Abstract

This paper explores the relationship between trade openness and economic growth through a change in institutions. To do so, the paper creates a theory of endogenous institutional change where an elite which controls the political power fix higher taxes in order to maximize their own welfare. This reduces investment in capital, the source for growth. The model compares a situation in autarky with one in a small open economy. When the economy opens to trade there are two effects: On the one hand the elites loose the control of prices putting lower taxes and accelerating the process of institutional change. On the other hand trade deviates resources from some activities to others depending on the trade pattern established. The positive effects on both the long-run growth and the time of the institutional change depends on the trade pattern of the economy. Economies specializing "too much" in agricultural products reduces the long-run growth rate and delays institutional change.

1 Introduction

Recent empirical evidence focuses on institutions as one of the main determinants of the creation of technological progress, the traditional source of growth (Easterly and Levine, 2003). However, little is known about what are the determinants of these institutions and more precisely, what drives to some countries to build institutions boosting growth while some others create those ones that lead to stagnation. During the last decades, international activity has increased all over the world including developing countries which have joined to this phenomenon recently in the 90s (UNCTAD, 1999). This has risen the interests of analysts on the effects of globalization in economic growth and development.

This project pretends to relate these two facts, and to combine two different traditions in the growth literature. On the one hand, I try to shed a light on the controversial relationship between globalization, understood here as an increase in trade volumes, and economic growth, by exploring a new channel through which international trade can affect economic growth, namely, institutions. To
do that, I focus on a particular historical period, the transition from the old regime to modern economic growth. By doing that, I explore the role played by international trade during the transition to modern growth of the Western economies, and, new hypotheses on the reasons why these changes were carried in certain economies like England and the Netherlands but not in others like Spain or Portugal are analysed. In that case, this could be seen as a contribution to the new growth literature that tries to explore the transition from Malthusian to modern economic growth.

The theoretical literature on the relationship between economic growth and international trade predicts ambiguous effects, and it usually establishes conditions under which trade openness or trade liberalization policies have a positive impact on economic growth. Grossman and Helpman (1991), Rivera-Batiz and Romer (1991) among others, identify different channels through which international trade can enhance growth in the participant countries. These models explore how the international trade affects directly the accumulation of technological progress. Taking the example of private R&D models, the interaction between an increase in the market size and an increase in the degree of competition which is affected by the system of intellectual property rights will give conditions under trade openness will have an impact on economic growth. What I do here, is going one step beyond and trying to explore how international trade would affect the determination of the institutional framework like for example the system of property rights itself.

From a theoretical perspective, different approaches to model institutional change have been addressed depending on the concept of the origin of institutions itself. Acemoglu et al. (2003) and Acemoglu (2005) develop a general framework focusing on the theory of social conflict as the main determinant of the institutional environment. According to this theory, institutions have different impact on economic outcomes and have different consequences for each group in a particular society. Different groups hold different institutional environments and the current institutional system is the result of the interests of the social group holding the political power. At the same time, those holding enough economic sources to provide the public goods traditionally related to the state are those ones controlling the political power.

As long as the interests of the group in power coincides with the ones that boosts growth, there is nothing to improve from the growth perspective. Institutions will maximize the growth rate of the economy. But, the fact that a social group has enough economic resources to conquer the political power does not mean that the sources of growth are in its hands and that is the relevant case I will study. This, for example, can happen when another social group is not enough economically powerful to have the political power, but the business opportunities of this group are higher. When this happens, the present institutional environment is not protecting the interests of those holding the sources of growth but the interests of the elite in power which does not have any interest in leaving the power. The model itself provides a theory of endogenous institutional change where the accumulation of rents will allow the emerging class to conquer the power by investing some resources. Realistically,
a powerful group can finance social movements and exert pressures in order to expel out the established political power. When this happens, the institutional environment will change according to the interests of the new group in power. Different elements can affect the transition period, but the focus of this paper is to analyse international trade as one of these ones.

International trade affects the speed of the transition because it generates a redistribution of rents in the society. The redistribution of rents in the society comes from the fact that production factors are remunerated differently in autarky than under international trade openness. If the beneficiaries of a potential growth-boosting institutional change, are also the beneficiaries of the redistribution of rents generated by trade openness, this economy approaches growth-enhancing institutional change more easily, but if the beneficiaries of this redistribution is the elite, international trade can delay institutional change. The international trade pattern which ultimately determines the redistribution of rents, is studied and conditions for faster institutional change are derived.

Evidence illustrating this can be found in the trade expansion of Western Europe in the XVI century. It is generally accepted among economists and historians that economies like Great Britain and the Netherlands, were introducing institutional changes during the XVII\textsuperscript{th} and XVIII\textsuperscript{th} centuries crucial to the first industrial revolution, while some other countries like Spain and Portugal, with a more rigid system and a smaller middle class did not generate this change. To explain why Great Britain and the Netherlands did it and why Spain and Portugal did not, has been a challenge to economists and historians. Acemoglu, Johnson and Robinson (2003) provides empirical evidence about the role played by international trade in the transition to modern growth of the western economies. While they arrive to the conclusion that the role played by international trade was important, they outline the role of initial political differences in the different experiences across Great Britain and the Netherlands and Spain and Portugal.

However, we consider that the role played by the different international trade patterns was non trivial. The model presented later on, reports that independently of the political conditions two countries with different initial factor endowments, had different institutional experiences. While economies like Great Britain and the Netherlands were specialized in exporting manufacturing goods, economies like Spain or Portugal were engaged in trade mainly based on primary products, as wine, sherry, wool, oil, and metals like gold and silver in the first one, etc... (Wallerstein, 1974; Yun, 2002). The trasatlantic trade concentrated

\footnote{The paper can analyse different factors affecting the transition period. These factors can focus on the benefit side (elements affecting the profits of an institutional change) or on the cost side. On the cost side we will consider the parameter $m$ (the costs of the revolution) as exogenous, but it could be interesting to endogeneize it as we comment on later. The strength of military force requirement to hold the state can be one of the most important, since those ones in power must provide the society with military force which defends the economy from foreign countries attacks.}
in the city of Seville was mainly based on the export of agricultural products and some manufacturing products. From the second half of the XVI\textsuperscript{th} century, the role played by Spanish manufactures in the colonial trade was quite low and most of the manufactures exported to the colonies came from Great Britain, the Netherlands\textsuperscript{2} etc... Given this specialization pattern we can conclude that in economies like Spain or Portugal, rather than the middle class, it was the landowning elites who were the main winners of the trasatlantic trade, therefore delaying institutional change.

Another interesting example can be found in the expansion of the agricultural trade of the Eastern European countries in the XIV\textsuperscript{th} and XV\textsuperscript{th} centuries. In these countries the openness to international trade, rather than improving the conditions of the peasants and the merchant class, improved the conditions of the lords and the landowners, thereby delaying institutional change in these countries. The international trade pattern that these countries established with the economies of Western Europe was mainly based on the export of cereals, above all wheat, and the import of elaborated products. On the other hand it is generally accepted among historians, that feudalism was reinforced during the XVI\textsuperscript{th} and XVII\textsuperscript{th} centuries in Eastern european economies. We believe that the international trade pattern beneficial to the feudal lords was crucial in the reinforcement of the existing regime during these centuries.

The baseline model of institutional change is developed in section 1. Section 2 extends the model to a small open economy and we study what are the conditions under institutional change is delayed or fostered. Section 3 concludes.

\section{The baseline model}

Consider an economy in which individuals live for one period and then die. There are two goods in the economy the agricultural and the manufacturing good. Preferences over the two different goods are given according to the Cobb-Douglas specification:

\[ c_i^t = c_i^{A_i} c_i^{M_i} \]

Individuals like to leave bequests to the future generation. Individuals are homogeneous in taste but differ in the sources of income, the access to asset markets, and the initial endowment of political power. According to these characteristics we can identify three kind of agents: landowners, workers and capitalists. Population for each group is normalized to one for simplicity.

Access to the land is restricted to the landowners. In the initial period, the landowners receive an equal endowment of land from the state and can be exchanged among landowners at the price of \( t_t \). They can also explote the use of it, by renting to the farmers at the price of \( d_t \) units, per unit rented. They cannot invest in physical capital. Crouzet (1985) finds for example that during

\textsuperscript{2}Many of them violated the state monopoly of the Casa de Contratacion by contracts with the spanish traders (Yun, 2002). Others were passed through the Canary Islands which has an independent trade with America, by 1607.
the period (1750-1850) only 3% of the entrepreneurs were part of the upper class and less than 10% were descendants of landowning elites. Historical evidence support the fact that landowners were not investing in productive activities and it there are already alternative explanations in economic history, (it was more profitable to invest in political rents, there were some problems about status and reputation, etc...) and Doepke and Zilibotti (2004) discuss about the tiny role played by the landowners elite and aristocracy in the early stages of the industrial revolution. We are not going to propose an alternative explanation for this phenomenon, what it could lead already to a different article. Instead of this, we are going to take it as an assumption. The landowners can leave in heritage the endowment of land to the future generation.

Historical evidence suggests that the creation of a secure system of property rights, was key for the development of the new economic system. The ancient regime was characterized by a system where the groups holding the power frequently expropriate the rents of the other groups in the society. As common in the literature (Acemoglu (2005), Rodriguez (2003) and others), I am going to use taxation on output as a proxy for the degree of security of property rights. In this model, capitalists and landowners are respectively, the owners of specific factors related to the two final consumption good sector and compete for a rival factor of production, labor. Then, I assume that the group in power can impose a tax $t$, on the output of the rival sector.

For simplicity, I am going to suppose Cobb-Douglas preferences for both final consumption goods, and in the case of the capitalists, also for the investment good. Landowners maximize:

$$\max_{c_{A_t}^A, c_{M_t}^M, T_{t+1}} \frac{1}{2} \ln C_{A_t} + \ln T_{t+1}$$

s.t. $C_{A_t} = c_{A_t}^A c_{M_t}^M$

s.t. $p_t c_{A_t}^A + c_{M_t}^M + t_t T_{t+1} = (t_t + d_t) T_t + \tau_t Y_t^M$

where, $C_{A_t}$ is the total consumption index of the landowners, $c_{A_t}^A, c_{M_t}^M$ are both respectively the agricultural and the manufacturing consumption goods of the landowners, $d_t$ are the land returns $T_t$ is both the quantity of land per landowner and the total quantity of land in the economy, and $t_t$ is the rental price of the land. $Y_t^M$, is the total output in the manufacturing sector.

We assume that there is a continuum of workers (denoted with subscript $L$) of measure 1 each of them endowed with one unit of labor. We denote with subscript $L$, the allocation referred to workers. They cannot leave heritage to future generations. They solve:

$$\max_{c_{L_t}^A, c_{M_t}^M} \frac{1}{2} \ln C_{L_t}$$

s.t. $C_{L_t} = c_{L_t}^A c_{L_t}^M$
On the other hand, capitalists (denoted with subscript \( k \)), can accumulate physical capital. We assume full depreciation of capital as Hansen and Prescott (2002). \(^3\) Capitalists solve the problem:

\[
\max_{c_{At}^A, c_{Mt}^M, k_{t+1}} \frac{1}{2} \left( \ln C_{kt} \right) + \ln K_{t+1}
\]

\[s.t. C_{kt} = c_{At}^A + c_{Mt}^M \]

\[s.t. p_t c_{At}^A + c_{Mt}^M + K_{t+1} \leq r_t K_t \]

This will give the following demand functions for each group:

\[c_{At}^A = \frac{E_{it}}{2p_t} \]

\[c_{Mt}^M = \frac{E_{it}}{2} \]

where \( E_{it} \) is expenditure dedicated to consumption. Notice that for the workers we have that consumption expenditure is equal to income, but for the capitalists or the landowners, who they make investments too, we have that:

\[E_{mt} = \frac{r_t K_t}{2} \]

\[E_{At} = \frac{(t_t + d_t)T_t + \tau_t Y_t^M}{2} \]

\[K_{t+1} = \frac{r_t K_t}{2} \] \hspace{1cm} (1)

\[T_{t+1} = \frac{(t_t + d_t)T_t + \tau_t Y_t^M}{2t_t} \]

and considering a case when there is no depreciation, we have that:

\[
\frac{K_{t+1}}{K_t} = \frac{r_t}{2}.
\]

\(^3\)Due to the fact that the time that passes between one period and another in this model is equivalent to the life expectancy of a generation, which here we normalize to 50 years, the capital that it can remains from one generation to another is negligible.
2.1 Production

In this model the endogenous formation of technological progress by firm private decisions is not considered. Along the historical period of reference, private R&D investment was reasonably low, and advances of technology were mainly the result of experience. Therefore, we assume that advances in this economy comes from a learning by doing process.

Both sectors employ the Cobb-Douglas technologies:

\[ Y_t^A = A_t T_t^\alpha (L_t^A)^{1-\alpha} \]  \hspace{1cm} (2) \\
\[ Y_t^M = B_t K_t^\alpha (L_t^M)^{1-\alpha} \]  \hspace{1cm} (3)

where \( B \) and \( A \) follows the standard LBD expression:

\[ B_t = \theta K_t^{1-\alpha} \]  \hspace{1cm} (4) \\
\[ A_t = \theta T_t^{1-\alpha} \]

At the beginning of the period, the group holding the political power decides on the level of taxes, \( \tau \). Producers in the agricultural sector maximize:

\[ \max A (T_t)^\alpha (L_t^A)^{1-\alpha} - w_t L_t^A - d_t T_t. \]

and manufacturers maximize:

\[ \max (1 - \tau_t)B (K_t)^\alpha (L_t^M)^{1-\alpha} - w_t L_t^M - R_t K_t \]

Applying perfect competition and the fact that in equilibrium \( B \) and \( A \) are given by the expression above, rental prices for each factor under an interior solution are given by:

\[ d_t = \alpha \theta p_t \left( L_t^A \right)^{1-\alpha} \]  \hspace{1cm} (5) \\
\[ w_t = p_t \theta T_t \left( L_t^A \right)^{-\alpha} = (1 - \tau_t) \theta K_t \left( L_t^M \right)^{-\alpha} \]  \hspace{1cm} (6) \\
\[ r_t = \alpha \theta (1 - \tau_t) \left( L_t^M \right)^{1-\alpha} \]  \hspace{1cm} (7)
2.2 Solving the model

Imposing the market clearing conditions in the labor market it follows that:

\[ L_t^A + L_t^M = 1 \]  (8)

\[ C_t^A = T \theta (L_t^A)^{1-\alpha} \]  (9)

\[ C_t^M + K_{t+1} = \theta K_t (L_t^M)^{1-\alpha} \]  (10)

\[ T_{t+1} = T_t \]  (11)

Manipulating, (9), (10) prices are given by:

\[ p_t = \frac{K_t}{T_t} \left( \frac{L_t^M}{L_t^A} \right)^{1-\alpha} \left( 1 - \frac{\alpha(1 - \tau_t)}{2} \right) \]  (12)

Taxes are going to affect optimal prices through two channels. Let denote the first channel as the supply channel, where the effect comes from the optimal reallocation of workers across sectors. Because taxation reduces the marginal productivity of labor in the manufacturing sector, an increase in taxes shifts workers from the manufacturing sector to the agricultural sector. Going to the wage equation and using the market clearing condition for the labor market it can be got:

\[ \frac{L_t^M}{L_t^A} = \frac{2(1 - \tau_t)}{2 - \alpha(1 - \tau_t)} \]

Notice that due to the assumption of Cobb-Douglas preferences, the allocation of labor across sectors do not depend on the endowments of the fixed factor. The complementarity between the two production factors in each sector is perfectly offset with the fact that individuals want to spend the same level of income in both goods. In a case with no taxes more labor is allocated to the manufacturing sector than to the agricultural sector because manufacturers produces also the investment good . However, taxes are shifting labor from manufacturing to agriculture. Using (8), it follows that:

\[ L_t^A = \frac{2 - \alpha(1 - \tau_t)}{(2 - \alpha)(1 - \tau_t) + 2} \]

\[ L_t^M = \frac{2(1 - \tau_t)}{(2 - \alpha)(1 - \tau_t) + 2} \]
therefore, an increase in taxes, will increase the supply of the agricultural sector, what it will decrease the relative price $p_t$.

The second one I call it the demand channel. An increase in taxes reduces the demand of consumption in both goods for the capitalists and increase the consumption of both goods in the case of the landowners, but the effects in the two groups perfectly offset. However, a rise in taxes reduces the demand of investment as well, reducing the aggregate demand of manufacturing and rising the relative price of the agricultural good $p_t$.

Finally, substituting the equations for labor allocation across sector, the price of the agricultural good is given by the expression:

$$p_t = \left( \frac{K}{T} \left( \frac{2 - \alpha(1 - \tau_t)}{2} \right)^\alpha (1 - \tau_t)^{1-\alpha} \right)$$

that, taking derivative, it can be shown is monotonically decreasing in taxes for a low value of $\alpha$.

**Proposition 1** $\frac{d p_t}{d \tau} < 0$, if $\alpha < \frac{2}{3 - \tau_t}$.

The positivity or negativity of the derivative depends on the relative strength of both effects, the supply one and the demand one. Notice that for the extreme cases $\alpha = 0, 1$, the effect is negative and positive respectively. When $\alpha$ is low, the effect in the supply side, is very strong as it can be seen already in the expression for the equilibrium price while the effect in the demand side, the third term in the equilibrium price is very small given as a consequence, a decrease in the relative price of the agricultural good (an increase in the relative price of the manufacturing good). Notice that, the rank of possible limits for $\alpha$ are $\alpha \in \left( \frac{2}{3}, 1 \right)$. Since no empirical evidence has reported such a high value for $\alpha$ even in the modern times we can consider the derivative to be negative. The law of motion of capital is given by:

$$\frac{K_{t+1}}{K_t} = \frac{\alpha \theta \left( 1 - \tau_t \right) \left( L_t^M \right)^{1-\alpha}}{2} = \frac{\alpha \theta \left( 1 - \tau_t \right) \left( \frac{2(1-\tau_t)}{2-\alpha(1-\tau_t)+2} \right)^{1-\alpha}}{2}$$

Since all the landowners are identical in preferences and endowments, in equilibrium the distribution of land across landowners will not be altered and the prices of the land are given by the expression:

$$t_t = d_t T_t + \tau_t Y_t^M$$

which is just the rents that each landowner receives for having land.

Total output of the economy is given by:
\[ Y_t = p_t T_t \left( L^A_t \right)^{1-\alpha} + K_t \left( L^M_t \right)^{1-\alpha}. \]  

(13)

Looking at conditions (??) and (??) it can be seen that the level of \( \tau_t \) is crucial in the dynamics of the model because it affects capital accumulation. Because taxes are creating a distortion in both production and consumption, the tax rate that maximizes aggregate output is \( \tau = 0 \).\(^4\) The next section explains how the tax rate \( \tau \) is determined.

2.3 The political system and the level of \( \tau \)

In this section we are going to discuss how taxes are determined.

Substituting the optimality conditions in the utility function and rearranging terms we have that:

\[ V_t^A = \ln \left( \frac{I^A_t}{(p_t)^{\frac{1}{2}}} \right) \]

where for the case of the capitalists is given by:

\[ V_t^k = \ln \left( \frac{I^k_t}{(p_t)^{\frac{1}{2}}} \right) \]

Proposition 2 Let \( V_t^k \) be the indirect utility function of the group. Then:

\[ \frac{\partial V_t^k}{\partial \tau} < 0 \]

Proof. The result is straightforward taking derivatives with respect to \( \tau_t \) in capitalists income and rearranging terms. See appendix.

Capitalists indirect utility function is ambiguous with respect to \( \tau \). Taxes reduce nominal income through a reduction in the interest rate but taxes makes real income high due to the decrease in agricultural prices. However, as expected, the net effect is negative.

Substituting the values of \( I^A_t \) and \( p_t \), we have that:

\[ V_t^A = \zeta + \ln \left( \alpha \theta (p_t)^{\frac{1}{2}} \left( L^A_t \right)^{1-\alpha} T_t + \tau_t \theta (p_t)^{\frac{1}{2}} K_t \left( L^M_t \right)^{1-\alpha} \right) \]

(14)

Notice that this expression is ambiguous in the level of taxes \( \tau_t \). Taxes here affects the utility of landowners through three mechanisms. The first and the second one are already very well known in the literature. The first one is called, Revenue extraction: An increase in taxes increases fiscal income. The second one

\(^4\) Although the agents are not maximizing output given the positive externality derived from the LBD assumption, taxes will not help to overcome the externality, and what’s more it gets it worst because an increase in taxes diverts resources from investment to consumption. Therefore the tax rate maximizing output is zero.
is called factor price manipulation: An increase in taxes increases the amount of labor in the agricultural sector, due to a reduction in the marginal productivity of labor in the manufacturing sector. This rises the marginal productivity of the land but reduces the amount of labor in the manufacturing sector, reducing fiscal income. The net effect is ambiguous.

The third one is the effect on the relative price. An increase in taxes, decreases the price of the agricultural good, reducing the nominal rents of the land. However the falling in prices rises the real rents of the land and the fiscal income. As you can see from equation (14) the net effect is ambiguous as well since there is a reduction in the real rents of the land but a rise in the real rents coming from fiscal income. This is not usually present in the literature because these models treats the two consumption good as perfect substitutes for simplification.

Using the expression for prices (12) and making several rearrangements you can get the expression:

$$V_t^A = \ln \left( \frac{2 - \alpha(1 - \tau_t)}{2} \right)^{\frac{1}{2}} + \tau \left( \frac{2}{2 - \alpha(1 - \tau_t)} \right)^{\frac{1}{2}} \left( (L_t^M) (L_t^A)^{\frac{1 - \alpha}{1 - \tau}} \right)$$

which after manipulating the expression it remains:

$$V_t^A = \ln \left( \frac{(1 - \tau)^{\frac{1 - \alpha}{1 - \tau}}}{2^{\frac{1}{2} - \frac{1 - \alpha}{2}} (2 - \alpha(1 - \tau_t))^{\frac{1 - \alpha}{2}}} \left( \frac{\alpha(2 - \alpha(1 - \tau_t)) + 2\tau}{((2 - \alpha)(1 - \tau) + 2)^{1 - \alpha}} \right) \right)$$

The appendix solves for the optimal tax rate and it shows that it is interior. Given that it was not possible to find an analytical expression for the value of \( \tau \), a numerical solution was carried out. In the following table, we show that taxes are relatively high, and it does not vary too much with the capital share \( \alpha \). Hansen and Prescott (2002) uses the value of \( \alpha = 0.4 \), for simulating a similar model in which the manufacturing sector uses the same technology as I use, so we will take also that but we make robust check with different levels of \( \alpha \). For calibrating the technological constant \( \theta \), I take the Maddison´s estimate for the average per capita GDP growth rate for the Western Europe of 0.14% per year. I consider that each period of our model represents a generation, and therefore is equivalent to 50 years, that is approximately the lyfe expectancy of each generation for that period. The following table gives gross growth rates under no taxes (what it would be the economy after institutional change), under

\[\text{Notice that the right measure for the number of years in each period is the lyfe expectancy of a generation. Therefore, we are not using the standard lyfe expectancy rate which includes the probability of surviving in the childhood period that it is very low for this case.}\]
optimal taxes (what it would be the economy before institutional change), and labor allocations for this numerical example:

<table>
<thead>
<tr>
<th>$\alpha$</th>
<th>$\tau$</th>
<th>$L_m$</th>
<th>$L_a$</th>
<th>$r$</th>
<th>$g$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>0.7587</td>
<td>0.1963</td>
<td>0.8037</td>
<td>0.9783</td>
<td>0.9654</td>
</tr>
<tr>
<td>0.2</td>
<td>0.7578</td>
<td>0.1989</td>
<td>0.8011</td>
<td>0.9961</td>
<td>0.9824</td>
</tr>
<tr>
<td>0.3</td>
<td>0.7613</td>
<td>0.1985</td>
<td>0.8015</td>
<td>1.0071</td>
<td>0.9933</td>
</tr>
<tr>
<td>0.4</td>
<td>0.7695</td>
<td>0.1946</td>
<td>0.8054</td>
<td>1.0153</td>
<td>1.0014</td>
</tr>
<tr>
<td>0.5</td>
<td>0.7830</td>
<td>0.1866</td>
<td>0.8134</td>
<td>1.0215</td>
<td>1.0074</td>
</tr>
<tr>
<td>0.6</td>
<td>0.8027</td>
<td>0.1734</td>
<td>0.8266</td>
<td>1.0261</td>
<td>1.0120</td>
</tr>
<tr>
<td>0.7</td>
<td>0.8299</td>
<td>0.1532</td>
<td>0.8461</td>
<td>1.0291</td>
<td>1.0149</td>
</tr>
<tr>
<td>0.8</td>
<td>0.8675</td>
<td>0.1228</td>
<td>0.8772</td>
<td>1.0296</td>
<td>1.0155</td>
</tr>
<tr>
<td>0.9</td>
<td>0.9204</td>
<td>0.0762</td>
<td>0.9238</td>
<td>1.0249</td>
<td>1.0108</td>
</tr>
</tbody>
</table>

**Proposition 3** $\tau^* = \max V^F_t(\tau) \neq 0, 1$, and interior.

**Proof.** See appendix. ■

Notice that taxes are quite high and it does not vary too much with the level of $\alpha$. Notice also that the optimal tax is higher than the standard Laffer one, because landowners have more mechanisms of extracting rents. Population in each activity under a situation of autarky and taxation, is given by 20% where 80% is dedicated to agriculture. Using the share of population living in medium size cities, as a proxy for the share of the labor force dedicated to the manufacturing sector reveals that the results of the model are not very far away from real data. The share of population living in cities with than 5000 individuals in the XVIth; according to Maddison (2005) for England is around 16% very similar to the 20% per cent given by the model.

### 2.4 How the Capitalists can reach the power?

On the other hand, the capitalists can rise to power by investing $m$ units of the kapital stock in order to finance an army which gets the monopoly of military strength in the state. We use capital stock units because at the beginning of the period, when this choice is made, the only asset individuals have to invest is the stock of capital they inherit from the past generation. The parameter $m$ can be used to allow for different political initial conditions, (i.e. military force strength, etc.). The level of $m$ measures the flexibility that a society has to change its political power and is crucial for the time of the revolution. Economies with strong state conditions (huge requirements of military force) could need more time for a revolution and a change in the political power, because the cost is higher. On the other hand a reasonable assumption is going to be made: capitalists cannot borrow for making this investment.

Two conditions are needed to have a revolution in this economy: firstly, it is profitable and secondly it can be financed. Mathematically means that:
\[ V^k_t(\tau = 0, \frac{I^k_t}{(p_t)^2}) = \left( \frac{r_t k^k - m}{(p_t)^2} \right) - V^k_t(\tau = \tau^*, \frac{I^k_t}{(p_t)^2}) = \frac{r^*_t k^k}{(p^*_t)^2} \geq 0 \]

The first condition is easy to derive:

\[ k^*_t \geq m \]

\[ \ln \left( \frac{r_t k^k - m}{r^*_t k^k} \left( \frac{p^*_t}{p_t} \right)^{\frac{4}{3}} \right) \geq 0 \]

which implies:

\[ k^* \geq \frac{m \lambda}{r^* \lambda - \tau^*} \]

where:

\[ \lambda = \left( \frac{\left( \frac{p^*_t}{p_t} \right)^{\frac{4}{3}}}{\left( \frac{p^*_t}{p_t} \right)} \right) = \left( \frac{(1 - \tau^*)(2 - \alpha)}{2 - \alpha(1 - \tau^*)} \right)^{\frac{4}{3}} \left( \frac{2 - \alpha(1 - \tau^*)}{2 - \alpha} \right)^{\frac{1}{3}} \]

For all the exercises we have carried out we have derived that in fact the second condition is not binding. This is due to the fact that the differences in the rates of returns at 50 years, both in the case of taxation and in the case of non-taxation are so high, that for the capitalists it is always profitable to invest in conquering the political power. Therefore the condition for having institutional change is reduced to the very simple condition

\[ k^* \geq m. \]

### 2.5 Steady state

The assumption of Cobb-Douglas preferences allow us to define a BGP when all variables grow at a constant rate. In concrete, under this assumption our model is a version of the standard two sector AK model. \(^6\) The dynamic properties of the model in autarky are derived in the following proposition:

**Definition 4** A BGP for this economy is a situation where the variables, \( L^M_t, L^A_t, \tau, \)

\( C^A_t, C^M_t, p_t, d_t, w_t, \)

grows at a constant rate.

\(^6\)We consider that the assumption of a constant proportion of income across individuals equal along time is not unreasonable given the period studied. We have solved for simplicity, a situation where 50% of the income of the capitalists and landowners is dedicated to investment while the other 50% is dedicated equally to the consumption of agricultural and manufacturing goods. (May be is convenient to look at the expenditure across population and to see the data in order to give values to this parameter)
**Proposition 5** A BGP for this economy exists and it is unique.

**Proof.** From the maximization problem of the indirect utility function of the farmers it is easy to see that $\tau$ is interior and constant, since the value function only depend on constant parameters. ■

**Proof.** Looking at $L_t^M, L_t^A$, it is easy to see that the allocation of workers across sectors is also constant because only depends on $\tau, \alpha$. ■

**Proof.** Substituting (12) in (13):

$$Y = \left(2 - \frac{\alpha(1-\tau)}{2}\right) \left(L_t^M\right)^{1-\alpha} K = DK$$

**Proof.** which is the standard aggregate production function of an AK model. The same properties of a two-sector AK model then applies. ■

**Proof.** Looking at (9) it can be noticed that production $C_t^A$ is also constant, and substituting (1), (7), in (10), it can be seen that $\frac{C_{t+1}^M}{C_t^M} = g$ constant. ■

**Proof.** Differentiating also $p_t$ you can get that it grows at the same constant rate $g$, and $d_t, w_t$ are a linear function of $p_t$ and another constant variables, therefore both of them are also growing at the same constant rate $g$. ■

**Proof.** Because $\frac{K_{t+1}}{K_t} = g$, this implies that the condition $k^* \geq m$, is satisfied at a finite time, but then we have that $\tau = 0$, in steady state and the growth rate of the economy is given by $g = \frac{4\alpha}{4-\alpha}$, where the condition $\theta > \frac{4-\alpha}{4\alpha}$ is needed (this condition is similar to the condition $r > \rho$, standard in the AK models.

The previous proposition has shown that our economy is a standard two-sector AK model where the economy grows at any point in time at the constant growth rate $g(\tau^*)$, up to a situation when the economy has enough capital to give the structural change and jump to the growth rate $g(\tau = 0)$. ■

### 3 Small open economy

Let consider now that the case of a small open economy which opens to trade and the equilibrium price of the rest of the world is given by $p_t^* >, <, = p_t$.

Let me denote $\left(\frac{p_t^*}{p_t}\right) = \gamma$, the world-national price ratio, where the national price would be the price of the good in the economy at time $t$ if the economy was kept in an autarkic situation. In this section for simplicity, we are going to assume that this $\gamma$ is constant along time. This allows us to derive a steady state of the model with similar dynamic properties than that of the autarkic model. and it help us to illustrate the main mechanisms of the model. In the next section we will allow for a general case where $\gamma$ can take either an increasing or decreasing trend.

Consumer decisions will not be altered with trade openness. Firms keep on allocating labour sources according to the following condition:

$$\frac{L_t^A}{L_t^M} = \left(\frac{p_t^* T}{(1-\tau)K_t}\right)^{\frac{1}{\delta}} = \gamma^{\frac{1}{\delta}} \left(\frac{2 - \alpha(1-\tau)}{2(1-\tau)}\right)$$

(15)
where prices are given by the above definition and therefore exogenous. Notice that this equation is equivalent to the autarkic one when $\gamma = 1$. When the economy opens to trade if $\gamma$ is bigger than one (as a consequence of trade the price of the agricultural good rises up), there is a shift of labour from the manufacturing sector to the agricultural one. As a consequence our economy will produce more agricultural goods and less manufacturing products. The reversed case will occur if $\gamma$ is less than one. Landowners, however, will change taxes according to the new economic equilibrium. Manipulating (15) and the market clearing condition for labor and substituting in the utility function of the landowners it remains:

$$V_t^A = \zeta + \ln \left( \alpha \theta (p_t)^{\frac{\gamma}{2}} (L_t^A)^{1-\alpha} T_t + \tau_t \theta (p_t)^{\frac{\gamma}{2}} K_t (L_t^M)^{1-\alpha} \right) = \ln \left( \frac{\alpha (\gamma \eta)^{\frac{1}{2}} + \tau (1-\tau)^{1-\alpha}}{(1-\tau)^{\frac{1}{2}} + (\gamma \eta)^{\frac{1}{2}})^{1-\alpha}} \right)$$

where $\eta = \left( \frac{2-\alpha(1-\tau)}{2} \right)^{\alpha} (1-\tau)^{-\alpha}$, such that $p^* = \gamma \eta \left( \frac{2}{\gamma} \right)$. Remember that $\eta$ and $\gamma$ are taken as constant, because the economy cannot affect world prices.

Notice that when $\gamma$ is constant, intersectoral labor allocation is constant along time and also taxes which depend only on $\gamma$ and $\alpha$. Before the institutional change has been carried out, the dynamic properties of the model are equal to the case in autarky. As in the previous section we carried out a numerical exercise for the value of $\alpha = 0.4$, and allowing for different values of $\gamma$. The table below shows the value for taxes and the rest of the variables as a function of $\gamma$.

<table>
<thead>
<tr>
<th>$\gamma$</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau$</td>
<td>0.9362</td>
<td>0.8632</td>
<td>0.7971</td>
<td>0.7412</td>
<td>0.6959</td>
<td>0.6598</td>
<td>0.6315</td>
<td>0.6094</td>
<td>0.5922</td>
<td>0.5787</td>
<td>0.53</td>
</tr>
<tr>
<td>$L_t^M$</td>
<td>0.9533</td>
<td>0.8872</td>
<td>0.811</td>
<td>0.7295</td>
<td>0.6969</td>
<td>0.6469</td>
<td>0.5669</td>
<td>0.4925</td>
<td>0.4254</td>
<td>0.3151</td>
<td>0.0840</td>
</tr>
<tr>
<td>$r$</td>
<td>1.0086</td>
<td>1.0232</td>
<td>1.0302</td>
<td>1.0339</td>
<td>1.0357</td>
<td>1.0364</td>
<td>1.0363</td>
<td>1.0357</td>
<td>1.0348</td>
<td>1.0336</td>
<td>1.0195</td>
</tr>
<tr>
<td>$g$</td>
<td>0.9977</td>
<td>1.0091</td>
<td>1.0160</td>
<td>1.0160</td>
<td>1.0215</td>
<td>1.0222</td>
<td>1.0221</td>
<td>1.0215</td>
<td>1.0205</td>
<td>1.0193</td>
<td>1.0055</td>
</tr>
<tr>
<td>$L_{mf}$</td>
<td>0.9975</td>
<td>0.9859</td>
<td>0.9621</td>
<td>0.9251</td>
<td>0.8761</td>
<td>0.8176</td>
<td>0.7530</td>
<td>0.6859</td>
<td>0.6193</td>
<td>0.5556</td>
<td>0.1810</td>
</tr>
<tr>
<td>$L_{af}$</td>
<td>0.0025</td>
<td>0.0141</td>
<td>0.0374</td>
<td>0.0749</td>
<td>0.1239</td>
<td>0.1824</td>
<td>0.2470</td>
<td>0.3141</td>
<td>0.3807</td>
<td>0.4444</td>
<td>0.8190</td>
</tr>
<tr>
<td>$r_f$</td>
<td>1.0663</td>
<td>1.0661</td>
<td>1.0658</td>
<td>1.0653</td>
<td>1.0646</td>
<td>1.0637</td>
<td>1.0626</td>
<td>1.0614</td>
<td>1.0601</td>
<td>1.0588</td>
<td>1.0446</td>
</tr>
<tr>
<td>$g_f$</td>
<td>1.0515</td>
<td>1.0514</td>
<td>1.0511</td>
<td>1.0506</td>
<td>1.0499</td>
<td>1.0490</td>
<td>1.0480</td>
<td>1.0468</td>
<td>1.0455</td>
<td>1.0442</td>
<td>1.0302</td>
</tr>
</tbody>
</table>

Looking at the table we can see that depending on the specialization pattern of the economy, trade will have different effects on the growth rate of the economy. As a consequence of the openness to trade in a small open economy the landowners fix lower taxes. The explanation for such movement we can find it in the ambiguity of the price effect. When the economy opens to trade the channel through prices is lost, and this leads the landowners to fix lower taxes. This can be seen in the third column when trade prices have not changed but the fact that the landowners consider they cannot manipulate prices any more, makes them fix a tax almost 20% lower than before. Therefore, we can conclude
that the effect on the real rents must predominate. On the other hand we observe that if the economy specializes in the agricultural good, \( \left( \frac{\bar{p}}{p} \right) > 1 \), there’s a huge fall in investment in manufacturing and as a consequence landowners decide to relax taxes a little bit in order to push investment in that sector. This cannot compensate the fall in the marginal productivity of capital, (i.e., the interest rate), and the growth rate of the economy falls.

On the other hand, when the economy specializes in manufacturing, there is a huge shift of workers to the manufacturing sector, and this rises hugely the marginal productivity of capital. As a consequence, the growth rate of the economy increases and therefore the institutional change will accelerate. However, the landowners in this case decide to rise taxes. Notice that for huge changes in the relative prices trade could lead to a reduction in the growth rate of the economy despite the specialization in manufacturing. In this case the rise in taxes is so high that it overcomes the positive effect that the reallocation of labor has had on the marginal return to capital. However, notice that this implies a very substantial fall in prices when we open to trade (the new prices must be at least 10 times lower than before).

What would be the effects on the timing for institutional change? If the second restriction is still not binding then the institutional change will be delayed the economy starts to grow at a lower rate than the one in autarky. This happens for example in the economies that as a result of free trade have specialized too much in agricultural products. (If the final price is at least two times the theoretical one in a hypothetical autarkic situation). An interesting result comes from the fact that something more than the reallocation of resources are moving when we open to free trade. For the case of \( \gamma > 1 \), a pure movement from autarky to free trade would have deviated resources from manufacturing to agriculture. This movement is perfectly seen if we consider the situation under no taxes. But the fact that trade reduces the power of landowners to control equilibrium prices implies implies that for small movements in the relative price, the latter effect predominates and therefore we see an increase in the proportion of workers dedicated to manufacturing and in the growth rate of the economy. Similar effects have been found in some other papers in the literature (Valkinger and Grossman, 2005). For these particular cases the effect is positive and the institutional change will be earlier.

Previous results have been derived under the assumption that \( \gamma \) is constant and therefore \( \frac{\bar{p}}{p} = \frac{\bar{g}}{g} \) before taxes. However the situation after the institutional change changes. To see this, assume that \( \frac{\bar{p}}{p} = g^* = \frac{\bar{g}}{g} \). Before the institutional change has been made this is equivalent to assume that \( \frac{\bar{p}}{p} = g \) in our table. However when the economy gives the institutional change, the economy starts to grow at the constant rate \( g^f > g \), and therefore \( \frac{\bar{p}}{p} < \frac{\bar{g}}{g} = g^f \), and \( \frac{\bar{g}}{g} < 0 \). What happens in this case?:

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Proposition 6 Let denote \( \frac{\dot{p}}{p}(k = m) \), the growth rate of the internal prices when \( \tau = 0 \), (i.e. the economy has given the structural change). Then we have that:

- If \( g^* < \frac{\dot{p}}{p}(k = m) \), then in BGP \( L_t^M = 1, L_t^A = 0, \tau = 0, \frac{\dot{Y}}{Y} = \frac{\dot{Y}^M}{Y^M} = \frac{K}{K} \)
- If \( g^* > \frac{\dot{p}}{p}(k = m) \), then in BGP \( L_t^M = 0, L_t^A = 1, \tau = 0, \frac{\dot{Y}}{Y} = \frac{\dot{Y}^A}{Y^A} = g^* \)

Proof. We can rewrite the equation above as:

\[
\dot{\gamma} = g^* - \frac{\dot{p}}{p} = g^* - \frac{\alpha \theta}{2 + \gamma \pi(2 - \alpha)}
\]

A non linear differential equation in \( \gamma \), with a unique steady state where \( \dot{\gamma} = 0 \), that it is divergent \((\frac{d^2\gamma}{d\gamma^2} > 0)\). Then this implies that:

- If \( g^* < \frac{\dot{p}}{p}(k = m) \), then in BGP \( \gamma \) is continuously decreasing and it approaches to zero. Then going to the labor market clearing condition, asymptotically the economy converges to: \( L_t^M = 1, L_t^A = 0, \tau = 0, \frac{\dot{Y}}{Y} = \frac{\dot{Y}^M}{Y^M} = \frac{K}{K} \)

- If \( g^* = \frac{\dot{p}}{p}(k = m) \), then \( \gamma \) remains constant and we come back to the BGP defined in the previous section.

- If \( g^* > \frac{\dot{p}}{p}(k = m) \), then \( \gamma \) increases along time and converges to \( \infty \). Then in BGP then the economy converges to \( L_t^M = 0, L_t^A = 1, \tau = 0, \frac{\dot{Y}}{Y} = \frac{\dot{Y}^A}{Y^A} = g^* \).

The case we have described before (with \( \gamma \) constant), it is a case when all the economies when they give the institutional change they became specialized in manufacturing products. The interesting point of this result is to consider that some economies can start specializing in agricultural products as a consequence of a combination of struggling institutions and bad factor endowments but when they give the institutional change they rise so much the marginal productivity of capital that they change their pattern of specialization and they converge to the growth rate of developed economies. In this case the model predicts convergence for all countries. The point for this particular case is when they converge. For convergence they need to expel out the landlord class and fix the optimal institutions that they would converge.

Empirical evidence however shows that our results overstate the process of industrialization. In the XIXth century for the case of England or the XVIIIth century for the case of The Netherlands, the share of population working on industry or services was around 60%. If we consider that by that time the institutional change in these economies have been already made, this implies that our share of labor dedicated to manufacturing is extremely high. Only similar results to those that we derive would be possible for the UK at the end of the XIXth century.

However, we are in fact more interested on seeing the contribution of trade on growth analysing the timing for the institutional change. In the next section I describe the general case for an economy that it didn’t make the institutional change.
3.1 General case

In this case the possibility of deriving theoretical results becomes limited. The main reason is the fact that under $\gamma$ not constant also $\tau$ is changing and we cannot give a theoretical expression for the level of $\tau$.

3.2 Conclusions

We have set up a simple model in order to understand the role played by international trade on economic growth through the evolution of the institutional environment. In a society in which the political power is at the hands of a social group whose interests are in conflict with economic growth, like for example the aristocracy in Europe in the modern age, this social group will establish an institutional environment which is bad for growth. This group, however, establishes institutions which do not lead to full expropriation. The process of capital accumulation along time will allow capitalists to conquer the political power, and to create growth-boosting institutional system.

In this context we want to examine the role played by international trade in this process. We have considered the case of a small open economy where the equilibrium prices are taken as given and equilibrium variables are not affected by the individual decisions. We have discovered that international trade plays a role in the evolution of the institutional environment both, by a redistribution of rents and by limiting the power of the elites to control economic variables. If trade specialization pattern rises capital rents, then capital accumulation becomes faster, accelerating the process of institutional change. However, if the country specializes too much in agricultural products, capital rents decrease, slowing capital accumulation and delaying institutional change.

We have also found that the limited political power derived by free trade can lead to specialization in manufacturing products in cases where in principle the specialization pattern would have lead to specialization in agriculture. Only for the cases in which the specialization in agricultural products is stronger enough, the country will specialize in agricultural products and the institutional change will be delayed.

We suggest that a similar story could be in the heart of the divergent experience of Spain and Portugal on the one hand, and England and The Netherlands on the other hand when they were opening to the trade with the Americas. While Spain and Portugal were specializing in trade in raw materials in the global world, reinforcing the economic and political power of the aristocracy, English and Dutch manufacturers and merchants were improving their economic position by exporting manufactured goods having earlier experiences of social and political revolutions.

This simple exercise suggests that the characteristics of our economy and our trade partners matters for the sign of the effect of trade on growth. Like in most models of endogenous growth with specialization gains, when poor countries trade with rich countries the specialization in agriculture of the poor ones leads to a decrease in the long run growth due to a reallocation of resources from the
knowledge intensive sectors to the agricultural sector. However in this model we have explored an extra channel through which trade can have an impact on growth. By altering the political power of the elite in the government trade can have extra effects on growth as we have seen before.

Empirical literature have suggested that the effects of international trade with the Americas was very small for occidental economies in the XVI\textsuperscript{th} century and my work claims that this would have been the case if we consider only the direct effect on capital accumulation. This can be seen just comparing the example without taxes in autarky with that one in trade. You can see that while the economy would have grown at a rate of 4.42\% without struggling institutions, this rate would have changed very little (less than 1\%) if we have opened the economy to free trade. Therefore our model suggests than the main gains from trade on growth were coming for its impact on the evolution of the institutional system.

4 Appendix

Proposition 7 $\tau^* = \max V_t^F(\tau) \neq 0, 1$, and interior.

Proof. Taking derivatives and rearranging terms we arrive to the f.o.c.: 
$$f = (1 - \alpha) \left( \frac{(2-\alpha)(2-\alpha)(1-\tau)}{2^2(1-\tau)} - \frac{1}{2(1-\tau)} \right) - \frac{a^2}{2(2-a(1-\tau))} + \frac{a^2+2}{a(2-a(1-\tau))}$$

This condition:

it goes to $-\infty$ when $\tau = 1$, and it is positive when $\tau = 0$. Moreover this function is continuous in $\tau \in (0, 1)$. The intermediate value theorem therefore says that there is an interior $\tau$, on the interval $(0, 1)$ such that: $f = 0$. ■