p_T}$, which are not affected by $\tau_{e,R}$. Finally, the profits of the EIC are given by $\frac{\Omega^{EIC}}{p_T^{GB}} = \frac{\tau_{e,R}\bar{Q}_R^{s,IN}}{p_T}$, which is strictly increasing in $\tau_{e,R}$. However, there are two constraints that must be satisfied for this equilibrium to exist:

$$\bar{p}^{m,GB} < (1-\tau_{e,R})\,\bar{p}^{s,IN}$$

$$(1-\alpha_{N,T})(1-\tau_{e,R})\,\bar{p}^{s,IN} Q_T^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) - Q_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) \geq \sum\nolimits_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$$

The first constraint implies that $\tau_{e,R} < \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}$. The left hand side of the second constraint converges to 0 when $\tau_{e,R} \to \frac{\bar{p}^{s,IN}-\bar{p}^{m,GB}}{\bar{p}^{s,IN}}$ and it is strictly decreasing in $\tau_{e,R}$. Therefore, the maximum $\tau_{e,R}$ that makes the second inequality holds is given by:

$$(1-\alpha_{N,T})(1-\tau_{e,R})\,\bar{p}^{s,IN} Q_T^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) - Q_R^{GB}\left((1-\tau_{e,R})\,\bar{p}^{s,IN}\right) = \sum\nolimits_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$$

Note that we are implictly assuming that $\bar{p}^{s,IN} > \bar{p}^{m,GB}$ and $(1-\alpha_{N,T})\,\bar{p}^{s,IN} Q_T^{GB}\left(\bar{p}^{s,IN}\right) - Q_R^{GB}\left(\bar{p}^{s,IN}\right) \geq \sum\nolimits_{j\in\{IN,RW\}} \bar{Q}_R^{s,j}$. Otherwise, the equilibrium in case 6 does not exist for any $\tau_{e,R}$.