

From Mercantilism to Free Trade: A History of Fiscal Capacity Building

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ABSTRACT

This paper presents a theory explaining how trade policy is contingent on the development of fiscal capacity. The paper investigates the conditions under which mercantilism is adopted as a substitute for taxation when fiscal capacity is weak, when mercantilist revenue is reinvested in developing fiscal capacity, and when economies endogenously abandon mercantilist practices and embrace free trade. If mercantilism is pursued when the stock of fiscal capacity is too low, the economy eventually falls into a protectionist trap, characterized by low income and low taxes. If mercantilism is adopted when the initial stock is large enough, then mercantilist revenue is invested in the expansion of the fiscal bureaucracy of the state. Eventually, the economy moves from the mercantilist-equilibrium to the free trade-equilibrium, where both income and taxes are high. The empirical implications of the model are examined against historical European data from 1820 to 1950.

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Political survival often depends on the provision of public services, which can only be secured with a large and stable flow of revenue. This flow of revenue, however, requires a sufficiently high administrative capacity, or *fiscal capacity*, to assess income and enforce tax payments. Building a state apparatus capable of identifying sources of income and monitoring tax compliance is costly and requires time to consolidate. In the United Kingdom alone, building an effective system of excise collection took more than a hundred years and continuous investment in the tax administration (Brewer, 1988; Chester, 1981; O'Brien, 2000). Not surprisingly, high fiscal capacity remains a rare phenomenon.

Poor fiscal capacity does not alleviate the urge to satisfy social demands for public services. Pressed by immediateness, rulers have historically borrowed (Drelichman and Voth, 2011; Stasavage, 2011) or adopted mercantilist policy (Ekelund and Tollison, 1981; Heckscher, 1931). This paper revisits the latter option by investigating the conditions under which mercantilist policy serves the purpose of raising revenue while not blocking further improvements in fiscal capacity. Mercantilism is defined here as an agreement between a ruler and key domestic producers by which the former grants the latter monopoly rights in exchange for higher tax compliance.¹ The artificial reduction of the number of competitors serves two purposes for the ruler: first, it mechanically facilitates tax collection, as oligopolies are easier to monitor than competitive markets (Musgrave, 1969); second, it allows the ruler to punish non-compliers by withdrawing operating licenses, thus alleviating non-contractibility issues of taxation. The analysis seeks to analyze when the revenue gain associated with mercantilism outweighs the inefficiency losses that artificial monopolies generate. More importantly, it investigates when *mercantilist revenue* is reinvested in expanding the stock of fiscal capacity. Ultimately, this is the first paper of its kind to evaluate the interaction between short- and long-term *revenue production policy* (Levi, 1988).

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¹A wider definition of mercantilism would consider the role of these monopolies in a broader strategy of the imperial expansion (Findlay and O'Rourke, 2007). However, I adhere to the more confined definition, also known as *fiscalism* (Heckscher, 1931, p. 178).

The *Mercantilist Era* in Europe exemplifies the use of non-competitive policy as a revenue production mechanism, although similar policy was widely adopted later on.² Entry barriers, protectionist tariffs and artificial monopolies were pervasively created in order to raise revenue from domestic producers (Ekelund and Tollison, 1981; Findlay and O'Rourke, 2007). Far from dying out, some of these practices lasted well into the nineteenth century, either in their original format or as private–public ventures (Bastable, 1891; Reinert, 2007).

The gradual abandonment of mercantilist policy in favor of free trade in Western Europe accelerated in the later decades of the nineteenth century. The policy switch was possible only once old forms of taxation (e.g., revenue tariffs, window taxes) had been replaced by newer methods (e.g., income tax, corporate tax) capable of securing a large and stable source of revenue. The capacity to implement the modern forms of taxation was not free. They became a reliable option only because of the gradual enhancement of the tax administration that resulted from purposeful investment in fiscal institutions.³ Crucial to my argument, this form of institutional investment took place while mercantilism was still effective, meaning that the availability of mercantilist revenue did not prevent political authorities from improving the state apparatus. If anything, this revenue would have played a central role in funding the construction of the fiscal state in Europe, as this paper seeks to establish at a theoretical level.

The European experience with mercantilism might not necessarily be the norm. A brief comparison between the British brewing industry in the late eighteenth century and the Bolivian tin industry in the mid-twentieth century suggests that mercantilist revenue might be used in opposite ways. In the early eighteenth century, the British Parliament bargained with major brewers to adopt entry barriers to French wine competitors in exchange for higher tax compliance by the protected

²We find documented instances of mercantilism in seventeenth-century Spain (Drelichman, 2009), eighteenth-century Britain (Nye, 2007), nineteenth-century Prussia (Spoerer, 2008) and Chile (Gallo, 2008), twentieth-century Bolivia (Gallo, 1988), and pre-communist China (Wang, 2001), and more recently in Russia (Gehlbach, 2008) and Korea (Kang, 2002).

³For a cross-national survey on the professionalization of the tax administration in the nineteenth century in Europe, refer to Cardoso and Lains (2010) and Lundgreen (1975).

producers (Nye, 2007). The mercantilist deal turned successful: beer excises grew significantly, accounting for 24% of total revenue at the turn of the century. Importantly, the mercantilist deal between the British government and the brewing industry did not stop the former from improving excise collection. On the contrary, the excise agency was modernized and professionalized over the years (Brewer, 1988; Chester, 1981; O'Brien, 2000). Eventually, protection became unnecessary to guarantee effective excise collection, and entry barriers were dropped in 1830. In a similar fashion, the Bolivian government decided to use export quotas as a carrot-and-stick mechanism to incentivize tax compliance by tin producers (Gallo, 1988). Initially, the strategy proved successful: tax yields from the tin sector doubled in 10 years, accounting for 62% of total revenue in 1942 (*ibid.*). However, despite the revenue surge, Bolivia did not reinvest even a small share in improving its poor tax administration, which remained flawed in its organization and ineffective even according to regional standards (Bahl, 1972).

The contrasting use of mercantilist revenue in Britain and Bolivia suggests that the European experience with mercantilism might not be reproduced in other institutional contexts. More importantly, it begs the question of why this is the case. In this paper, I address this puzzle by investigating the conditions under which a ruler would reinvest mercantilist revenue in enhancing the tax apparatus of the state, even at the expense of present welfare. Ultimately, this analysis seeks to establish when mercantilist practices are an end in itself or when they are a stepping stone into higher fiscal capacity, and, eventually free trade. In order to address these questions, the analysis begins by evaluating when anti-competitive policy might be exchanged for higher tax compliance in the first place. Provided a mercantilist agreement is implemented, I then investigate the conditions under which investment in fiscal capacity takes place. The paper develops a simple theoretical model in which a ruler simultaneously sets taxation and trade policy; two firms operating technologies of different vintages compete for a domestic monopoly in a Schumpeterian economy; and workers (i.e., the poor) offer their labor inelastically.

Initially, the market is operated by an uncompetitive monopolist. In case of entry, a new firm, which is assumed to produce a high quality good, drops the uncompetitive producer from the market, and becomes the new monopolist. Aware of the effects of *creative destruction*, the ruler

might link the adoption of entry barriers to the effective tax rate that the incumbent producer is willing to abide by. In particular, the ruler may grant monopoly privileges to the incumbent producer in exchange for compliance with a tax rate above the *stock of fiscal capacity* — that is, the maximum tax rate enforceable by the tax administration.⁴ The ruler may offer this deal to the incumbent producer only, not the new one, as only the former needs protection to secure its own survival in the market. If the incumbent producer does not stick to the mercantilist deal, the high-tech producer enters the market and becomes the new monopolist. When that is the case, the ruler sets a tax rate within the range permitted by the stock of fiscal capacity.

The ruler is initially assumed to maximize a social welfare function. Later, she is allowed to maximize private consumption. In the latter case, the ruler might accept contributions from the incumbent producer, who may have a vested interest in keeping the *status quo* (i.e., mercantilism). Labor welfare is assumed to be a function of wages and a flow of public goods. Wages are a positive function of the technology operated by the monopolist. Thus, wages increase following the entry of the new producer. The upper bound of public good provision is determined by total tax revenue (i.e., the budget is balanced), which is raised via a sales tax levied on the monopolist. Accordingly, tax revenue increases with the tax rate and actual sales. Taking all these elements into consideration, the ruler decides whether it is optimal to implement a mercantilist bargain with the incumbent producer, who would be obliged to abide by a higher tax rate, or allow entry to a high-tech firm, who would abide by a lower tax rate but pay higher wages. The ruler's equilibrium strategy is proved to depend on the technology distance between the old and new producers and, more importantly, the stock of fiscal capacity. In particular, the ruler prefers mercantilism to free trade despite all its inefficiencies as long as the stock of fiscal capacity is sufficiently low. When that is the case, the marginal gain from tax revenue (and thus public good provision) overcomes the marginal loss in real wages and production.

⁴Monopoly rights might be implemented in various ways: licensing, tariffs, non-tariff barriers, markup prices, etc. Refer to Hoekman and Hostecki (2000) for the functional equivalence between competition and trade policy in limiting market access.

Provided that mercantilism is in place (i.e., the ruler protects the obsolete producer from competition in exchange for tax abidance), I then evaluate the conditions under which the ruler would invest tax revenue in expanding the stock of fiscal capacity. The extension builds on Besley and Persson's (2010) model of fiscal capacity building. Accordingly, investment in the tax administration is modeled with a reduced-form two-period setup, and is solved by subgame perfection. This simple approach captures the essence of the inter-temporal dilemmas underlying institutional investment. Basically, investing in tax administration implies lower public good provision today while guaranteeing higher expenditures tomorrow.

The long-term setup assumes a degenerated ruler's objective function, by which she only advances the interest of labor, not domestic industry. This approach seeks to prove that underinvestment in fiscal capacity might result from mere inter-temporal dilemmas and not necessarily from rent-seeking, as commonly believed. The results suggest that, despite the long-term benefits that labor would accrue from an enhanced fiscal capacity (i.e., higher taxes on the producers — the rich — and embracement of free trade, meaning higher salaries), the ruler might still refrain from investing in the tax administration. That is, foregone consumption might be enough to prevent even a *labor-leaning* ruler from expanding the capacity to tax the rich (i.e., the firm) in the future.

The analysis points to a new mechanism behind the strong correlation between country income levels and fiscal capacity (Acemoglu, 2005; Dincecco and Prado, 2012). I claim that the incentives of protected firms to catch up with foreign competitors might depend on the evolution of fiscal capacity. In anticipation of an eventual embracement of free trade resulting from investment in fiscal capacity, protected firms have a strong incentive to catch up with high-tech foreign competitors. *Induced technology innovation*, as I refer to this mechanism, might affect the path of innovation in the domestic industry and, ultimately, long-term economic growth (Romer, 1994). Yet, induced innovation is only expected to take place when policy capture is limited. Otherwise, the obsolete producers would prefer to spend the funds that technology adoption requires on buying-off the ruler's favors, which is consistent with the protection for sale hypothesis (Grossman and Helpman, 1994).

The results of the full analysis might be summarized as follows: if the initial stock of fiscal capacity is very low to begin with, a ruler seeking to

maximize labor welfare might never invest in fiscal capacity. The forgone consumption would be too large for institutional investment to take place. In this case, mercantilism would become a steady equilibrium, driving the economy into a low fiscal capacity, low income protectionist trap. Only if the stock of fiscal capacity is intermediate at the time that mercantilism is first adopted will mercantilist-derived revenue possibly be reinvested in expanding the stock of fiscal capacity. Anticipating an eventual drop of entry barriers, the domestic industry can take advantage of the regulatory shelter to catch up with superior competitors. Eventually, as fiscal capacity expands, protection is no longer preferred by the ruler, and the economy switches from a *mercantilist equilibrium* characterized by low fiscal capacity and uncompetitive industry to a *free trade equilibrium* characterized by high fiscal capacity and competitive industry.

The theory of endogenous fiscal and trade institutions advanced in this paper assumes a minimum capacity by the state to enforce monopolies, even if imperfectly (refer to the online Appendix for the micro-foundations). This requirement, early satisfied in the Western World (Heckscher, 1931; Viner, 1948), and subsequently in the Americas, Asia, and Africa (e.g., De Soto, 1989; Kurtz, 2013; Wade, 1990; Bates, 1981, respectively), defines the key scope condition of the present theory and its implications.⁵

This paper is closely related to three key pieces of the literature: the determinants of fiscal capacity *building* (Besley and Persson, 2010); mercantilism as a revenue policy in scenarios of low fiscal capacity (Ekelund and Tollison, 1981); and, the notion of second-best institutions (Rodrik, 2008). First, Besley and Persson's (2010) advance two causes of fiscal capacity underinvestment: political instability and ethnic fragmentation. Building on their approach, I claim that there are consumption-based inter-temporal dilemmas in fiscal capacity building that precede the set of hypotheses that they advance. My analysis suggests that investing

⁵For the deeper historical roots of state capacity, refer to Levi (1988), Tilly (1990), and North *et al.* (2009). Importantly, the results hold if we only require enough state capacity to enforce oligopolies, in line with some of the previous examples (e.g., the brewing industry in Britain (Nye, 2007)). The analysis focuses on a monopoly market merely for presentational purposes. The interested reader may refer to the online Appendix, where the theoretical results of the mercantilist model are replicated for an oligopoly setting.

in fiscal capacity might depress current public *and private* consumption to levels at which the ruler, *even if she is assumed benevolent*, would refrain from expanding the stock of fiscal capacity.

Besley and Persson (2010) focus on the *mechanical effect* of fiscal capacity investment on current provision of public goods: that is, investment funnels resources away from present public consumption (e.g., schools, roads, benefits). In this set up, foregone public consumption might be minimized by raising higher taxes, so that equilibrium tax revenue is large enough to fund public consumption and investment. I revisit this result by exploring how institutional investment affects present wages, thus private consumption. This is possible once we make wages endogenous to taxes. Notice that high tax rates are necessary to fund investment, but they also push current wages down, as taxes decrease production and, in turn, market-clearing wages. This *backdoor effect* of institutional investment on current welfare implies that the ruler faces mixed incentives in deciding whether to invest in fiscal capacity. The latter requires high taxes, as investment is costly and it must be somehow funded, but high taxes depresses private consumption, which adds to the mechanical effect of fiscal capacity investment. Ultimately, foregone public *and private* consumption derived from fiscal capacity investment give rise to an inter-temporal dilemma that is only solved in favor of investment as long as the initial stock of fiscal capacity is large enough. Otherwise, the economy falls into a low fiscal capacity trap. Once again, this trap is *strictly* caused by problems of time-inconsistency, not by the usual suspects of fiscal capacity underinvestment: namely, political instability, ethnic conflict (Besley and Persson, 2010), or even rent-seeking (as I also consider below).

Second, Ekelund and Tollison (1981) advance a theory for the rise and decline of mercantilism. They argue that early democratic reforms in Europe changed the net benefits of rent-seeking for protection. The costs of lobbying a unified monarchy for a monopoly charter, they claim, are smaller than those associated with multiple decision-makers unevenly distributed across legislative houses.⁶ Essentially, according to these scholars, the adoption of representative institutions made mercantilism too costly. This paper shares the premise that the rise and

⁶Additional, in the case of England, jurisdictional competition within the judiciary is argued to be responsible for the end of royal charters (thus, mercantilism).

decline of mercantilism is the result of the shifting costs and benefits of mercantilism. However, I advance a separate (non-mutually exclusive) cause for the change of costs and benefits: namely, the development of a tax bureaucracy. That is, I evaluate how weak administrative capacity makes mercantilism a second-best policy, and how the development of an administrative capacity gradually changes the ruler's net benefit of mercantilism so that, *even if the lobbying costs are held constant*, mercantilism turns suboptimal whenever the fiscal capacity evolves strongly enough.

Third, this paper advances the notion of second-best institutions (Rodrik, 2008), as applied to fiscal policy. Tilly (1975) characterized *intermediate institutions* as inefficient institutions that are eventually replaced by modern types, which were, nevertheless, crucial to state building. Johnson and Koyama (2014) identify one such intermediate institution: namely, the cartelization of tax farming started in the seventeenth century in England and France.⁷ These scholars prove how the non-competitive allocation of the right to collect taxes increased the incentives for rulers to invest in standardization and in fiscal capacity. Hence, tax farming, otherwise an inefficient institution, paved the way for the financial revolutions that transformed England after 1688 and France after 1789. Along these lines, I argue that at the right time, mercantilism might be conducive to a big push in fiscal capacity building that, indirectly, should also induce domestic industry to adopt superior technologies. In other words, the adoption of entry barriers at the right stage of fiscal capacity development might have positive long-term effects both in fiscal and trade terms.

Relatedly, the results speak to the lasting debate concerning protectionism and economic growth (Clemens and Williamson, 2004; Irwin, 2000; Lampe and Sharp, 2013; Lehmann and O'Rourke, 2011). This literature finds heterogeneous effects of tariff protection on growth. The present paper qualifies this debate by conditioning those effects on the *initial* stock of fiscal capacity at the time that mercantilism is implemented. Depending on the initial state of fiscal capacity, rulers face different incentives to reinvest mercantilist revenue in fiscal capacity building, which in turn determines the protected industry's incentives to innovate and grow.

⁷See also Johnson (2006) for the statics of that model.

The rest of this paper is organized as follows. Section 1 provides a stylized model of mercantilism. In contrast to Ekelund and Tollison (1981), the static model characterizes the decision to exchange protection for tax compliance as a function of the stock of fiscal capacity, relative prices and public spending. In other words, the theoretical model derives conditions under which we should expect mercantilist policy to be adopted. Section 3 evaluates the conditions under which the tax proceeds derived from a mercantilist agreement are reinvested in expanding the stock of fiscal capacity. Two scenarios are considered: one in which the ruler's preferences are fully aligned with labor's, and another in which the ruler is open to political giving from domestic producers. The theoretical section is followed by an empirical analysis in Section 4, where I test the two main theoretical predictions against historical data for 11 European countries from 1820 to 1950. *Hypothesis 1* is that fiscal capacity expands whenever the stock of fiscal capacity *and* policy capture are limited. *Hypothesis 2* is that, provided fiscal capacity is expanding and protection is effective, technology adoption takes place in anticipation of an eventual embracement of free trade. Finally in Section 5, a discussion follows the empirical section.

1 The Short Run: Set Up

When the capacity to raise revenue through taxation is limited, rulers might resort to mercantilist policy as a means to rapidly produce revenue. Mercantilist agreements grant monopoly rights to selected industries in exchange for higher tax compliance. This section derives the necessary conditions for a mercantilist agreement to be preferred to its alternative, i.e., a *free-entry* policy.

Suppose that an economy has a fixed number L of people who have no demand for leisure and who offer their labor inelastically.⁸ All labor is hired in the final market sector. Final output Y is produced under perfect competition, using labor and a flow of intermediate product x

⁸The structure of the economy is borrowed from Aghion and Howitt (2009, Chapter 11).

of quality $A_j \in \{A_l, A_h\}$, $1 < A_l < A_h$, according to

$$Y = \frac{1}{\alpha}(A_j L)^{1-\alpha} x^\alpha \quad (1)$$

with $\alpha \in (0, 1)$, and Y being the *numéraire*.

The intermediate product is produced monopolistically using a flow of final product, one for one.⁹ The intermediate market might be operated by the incumbent producer or the would-be entrant. These firms differ in the technology vintage they operate. The incumbent producer operates an old technology A_l , and the would-be entrant a newer technology A_h . The monopolist, regardless of its type, seeks to maximize profit

$$\pi = (1 - t)px - x \quad (2)$$

where t denotes the sales tax rate imposed on the intermediate good. Since the final market is competitive, the price of the intermediate product equals the marginal product, $p = (A_j L/x)^{1-\alpha}$. Accordingly, the producer's profit is maximized for

$$x^* = A_j L(\alpha(1 - t))^{1/(1-\alpha)} \quad (3)$$

which brings the equilibrium price of the intermediate product to

$$p^* = \frac{1}{\alpha(1 - t)} \quad (4)$$

The equilibrium price does not depend on the technology vintage operated by the monopolist. However, final producers prefer the more productive input, as final production $Y(A_j)$ increases in the intermediate good's productivity. Since $A_h > A_l$, if entry takes place, the new producer pushes the incumbent firm out of business and becomes the

⁹Results hold if we assume an oligopoly in the intermediate market or if the producers differ in their marginal costs of production. Refer to the online Appendix for both extensions. Results do unravel if the market is assumed to be perfectly competitive, for two reasons: First, the expectation of gaining non-competitive profit is a disciplinary device to encourage mercantilist producers to stick to the terms of the contract. Second, oligopolistic structures facilitate monitoring and collection, thus reducing the inefficiencies associated with mercantilism (refer to the online Appendix).

new monopolist. Specifically, the incumbent producer is assumed to vanish instantaneously once entry takes place. This kind of competition captures the Schumpeterian logic of *creative destruction*.

Labor derives (indirect) utility from private consumption and public good spending

$$u_l = c(A, t) + \rho \frac{G(A, t)}{L} \quad (5)$$

where c denotes private consumption of final good Y , G/L per capita public spending, and $\rho > 1$ the extra weight attached to the latter. Private consumption is fully funded by wages. Since savings are not considered, the full wage is consumed. In particular, wages equal the marginal productivity of labor in the final sector

$$w^* = \frac{1 - \alpha}{\alpha} A_j (\alpha(1 - t))^{\alpha/(1-\alpha)} \quad (6)$$

Notice that the equilibrium wage decreases in the sales tax and increases in the technology vintage A_j operated by the intermediate producer. In other words, the newer the technology operated by the intermediate monopolist, the higher the equilibrium wage. Workers do not pay taxes (only the intermediate producer does), but the relative wage, w/p , decreases with them. This characteristic intrinsically captures the regressive effect of sales taxes, which are the main tax type in developing economies. The second element in Expression (5) captures per capita public spending. G/L is funded by the sales tax paid by the intermediate producer. For the sake of simplicity, tax revenue $T = tpx$ is assumed to be entirely funneled to public-good provision (i.e., $G \equiv T$).¹⁰ Public spending might involve national defense, hospitals or roads. The valuation of public services is increasing in ρ , which is assumed to be greater than 1 to avoid degenerate results with no public spending.

The political authority (or *ruler*) sets entry regulation as well as the tax rate paid by the intermediate producer. The tax rate $t \geq 0$ is levied on the intermediate good only. The sales tax increases the price of the intermediate good, which depresses its demand, final sector wages and ultimately consumption. However, taxes are still necessary to fund public spending G .

¹⁰Refer to the online Appendix for sunk costs in taxation, implying $G = \kappa T$, $\kappa < 1$.

Initially, the tax rate's upper bound is determined by the stock of fiscal capacity, $t \leq \tau$. The stock of fiscal capacity $\tau \in [0, 1]$ determines the maximum tax rate that the tax administration is capable of enforcing (i.e., the maximum *effective* tax rate). The stock reflects the strength of the administrative apparatus of the state, which may be expanded over time by investing in the tax administration (Besley and Persson, 2010). However, as examined below, mercantilist policy may raise levels of revenue similar to those associated with high fiscal capacity.

The ruler also sets entry regulation, which either allows or bans entry of the new, superior competitor. Entry barriers may take any form of competition policy: e.g., licensing, anti-dumping actions, or markups (Scherer, 1994). Ultimately, any of these measures grants the incumbent producer monopoly access to the intermediate market.¹¹ In return, the ruler demands higher tax compliance. Specifically, the ruler may protect the incumbent producer from the high-tech competitor if and only if the incumbent firm abides by a tax rate greater than the stock of fiscal capacity. Let $t_m > \tau$ be the effective tax rate in the *mercantilist* regime.

Free-entry (or free trade) implies an absence of entry barriers. When the ruler chooses *free entry*, it is assumed that a new competitive firm will enter with certainty. From that moment on, the ruler cannot enforce tax rates above the stock of fiscal capacity. The new producer, already competitive, does not need protection from government, meaning that the ruler loses the carrot-and-stick mechanism that allowed her to enforce tax rates above the stock of fiscal capacity. For this very reason, in case of entry, the tax rate must be set from *within* the possibilities given by the stock of fiscal capacity, $t_e \in [0, \tau]$, with subscript *e* standing for *entry*.

Initially, the ruler is assumed to maximize a weighted function of labor's and producers's indirect utility:

$$V = \theta \cdot u_l(w(t), G(t)) + (1 - \theta) \cdot \pi(x(t)) \quad (7)$$

¹¹Alternatively, the ruler could resort to trade policy (e.g., tariff and non-tariff barriers) to enforce a monopoly in the intermediate market. Refer to Hoekman and Hosteck (2000, pp. 425–434) for the *substitutability* of competition and trade policy in restricting market access.

with $\theta \in [0, 1]$, and the tax rate t upper bounded by the stock of fiscal capacity τ in case of entry, only. The ruler neither keeps any share of revenue for private consumption nor accepts bribes or contributions. That is, her motives are purely altruistic.¹²

The timing of the mercantilist game is as follows:

- First, the ruler sets the entry and tax policy.
- If barriers are adopted, the old producer remains and complies with $t_m > \tau$.
- If barriers are not raised, entry takes place, intermediate good producers compete, and the winner abides by $t_e \leq \tau$.
- With the entry and tax policy in place, tax revenue, wages and profit follow.

Commitment problems are ruled out by assumption. Repeated interaction, in combination with the perils of Schumpeterian competition that the obsolete producer faces, should suffice to solve the non-contractibility issues of taxation.

1.1 *The Short Run: Analysis*

The short-run problem is easily solved once we assume that the old producer drops out of the market upon entry of the new competitor. In other words, the uncompetitive producer is automatically phased out by the high-tech firm as a result of creative destruction.¹³ This leaves the

¹²I relax this assumption later on.

¹³Alternatively, the micro-foundations of Schumpeterian competition can be fully modeled by a standard Bertrand oligopoly model, where intermediate firms compete in prices. In order to capture the technological gap between firms, we can assume the latter to differ in their marginal costs of production. Specifically, instead of supplying goods of different qualities A_j , firms may differ in their marginal cost of production ϕ_j , with the non-competitive incumbent operating a technology associated with high marginal costs ϕ_h , and the would-be entrant another one associated with low marginal costs ϕ_l . Accordingly, the profit function remains: $\pi_j = (1 - t)px - \phi_j x$. The equilibrium prices of these firms now differ across firms: $p_j = \phi_j / (\alpha(1 - t))$, with $\phi_h > \phi_l$. That is, the would-be entrant, in case of entry, would beat the incumbent producer's price, driving the latter out of business. Notice that price competition is an isomorphic way to model quality-based Schumpeterian competition (A_j): in the former, firms compete to offer the same product at the lowest price; in the latter,

ruler's as the only player actually making a decision. Specifically, the ruler might choose between signing a mercantilist agreement with the incumbent monopolist (i.e., protection in exchange for higher taxation) and allowing for entry of the new firm, which leads to lower taxation but higher wages.

Suppose the ruler opts for *free-entry*. Her maximization problem in (7) might be constrained by the stock of fiscal capacity:

$$t_e^* = \begin{cases} \frac{\theta\rho-1}{\theta(1+\frac{\rho}{1-\alpha})-1}, & \text{if } \lambda = 0 \\ \tau, & \text{if } \lambda > 0 \end{cases} \quad (8)$$

which requires $\rho\theta > 1$. This condition overrules states of the world in which the ruler has no preference for positive taxation, either because she cares little about labor's welfare (low θ), or labor values little public spending (low ρ), or both. Expression (8) implies that when fiscal capacity endowment is sufficiently large (i.e., the fiscal constraint is not binding), the ruler adopts an *unconstrained* or ideal tax rate. For future reference, let

$$\tau^u \equiv \frac{\theta\rho - 1}{\theta(1 + \frac{\rho}{1-\alpha}) - 1} \quad (9)$$

which denotes the minimum stock of fiscal capacity necessary to effectively implement the unconstrained tax rate. This stock (and thus the unconstrained tax rate) increases in the labor's preference for public spending ρ and the ruler's preference for labor's welfare θ . Expression (9) also implies that the unconstrained tax rate has an upper bound, $\tau^u < 1 - \alpha$. The reason for this lies in the effect that taxes exert on the intermediate good demand ($\partial x^*/\partial t > 0$) and on final sector wages ($\partial w^*/\partial t < 0$).

When the fiscal constraint binds, $\lambda > 0$, the ruler adopts the maximum tax rate that the endowment of fiscal capacity allows, $t_e^*(\lambda > 0) = \tau$, since the ruler's utility function is strictly increasing in the $[0, \tau^u]$ interval.

Suppose now that the ruler opts for *mercantilism*, choosing to protect the obsolete incumbent firm so long as it abides by a tax rate above the stock of fiscal capacity, $t_m > \tau$. For the sake of simplicity, assume

firms compete to offer for the same price goods of different quality (which, recall, drives the final market productivity).

$t_m = \tau^u$, the unconstrained tax rate.¹⁴ That is, by agreeing to the ruler’s terms, the domestic firm receives the necessary protection for survival, though at a high cost, since it must abide by a higher tax rate, $\tau^u > \tau$. It is precisely the capacity to induce higher tax compliance by non-market mechanisms that makes mercantilism advantageous for a ruler in immediate need of revenue.

Given t_e^* , t_m^* , A_h and A_l , the ruler evaluates when mercantilism is optimal. The answer depends on the technology distance between the new and the old producer, the stock of fiscal capacity endowment, and the valuation of public spending.

Proposition 1. *Let intermediate good demand, prices and final sector wages be given by (3), (4) and (6), respectively. Suppose that the ruler has a preference for non-negative taxation, $\rho\theta > 1$, and the fiscal capacity constraint in (8) bites. Provided that*

$$\frac{A_h}{A_l} < \frac{\theta(1 + \alpha(\rho + 1))}{\theta(1 - \alpha) + \alpha} \left[\frac{\theta(1 + \alpha(\rho + 1))}{\theta(1 - \alpha + \rho) - (1 - \alpha)} \right]^{\frac{\alpha}{1-\alpha}} \tag{10}$$

there exists a unique $\hat{\tau} < \tau^u$ such that, for any $\tau \leq \hat{\tau}$ a unique Subgame Perfect Nash Equilibrium (SNPE) exists in which entry barriers are raised in exchange for $t_m^* = \tau^u > \tau$; and for any $\tau > \hat{\tau}$ barriers are not raised, entry takes place, and the tax rate is set to exhaust the stock of fiscal capacity, $t_e^* = \tau$.

Proof. See online Appendix. □

Proposition 1 states that a ruler finds mercantilism preferable to free trade when the stock of fiscal capacity is sufficiently low, even if protection blocks entry of superior technology and pushes equilibrium wages down. That is, the ultimate combination of lower wages but higher tax compliance by the obsolete incumbent producer is preferred to the alternative scenario with higher wages but lower tax compliance by the new producer.¹⁵ However, this is only true as long as the fiscal capacity

¹⁴The results and the main inter-temporal trade-off stand if we assume a more conservative tax rate to abide by in return for protection, $\tau < t_m < \tau^u$. However, those results are no longer explicit. For further details refer to the online Appendix.

¹⁵When entry barriers are raised, the incumbent firm makes positive but limited profit $\pi(t_m^*, A_l) < \pi(\tau, A_l)$. Interestingly, the ruler is not expected to push the firm’s profit all the way to 0, as that would hurt wages too much (thus being suboptimal).

endowment τ is sufficiently low (i.e., $\tau \leq \hat{\tau}$), and the productivity differential between the old and new producer is not excessively large (as stated in Expression (10)). When these conditions are met, the ruler's marginal gain of a one-unit increase of per capita public spending $G(t_m^*)$ is greater than the marginal loss in wages $w(t_m^*)$ and production $x(t_m^*)$. By the same token, when the fiscal capacity endowment is sufficiently large (i.e., $\tau > \hat{\tau}$), the relative magnitude of these marginal effects are flipped, and *free-entry* is preferred instead.

Expression (10) in Proposition 1 implies that the mercantilist equilibrium may only arise when the technology differential between the incumbent and would-be entrant is not too large. This is consistent with the historical survey of technology adoption conducted by Comin and Hobijn (2009b). When the benefits of a new technology are too large, no barrier can prevent the newer firm from entering. It is also true that major technological shocks are exceptional (*ibid.*). Notice, too, that the right-hand side of Expression (10) is increasing in the labor's valuation of public spending ρ , and in the ruler's affinity for labor, θ . That is, the relative gain from mercantilism *vis-à-vis* free-entry increases when the public good is most needed (e.g., in times of war) or when the government is left-leaning (i.e., advances the interests of labor over producers'). As argued below, these properties may cause adverse effects in the long run.¹⁶

2 The Long Run: Set Up

Mercantilist policy may indeed be an effective mechanism to raise revenue in the short run. However, this shortcut to large revenue may produce unfavorable effects in the long run if it discourages investment in fiscal capacity. The Bolivian case exemplifies the risks derived from this form of protectionist policy. The British case, on the other hand, suggests that mercantilism might be a temporary solution while fiscal capacity consolidates. In this section, I explore the conditions under

¹⁶The incumbent producer might try to buy off protection without higher taxation (i.e., $t_m < \tau$), à la Grossman and Helpman (1994). Still, it can be proved that there exists a stock of fiscal capacity $\hat{\tau} \in (0, \hat{\tau})$ such that for all $\tau < \hat{\tau}$, the equilibrium tax rate is above the stock of fiscal capacity despite money changing hands. That is, when fiscal capacity is sufficiently low, mercantilism is contribution-proof.

which mercantilist policy results in either a higher equilibrium (i.e., strong fiscal capacity), or a weak state trap.

Specifically, this long-run analysis seeks to identify the fundamental trade-offs preventing investment in fiscal institutions. With that aim, from now on the objective function of the ruler is assumed to mimic that of labor (i.e., $\theta = 1$). This assumption eliminates the usual suspects of poor policy-making from the analysis such as rent-seeking and policy capture. Instead, I focus on the basic dynamic dilemmas of fiscal capacity building that even a labor-leaning ruler would face: higher public good provision in the long run and higher wages (as higher fiscal capacity makes entry of better firms preferable to protection) at the cost of lower private and public consumption today. Later on, I also evaluate the role of policy capture. Those results confirm that rent-seeking aggravates underinvestment but does not necessarily cause it.

The long-run set-up assumes that mercantilist policy is already in place, and evaluates the conditions under which fiscal capacity expands and free trade is eventually embraced. The initial state of fiscal capacity is assumed to be low. In terms of the benchmark model, this implies that $\tau < \hat{\tau}$. From Proposition 1, the technological distance between A_l and A_h cannot be excessive for mercantilism to be an equilibrium. Thus, I also assume that condition (10) is satisfied.

Now there are two time periods, $s = \{1, 2\}$. Suppose that fiscal capacity endowment can move from $\tau_1 = \tau$ up to $\tau_2 = \tau^u$ at a cost σT , with $\sigma < 1$.¹⁷ That is, the economy can evolve from constrained to unconstrained fiscal capacity between Period 1 and Period 2 if a share

¹⁷How big is σ ? Available qualitative evidence suggests it is non-trivial. In 1842, Britain permanently adopted the income tax, a milestone in fiscal capacity building. The full cost of the tax administration in 1846 was 11.5% of *total* expenditure (Peto, 1863). There are, allegedly, other costs or inefficiencies associated with investing in the tax administration. For instance, building a professional tax administration raises tensions between old and new system tax officials: e.g., the Landräte vs. the professional officials in Prussia (Kühne, 1994); the clash between common law and royal courts in interpreting royal charters in England (Ekelund and Tollison, 1981); or, the tensions between the local assessors vs. the professional officials following the adoption of the income tax in Britain (Daunton, 2001). These tensions are partly responsible for the slow-moving nature of fiscal capacity building. But, they may also add to the investment costs, σ , if tensions are mitigated with some form of compensation schedules for the losers of the reform. Either way, considering them in the model would only exacerbate the problems of time-inconsistency that the model already identifies.

σ of tax revenue T is invested in fiscal capacity.¹⁸ Given the ruler type $\theta = 1$, the *investment goal* becomes

$$\tau^u(\theta = 1) = (1 - \alpha) \left[1 - \frac{1}{\rho} \right] \quad (11)$$

which is still increasing in ρ , the labor preference for public goods.

Denote $I \in \{1, 0\}$ the ruler's investment decision in fiscal capacity. Then,

$$\tau_2 = \begin{cases} \tau_1, & \text{if } I = 0 \\ \tau^u, & \text{if } I = 1 \end{cases} \quad (12)$$

where $\tau_1 = \tau$ denotes the stock of fiscal capacity in period 1. This value may become τ^u in period 2 if a share σ of the mercantilist revenue $T(t_m)$ is reinvested in period 1. As a simplifying assumption, σ is made proportional to the distance between the stock of fiscal capacity and the investment goal: $\sigma = \gamma(\tau^u - \tau)$, with $\gamma < 1$.

The incumbent producer is now allowed to innovate, perhaps adopting the higher technology A_h . Technological adoption takes a full period to materialize, and it is costly too. The intermediate producer must funnel a share $1 - \delta$ of its own intermediate good output into R&D activities. Hence, when the intermediate producer innovates, only a share δ of intermediate good x_l reaches the final market. The magnitude of $\delta < 1$ can be related to the technological distance between A_h and A_l , but it can also be interpreted as the quality of the capital market (i.e., the lower the δ , the harder it is to obtain funds to invest in R&D), or even as the strength of property right protection (i.e., the lower the δ , the more resources that have to be funneled to guarantee the same outcome).

¹⁸Alternatively, I could consider a less ambitious investment goal: for instance, $\tau_2 = \hat{\tau}$, the value of fiscal capacity at which the ruler is indifferent between mercantilism and free trade (as defined in Proposition 1). The more moderate investment goal, $\hat{\tau} < \tau^u$, is evaluated in the online Appendix. Results do not vary, but they are no longer explicit. Importantly, the two investment goals considered follow an *all-or-nothing* logic. The “bang-bang” set up is proved to produce equivalent inter-temporal dilemmas, results and intuitions as those derived from a fully dynamic set up in which investment gradually takes place and the equilibrium concept is Markovian (Besley *et al.*, 2013).

Given $\tau < \hat{\tau}$, the order of play becomes

- At the beginning of Period 1, the ruler decides whether to invest σT in fiscal capacity and sets the Period 1 entry policy and sales tax rate.
- The producer decides whether to adopt technology A_h at a cost $(1 - \delta)x_l$ and chooses Period 1 profit-maximizing output x_l .
- In Period 2, given the stock of fiscal capacity τ_2 , the ruler sets the Period 2 tax rate and entry policy.
- The producer (old or new) chooses Period 2 profit-maximizing production, and the game ends.

Once we allow the ruler to invest in fiscal capacity and the producer to adopt the superior technology, we can envision four possible strategy profiles, depicted in Table 1. However, two of them are unlikely and are disregarded by assumption in the analysis. First, if the ruler does invest in fiscal capacity in Period 1, according to Expression (12) and Proposition 1, she drops barriers in Period 2. This implies that the Period 1 obsolete producer will compete with the superior firm in Period 2, in which case the incumbent producer can only inhibit entry through innovation (i.e., investing in technology adoption in Period 1). If the incumbent producer does not adopt the superior technology, the firm runs out of business following entry of the new firm in Period 2 as a result of creative destruction. Thus, as long as the extinction payoff is sufficiently low — zero, or even negative infinite — investment in fiscal capacity by the ruler should always be followed by adoption of the higher technology by the incumbent producer. I refer to this phenomenon as *induced technology innovation*. Second, if the ruler does not invest in

Table 1: Strategy profiles: Investment in fiscal capacity *vs.* adoption of higher technology.

	Producer	
Ruler	invest, adopt	invest, not adopt
	not invest, adopt	not invest, not adopt

fiscal capacity, I assume that the incumbent producer does not innovate, either. Technology adoption is costly; since fiscal capacity endowment is (and will remain) low in period 2, I assume that the incumbent producer has no incentive to innovate once the ruler decides not to invest in fiscal capacity building. In other words, the *status quo* perpetuates. Altogether, I only consider two of the four strategy profiles in Table 1: the top left cell, $\{invest, adopt\}$; and the bottom right cell, $\{not\ invest, not\ adopt\}$.

2.1 *The Long Run: Analysis*

Given the stock fiscal capacity endowment τ_2 as defined in (12), Period 2 strategies and payoffs are characterized by Proposition 1. We only have to analyze the investment decisions in Period 1 to fully characterize the SPNE in the whole game. Period 1 best responses are solved using backwards induction within the period.

In Period 1, the incumbent producer decides whether to adopt the high technology A_h . The producer only innovates if it is induced to; that is, if and only if the ruler decides to expand fiscal capacity in Period 1. If the ruler does not invest, the producer does not innovate, either, for the reasons explained above. The incumbent producer's payoffs are then defined by Proposition 1. If the ruler does invests in fiscal capacity, then the producer is induced to innovate as well. In order to adopt the superior technology, $(1 - \delta)$ units of intermediate output x are lost in period 1. This share represents the cost of technology adoption. The profit function (upon the investment decision of the ruler) becomes

$$\pi_1(I = 1) = (1 - t_1)p_1\delta x_1 - x_1 \tag{13}$$

That is, the producer still produces x_1 units of intermediate good in Period 1, but only a share δ of it reaches the final market. The other share $(1 - \delta)$ is reinvested in technology adoption.

The equilibrium price in Period 1, p_1 , is still determined by the marginal productivity of input x in the final market, $p = \partial Y / \partial x$, with Y defined by (1). Given p_1 , the producer problem becomes

$$\max_x \pi_1(I = 1) = (1 - t_1)(A_L L)^{1-\alpha} \delta x_1^\alpha - x_1 \tag{14}$$

which is maximized for

$$x_1^*(I = 1) = A_L L (\alpha \delta (1 - t))^{1/\alpha} \tag{15}$$

Notice that the cost of innovation in Period 1, $(1 - \delta)x_1$, translates into lower equilibrium production in comparison to the mercantilist equilibrium without investment, as characterized by Proposition 1. Accordingly, equilibrium prices rise to

$$p_1^*(I = 1) = \frac{1}{\alpha\delta(1 - t_1)} \quad (16)$$

Altogether, induced technology innovation depresses production and increases prices compared to the alternative scenario without any investment in fiscal capacity.

The labor-leaning ruler decides whether to invest in fiscal capacity, $I \in \{0, 1\}$, anticipating the effects of Period 1 production and prices upon investment. Importantly, investment in the stock of fiscal capacity also consumes a share σ of Period 1 tax revenue T . Since public spending G is also funded by taxation, fiscal capacity investment reduces per capita public spending in Period 1. The exact level of public spending is determined by

$$\max_{t_1} V_1(I = 1 | \theta = 1) = w_1(x(t_1))^* + \rho \left[\frac{(1 - \sigma)T_1}{L} \right] \quad (17)$$

with

$$T_1 = t_1 p_1^* x_1^*$$

and p_1^* , x_1^* given by (15) and (16), and market-clearing wage

$$w_1^* = \frac{1 - \alpha}{\alpha} A_l (\delta\alpha(1 - t_1))^{\frac{\alpha}{1-\alpha}}$$

Given all the market equilibrium values, the ruler's problem is solved for

$$t_1^* = (1 - \alpha) \left[1 - \frac{1}{\rho(1 - \sigma)} \right] \quad (18)$$

Expression (18) implies that the equilibrium tax in Period 1 is a decreasing function of σ , the cost of investing in fiscal capacity. The reason for this relationship lies in the fact that the investment costs inclines the underlying tension between wages and public spending in favor of the former. Fiscal capacity investment not only reduces the magnitude of public spending but also, due to the induced innovation costs $(1 - \delta)$, pushes wages down. This additional effect reduces the ruler's preference

for higher tax rates. In turn, this explains why the equilibrium tax rate in (18) is lower than that in the benchmark case, $t_1^*(I = 0)$ as defined in (11). Against all intuitive predictions, when tax revenue is most needed (i.e., when the ruler needs taxation to fund public spending *and* investment in fiscal capacity), the ruler has the weakest incentives to raise taxes. These are lowest when $\sigma \rightarrow \bar{\sigma}$, with

$$\bar{\sigma} = 1 - \frac{1}{\rho} \tag{19}$$

When $\sigma \rightarrow \bar{\sigma}$ the investment cost of fiscal capacity is so large that wages are given full priority in (17) and the equilibrium tax is set to 0, thus precluding any expansion in fiscal capacity at all. As σ is assumed to be proportional to the distance between the unconstrained fiscal capacity and the actual stock of fiscal capacity, Expression (18) implies underinvestment traps are more likely for states with weaker state capacity. Such economies, despite having the strongest need for fiscal capacity investment, would be those facing weaker incentives to enhance their tax administrations. To guarantee that fiscal capacity investment might happen in equilibrium, let us assume that $\sigma < \bar{\sigma}$ throughout.

Lemma 1. *Suppose the ruler invests in fiscal capacity in Period 1 at a cost of σT and $\sigma < \bar{\sigma}$. Then, the producer is induced to adopt technology A_h at cost $(1 - \delta)x_1$. Provided that*

$$\delta < \bar{\delta} \equiv \frac{\alpha + \frac{1-\alpha}{\rho}}{\alpha + \frac{1-\alpha}{\rho(1-\sigma)}} < 1 \tag{20}$$

then $w(I = 1) < w(I = 0)$ and $G(I = 1) < G(I = 0)$, with $w(I = 0)$ and $G(I = 0)$ defined in Proposition 1.

Proof. See online Appendix. □

Condition (20) guarantees that the cost of induced technological innovation is significant enough as to push Period 1 equilibrium wages down.¹⁹ Lemma 1 defines the basic components of a prototypical consumption inter-temporal dilemma. Both elements in the ruler utility

¹⁹Wages depend negatively on δ but positively on σ , since the latter reduces the equilibrium tax rate. Only when δ is sufficiently low will the first effect dominate and

function, wages and per capita public spending decrease in Period 1 whenever the ruler invests in fiscal capacity. The benefits of investment in fiscal capacity materialized in Period 2 must be sufficiently large as to offset the utility loss of Period 1.

Period 2 payoffs are given by Proposition 1. If the ruler invests in fiscal capacity in Period 1, $\tau_2 = \tau^u$ and *free-entry* is preferred. A new firm enters, wages rise and the new monopolist is taxed at the unconstrained tax rate. On the contrary, if the ruler does not invest in Period 1, $\tau_2 = \tau_1 < \hat{\tau}$ and mercantilism is still preferred in Period 2. Overall, the two-period payoffs of the ruler are

$$V_s = \begin{cases} 2 \times \left[w_s(I = 0) + \rho \frac{T_s(A_I, I=0)}{L} \right], & \text{if } I = 0 \\ w_1(I = 1) + (1 - \sigma) \rho \frac{T_1(A_I, I=1)}{L} + w_2(A_h, \tau^u) + \rho \frac{T_2(A_h, \tau^u)}{L}, & \text{if } I = 1 \end{cases} \quad (21)$$

Proposition 2. *Suppose Condition (20) in Lemma 1 is met; the initial stock of fiscal capacity is $\tau_1 < \hat{\tau}$, as defined in Proposition 1; the (induced) technology adoption cost is $(1 - \delta)x_1$, with $\delta \in (0, 1)$; and the investment cost in fiscal capacity is σT , where $\sigma = \gamma(\tau^u - \tau_1) < \bar{\sigma}$, with $\bar{\sigma}$ defined in (19). Then*

- *If $A_h < 2 - \delta^{\frac{\alpha}{1-\alpha}}$, investment in fiscal capacity in period 1 is never an SPNE.*
- *If $A_h > 2$, investment in fiscal capacity in period 1 is always an SPNE.*
- *If $2 - \delta^{\frac{\alpha}{1-\alpha}} < A_h < 2$, there is a $\hat{\sigma} < \bar{\sigma}$ such that for $\sigma \in [0, \hat{\sigma}]$ investment in fiscal capacity is always an SPNE, and for $\sigma \in [\hat{\sigma}, \bar{\sigma}]$ investment in fiscal capacity is never an SPNE.*

Proof. See online Appendix □

Proposition 2 states that the ruler always invests in fiscal capacity whenever the gain associated with future technology is very high ($A_h >$

$w_1(I = 1) < w_1(I = 0)$. If (20) is not met, foregone consumption upon investment would only involve public good provision. Then, the expansion of fiscal capacity would take place in more states of the world. Nevertheless, the generalized opposition to technological adoption (Comin and Hobijn, 2009a; Mokyr, 1991) implies that the costs of adopting new technologies must be non-trivial, meaning (20) is often met.

2). This is consistent with Comin and Hobijn's (2009b) findings, which prove that no major technology innovation can be perpetually blocked. It is equally true that major innovations are rare. When innovations are incremental ($A_h < 2$), investment depends on the innovation cost δ and the institutional investment cost σ . As δ approaches 0 (i.e., the cost of catching up increases), the parameter space of fiscal investment shrinks. The future gains derived from the new technology do not compensate for the foregone consumption in the present (i.e., lower wages and lower public spending in Period 1). Provided that $\delta > 0$ (i.e., induced innovation costs are not extreme), there exists an intermediate interval of fiscal capacity cost $\sigma \in [0, \hat{\sigma}]$, $\hat{\sigma} < \bar{\sigma}$, for which fiscal capacity investment takes place even though the future technology is merely incremental. In other words, the expansion of fiscal capacity under mercantilism takes place under two conditions only: not only must the institutional investment cost be low, as one would presume, but the induced innovation cost must be moderate as well. If these two conditions are simultaneously met, the ruler invests in fiscal capacity, and the domestic producer adopts the higher technology. Eventually, the economy moves from mercantilism to a free trade equilibrium characterized by high fiscal capacity, no entry barriers, and high wages (as they increase with technology). Without both of the necessary conditions met, even a labor-leaning would prefer to stick to the mercantilist *status quo* despite its current and future inefficiencies (i.e., lower wages and higher prices).²⁰

We already know that fiscal capacity building in peacetime requires political stability and low ethnic conflict (Besley and Persson, 2010). Proposition 2 advances a less intuitive prediction: even if the political

²⁰What if technology costs were non-linear? Comin *et al.* (2010) claim that the technology adoption costs decrease as the stock of technology increases. What does it imply for the model? Decreasing marginal costs of technology adoption would exacerbate the inter-temporal dilemma of expanding fiscal capacity in countries with non-competitive industries (i.e., far from the technology frontier). In order to catch up, the incumbent producers would have to exert significant economic effort, depressing current wages to levels for which the ruler might no longer be interested in investing in the tax administration. Thus, a more realistic characterization of the costs of R&D would expand the parameter space for which we would see no investment in fiscal capacity, given mercantilism. In other words, episodes of low fiscal capacity traps and high protectionism are more likely to happen if we account for non-linearities in the cost of innovating.

arena is perfectly stable and ethnic divisions are frictionless, rulers might still lack the incentive to invest in fiscal capacity. The mere inter-temporal dilemma of institutional investment might suffice to discourage even a labor-leaning ruler from strengthening the tax administration. I reach this conclusion by fully endogenizing *tax policy* (i.e., the optimal tax rate today) and the institutional investment decision (i.e., whether to expand the tax apparatus). Besley and Persson (2010) focus on the mechanical effect of investment in present spending: the more resources are invested in building a stronger tax apparatus, the fewer are left to inaugurate new schools or hospitals. In that set up, foregone public consumption can be minimized by raising higher taxes, as they guarantee enough resources to fund investment *and* spending today. Building on Besley and Persson (2010), I assume wages to be a negative function of the tax rate. This tweak produces two consequences: First, investing in fiscal capacity does not only reduce current public spending — the mechanical effect — but equilibrium wages too — the backdoor effect. Second, for the very same reasons, the incentives of the ruler to set high tax rates to fund investment are now mixed: since high taxes depress present wages, the latter cannot compensate for the loss of public consumption following investments in the tax administration. This tension opens up a set of inter-temporal trade-offs that are not necessarily solved in favor of institutional investment. When the stock of fiscal capacity is low (alternatively, when the costs of expanding fiscal capacity are high $\sigma > \hat{\sigma}$), the incentives to set a high tax rate to amass enough revenue to fund investment in fiscal capacity are weakest, leading to problems of time-inconsistency. This is true even for a welfare utility maximizing ruler, and in the absence of ethnic divisions or political instability.

3 Vested Interests

Proposition 2 states that when the cost of fiscal capacity investment is small, the ruler might opt for investing in Period 1 and deviate from mercantilism in Period 2. I now explore the possibility of political giving. The incumbent producer might prefer to bribe the ruler in order to keep the *status quo* rather than adopting a new technology.

Specifically, this section explores the possibility that *vested interests* use contributions (or bribing) in order to inhibit fiscal capacity

investment when the fiscal capacity investment costs are low ($\sigma < \hat{\sigma}$). To this end, a new stage at the very beginning of Period 1 is required. In this stage, the incumbent producer evaluates whether to bribe the ruler to maintain mercantilism. Commitment problems are ruled out by assumption.

By definition, the producer has an incentive to bribe whenever the profit following innovation is lower than the profit in the *status quo*:

$$\sum_s^2 \Pi_s(I = 0) \geq \sum_s^2 \Pi_s(I = 1, \delta) \tag{22}$$

Lemma 2. *There exists a $\tilde{\delta} < \bar{\delta}$, with $\bar{\delta}$ defined in (20), such that, for all $\delta \leq \tilde{\delta}$, the producer has an incentive to bribe the ruler in order to keep the status quo.*

Proof. See online Appendix. □

Lemma 2 defines the producer participation constraint for bribing, which is a function of the cost of the induced technology adoption. As expected, when the innovation cost is large (small δ), the producer has a stronger incentive to resort to bribing in order to prevent the ruler from investing in fiscal capacity. δ can be associated with the cost of innovating (i.e., the distance between the high and low technology), but it can also reflect the strength of property right protection (the lower the δ is, the lower the returns of the innovation process), or even the quality of the financial market (the lower δ is, the more difficult it is to fund R&D activity).

When $\delta < \tilde{\delta}$, the producer has an incentive to bribe. However, it does not necessarily mean that the ruler would accept the bid. This is the case whenever the maximum feasible contribution matches (or exceeds) the ruler’s indirect utility derived from investing in fiscal capacity, $V_s(I = 1)$.

Definition 1. *The maximum feasible contribution is*

$$c_{\max} = \sum_s^2 \Pi_s(I = 0) - \sum_s^2 \Pi_s(I = 1, \delta) \tag{23}$$

Expression (23) defines the maximum contribution the producer would ever give, which is equal to the difference between his profit under the *status quo* and his profit upon innovating.

Definition 2. *The ruler incentive compatibility constraint is defined by*

$$c_{\max} \geq \sum_s^2 V_s(I = 1|\theta = 1) - \sum_s^2 V_s(I = 0|\theta = 1) \tag{24}$$

Expression (24) defines the ruler incentive constraint, that is, the contribution that would make her stick to the *status quo* (i.e., mercantilism) even if $\sigma < \hat{\sigma}$. The interpretation is straightforward: the ruler would only keep the *status quo* if the bribe is large enough to outbid the utility derived from expanding the fiscal capacity of the state.

Proposition 3. *Suppose Lemma 2 is met and $A_h \in (2 - \delta^{\frac{\alpha}{1-\alpha}}, 2)$. Then, there exists a $\tilde{\sigma} \in (0, 1)$, $\tilde{\sigma} < \hat{\sigma}$ such that, for all $\sigma \in [\tilde{\sigma}, \hat{\sigma})$, there exists a unique SPNE in which the producer has an incentive to bribe and the ruler always accepts the contribution $c^* = \sum_s^2 V_s(I = 1|\theta = 1) - \sum_s^2 V_s(I = 0|\theta = 1)$; in exchange, the ruler keeps the *status quo* (i.e., mercantilism) despite the low wages $w_s(A_l)$ and low fiscal capacity $\tau_2 = \tau_1 = \tau < \hat{\tau}$, as defined in Proposition 1. The obsolete producer remains “in”, making profit $\pi_s(c_1^*, t_s^*) \geq 0$, and the new entrant stays “out”.*

Proof. See online Appendix. □

Proposition 3 states that when the cost of fiscal capacity investment is moderately low, $\sigma \in [\tilde{\sigma}, \hat{\sigma})$, and the cost of technology adoption is high ($\delta \leq \tilde{\delta}$), the producer offers a bribe to the ruler and the ruler accepts it. Now the range of σ for which the ruler would invest in fiscal capacity is smaller than the one in which bribes were not allowed. This implies that the producer, thanks to political giving, is able to align the ruler’s interests with his own. As a direct consequence, the *status quo* (i.e., mercantilism) can be preserved in states of the world in which it would be optimal to invest in fiscal capacity for a labor-leaning (non-corruptible) ruler.²¹

²¹Proposition 3 also states that the producer stays “in” and makes positive profit

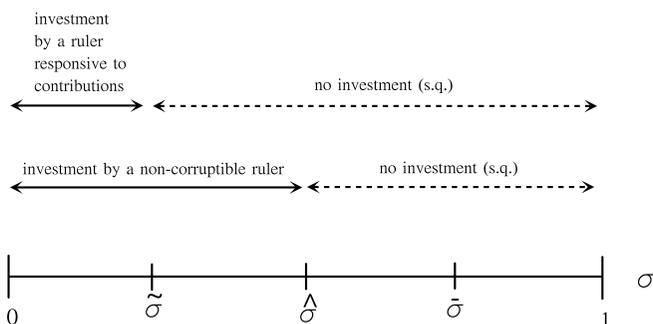


Figure 1: Equilibrium investment by the cost of fiscal capacity investment and ruler type.

Figure 1 plots the parameter space for which fiscal capacity investment takes place as a function of the ruler type and the cost of fiscal capacity building. I have assumed two ruler types: the labor-leaning (non-corruptible) type, and the corruptible type. When the cost of investing in fiscal capacity is high, $\sigma > \hat{\sigma}$, neither type would invest in fiscal capacity. Accordingly, mercantilism would persist in the long run. When the cost of investing in fiscal capacity is moderate, $\sigma \in [\bar{\sigma}, \hat{\sigma}]$, fiscal capacity investment takes place only if the ruler is non-corruptible. If the ruler is corruptible, for this interval only, the incumbent producer can afford the bribe c^* , which makes the ruler indifferent between expanding fiscal capacity and maintaining the *status quo*. When bribing occurs, the bribe-responsive ruler keeps entry barriers against newer competitors despite the perpetuation of low wages, low productivity and weak fiscal capacity.

We may interpret Propositions 2 and 3 in a slightly different way. Recall that the investment cost is assumed to be proportional to the distance between the investment goal and the initial stock of fiscal capacity: $\sigma = \gamma(\tau^u - \tau)$. This implies that, when the initial stock of fiscal capacity is low (high σ), we should not expect any investment in fiscal capacity, regardless of the ruler type. As for higher values of the stock of fiscal capacity (intermediate σ), we should expect investment

despite the contribution cost, c^* . Only when *Lemma 2* is met at equality, $\delta = \tilde{\delta}$, would the producer remain “in” but make competitive profit only.

only if the ruler is non-corruptible. Altogether, the results suggest that mercantilism might be a stepping-stone into high fiscal capacity only if the initial stock of fiscal capacity is not too low to begin with (Proposition 2), and if policy capture is limited (Proposition 3). If these two conditions are not simultaneously met, the mercantilist equilibrium persists in the long run because mercantilist revenue is not re-invested in expanding the stock of fiscal capacity. When that is the case, we would only expect a departure from the mercantilist equilibrium in case of a major technological shock (see Proposition 1), which rarely occurs.

To sum up, the reduced-model of fiscal capacity building presented in this section suggests that it is in fact feasible to have an endogenous switch from a lower equilibrium — the *mercantilist equilibrium*, characterized by high rates of protection, weak fiscal capacity, and low income — to a higher equilibrium — the *open economy equilibrium*, characterized by free trade, high fiscal capacity, and high income. However, for this switch to take place, two conditions must be simultaneously satisfied: the stock of fiscal capacity cannot be too low to begin with, and policy capture must be limited. The temptation to resort to mercantilist policy too soon in the path of fiscal capacity building, and the risk of policy capture by incumbent producers in the field of trade, might push an economy into a long-term trap characterized by poor fiscal capacity and protectionism.

The analysis also suggests a new mechanism linking high fiscal capacity and high income levels: *induced technology innovation*. Specifically, the model suggests that technology innovation might take place under protection whenever the ruler funnels mercantilist proceeds to expand the stock of fiscal capacity. In anticipation of an eventual drop of entry barriers, protected firms would take advantage of the regulatory shelter to catch up with superior competitors. If they fail to do so, they will be phased out by new competitors once fiscal capacity hits the stock level at which point taxation is secured without the use of anti-competitive policies. Anticipating the eventual adoption of free trade policy, protected firms have a strong incentive to adopt newer technologies. Ultimately, the mechanism of induced innovation implies that the path of fiscal capacity building, trade policy, and technology adoption might be complementary phenomena. The following section tests this possibility against actual data.

4 Empirical Implications

In this section, I test the predictions of Propositions 2 and 3 stepwise. First, I model the expansion of fiscal capacity conditional on intermediate levels of fiscal capacity *and* high policy preference alignment between the ruler and labor (Hypothesis 1). Then, I test whether technology adoption occurs under high levels of protection conditional on fiscal capacity growth (Hypothesis 2). Both hypotheses are tested using a sample of 11 Western European countries from 1820 to 1950.²² The time coverage begins in the years following the Napoleonic Wars and ends with the multilateral reduction of trade barriers following World War II (Clemens and Williamson, 2004). Conditional on the usual data availability constraints associated with crossnational historical series, this test should be interpreted as a preliminary exploration of the theory at stake.

Crucially, Western European economies satisfy a necessary condition under which investment in fiscal capacity takes place despite protectionism: the initial stock of fiscal capacity cannot be too low to begin with (Proposition 2). By the mid-nineteenth century, most European states had already experienced some professionalization of their tax administrations and had incorporated basic methods of modern taxation.²³ The income tax best exemplifies the state of fiscal capacity in Western Europe in this period. This tax is said to be the final destination of fiscal capacity building (Tilly, 1990).²⁴ And yet, by the late nineteenth century, all countries in the sample except for Switzerland had already adopted it, at least temporarily (Aidt and Jensen, 2009). The implementation of income taxes is costly and challenging, and it requires some prior development of the tax apparatus for it to be effective (Bird and Zolt, 2014). This suggests that fiscal capacity in Western Europe can no longer be considered weak in the second half of the mid-nineteenth century. But neither high. The initial income taxes only targeted the

²²Austria–Hungary (later Austria), Belgium, Denmark, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The online Appendix includes further details on the data.

²³For extractive capacity in Europe in the nineteenth century, refer to Aidt and Jensen (2009), Cardoso and Lains (2010), Dincecco (2009) and Scheve and Stasavage (2010). For the professionalization of the tax administration, refer to Footnote 3.

²⁴The income tax taps into previously unreported sources of income and collects unprecedented amounts of revenue.

wealthy — thus limiting the scope of monitoring and tax collection — and its extractive capacity was still limited, accounting for only 5% of total revenue on average, as compared to 29% in the late 1940s (Flora *et al.*, 1983). It is precisely this *intermediate stage* of fiscal capacity building that makes of this sample an ideal one to test the present theory. This particular region of the parameter space of the stock of fiscal capacity continuum is the one from which, conditional on low political capture, we should expect investment in fiscal capacity to take place (Hypothesis 1).

The theoretical analysis also suggests that fiscal capacity and domestic industry competitiveness covary over time. Specifically, investment in fiscal capacity stimulates adoption of newer technologies by the domestic industry, even when protected from competition. The second part of the empirical analysis investigates whether, conditional on fiscal capacity being expanded, technology adoption is actually *induced* (Hypothesis 2).

4.1 Hypothesis 1. Investment in Fiscal Capacity

In order to test Hypothesis 1, I follow Gehlbach and Malesky (2010) empirical strategy, as it is particularly compelling to study institutional reform based on its past realization, current political conditions, and their interaction. The analysis in this section follows the same logic: I seek to model the *expansion* of fiscal capacity based on its past realization (the *stock* of fiscal capacity at time $t - 1$), the ruler-labor policy preference alignment, and their interaction. By Proposition 2, I expect fiscal capacity to grow when the stock is low and the ruler and labor preferences are aligned.

Following Gehlbach and Malesky (2010), I measure the expansion of fiscal capacity with first-differences. Denote c_{it}^+ any positive movement toward higher fiscal capacity in country i in year t , and $c_{it}^+ = \max[c_{it}, c_{it-1}]$. That is, c_{it}^+ measures movements toward higher fiscal capacity between t and $t - 1$. The model specification remains

$$c_{it}^+ = \phi c_{it-1} + \psi a_{it} + \delta c_{it-1} a_{it} + \beta X_{it} + \alpha_i + \eta_t + v_{it} \quad (25)$$

where a_{it} denotes the *ruler-labor policy preference alignment* (θ in the model), X_{it} a vector of controls varying by country i and year t , α_i a

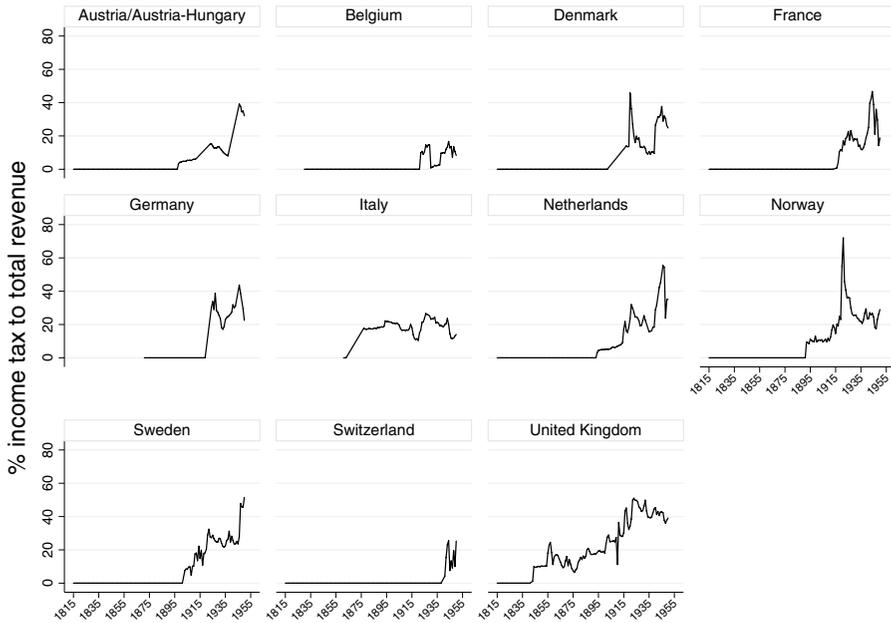


Figure 2: Percentage of income tax to total tax revenue in western Europe from 1815 to 1950.

full set of country-fixed effects, η_t a full set of time-fixed effects, and v_{it} a disturbance term.²⁵

In light of the relevance and adoption time of the income tax in Western Europe, both the stock and growth of fiscal capacity are measured by the share of income tax to total tax revenue.²⁶ Figure 2 shows the distribution of this variable over time.

The extent of *ruler-labor policy preference alignment* is proxied by the Polity IV score (Marshall and Jaggers, 2000). I work under the premise that in the late nineteenth-century and early twentieth-century Europe, workers’ interests were better upheld in a democratic setting,

²⁵Departing from Gehlbach and Malesky (2010), I fit Expression (25) with OLS instead of GMM. The small-N-big-T and the unbalanced nature of this panel does not recommend the use of GMM.

²⁶Ideally, we would like to work with a policy variable such as *effective* tax rates or direct measures of the tax administration (e.g., professional staff). Unfortunately, these data are not available for the nineteenth century.

in which they could, at least to some degree, hold the ruler accountable for her actions at election day (Przeworski, 2010). Besides electoral accountability, free society institutions such as free press and secondary associations are expected to increase the cost of silencing corrupt transactions between vested interests and public officials (Treisman, 2000), thus limiting policy capture. Altogether, the empirical strategy assumes that, for this particular sample and period, higher values of the Polity IV score denote a stronger alignment between the ruler and labor preferences or, alternatively, lower potential for policy capture by vested interests.

Table 2 reports the results of the Hypothesis 1 tests. In the spirit of Gehlbach and Malesky (2010), Columns 1–4 consider moves toward higher fiscal capacity only. Additionally, Columns 5–8 consider positive *and negative* changes in fiscal capacity, which is equivalent to fitting a lagged dependent variable model. For each version of the dependent variable, I run two specifications: one with year-fixed effects, and another with flexible time polynomials (which account for common trends while maximizing degrees of freedom). For each time-trend specification, I consider two batteries of controls: first, I include variables for which I have full information (thus maximizing the sample size). These are *GDP per Capita* (Maddison, 2007), as adopting the income tax also requires a large tax base; and *War* (Sarkees and Wayman, 2010), the usual suspect of major fiscal innovations (Tilly, 1990). Then I add four additional controls that, due to data availability, reduce the sample size over 30%. These are *Primary School Enrollment* (Banks and Wilson, 2010), a standard proxy of state capacity (and potentially demand for higher taxation); the *Urbanization Rate* (Banks and Wilson, 2010), which proxies the level of monetarization of the economy, a necessary condition for the adoption of income taxation (Tilly, 1990); *Ad Valorem Equivalent (AVE) Import Tariffs* (Lampe and Sharp, 2013), which captures any substitution effect between AVE and income taxes (more below); and *Military Size* normalized to population, which captures any preparation for war (Banks and Wilson, 2010).

Irrespective of the model specification, time trend and controls, for all eight models, as predicted, higher ruler-labor alignment (proxied by Polity IV) is positively and statistically significantly associated with extensions of fiscal capacity only when the stock of fiscal capacity is low (measured by the share of income taxes to total taxes). The

Table 2: Fiscal capacity growth as a function of past realizations of the stock of fiscal capacity and the ruler-labor preference alignment (proxied by Polity IV).

Dependent variable: change in fiscal capacity	Positive changes			Positive and negative changes				
	Two-way FE (1)	Two-way FE (2)	Flex polynomial (3)	Flex polynomial (4)	Two-way FE (5)	Two-way FE (6)	Flex polynomial (7)	Flex polynomial (8)
Polity	0.050** (0.022)	0.069** (0.033)	0.053** (0.025)	0.056* (0.032)	0.093*** (0.035)	0.123** (0.053)	0.103*** (0.039)	0.112** (0.050)
Lagged fiscal capacity	0.032* (0.018)	0.047** (0.024)	0.029* (0.016)	0.048** (0.023)	-0.067** (0.030)	-0.073* (0.039)	-0.058** (0.028)	-0.064* (0.036)
Polity × lagged fiscal capacity	-0.006*** (0.002)	-0.009*** (0.002)	-0.004*** (0.001)	-0.008*** (0.002)	-0.008*** (0.003)	-0.012*** (0.003)	-0.008*** (0.002)	-0.012*** (0.003)
GDP/cap	0.347 (0.261)	0.468 (0.331)	0.155 (0.237)	0.208 (0.282)	0.514 (0.367)	0.728 (0.471)	0.377 (0.343)	0.454 (0.411)
War	-0.219 (0.358)	-0.620 (0.544)	0.214 (0.276)	-0.201 (0.273)	0.137 (0.417)	-0.438 (0.666)	0.579* (0.350)	0.132 (0.424)
AVE tariffs		-3.657 (3.569)		-9.882*** (2.999)		-4.394 (5.773)		-10.025*** (3.838)
Urbanization		-5.813** (2.320)		-7.094*** (2.186)		0.978 (3.791)		-0.167 (3.373)
Military size		0.002 (0.002)		0.006** (0.002)		-0.001 (0.003)		0.003 (0.003)
Primary education		-0.433 (0.896)		-0.532 (0.787)		-0.634 (1.224)		-0.840 (1.108)
Constant	-0.104 (1.087)	1.764 (2.152)	-0.567 (0.555)	0.534 (1.119)	0.412 (1.466)	1.280 (3.254)	-1.424* (0.801)	1.105 (1.601)
Observations	1.207	830	1.207	830	1.207	830	1.207	830
R-squared	0.281	0.290	0.104	0.128	0.231	0.264	0.082	0.112
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	No	No	No	Yes	Yes	No	No
Flexible polynomial	No	No	Yes	Yes	No	No	Yes	Yes
WW participant indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

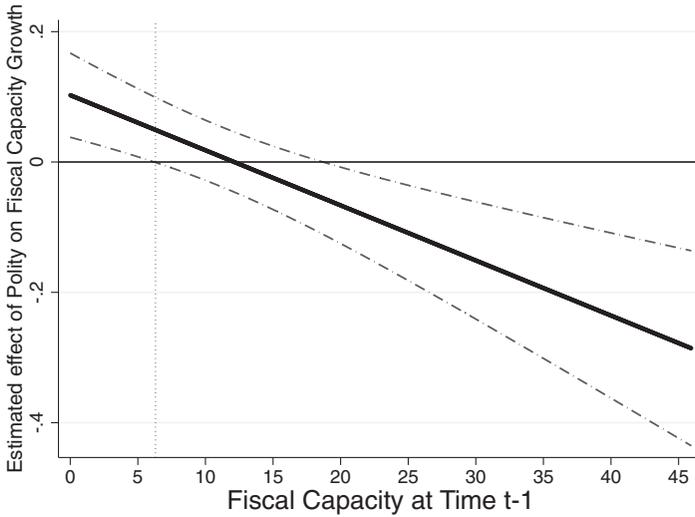


Figure 3: Marginal effect of ruler–labor preference alignment (proxied by Polity IV) on fiscal capacity growth as a function of the stock of fiscal capacity at time $t - 1$. Estimates drawn from column 3 in Table 2. 90% CI.

positive effect of ruler–labor alignment on the extension of fiscal capacity gradually vanishes as the latter expands. Figure 3 plots the conditional marginal effect. This becomes statistically insignificant when income taxation, again, the measure of fiscal capacity, represents 7% of total taxation (as indicated by the dotted vertical line). Low as it may seem, only 35% of the sample has income tax ratios above that value.²⁷ This result suggests that, when the administrative capacity to tax is sufficiently developed, its expansion depends on factors other than additional improvements in the policy preference alignment between the ruler and labor (for instance, aging of the population).

²⁷Most unit-years in the sample have a value of 0 for this variable, as one could expect based on Figure 2. The reason is that I set *income tax to total taxation* to 0 for the interval that separates 1820 from the actual adoption year of income taxes. Are the results driven by this coding decision? The online Appendix includes an additional test in which income taxation is set to missing for all years preceding the income tax adoption. The sample shrinkages, but results hold.

The one inconsistency with my expectation is the negative effect of the Polity score for very high values of fiscal capacity (income tax ratios > 20%, which involves 16% of the sample). When the stock of fiscal capacity is this high, an additional increase in the ruler–labor alignment reduces further expansions of direct taxation. This is, nevertheless, consistent with two results in the literature: First, the structural dependence of labor on capital (Przeworski and Wallerstein, 1988), by which labor, for their own sake, refrain from taxing the wealthy at very high rates. Second, the social contract of the welfare state, by which extensive welfare programs — which correlate with high Polity scores — are proved to be waged by indirect and not direct taxes (Beramendi and Rueda, 2007; Timmons, 2005).²⁸ Importantly, the prediction advanced in Proposition 2 accounts for the extension of fiscal capacity when this is weak or intermediate, not high. The results in Table 2 do suggest that, when fiscal capacity is low, an increase in the ruler–labor preference alignment does expand the stock of fiscal capacity.

4.2 Hypothesis 2. Induced Technology Innovation

From Proposition 3 and Table 2, we know that fiscal capacity investment takes place only if policy capture is limited. Now we seek to test for *induced technology innovation*. That is, in anticipation of the eventual adoption of free trade following the expansion of fiscal capacity, protected firms catch up with superior competitors. From the previous section, we know that fiscal capacity is more likely to expand when the stock of this variable is low *and* the ruler at least minimally advances the interest of labor. Accordingly, we could model technology adoption twofold: regressing it on a two-way interaction between fiscal capacity *growth* and protection, or on a three-way interaction between ruler–labor preference alignment and low fiscal capacity (thus fiscal capacity growth), and protection. For the sake of simplicity, I stick to the first option, the two-way interaction model.²⁹ Accordingly,

$$\Delta h_{it} = \phi p_{it} + \rho \Delta c_{it} + \kappa p_{it} \Delta c_{it} + \beta X_{it} + \alpha_i + \eta_t + v_{it} \quad (26)$$

²⁸That is, the middle class in advanced democracies pays for the services it receives. The welfare state is not funded by the rich; it results from a contract of the middle class *with the middle class*.

²⁹Results for the three-way interaction are available from the author.

where Δh_{it} is the first difference of the stock of technology between year t and $t - 1$, p_{it} denotes tariff protection at year t , Δc_{it} the first difference of the stock of fiscal capacity between year t and $t - 1$, X_{it} a vector of time-varying controls, α_i a full set of year-fixed effects, η_t a full battery of time-fixed effects, and v_{it} a disturbance term. The expectation for the two-way coefficient is $\kappa > 0$. That is, when fiscal capacity expands, protected firms have an incentive to adopt better technologies.

To proxy for technology adoption, the dependent variable in Hypothesis 2, I measure the intensive use of two major input technologies in the Industrial Revolution: *Metric Tons of Freight carried on Railways* (excluding livestock and passenger baggage), and *Gross Output of Electric Energy in Terawatt Hour*. Importantly, both technologies were susceptible of innovations, and those could be imported from the international market. Railway freight, for instance, benefited from the adoption of Bessemer steel rails, which allowed for heavier, powerful locomotives that resulted in increased productivity (Rosenberg, 1982); mechanical refrigeration (O'Rourke and Williamson, 1999), which had been a major impediment for grain, meat and dairy trading; or, the adoption of diesel combustion engines (Grübler, 1990), which speeded transportation time. Not surprisingly, the market for Bessemer steel rail already was international and competitive in the last quarter of the nineteenth century (Allen, 1979), as was that of locomotives and wagons (Herrera, 2006). The electric energy similarly benefited from the many technology innovations that took place in the second half of the nineteenth century, both in its production and distribution (Devine, Jr., 1983). The invention of alternating current, or steam turbines, for instance, dramatically changed the capacity and reliability of electric energy relative to its close competitors: oil and gas. The market of electrical power machinery also turned international and competitive in the turn of the nineteenth century, with American and German firms ahead (Brittain, 1974).

Next I model the intensive use of rail freight and electric energy as a function of fiscal capacity building and protection from international competition. The series for both technologies are drawn from the *Cross-country Historical Adoption Technology Dataset* produced by Comin and Hobijn (2009a). To make these data comparable between countries, I normalize the two dependent variables with respect to population size

Table 3: Data availability for the two dependent variables for Hypothesis 2. Year for first and last observation.

	Rail freight		Energy	
	tons per capita		production per	
	First	Last	First	Last
Austria/Austria-Hungary	1865	1950	1920	1950
Belgium	1850	1950	1920	1950
Denmark	1867	1950	1920	1950
France	1850	1950	1901	1950
Germany	1888	1950	1900	1950
Italy	1870	1950	1895	1950
Netherlands	1878	1950	1920	1950
Norway	1867	1950	1920	1950
Sweden	1865	1950	1901	1950
Switzerland	1880	1950	1920	1950
United Kingdom	1856	1950	1896	1950

(the actual unit is *per thousands inhabitants*).³⁰ The coverage of the data by country differs by input technology. Table 3 reports the first and last year for which information exists by country. The rail freight data goes systematically further back in time, as electric energy, which replaced coal and gas energy, was a later technology.³¹

Protection is measured by import-weighted average ad valorem equivalent (AVE) tariff, calculated as the ratio of custom duty revenue

³⁰Countries have different sizes, ruggedness, coast lines and light hours. These confounders are captured by the country-fixed effects. Population data is drawn from Maddison (2007).

³¹The technology used to produce steel would be a clear candidate for the dependent variable, as steel was a main input in the Industrial Revolution too. Unfortunately, the available cross-national series are not detailed enough to model the adoption of the Bessemer process, which drastically reduced the cost of steel production in the late nineteenth century.

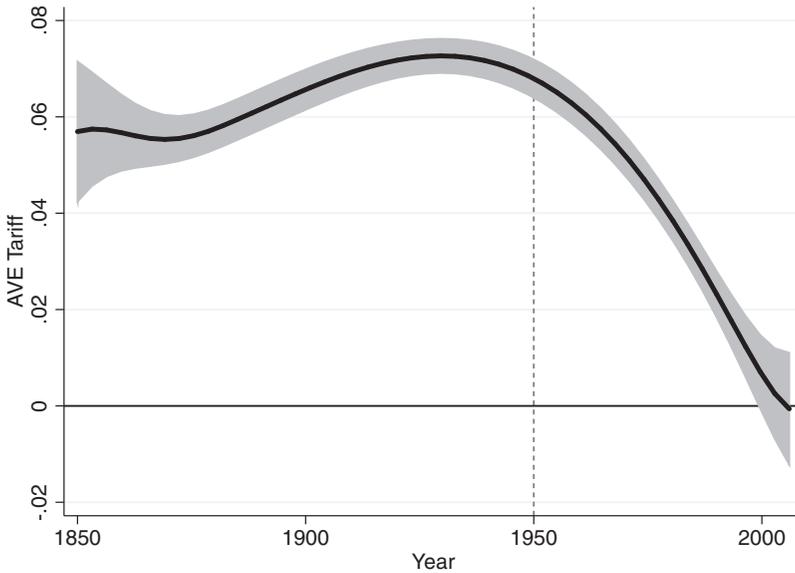


Figure 4: AVE tariff in western Europe for period covered and afterwards.

to total imports for domestic consumption.³² AVE tariff data is drawn from Lampe and Sharp (2013), who completed and extended Clemens and Williamson's (2004) data. The range of this variable goes from 0 to 0.33, meaning that, protection might be equivalent up to a third of the import unit value. These figures vary yearly by country. Figure 4 plots the evolution of average AVE tariff protection in Europe since 1850.

The estimates of the two-way interaction model specified in (26) are reported in Table 4. The main estimate of interest is $\hat{\kappa}$, the two-way interaction coefficient. This coefficient takes positive values for both dependent variables, suggesting that technology adoption (measured as the intensive use of two cornerstone technologies of the Industrial Revolution) takes place *despite protectionism* provided fiscal capacity is expanding, which is itself more likely when a ruler that advances the interest of labor rules a country with limited fiscal capacity (Hypothesis 1).

³²Had the data existed, I could have worked indistinguishably with competition policy (e.g., licensing), as both trade and competition policy are functionally equivalent in restricting market access (Hoekman and Hostecky, 2000).

Table 4: Input Technology Growth as a function of the expansion of fiscal capacity and protection from competition.

	Growth of rail freight per capita			Growth of electric energy per capita		
	(1)	(2)	(3)	(4)	(5)	(7)
AVE tariff	-0.568 (0.489)	-0.609 (0.489)	-0.778 (0.595)	-1.296** (0.517)	-0.103 (0.079)	-0.099 (0.081)
Δ Fiscal capacity	-0.008 (0.008)	-0.008 (0.007)	-0.009 (0.008)	-0.017** (0.008)	-0.003** (0.002)	-0.003** (0.001)
AVE tariff \times Δ Fiscal capacity	0.297** (0.117)	0.299** (0.116)	0.309** (0.122)	0.383*** (0.132)	0.051* (0.030)	0.046 (0.030)
Dependent variable stock at $t - 1$		-0.027* (0.014)	-0.054*** (0.019)	-0.067*** (0.019)	0.016 (0.041)	-0.039 (0.060)
GDP/cap		0.093* (0.052)	0.093* (0.052)	0.177*** (0.048)	0.018 (0.012)	0.018 (0.012)
Urbanization			-2.218** (1.018)	-2.666** (1.056)	0.141 (0.235)	0.141 (0.235)
War			-0.038 (0.136)	-0.062 (0.129)	-0.006 (0.014)	-0.006 (0.014)
Military size			0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Primary education			-0.126 (0.126)	0.058 (0.106)	-0.053* (0.027)	-0.053* (0.027)
Constant	0.068 (0.054)	0.227** (0.101)	0.833* (0.478)	0.206 (0.609)	-1.741 (1.778)	-2.730 (2.782)
Observations	797	797	746	746	387	387
R-squared	0.333	0.343	0.363	0.130	0.217	0.241
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	No	No	No
Flexible polynomial	No	No	No	Yes	Yes	Yes
WW participant	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

These results are robust to different specifications, including models with and without a first lag of the *stock* of the dependent variable (i.e., does technology expansion vary depending on its own level?); a battery of controls that might correlate with both hands of the equation (e.g., preparation for war might ignite technology adoption in the military industry and push for the expansion of fiscal capacity); country- and year-fixed effects (to account for cross-section heterogeneity and common time trends); as well as flexible time polynomials, which account for underlying trends while maximizing degrees of freedom.³³

Figure 5 plots the marginal effects of the two-way interaction, as estimated in Column 4 of Table 4. As both components can be interpreted as a modifying variable, I report the marginal effect of tariff protection on technology adoption as a function of the expansion of fiscal capacity (left panel), and the marginal effect of the expansion of fiscal capacity on technology adoption as a function of tariff protection (right panel). The first figure suggests that the effect of protection on technology adoption (proxied by the intensive use of rail freight) is positive as long as fiscal capacity expands, but negative otherwise. This result speaks directly to the theoretical model. In anticipation of an eventual

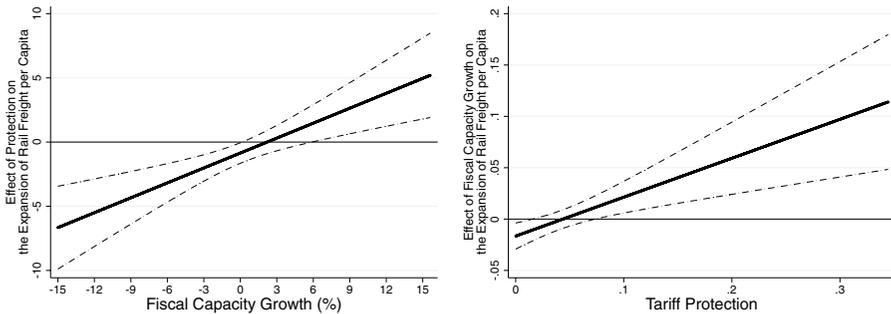


Figure 5: Marginal effects of protection on technology adoption as a function of the expansion of fiscal capacity (left panel), and marginal effect of the expansion of fiscal capacity on technology adoption as a function of protection (right panel). Estimates drawn from Column 4 In Table 4. 90% CI.

³³This is particularly compelling for the second dependent variable, *Growth of Electric Energy per Capita*, for which data is scarce. This is the reason why a battery of year fixed effects (which consume 55 degrees of freedom) is not even considered in those models.

liberalization of the economy, which would follow the expansion of fiscal capacity, domestic producers have a strong incentive to enhance their productivity and competitiveness. If fiscal capacity does not expand, or is even contracting, protection exerts a negative effect on the expansion of rail freight. To the contrary, when fiscal capacity does not expand (i.e., if mercantilism remains the most likely future scenario), there is no need to engage in *costly* technology adoption. The right panel in Figure 4 analyzes the same two-way model interaction from a different angle: this figure indicates that the effect of the expansion of fiscal capacity on the adoption of superior technologies requires positive levels of protection. This result suggests that *induced technology adoption* requires some positive levels of protection of incumbent firms, probably so that they can accrue the returns of investing in new technologies.

Altogether, the results are consistent with the theoretical expectation: technology growth is not necessarily incompatible with protection of domestic industry. However, for that to be the case, the incumbent producer must anticipate that the protection is only temporary, which requires institutional investment in fiscal capacity in the first place. The latter, Table 2 suggests, is more likely when the ruler advances the general interest or, alternatively, policy capture is limited. Ultimately, the evidence in this section advances a new mechanism for the empirical association between high fiscal capacity and national income (Acemoglu, 2005; Dincecco and Prado, 2012): namely, *induced technology innovation*. The replacement of old forms of revenue extraction (e.g., revenue tariffs or land taxes) by modern extractive technologies (e.g., income and corporate taxes) pushes protected firms to adopt newer technologies, which are themselves responsible for long-term economic growth (Romer, 1994).

5 Discussion

This paper presents a theory of endogenous fiscal institutions in which fiscal capacity accumulation drives trade policy and domestic industry productivity. The theory is based on an extended practice in Mercantilist Europe: when the capacity to raise revenue through taxation is limited but public expenditure is required, rulers might grant protection from competition to domestic producers in exchange for higher tax compliance.

Propositions 1–3 identify the conditions under which mercantilist policy is optimal, as well as those under which mercantilist revenue is reinvested in building fiscal capacity.

The initial endowment of fiscal capacity is expected to play a significant role in shaping incentives to reinvest the mercantilist revenue. If the initial stock of fiscal capacity is *low*, mercantilist policy becomes a sticky equilibrium *even if* the ruler is welfare utility maximizing and impermeable to rent-seeking. Vested interests might exacerbate underinvestment in fiscal capacity, but they are not a necessary condition. Consumption-based inter-temporal dilemmas suffice to prevent investing in the tax apparatus. The reason is as follows: expanding the tax bureaucracy is costly, as it funnels spending from other politically (if not *electorally*) appealing areas. Accordingly, rulers must decide whether to invest in long-term institution building (which would guarantee larger revenue in the future, but at a cost today), or provide public spending so as to maximize short-term welfare (and give up the possibility of taxing the wealthy in the future). The analysis proves that, if the initial stock of fiscal capacity is too low, the long-term goals (i.e., developing a strong tax administration) is abandoned in favor of current spending even if the ruler is assumed to be welfare maximizing. This is the case because foregone public and private consumption upon investment are too high when fiscal capacity is low. All in all, a premature adoption of mercantilism might be a second-best policy in the short term (as it effectively raises revenue), but it is detrimental in the long run (as it traps the economy in a low fiscal capacity equilibrium). This result advances a new hypothesis for fiscal capacity underinvestment, namely, time-inconsistency problems, to the stock of generally accepted causes: participating in few or minor inter-state wars (Tilly, 1990; Herbst, 2000), and ethnic fragmentation and political instability (Besley and Persson, 2010). Importantly, the analysis proves that the problems of time-inconsistency apply *even if* the ruler is benevolent, the incumbency turnover is null, and ethnic frictions are nonexistent.

Only when the initial stock of fiscal capacity is *intermediate* is mercantilism optimal in both the short *and* long run. For this interval of the parameter space, the ruler has incentives to invest the tax proceeds raised by mercantilist policy in expanding the stock of fiscal capacity. Institutional investment might itself induce technology adoption among

incumbent producers, who, anticipating the adoption of free trade as fiscal capacity expands, catch up with foreign competitors. Eventually, the stock of fiscal capacity hits the point at which free entry is optimal. At this point, the economy endogenously switches from the protectionist equilibrium to a new one characterized by high fiscal capacity, free trade and competitive industry, all of which translate to higher wages (or income).

The curse that results from a premature adoption of mercantilist policy seems consistent with the Bolivian case. Bolivia faced pressing social needs (large ρ in the model) from 1930 to 1952.³⁴ First the Chaco war, and later the appeasement of an increasingly militant labor movement, called for an increase in public spending. This demand was met, and revenue from tin taxes was spent on new welfare programs: they grew from 9% in the 1920s (before export licenses were used as carrot-and-stick to induce tax compliance), to 16% in the 1930s and 25% in the 1940s (Gallo, 1988). Despite the emphasis on welfare programs, the precarious fiscal capacity remained unattended. From Proposition 2, we know that rulers seeking to maximize a joint flow of wages and public spending — as it was the case in Bolivia — face a strong inter-temporal dilemma, as opportunity costs are significant. Under such circumstances, even a ruler who only advances labor's interests might prioritize present welfare over fiscal capacity building, thus giving up higher taxation on the rich in the future. This might well explain what happened in Bolivia from 1930 to 1952. Social needs were rampant and the stock of state capacity was very low. The foregone consumption following institutional investment might have been too large even for a labor-leaning government.³⁵ Ultimately, time-inconsistency problems perpetuated mercantilism as a means to induce tax compliance by tin producers.

The lack of fiscal capacity investment in Bolivia would also explain the absence of any significant productivity achievements in the tin

³⁴In 1952, a revolution took place and tin production was nationalized.

³⁵Between 1936 and 1946, three populist, labor-leaning governments ruled Bolivia. These fulfilled significant reforms in tax and agricultural policy that benefited workers to the detriment of tin producers' profits. Conservative governments ruled from 1946 to 1952. They were certainly more sympathetic to the tin producers. Nevertheless, the tax pressure levied on the latter was never relaxed. Political survival of conservative governments still required expansive welfare programs (Gallo, 1988).

industry. Domestic producers did not take advantage of the regulatory shelter to catch up with foreign competitors. Firms rarely reinvested the profit, and the capitalization of the mines declined over this period (Gallo, 1988; Klein, 1986). Major technical challenges for the future of the industry remained unattended.³⁶ Instead, tin producers focused on lobbying the government to maximize export quotas (Hillman, 2002). As a result, by the end of two mercantilist decades, Bolivia's world share of tin production had declined by three percentage point, from 22.3% to 19.4% (Ayub and Hashimoto, 1985). Eventually, the country was trapped in a low income, low fiscal capacity equilibrium.

The Bolivian experience contrasts with that of the eighteenth century British brewing industry. Mercantilism did not stifle investment in fiscal capacity. Despite the increasing demands for public spending (Pincus and Robinson, 2011; Knights, 2005), throughout the period, the British government reserved a share of the mercantilist revenue to fund the expansion of the tax administration and its capacities (Brewer, 1988). Eventually, protection became unnecessary to guarantee effective excise collection, and entry barriers were dropped in 1830. By that time, beer producers had become productive enough to compete against French wine producers. The British economy endogenously switched from a mercantilist agreement with low fiscal capacity and uncompetitive firms to a free trade equilibrium with high fiscal capacity and a strongly competitive industry. Not only did the state reinvest a share of the mercantilist-generated revenue, but the protected industry seized the opportunity afforded by the regulatory shelter to catch up with foreign competitors.

The comparison between Britain and Bolivia, otherwise very different cases, emphasizes the opposite set of incentives that a ruler faces following the adoption of mercantilism at different levels of fiscal capacity development. These examples suggest, and the theoretical model states, that mercantilism is a second-best institution (Rodrik, 2008) only if the initial stock of fiscal capacity is not too low to begin with (and policy capture is limited). If these conditions are not satisfied, then the revenue effects not only fail to compensate for the inefficiencies

³⁶Tin mines in Bolivia were hardly accessible and were plagued by poor communication, which increased the production costs relative to Malaysia, the world leader in tin production and Bolivia's main competitor.

that follow the creation of artificial monopolies, but the latter prevail in the long-run. However, if the right conditions are met, mercantilism might be a constrained-best option, consistent with Tilly's (1975) characterization of *intermediate institutions*: that is, inefficient institutions that are eventually replaced by modern types, which, nevertheless, are crucial to state building (see also Johnson and Koyama (2014)). Importantly, this interpretation of the benefits and costs of mercantilism offers an alternative (although non-mutually exclusive) account to Ekelund and Tollison (1981) for the rise *and decline* of this form of revenue-generating policy. These authors claim that representative institutions increase the costs of lobbying for protection and makes mercantilism unappealing. This paper suggests that, keeping the political regime constant, the costs of mercantilism vs. free trade increase as fiscal capacity expands.

The results of this paper shed light on the infant-industry literature too, particularly concerning the effect of tariff protection on long-term economic growth (Clemens and Williamson, 2004; Irwin, 2000; Lampe and Sharp, 2013; Lehmann and O'Rourke, 2011). The theoretical model suggests that the effect of tariff protection on growth might be conditioned by the *initial* stock of fiscal capacity. If tariff protection is adopted when fiscal capacity is too low, both the ruler and the producers lack incentives to invest and innovate, respectively. Without technology adoption, long-term growth should not be expected. However, if protectionist tariffs are raised when the stock of fiscal capacity is already intermediate, we might expect tariff revenue to be reinvested in fiscal capacity building. By the logic of *induced technology innovation*, institutional investment would stimulate technology adoption. In turn, newer technologies would result in endogenous growth (Romer, 1994).

To sum up, this work builds on the growing literature on state capacity building by stressing the endogenous relationship between short- and long-term *revenue production policy* (Levi, 1988). It emphasizes that fiscal capacity underdevelopment might result from time-inconsistency problems and not necessarily from rent-seeking, political instability, or ethnic divisions. Satisfying *current* demand for public spending conditions *future* institutional investment in fiscal capacity. Depending on the initial stock of fiscal capacity, shortcuts to high fiscal capacity such as mercantilism might become a stepping stone to a *high-tech, high*

fiscal capacity equilibrium; or, alternatively, result in a downslide into a *low income, low fiscal capacity* trap.

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