Structural Change and Economic Dynamics 57 (2021) 136–147

Contents lists available at ScienceDirect

Structural Change and Economic Dynamics

journal homepage: www.elsevier.com/locate/strueco

# Political corruption and legislative complexity: Two sides of same coin?

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ARTICLE INFO

*Article history:*
Received 10 April 2019
Revised 3 March 2020
Accepted 8 March 2021
Available online 13 March 2021

*Keywords:*
Asymmetric information
Economic growth
Income distribution
Legislative complexity
Political corruption JEL classification: 043
K42

ABSTRACT

This paper investigates the macroeconomic impact of legislative complexity in relation to political corruption on growth rate, welfare level and income distribution. After reviewing economic literature on corruption and legislative complexity, an endogenous model is provided. The main theoretical findings of the analysis are that a high level of legislative complexity, like political corruption, constitutes a constraint to growth, reduces the welfare and determines a redistribution of income in favor of the politicians.



## 1. Introduction

This paper analyses political corruption and legislative complexity using an endogenous growth model, jointly examining their impact on the growth rate of the economy, welfare and income distribution.

Legislative complexity is considered a constraint to growth in many countries as, for example, in Australia, in member states of the European Union and of the OECD (Australian Government, 2011, European Commission, 2005, 2012, OECD, 2012, 2014b, United Kingdom, 2013, United Kingdom Office of tax Simplification (OTS), 2012).

Using the main findings of the scolars who have studied "Legislative complexity" in depth (Bourcier and Mazzega, 2007, Colliard and Georg, 2020, Ruhl and Katz, 2015) it is possible to say that this phenomenon is difficult to define and measure, because it is multi-faceted. Firstly, the problem of regulation involves many aspects of life and business. Secondly, the legislation is complex in itself (e.g. overlapping of laws, negative externalities of coordination among continuously increasing laws, different interpretations of the law) and or due to the intricacy of the case to regulate. Thirdly, the enforcement of law is costly in terms of time and resources. Legislative complexity is an inevitable by-product of law making, that represents a source of government failure when its marginal social costs are greater than its marginal social benefits.

The persistence of legislative complexity raises the doubt that this phenomenon is not random or unwanted, but the result of the rational behaviour of self-interested politicians aiming to appropriate public rent and modify the income distribution in their favour (Tullock et al., 2002). Legislative complexity may be a legitimate way of applying different laws to the same cases, or to applying the same law to different cases, to favour some groups instead of others, without a formal infringement of the law, as is the case of corruption (Rose-Ackerman, 2007).[1]

The relation between political corruption and legislative complexity has received little attention in economic theory, despite some pioneering analyses (Rousseau, 1915; Tacitus, 1942; Spencer, 1842), in which it was affirmed that both phenomena are sources of social costs. Recently, the strong relationship between corruption and legislative complexity has been highlighted by the World Bank which stated: " ... Monopoly rents can be large in highly regulated economies and, as noted above, corruption breeds demand for more regulation ... " (World Bank, 1997). The World Bank (2017) in a recent report confirmed the existence of a correlation between political corruption and legislative complexity. The International Monetary Fund (2019) suggested that in

[1] A phenomenon similar to legislative complexity is the "regulatory capture", a case of government failure that occurs when a regulatory agency, created to act in the public interest, instead advances the commercial or political concerns of special interest groups, that dominate the industry or sector it is charged with regulating. When regulatory capture occurs, the interests of firms or political groups are prioritized over the interests of the public, leading to a net loss to society as a whole (Dal Bò, 2006).

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https://doi.org/10.1016/j.strueco.2021.03.004
0954-349X/

countries with a high level of corruption a legislative simplification, under form of an improvement in fiscal transparency and digitalization of the economy, could be of help to control corruption.

Journals are also full of references to legislative complexity as a form of political corruption (De Rugy, 2011,[2] and Fareed, 2011).[3] Legislative complexity, due to increasing law stock over time (Krueger, and Duncan, 1993) could represent a source of government failure from a double point of view. The lawmakers may use the law to create asymmetric information for rent seeking activity, as claimed for bureaucrats by Fredriksson (2014); Lambsdroff (2013). This does not means that politicians are the only protagonists of the law making process. Legislation is often the result of compromises and lobbying activities by the categories concerned. So sometimes private individuals could be the direct beneficiaries of the information asymmetries generated by the legislation.

Since Schuck (1992); Epstein (1997, 2004) in the last decade economic literature paid more attention to the economic impact of legislative complexity in connection to political corruption (Chong and Gradstein, 2007; Dawson and Seater, 2013; Glaeser and Shleifer, 2001, Harris, 2003, 2013, Rose-Ackerman, 2007; Yadav, 2011), without introducing an analytical framework. The added-value of this paper is threefold. Firstly, the theoretical model is the first attempt to analyze legislative complexity and political corruption togeher. Secondly, a special kind of asymmetric information is considered among the agents of the model, due to legislative complexity. Thirdly, explore theoretically the relationship between the elasticity of marginal utility of political consumption (i.e. the private consumption of politicians, using the same terminology as Barro, 1990; Ventelou, 2002), with the elasticity of marginal utility of private consumption.

This research addresses the following questions: is legislative complexity an obstacle to economic growth? Is there a relationship between political corruption and legislative complexity? Are there income redistribution effects due to legislative complexity?

To answer the previous questions an endogenous growth model is used, where legislation, public expenditure, and taxation are all taken into consideration. To this purpose a modified version of the endogenous growth version of Barro's model (1990) of a closed economy, in the wake of Mauro (1995) and Ventelou (2002). [4] Two kinds of agents are considered: private (consumers and entrepreneurs) and political ones.

In the economic literature there are no models to investigate the relationship between political corruption and legislative complexity. Barro (1990) marginally accounts for the positive social impact increase in property right protection in rising the growth rate of economy. However, Barro (1990) does not consider the effects of a changes in the legislation.

The stock of legislation is embodied in the model in order to consider the economic impact of legislative complexity, assuming that it is greater in countries which have introduced liberal democracy as a government system which have already introduced (Acemoglu and Robinson, 2000, 2001, 2012). In particular, the legislative stock is included in the production function, as a purely public good (Musgrave, 1969), as well as the legislative complexity that is a by –product of law making.[5]

Using this theoretical framework a comparative analysis is made between fiscal policies and legislation policies, in a static and dynamic framework, and the impact of legislative complexity on income distribution is studied. The model developed in the paper can be applied in countries at different stages of economic growth.

The main result of this paper is that legislative complexity constitutes, like political corruption, a constraint on economic growth and social welfare improvement. Moreover, legislative complexity and political corruption may be complements or alternatives of each other, depending on the level of legislative stock. Finally, legislative complexity may raise the level of inequality of income distribution, and increase the negative impact on the growth rate and social welfare (Persson and Tabellini, 1994). The redistributive effects of political corruption and legislative complexity are addressed, considering their impacts within the current generation and between the current and future generations.

After this introduction, the rest of the paper is organized as follows. Section II aims to survey the economic literature on legislative complexity and political corruption, describing the theoretical assumption of the model. Section III is devoted to setting up the theoretical framework. In Section IV the implications of the analysis are explained and some exercises of comparative analysis are performed in a static and dynamic framework. Final remarks conclude.

## 2. Literature survey

Political corruption has been defined as: " … the abuse of entrusting the power by political leaders for private gain, with the objective of increasing power or wealth" (Hodess, 2004), ignoring the other kinds of corruption such as administrative and private corruption.[6] For example, two parties may exchange favours over time which "pay each other back": through the allocation of specific legislation or procurement contracts (by the politician to the private sector counterpart), and earmarking political campaign funding (by the private sector connected to the politician).

[2] De Rugy (2011), quoting Kevin Drum, claims that: "Businesses don't like simple rules, because simple rules are hard to evade. So they lobby endlessly for exemptions both big and small. This is why we end up with tax subsidies for bow-and-arrow makers. It's why we end up with environmental rules that treat a hundred different industries a hundred different ways. It's why financial regulators don't enact simple leverage rules or place firm asset caps on firm size. Those would be hard to get around and might genuinely eat into bank profits. Complex rules, conversely, are the meat and drink of $500-per-hour lawyers and whiz kid engineers. If the rules are complicated enough, smart lawyers can always find ways around them. And American corporations employ lots of smart lawyers. Keep this firmly in mind the next time you hear someone from the Chamber of Commerce complaining about how many thousands of pages of regulations they have to comply with.".

[3] Fared (2011), in his newspaper article entitled "Complexity equals Corruption", says " … Most Americans believe that the federal tax code is highly complex and fundamentally corrupt. They are right. The federal code (plus IRS rulings) is now 72,536 pages in total. The code itself is 16,000 pages. The statist French have a tax code of 1,909 pages, only 12% as long as ours. Countries like Russia, the Czech Republic and Estonia have innovated and moved to a flat tax, with considerable success … " (see also Edwards, 2016).

[4] The theoretical model employed in this research regard a closed economy, such that coherently the legislative complexity that could arise account exclusively the laws passed by the state considered.

[5] In this research just the primary legislation, defined as Acts of Parliament (Congress) or statutes, are taking into account, without considering secondary legislation (or rules), rules adopted by government and executive agencies as a way to enforce laws passed by legislature, like SIs, which are often called Codes, Orders, Regulations or Rules (Taylor, 2010). Politicians use the primary legislation to preserve and increase their power, while the bureaucrats to preserve their privileges employ secondary legislation (Sarte, 2001). Schuck (1992, p. 4) refers to regulation to define secondary legislation " … standards promulgated by several different agencies and private technical organizations, tort litigation, and common law contract principles … ".

[6] Many definitions of corruption in general have been used in previous studies, for example "an illegal payment to a public agent to obtain a benefit that may or may not be deserved in the absence of payoffs" (Rose-Ackerman, 1997, 1999) or "the sale by government officials of government property for personal gain" (Hessami, 2014, Shleifer and Vishny, 1993, World Bank, 1997). Jain (2001) defines corruption as " … an act in which the power of public office is used for personal gain in a manner that contravenes the rule of the game". Even the OECD (2007) supplies a definition of corruption as: "active or passive misuse of the powers of Public officials (appointed or elected) for private financial or other benefits." and Passive bribery as: "the offence committed by the official receiving the bribe" and Active bribery "as paying or promising to pay a bribe."

The economic history of corruption is well documented. Noonan (1984) reports several episodes of corruption since the time of the Roman Republic with the case of Verres who bribed everyone in Sicily and half of the public officials of the Republic. History continues with famous cases such as the trials against Francis Bacon in the 17th century, and Warren Hastings in the 18th century, but even the history of United States of America is full of episodes of bribery. The sale of seats in "rotten boroughs" in United Kingdom, before the Reform Act of 1832 and "machine politics" in immigrant' cities in the United States at the turn of 19th century (Aidt, 2003; Campos et al. 2016; Williams, 2000; Williams et al., 2000; Williams and Doig, 2000; Williams and Theobald, 2000). No historical episodes of public rent appropriation due to legislative complexity has been reported, despite formerly Tacitus (110) have warned on the dangerous relationship between excessive legislation and corruption.

Legislative complexity is inextricably linked to law-making. The monarchs did not need to be corrupt, because they embolie all three fundamental branches of government (executive, legislative, and judicial).[7] In states governed by monarchs, bribery was widespread at the lower levels of bureaucrats, who remained completely extraneous to the process of legislative production.

The politicians who took over from the sovereign, or otherwise joined them in guiding the country, began in an increasingly pervasive way to introduce laws to regulate all social phenomena, raising the stock of laws. Political corruption cannot be done in the open, as it must succeed in concealing the activities of rent seeking by using legislature as much as possible.[8]

Since Adam Smith (1776) an economic role of the State emerges to supply public goods and to correct market failures. The measures of political economy leave the politician room for rent-seeking activities, which may take the form of corruption.

In the developing economies bribes are easier to exact, because politicians have almost complete control, the risk of being jailed is low, and the influence of public opinion is limited (Khan, 2006; Mocan, 2008, 2009). Moreover, the ability to hide public rent appropriation using legislative complexity is limited, because there are few laws. Khan (2006), emphasized that in the less industrialized countries there are four kinds of corruption and that during the process of per capita income convergence corruption and growth can grow together.

In wealthy economies with a long history of liberal democracy and law-making, and more stringent control over the management of public resources by public opinion, legislative complexity may represent a devious (because lawful) and cheap alternative to political corruption.

The complexity of legislation is a natural by-product of law-making, accruing over time in a stock of laws issued at different times, which could represent a constraint to growth, whenever the marginal social benefit of a new law is lower than the marginal social cost (Keech and Munger, 2015; Kearl, 1983; Orbach, 2013).[9]

Kearl (1983), quoting Jordan (1972); Posner (1973, 1974), emphasises the negative externality due to legislative complexity that works as a "barrier to entry" into markets, affirming that politicians (regulators) rarely achieve "public interest" outcomes (Aidt, 2003). The appropriation of public rent by politicians by using legislative complexity is almost invisible, because it is a hidden phenomenon, which eludes official statistics and to the control of public opinion. The members of parliament use their power to take advantage of the asymmetries information with private agents, due to legislative complexity, by adopting legislation to by-pass ordinary procedure and diverge public resources in their favour, or in favour of complaisant agents accepting bribes.[10] Harris (2003) put emphasis on complex and continuously changing legislation in the banking system and money laundering to hide illegal exchange activities. Viscusi (1996) investigated the negative impact of excessive legislation, but did not address the problem of the comparison between the social benefits of new laws, with the social costs due to upgrading legal knowledge, due to the introduction of new laws.

Following the approach of Jain (2001) it is assumed that legislative complexity falls within the category of self-reinforcing corruption, where the revenue from rent-seeking activity depends, among other things, on the history of the institutions (Khan, 2010).

This brief survey of theoretical models of various forms of corruption paves the way to the concept of "legal corruption" (Kaufmann and Vincent, 2011).[11]

Legislative complexity differs from "legal corruption" because it is useful in creating a prerequisite for the lawful appropriation of public rent by politicians in cases where the marginal costs of corruption, in terms of the likelihood of being discovered and convicted, are higher than the marginal revenues of bribery (World Bank, 1997). For example, the switch of corruption from an illegal to a legal form, after the process of democratization in Latin American countries and former member-countries of the Soviet Union, is well documented in economic literature (see Acemoglu and Robinson, 2000, 2001).

The effects of income redistribution of corruption have been highlighted in economic literature by Blackburn and Forgues-Puccio (2007), but the relationship between legislative complexity and the inequality income distribution has not been studied up to now.

In this research only political corruption that emerges as a negative by-product of law-making process is considered (Kaufmann and Vicente, 2011). Acemoglu (2006, 2013) emphasized the rational behavior of groups with political power (i.e. elites) that, in order to appropriate public rent and redistribute income in their favor, introduce legislations and create institutions determining an inefficient performance of the economy at a macroeconomic level.[12] The problem of political corruption has become increasingly relevant so as to draw attention from public opinion and several scholars (Heidenheimer and Johnson, 2002, Heywood, 1997, Mironov et al., 2016, Neudorfer, 2015, Peters and Welch, 1978; Rose Ackerman, 1997) highlighted political corruption in Russia, in the area of public procurement. However, there are many other examples regarding European countries.

[7] See the interesting papers by Richard Epstein about the evolution of the state of nature and the development of property right like a guarantee of individual economic freedom (Epstein, 2011, 2015, 2016).

[8] In some sense there is a price that must be paid to transit from dictatorship to modern democracy and it is represented by corruption, this implies that there is a "leakage" (or transfer) of part of social welfare either to the dictator, to the sovereign or to the politician. In fact Acemoglu and Robinson (2005) argues that the society tolerates dictators because the total transfer could be less under the dictator (regular people may receive a larger share of the economic pie under the dictator when corruption of politicians is high. This may be a reason why dictators are supported in many developing countries).

[9] In this theoretical framework is ignored the structure of the State, that could be of a multilevel type and generate negative coordination externalities among the different sources of regulation coming from different institutions (OECD, 2014).

[10] Rose-Ackerman (2007) refer to a famous Italian case of *Tangentopoli* to explain how the legislative complexity is used by politician to get bribery.

[11] In this hypothesis the 'abuse of public office for private gain', assumes a legal form, such that the liable party does not run the risk of going to jail. An example of legal corruption are " … the lobbying contributions by the private sector in exchange of passage of particular legislation, biased in favor of those agents, or allocation of procurement contracts may be regarded as examples of interaction of both private and public sector representatives. Where the second makes use of her publicly invested power at the expense of broader public welfare …" (Kaufmann and Vincent, 2011).

[12] For an interesting empirical analysis regarding the relationship between inequality and democratization see Houle (2009).

Legislative complexity is a subtle phenomenon, because it is silent, obscure and associated with bureaucracy (which operates at a lower level of legislation), which in itself does not interest the media and, therefore, like all impalpable and invisible phenomena (including certain dangerous causes of market failure), is often ignored or poorly understood. It raises the costs for private agents to upgrade the knowledge about new legislation. Law making generates negative coordination externalities among laws, that are an increasing function of legislation in force at the same time in a country.[13] It is a source of ineffectiveness of the legal system (Herzfeld and Christoph, 2003; Jain, 2001) and poor quality of institutions (Chang and Calderon, 2000, p. 761)[14] to make the interpretation of the laws costly, difficult and time consuming.[15] Lawless (2013) in a recent research using data of sixteen developed countries found empirical evidence that complexity of tax systems constitutes a constraint to foreign direct investments.

The connection between legislative complexity and political corruption has been reported by Rose Ackerman (2007). Ackerman underlines how legislative complexity makes corruption easy.[16] Yadav (2011) affirms that corruption takes place in a more creative way by the legislative process, because appointed members of parliament used their power to create an oligopoly in favour of some cooperative firms. In particular Yadav highlights the cases of corruption cases in Romania concerning the bank legislation and Indonesia regarding public procurement (see Yadav, 2011).

Joskow and Rose (1989) define two main reasons for legislation: a) poor performance of unregulated markets; b) sources of market failures like market power, externalities, public goods and asymmetric information. Joskow and Rose (1989) were among the first scholars to recognize that legislation (and regulation) had income redistributive effects, due to administrative regulation of prices and entry barriers into specific industries or markets.[17]

Given that politicians are rational agents who want to maximize their personal gains (Aidt, 2003), they can do this illegally by requesting or accepting bribes, and/or legally by means of legislative complexity. Corruption allows for the immediate appropriation of public rent, but if the illicit behavior of the politician is discovered, they can be convicted and sent to jail. Legislative complexity make opaque the applicable law which makes some kind of public rent appropriation lawful. Potential benefits and costs are greater in the case of corruption than in that of legislative complexity. The costs of corruption for politician are much higher, because such an offense is punishable by imprisonment, unlike legislative complexity.

On the one hand democratic institutions deter corruption, on the other hand the accrual the stock of the laws create increasing information asymmetries between the two kind of agents, and raises the private costs of negative coordination externality due to legislative complexity. In other words after an equilibrium value the marginal social costs of legislative complexity may become greater than the marginal social benefits.

In the wake of Mauro's (1995) research on corruption, it is assumed that after a threshold level of laws stock, legislative complexity may reduces economic growth and social welfare, and creating conditions to increase corruption through two possible channels. Firstly, it tends to make people willing to pay bribes to avoid legal uncertainty and bureaucratic delay. Secondly, politicians who know how to solve the problem created by legislative complexity and who are allowed to levy bribes tend to work harder, especially in the case where bribes are paid at a piece rate. While the former mechanism would increase the likelihood that corruption may take place at all stages of economic growth, the second mechanism is typical of more developed countries with a long history of law making, and high level of public opinion controls.

The main novelty of this research is represented by the analysis of the relationship between the corruption and the legislative complexity, and their relationship with the public opinion control. Before introducing the theoretical model it is useful examine the real data regarding corruption, legislative complexity and democracy level.

A measurement of corruption widely used in economic analyses is the corruption perception index (CPI) (Transparency International, 2019), that is: " … an index published annually by Transparency International since 1995 which ranks countries by their perceived levels of public sector corruption, as determined by expert assessments and opinion surveys."[18] (Lambsdorff, 2013). It takes scores from 0 (highly corrupted) to 100 (absence of corruption).

Measuring legislative complexity is very difficult, because it is an invisible phenomenon that eludes official statistics. In this paper like proxy of legislative complexity it is used the Compliance Complexity Index (CCI), published yearly by TMF Group P.V. (an international consulting firm). CCI ranks the 84 countries considered in its annual report "in order of the complexity of regulatory compliance, and contains in-depth information about global trends, as well as about compliance regimes in many key countries. It aims to provide useful information for two main audiences: generalist business people who need to consider compliance complexity as they make decisions about international expansion; and legal teams who need to react to the latest trends as well as allocate resources appropriately (TMF Group B.V., 2020). To make the analysis easier the rank of each country was rescaled dividing the rank by the number of the countries. This means that this indicator includes values from 1 (high level of legislative complexity) to 0 (lowest levels of legislative complexity).

Finally, as a proxy of the influence of public opinion on politicians the Democracy Index (DI) is used, published by The Economist (2020). The Democracy Index is compiled by the Economist Intelligence Unit (EIU), a UK-based company. It intends to measure the state of democracy in 167 countries, 166 of which are sovereign states and 164 are UN member states. It ranks from 0 (absence of democracy) to 10 (full democracy).

The data for 2019 of Corruption Perception Index and Compliance Complexity Index for 29 countries, with a high value of Index of Democracy, are reported in Table 1 below

Fifteen countries from twenty-eight included in Table 1, show a CCI Rescaled lower than the average (CCI rescaled average = 0.398). This means that more than half of the countries listed in Table 1, have high levels of democracy (public opinion control) and low perceived corruption, but possess high levels of legislative complexity. The relationship between the indicator of

[13] Regarding the business tax system, legislative complexity has been defined in three directions: technical, structural and compliance (see Ramalingam *et al*., 2008). See also Wright (2000) who warns about simplicity as the virtue of legislation. A different view is held by Richard Epstein who sees the complexity of legislation as a serious problem. His book is symptomatically entitled: Simple Rule for a Complex World (Epstein, 1997).

[14] In empirical literature legislative complexity has still been considered as an indicator of the poor quality of institutions that may: " ... *translate into an increased degree of uncertainty that sends mixed signals to the market, thus affecting the productive process* ... " (Chong and Calderon, 2000, p. 761).

[15] In particular, Spatt (2012) says: " … much of the costs of regulation in my view are associated with its intricacies. It also is useful to recognize that complexity in regulation leads to huge entry barriers associated with the cost of regulatory compliance … ".

[16] Diwan (2014) consider legislative simplification a relevant measure of political economy which will have to be adopted even in partially democratic and authoritarian regimes to promote economic growth.

[17] For a more complete survey of the literature on economic and social regulation through 1980, see Joskow and Noll (1981).

[18] The CPI defines corruption the misuse of public power for private benefit.

**Table 1**
List of twenty-nine countries with a value of Index of Democracy greater than 7.5, with CPI, CCI and ID.*

| Countries | CPI | CCI rescaled | index of Democracy ID |
|---|---|---|---|
| Denmark | 87 | 0.01 | 9.22 |
| New Zealand | 87 | 0.28 | 9.26 |
| Sweden | 85 | 0.39 | 9.39 |
| Switzerland | 85 | 0.46 | 9.03 |
| Norway | 84 | 0.67 | 9.87 |
| Netherlands | 82 | 0.80 | 9.01 |
| Germany | 80 | 0.50 | 8.68 |
| Luxembourg | 80 | 0.07 | 8.81 |
| Iceland | 78 | 0.12 | 9.58 |
| Australia | 77 | 0.26 | 9.09 |
| Austria | 77 | 0.42 | 8.29 |
| Canada | 77 | 0.25 | 9.22 |
| United Kingdom | 77 | 0.43 | 8.52 |
| Belgium | 75 | 0.20 | 7.64 |
| Estonia | 74 | 0.64 | 7.91 |
| Ireland | 74 | 0.00 | 9.24 |
| Japan | 73 | 0.41 | 7.99 |
| France | 69 | 0.58 | 8.12 |
| Unit. States of America | 69 | 0.35 | 7.96 |
| Chile | 67 | 0.62 | 8.08 |
| Portugal | 62 | 0.37 | 8.03 |
| Spain | 62 | 0.14 | 8.29 |
| Israel | 60 | 0.16 | 7.86 |
| Slovenia | 60 | 0.52 | 7.51 |
| South Korea | 59 | 0.35 | 8.01 |
| Cyprus | 58 | 0.74 | 7.59 |
| Czech Republic | 56 | 0.55 | 7.69 |
| Malta | 54 | 0.86 | 7.95 |

* The CPI and CCI data are relative to 2019, while the DI figures are regarding 2018.

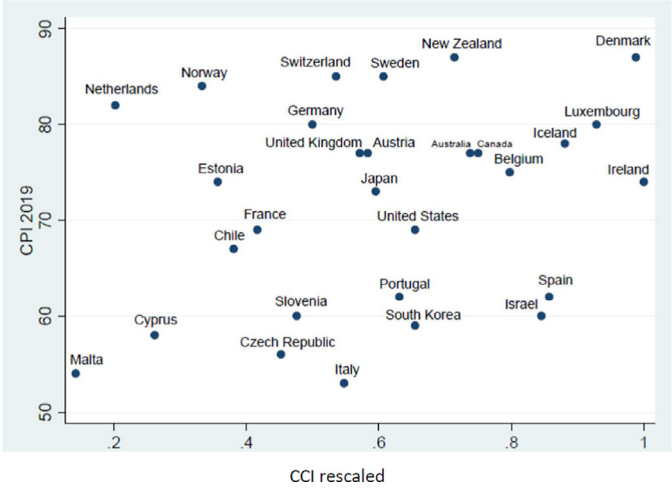


**Fig. 1.** Complexity Compliance Index(CCI) and Corruption Perception Index(CPI)

legislative complexity and perceived level of corruption is clarify further in Fig. 1.

This first overview of data regarding countries with low levels of corruption and a high level of democracy, seems that legislative complexity is high when the corruption is low and the control of public opinion is high. Such to justify some assumption that will be made within the theoretical model.[19]

[19] For countries with a level of legislative complexity lower than the average value of the sample (0.601), the CPI and CCI possess a positive partial correlation equal to 0.467 (with $\rho$<10%).

## 3. A model of political corruption and legislative complexity

Political corruption and legislative complexity are analysed jointly in the following endogenous growth model of a closed economy.[20]

### 3.1. Utility functions and welfare

Two kinds of infinitely-lived agents are considered: private w (that could be consumers or entrepreneurs indifferently) and politicians q (Barro, 1973), under the assumption w + q = N,[21] where N is the total population. For this reason two standard constant intertemporal iso-elastic elasticity utility functions are tackled. The first function is related to agents employed in the private sector w, for which the utility depends on the flow of consumption C (see Barro, 1990; Romer, 1990).

$$u_w = \frac{C^{1-\varepsilon} - 1}{1-\varepsilon}, \tag{1}$$

where the elasticity of marginal utility of private consumption C is constant and equal to -$\varepsilon$.

The utility function of the politicians q depends on the flow of political consumption B.

$$u_q = \frac{B^{1-\eta} - 1}{1-\eta}. \tag{2}$$

Here -$\eta$ is the elasticity of the marginal utility of B, that may be greater than, equal to or lower than -$\varepsilon$.[22] In an infinite time-horizon, the welfare function that the social planner wants to maximize is

$$W = \int_0^\infty u_w(C) w e^{-\delta t} dt + \int_0^\infty u_q(B)(1-w) e^{-\delta t} dt. \tag{3}$$

Where $\delta > 0$ is the exogenous discount rate.

### 3.2. Technology

The production function considers the physical capital K, labor w, public expenditure G, stock of legislation R and the legislative complexity Z as input. The production function is

$$Y = RK^{\alpha} w^{\beta} Z^{-\rho} \left(\frac{G}{K}\right)^{\psi}, where (a,b,r,y) \hat{I} [0,1] and a+b+y=1 \tag{4}$$

where the aggregate production Y is a function of the physical capital endowment K, the labour force w employed in private sector, R is the stock of legislation, and Z is the negative coordination externalities due to legislative complexity, that in turns depends on R. To correct the sources of market failure the policy maker may use the public expenditure or change the institutional setting modifying legislation. Public expenditure G, financed with direct taxation $\tau$Y (where $0 \leq \tau < 1$ is the flat tax rate), is included in the production function as an input, so that Y shows constant returns to scale in the G/K ratio, and decreasing returns to scale in the physical capital K alone. The parameter $\rho$ considers the characteristics of the legal system in terms of legislative complexity.[23] If $\rho$ is high (close to 1) this means that the legal system has a weak mechanism of coordination among laws passed at different point of time

[20] Although the variables are function of time (t), the term is omitted to make the analysis simpler.

[21] The condition that in each point of time the growth rate of the population is equal to zero (i.e., the number of births is equal to the number of deaths) helps to simplify the analysis. A changing population assumption (both growing or declining) can easily be introduced in the model.

[22] This is an assumption that simplifies the analysis, but it is not a necessary condition to derive the results of the model.

[23] See, for example, the scores of Compliance Complexity Index (CCI) reported in column III of Table 1, for a sample of countries.

and to avoid overlapping and conflicting laws, that make opaque for private agents the rule applicable.

Legislation is a "pure public good", because it is perfectly non-rival and nonexcludable in consumption (Musgrave, 1969), and in theory may be applied to an infinite number of cases and hypotheses at zero marginal cost. In practice, law-making continually raises the stock of legislation, thus increasing the negative coordination externalities among laws passed at different point of the time, which may overlap and conflict each other (Di Vita, 2018; Loeper, 2011). It raises the costs for private agents of being updated about new laws (Epstein, 1997; Kearl, 1983; OECD. 2014a; Schuck, 1992; Thomsen, 2011).

To summarize, laws is undoubtedly useful to correct markets failures, but at a certain threshold level, legislative accruing creates legislative complexity as an unwanted by-product, making marginal social costs of legislation greater than marginal social benefits, thus hampering economic growth.[24]

$$Z = R^{\gamma}, with 0 < \gamma \leq 1. \tag{5}$$

This specification of Z is based on the previous studies on negative coordination externalities (Di Vita, 2018; Di Vita et al., 2019, Klibanoff and Morduch, 1995; Kaplow, 1995) and legislative complexity (Bourcier and Mazzega. 2007; Colliard and Co-Pierre, 2020), that assumes rising costs of legislative complexity.

The equation [5] satisfies the following conditions: $Z(0) = 0$, $dZ/dR>0$, $d^2Z/dR^2>0$ for $\forall R \in R_+$. Without laws there is no legislative complexity. Z is increasingly convex in the stock of the laws (Bourcier and Mazzega, 2007, Klibanoff and Morduch, 1995, Kaplow, 1995). The parameter $\gamma$ measures how the law stock increases the legislative complexity (Colliard and Co-Pierre, 2020). A low value of $\gamma$ means that the law making has a limited impact on legislative complexity (because the laws are of good quality or the legislative system is able to embody the changes without raises significantly the stock of legislative complexity).

The physical capital satisfies the following equation:

$$K = Y - C - B, where\ C(0) = C_0 \tag{6}$$

Eq. [6] is a constraint which considers the change of physical capital over time. To make the analysis simple, it is assumed that there is no depreciation in K. Aggregate consumption is denoted by $C = cY$, with $0 < c \leq 1$. Aggregate saving is $S = sY = \dot{K}$, where $0 < s \leq 1$, and $s = (1-c)$.

### 3.3. The public sector

In the presence of sources of market failure, the policy maker may adopt different policies such as fiscal measures to cover public expenditure or change the institutional setting by introducing new legislation.[25]

#### 3.3.1. Fiscal policy

The public budgetary constraint (for a zero public deficit), according to Barro (1990); Ventelou (2002), is

$$tY = B + G \tag{7}$$

where B is the political consumption that depends on the flat tax rate, the GDP and the rate of public rent appropriation E, while G is public expenditure (Ventelou, 2002).

$$B = EtY \tag{8}$$

The rate of misappropriation (or public resource dissipation), is

$$E = f(\underset{+}{\tau}, \underset{-}{Y}, \underset{+}{Z}, \underset{-}{\phi}) = \frac{\sigma\pi}{\theta\phi}, \text{with} 0 < (\sigma, \pi, \theta \text{and} \phi) \leq 1, \tag{9}$$

where $\sigma$ accounts for the effects of the tax rate on the rate of misappropriation, $\pi$ considers the social costs of negative coordination externalities due to legislative complexity, $\theta$ measures how E varies with a change in the aggregate product, and, finally, $\varphi$ is a parameter accounting for the probability that a corrupted politician will be imprisoned if discovered taking bribes. The subscripts express the algebraic sign of the first partial derivatives.

This functional form of the misappropriation rate satisfies the assumptions that E is increasing in the level $\tau$, such that $\partial E/\partial \tau > 0$ ($\tau$ = G/Y), decreasing in the level of income $\partial E/\partial Y < 0$ (Ventelou, 2002, p. 25), and declining in the probability of a politician being discovered to be corrupt and convicted to jail $\partial E/\partial \varphi < 0$.[26]

To explain the specification rate of misappropriation by politicians assumed in [9] previous research in economic literature are reported.

Following Barreto and Alm (2003) the consumption of politicians is considered as increasing in the income flat tax rate. This is because corruption flourishes in thef public sector weight ($\partial E/\partial \tau < 0$) (Acemoglu and Verdier, 2000).

The model assumes that the misappropriation rate declines as the income growth ($\partial E/\partial Y < 0$), as stated by Aghion et al. (2016). This happens because when people are wealthy they are less prone to pay bribes.

The public rent extracted by politicians is increasing in the legislative complexity as affirmed by World Bank (1997) (i.e. $\partial E/\partial Z < 0$), because the latter is a "smoke screen" to hide corruption (Fared, 2011; Rose Ackerman, 2007), typical phenomenon of wealthy countries with a high legislative stock (OECD, 2014b), and strong levels of public opinion on government spending.

Finally, legislative complexity is considered a condition for appropriation of public rent by politicians in a legal way, in cases where the marginal costs of corruption are high, in terms of the likelihood of being discovered and convicted ($\partial E/\partial \varphi < 0$).

#### 3.3.2. Legislative measures

Law making is considered as a way to address the sources of market failures that do not need public provision of goods and services by the State. The economic system is itself a complex system that interacts with all the aspects of life, that may lead to inefficiency, without the adoption of economic policy measures. The legislation issued by self-interested politicians on the one hand is helpful when addressing the new needs of society, due to changes in technology, preferences, social customs and so on, while on the other hand it raises the stock of legislation and the level of negative coordination externalities in legislation issued in previous years. This means that at the same point in time, the stock of legislation will be higher in economies with a high level of law making (for example countries where the liberal democratic government system was introduced long time ago, Acemoglu and Robin-

[24] In between these two extremes of the ways of intervention in the economy: taxes versus legislation, in which government intervention in the economy can be achieved either by taxation and subsequent public spending (for example pure public good provision). Changing economic incentives through legislative changes (for example transforming common goods into private), there are a number of cases in which the choice is purely discretionary and depends on the social preferences and decisions of policy makers (for example the pension system, telecommunications, health care, instruction, etc.).

[25] In some cases, the choice between legislation and fiscal policy is mandatory (for example in the case of a registry office, etc.), or in defining property rights. But there are many areas where the kind of economic policy measure to adopt depends on collective preferences and the economic role assigned to the State.

[26] The introduction of a parameter $\varphi$ in the appropriation rate function is the main change in respect of equation (1') in Ventelou (2002, p. 25). This assumption come from economic literature (Acemoglu and Verdier, 2000) and empirical result obtained by estimation of partial correlation between the index of democracies and the perceived corruption, for the sample of countries accounted in Table 1. The partial correlation between the variables mentioned above is equal to 0.3428, and is statistically significant at 5% level.

son, 2000, 2001). The utility function of politicians is increasing in Z (this is evident substituting [8] in [2]). The legislative complexity can be used as a device for public rent appropriation, and may be either an alternative to or a complement of political corruption. The negative coordination externality despite being designed for microeconomic analysis, has been thoroughly investigated in macroeconomic theory in the areas of employment and economic growth (Cooper and Jones, 1998, Klibanoff and Morduch, 1995). The social costs due to negative coordination externalities in the legislation is Z, continuously increases over time,[27] because self-interested politicians issue more and more legislation to create artificial barriers to entry into the market, making the applicable law vague and leaving room for their rent-seeking activity.[28] The law making activity increases the level of asymmetric information between politicians and private agents about the applicable law (Krueger and Roderick, 1993), simultaneously increasing the discretionary power of politicians and slowing down economic growth (Fu, 1996).

The motion equation of the legislative stock R is

$$R\prime = (q\mu - \vartheta)R, where R(0) = R_0 and (\mu, \vartheta) > 0 \tag{10}$$

Here $\mu$ is a parameter that accounts for political productivity in law-making, and represents the positive effects of legislation due to the internalization of macroeconomic causes of market failures and $\vartheta$ is the rate of repeal of laws.[29] This means that q$\mu$ is the rate at which the stock of legislation would grow if there were no rate of legislation repeal $\vartheta$.

In this theoretical framework it is assumed that the repeal of laws reduces, simultaneously, the stock of legislation and the effects of the flow of negative coordination externalities.

The function to be maximized is [3] subject to [4] – [10]. The current-value Hamiltonian H is

$$H = \frac{C^{1-\varepsilon}-1}{1-\varepsilon} + \frac{B^{1-\eta}-1}{1-\eta} + \lambda_1\left\{\left(RK^{\alpha}w^{\beta}Z^{-\rho}\right)\left(\frac{G}{K}\right)^{\psi} - C - B\right\} + \lambda_2[(1-w)\mu - \vartheta]R, \tag{11}$$

$\lambda_i$ with i = 1, 2, denote the current value of shadow prices of stock variables.

To simplify the exposition, the first order conditions, together with transversality conditions, are reported in Appendix A.[30]

### 3.4. Corruption and legislative complexity

The first problem investigated is how the aggregate production level is influenced by a change in the probability of detecting corruption in politicians and the consequences of a reduction in the negative coordination externality due to legislative complexity. To analyze the first issue, the equations [A.1] and [A.2] are considered jointly, to eliminate $\lambda_1$, the semi-reduced form of Y is

$$Y^* = \left[\left((\sigma\pi\tau)^{-\eta}(\theta\phi)^{\eta}c^{\varepsilon}\right)\right]^{\frac{1}{\eta-\varepsilon}}. \tag{12}$$

The [12] show that Y is higher if the elasticity of the marginal utility of political consumption $\eta$, is greater than the elasticity of marginal utility of private consumption $\varepsilon$ (i.e. $\eta > \varepsilon$). This theoretical result seems to be confirmed by the empirical evidence supplied by Evans (2005), who found that the elasticity of marginal utility of consumption is greater for people with a high income level (Dawood et al., 2018, Leeper et al., 2017).

Ruling out the hypothesis $\varepsilon = \eta$ which implies Y = $\infty$, that does not make sense in economics, the condition $\eta > \varepsilon$ means that the private agents possess a higher level of impatience than politicians.[31]

Taking the partial derivative of Y*, with respect to $\varphi$, the result is

$$\frac{\partial Y^*}{\partial\phi} = \frac{\eta}{\eta-\varepsilon}\frac{\left[\left((\sigma\pi\tau)^{-\eta}(\theta\phi)^{\eta}c^{\varepsilon}\right)\right]^{\frac{1}{\eta-\varepsilon}}}{\phi} = \frac{\eta}{\eta-\varepsilon}\frac{Y^*}{\phi} > 0. \tag{13}$$

An increase in the probability that a politician will be discovered taking bribes always has a positive effect on the production level because it deters corruption. Calculating the partial derivative of Y* with respect to $\pi$, it is possible to understand the effects of a change in the level of the negative coordination externality due to legislative complexity over Y,

$$\frac{\partial Y^*}{\partial\pi} = -\frac{\eta}{\eta-\varepsilon}\frac{\left[\left((\sigma\pi\tau)^{-\eta}(\theta\phi)^{\eta}c^{\varepsilon}\right)\right]^{\frac{1}{\eta-\varepsilon}}}{\pi} = -\frac{\eta}{\eta-\varepsilon}\frac{Y^*}{\pi} < 0, \tag{14}$$

In the instantaneous equilibrium there is an inverse relationship between Y and the negative coordination externality due to legislative complexity, for $\forall(\xi,\gamma)\in\mathbb{R}_+$:Z>0.

To investigate the relationship between legislative complexity and corruption, the implicit partial derivative of $\pi$ respect to $\varphi$ is calculated, using [12], to get

$$\frac{\partial\pi}{\partial\phi} = (\sigma\tau\theta)^{-\frac{\eta}{\eta-\varepsilon}}\pi^{-\frac{2\eta-\varepsilon}{\eta-\varepsilon}}\phi^{--\frac{\varepsilon}{\eta-\varepsilon}} > 0, \tag{15}$$

this means that in a static equilibrium the two channels accounting for appropriation of public rent are alternative, and that an increase of the probability that corruption is detected and punished raises the level of legislative complexity.

To investigate the relationships between legislative complexity, corruption and taxation the second mixed partial derivatives of $\pi$ with respect to $\sigma$, departing from [15], obtaining

$$\frac{\partial^2\pi}{\partial\phi\partial\sigma} = -\frac{\eta}{(\eta-\varepsilon)\sigma}(\sigma\tau\theta)^{-\frac{\eta}{\eta-\varepsilon}}\pi^{-\frac{2\eta-\varepsilon}{\eta-\varepsilon}}\phi^{--\frac{\varepsilon}{\eta-\varepsilon}} < 0. \tag{16}$$

Equation [16] proves that legislative complexity and taxation are two different alternative channels, which politician can use to extract public rent. The likelihood of being discovered if corrupt and the tax rate are alternatives. This result implies that corruption and taxes are complementary (Shleifer and Vishny, 1993).[32]

### 3.5. Fiscal policies versus legislative changes

The policy maker, in the presence of sources of market failure, may uses taxation or legislation to overcome inefficiencies. To make a comparison between these two kinds of economic policies, using [A2], [A3], [A4], [8] and [9] after some algebra and the implicit function theorem, the result is

$$\frac{\partial Y}{\partial R} = \frac{2(\zeta R - \gamma)}{(\zeta 2R - \gamma)kR} > 0, and \frac{\partial^2 Y}{\partial R^2} < 0 for \forall(x,g)\hat{I}\mathbb{R}_+ : R > 0 \tag{17}$$

[27] For the concept of dynamic externalities see Boldrin (1992), Datta and Mirman (2000), Partridge and Rickman (1999). Datta and Mirman (2000) have shown that policy coordination is not required when preferences are the same among the agents involved in trade.

[28] Under our theoretical assumptions for which politicians are self-interested people attempting to maximize their utility, performing rent-seeking activity which takes the form of legislative complexity to justify the proliferation of commissions, institutions, and, more in general, new and better remunerated public appointments, these activities may be alternatives to and/or complements of corruption.

[29] From the standard initial conditions of all the stock variables, at each point in time their values depend on the time spent since the time t=0, and the law motion for each state variable. This mathematical framework allows us to capture the feature of the economic system that will have a greater stock of legislation, and therefore of legislative complexity, depending on the number of years since the introduction of liberal democracy as a form of government.

[30] The proof that our model exhibits a saddle point equilibrium is available, upon request, from the author.

[31] The value of elasticity of marginal utility of consumption (the inverse of the intertemporal elasticity of substitution) is matter for empirical research. Evans (2005) for U.K. estimate a value of 1.4. In general for a survey of the literature on the relationship between elasticity of marginal utility of consumption and discount rate see Di Vita (2012).

[32] Note that the likelihood of being corrupted is, in statistical meaning, the complement of $\varphi$, and is equal to (1-$\varphi$).

where $k = K^{\alpha} w^{\beta} Z^{-\rho} (\frac{G}{K})^{\psi}$,

$$\frac{\partial Y}{\partial \tau} = -\frac{2K\tau}{(\tau Y - B)kR^2} < 0. \tag{18}$$

In the short run only legislation has a positive impact on the total product, despite declining rate. In order to keep the public budget balance in equilibrium it is always better to use legislative measures to modify the market allocation of resources.

To understand the relationship between taxation and legislation in the aggregate production function, the second partial derivative of Y is calculated, with respect to $\tau$ and R, to obtain

$$\frac{\partial^2 Y}{\partial \tau \partial R} = \frac{4K\tau}{(\tau Y - B)kR^2} > 0. \tag{19}$$

[19] is always positive and this means that the two most important instruments in the hands of the policy maker are complementary.

### 3.6. Redistributive effects of legislative production

From equations [A1] and [A2], it follows that this condition should be satisfied along the balanced stationary growth path

$$B^{-\eta} - C^{-\varepsilon} = 0, \tag{20}$$

This means that an increase in the utility of the politicians implies a reduction in the utility of private agents i.e. they are "Edgeworth substitutes" (Dawood and Francois, 2018).

Solving equations [20], [1], and [10] for C and taking the partial derivative with respect to Z, it is possible to evaluate the impact of legislative complexity on the flow of private consumption

$$\frac{\partial C}{\partial Z} = -\frac{\eta\rho}{\varepsilon} \frac{(\tau Y E)^{\frac{\eta}{\varepsilon}}}{Z} < 0. \tag{21}$$

This means that private consumption decreases with the flow of negative externalities due to legislative complexity. To account for the total effects of legislation on private consumption the $\partial C/\partial R$ is calculated

$$\frac{\partial C}{\partial R} = (\tau Y E)^{\frac{\eta}{\varepsilon}} \frac{\eta}{\varepsilon} [1 - 2\rho\gamma]. \tag{22}$$

This partial derivative may be greater than, equal to or lower than zero, in consideration of the values that R assumes. For low levels of legislation stock so that r< 1, the marginal benefits of new legislation are greater than the marginal costs (due to negative coordination externalities), so there is room for new laws to raise the social welfare. An equilibrium is achieved when r = 1, such as the marginal costs and marginal benefits of new legislation are perfectly balanced ($\partial C/\partial R$)=0. Finally, for high levels of R such that r> 1, the marginal external costs of legislative complexity are greater than the marginal benefit, such that further laws will reduce private consumption.

The other channel that politicians may use to increase their rent is the flat rate on income tax. Using [22] to calculate the second partial derivative of C with respect to $\tau$, the result is

$$\frac{\partial^2 C}{\partial R \partial \tau} = (\tau Y E)^{\frac{\eta}{\varepsilon}} \frac{\eta^2}{\varepsilon^2 \tau} [1 - 2\rho\gamma]. \tag{23}$$

Using [23] and [22] it is possible to affirm that in an instantaneous equilibrium an increase of flat rate income tax reduces private consumption, for high levels of legislative stock like r>1.

Moving from a static to a dynamic analysis, the emphasis is placed on the balanced stationary growth path.[33]

[33] The analysis of transitional dynamics of the model and the possible existence of multiple equilibria will be addressed in a companion paper.

### 3.7. The stationary growth path

Deriving logarithmically the production function [4] with respect to time,

$$g_Y^* = \alpha g_K + g_R - \rho g_Z + \psi (g_G - g_K), \tag{24}$$

simplifying

$$g_Y^* = (\alpha - \psi) g_K + (1 - \gamma\rho) g_R + \psi g_G \tag{25}$$

This means that in long term equilibrium the growth rate of aggregate production will be equal to $\alpha g_K$, if the sources of macroeconomic market failures are perfectly internalized, (i.e. $g_R = 0$, and $g_K = g_G$), bearing in mind that along the stationary growth path the growth rate of public expenditure is equal to $g_K$.

The worst situation occurs when the costs of negative externality of legislative complexity are greater than the benefits ($1 < \rho$) and the growth rate of public expenditure is higher than the physical capital ($g_K < g_G$).

To calculate the reduced form of the growth rate of the economy, the equation [A3] is derived logarithmically, and considering that along the stationary growth path $g_G = \tau$ and $\alpha g_K = g_Y$ the result is

$$g_Y^* = \frac{(1 - \gamma\rho)[(q\mu - \delta - \vartheta) - \delta] + \psi\tau}{1 - [\alpha - \psi - (1 - \gamma\rho)(1 - \varepsilon)]} \tag{26}$$

the equation [26] expresses the growth rate of the aggregate production in terms of parameters. It may be observed that the growth rate of the economy is positive if (1 - $\rho$) > 0, or in other words when stock of legislation is low, so that the benefits of new laws are greater than the external costs due to legislative complexity. This result confirms that the legislation stock accrual, after a threshold level, not only reduces aggregate production, but also has a negative impact on the growth rate of the economy.

To address the impact of change in corruption levels on the growth rate of the economy along the stationary growth path, it is possible to use [9] and substitute for $\tau$, calculating the partial derivative of the $g_Y^*$ with respect to $\sigma$

$$\frac{\partial g_Y^*}{\partial \sigma} = -\frac{\psi E \theta \phi}{\sigma^2 \pi \{1 - [\alpha - \psi - (1 - \gamma\rho)(1 - \varepsilon)]\}} < 0. \tag{27}$$

This simple analysis immediately shows that an increase in $\sigma$ reduces the optimal growth rate. The effect of a change in legislative complexity is the same as in the case of $\sigma$, as it is evident taking the partial derivative of $g_Y^*$ with respect to $\pi$

$$\frac{\partial g_Y^*}{\partial \pi} = -\frac{\psi E \theta \phi}{\sigma \pi^2 \{1 - [\alpha - \psi - (1 - \gamma\rho)(1 - \varepsilon)]\}} < 0. \tag{28}$$

These findings confirm that also along the optimal growth path, corruption and legislative complexity constitute a burden on the economy.

The growth rate of the economy is increasing in the flat rate of income tax, a result that this model shares with other theoretical frameworks in consideration of the assumed positive externality of public expenditure (Barro, 1990). To perform a formal analysis of this result, it is investigated how $g_Y^*$ varies as a consequence of a change in $\tau$,

$$\frac{\partial g_Y^*}{\partial \tau} = \frac{\psi}{1 - [\alpha - \psi - (1 - \gamma\rho)(1 - \varepsilon)]}. \tag{29}$$

The magnitude of the impact of a change in the taxation level on the growth rate also depends on the value of the parameter $\psi$, measuring the incidence of the public sector (given by the ratio G/Y) in the aggregate production function (Barro, 1990). To complete the analysis on the impact of the public sector of the economy on the growth rate, the partial derivative of $g_Y^*$ is taken with

respect to $\psi$

$$\frac{\partial g_Y^*}{\partial \psi} = \frac{\tau}{\{1-[\alpha-\psi-(1-\gamma\rho)(1-\varepsilon)]\}^2} \tag{30}$$

To evaluate the dynamic redistributive effects of taxation, legislative complexity and corruption between the two categories of agents, using (A1), (A2), (A8), (A12), letting total consumption $C_T = C + B = 1$, the result is

$$\dot{C} = \left(\frac{\alpha Y}{K} - \delta\right)\frac{1 - B\frac{\varepsilon}{\eta}}{\varepsilon} \tag{31}$$

taking the partial derivative

$$\frac{\partial \dot{C}}{\partial B} = -\frac{\alpha Y + \delta K}{K}\frac{B^{\frac{\varepsilon-\eta}{\eta}}}{\eta} \tag{32}$$

This means that political consumption reduces the flow of private consumption, along the optimal stationary growth path.

To confirm the previous result, the effects of a change in the parameter $\sigma$ are also accounted for in the analysis, considering the impact of the flat tax rate on private consumption (Jaimovich and Rud, 2014).

$$\frac{\partial \dot{C}}{\partial \sigma} = -\frac{\alpha Y + \delta K}{K}\frac{\left(Y\tau\sigma\frac{Z}{\theta\varphi}\right)^{\frac{\varepsilon}{\eta}}}{\eta\sigma} < 0 \tag{33}$$

The relationship in this case also has a negative algebraic sign: an increase in the flat tax rate reduces private consumption. Finally, it is investigated how the flow of consumption is influenced by a change in the probability that a politician will be discovered accepting bribes.

$$\frac{\partial \dot{C}}{\partial \varphi} = \frac{\alpha Y + \delta K}{K}\frac{\left(Y\tau\sigma\frac{Z}{\theta\varphi}\right)^{\frac{\varepsilon}{\eta}}}{\eta\varphi} > 0 \tag{34}$$

The effect of a change in $\varphi$ on $\dot{C}$ is positive. An increase in $\varphi$ reduces the rate of misappropriation of public rent.

## 4. Extensions of the model

In this section some possible extensions of our analysis are addressed, to consider how the theoretical results change relaxing or modifying some assumptions of the model, to account for the impact of legislative complexity on growth rate.[34]

The policy maker in order to overcome the negative impact of legislative complexity on $g_y$, may decide to reduce the future lawmaking of an amount $0 < \varpi \leq 1$, thus deregulating the economy. The growth rate of economy [25] becomes

$$g_Y^{*'} = (\alpha - \psi)g_K + [1 - (\gamma\rho\text{-}\varpi)]g_R + \psi g_G. \tag{35}$$

This measure of economic policy may have three different impacts on the growth rate of the economy. Firstly, for $(\gamma\rho\text{-}\varpi) < 0$ the deregulation more than overcomes the negative impact of legislative complexity on the growth rate. This is a typical situation of developed countries with a long story of law-making and high levels of negative coordination externalities, where law making has a heavy impact on legislative complexity (i.e. $\gamma\rho > 1$) (Alesina et al., 2005, Stankov, 2018). Secondly, for $(\gamma\rho\text{-}\varpi) = 0$, as a consequence of economic policies implemented by policy maker, all the negative coordination externalities due to legislative complexity were internalized. This means that as a result of the deregulation policy of government, the legislative stock grow at its optimal stationary level. Thirdly, for $(\gamma\rho\text{-}\varpi) > 0$ the legislative complexity level is so low that a deregulation policy measure reduces the growth rate of economy. This is a typical situation of developing countries where legislation is useful in establishing efficient institutions and in support the growth.

To implement the deregulation policy the policy maker could still increase the repeal rate of laws $\vartheta$, that enter in the reduced form of $g_Y^*$ [26], exclusively on the numerator. Reducing the accrual of legislative stock increase the growth rate of economy.

Legislative complexity may be even accounted for in terms of characteristics of legal system. Since the pioneering studies by La Porta et al. (1998) it has been proved that the countries with a more flexible legal system, belonging among the common (and German) law economies, perform better than civil law countries.[35] The policy maker could introduce some institutional change to reduce $\rho$, thus increasing the coordination among laws passed at different points of time. Djankov et al. (2006) found evidence that countries with better quality of regulation grow faster than others.

From [12] it is evident that the aggregate product is increasing in the parameter $\varphi$ accounting for social control on lawmakers. If the politicians are self-interested (Aidt, 2003) it is difficult that they make the control of public opinion on their behaviour easier. As it is possible to observe from Table 1, in general the countries with high levels of social controls have low levels of perceived corruption. Despite it being uncommon to observe that developed countries with high scores of democracy have poor performance in terms of legislative complexity (as approximated by Compliance Complexity Index rescaled).

The model can be modified to include economies with an absence or a low level of legislative complexity, for example countries at the initial stages of development, without social control on the politician's behaviour and inelasticity of aggregate product in respect of tax rate, where the political corruption raises $g_Y$ (Khan, 2006). In a recent paper Alfada (2019) found evidence that since a threshold level is not achieved the corruption can contribute to pushing growth.

The theoretical framework presented in this research constitutes an initial attempt to investigate political corruption and legislative complexity together. Under the assumptions made, based on previous research and some empirical evidence, it seems to be reasonable to say that legislative complexity may be a channel in the hands of lawmakers to hide the political corruption and modify the income distribution in their favour, especially in developed countries where the controls of public opinion are relevant and the risk of being jailed if corrupt is high. Legislative complexity seems to have a negative impact of the growth rate like the corruption. The model can be used even to investigate what happens in developing countries assuming different parameters values. Econometric analysis can shed light on the relationship between corruption and legislative complexity, especially in consideration of asymmetries between developed and developing countries. In the case of the former all the economic policies that reduce the legislative complexity would be helpful to promote growth and to avoid legal forms of rent seeking by politicians. In developing countries a progressive reduction of corruption is necessary to bring these economies in a sustainable growth path. The growth process needs a simplification of legislation, more control of public opinion and the implementation of a more flexible legal system.

## 5. Final remarks

This paper developed a simple framework to investigate political corruption and legislative complexity together in an endoge-

[34] In consideration of the length of the paper the extension of the model cannot considered in full.

[35] From Table 1 is possible to observe that the common law countries like Australia, Canada, Ireland and New Zeland together with German law economies, like Denmark and Sweden has the best ranking in terms of Compliance Complexity Index rescaled.

nous growth model, to analyse the impact of these phenomena on the growth rate, welfare and distribution of total production between the two kinds of agents considered.

By using simple assumptions based on previous literature and some analysis of incomplete data, it is shown in a static and dynamic equilibrium, that beyond a certain threshold, the social costs of new legislation in terms of negative coordination externalities, are greater than the benefits. These theoretical findings represent a starting point for explaining why many developed countries have observed a reduction in their growth rate because of legislative complexity, while developing countries are less affected or only marginally so by legislative complexity, probably as a result of the more recent introduction of liberal democracy as a form of government. This is a matter for empirical research to estimate the coefficients of the parameters considered in the model.

Legislative complexity seems to be a channel for legal rent seeking that is used by politicians to increase their utility in a legal manner, without the risk of being convicted and jailed for corruption. One of the most important results of this model is that a condition for high levels of aggregate product is that the elasticity of marginal utility of private consumption should be greater than the elasticity of marginal utility political consumption. This means that the rate of impatience of private agents should be greater than politicians. This is an interesting issue for an empirical research. This research seeks to dispel the myth that the complexity of legislation is an inevitable by-product of law making, while suggesting that it is the result of a rational choice made by politicians used to conceal legal forms of appropriation of public rent. Up to now legislative complexity has not been considered in a theoretical model as a way to redistribute income in favour of politician, despite the reports of the World Bank and some articles in the press. The problem is that legislative complexity is difficult to define, and is more hard to measure.

This research is a first step in analysing the economic impact of legislative complexity. More in-depth theoretical studies may also include secondary legislation, bureaucracy, as well as empirical analysis.

## Declaration of Competing Interest

Regarding a paper of mine entitled “POLITICAL CORRUPTION AND LEGISLATIVE COMPLEXITY: TWO SIDES OF SAME COIN?.” that I had submitted for possible publication to Structural Change and Economic Dynamics, I declare that have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgements

I am grateful to the Managing Editor, prof. Roberto Scazzieri, and to the two referees for their valuable comments. I am indebted to Roberto Cellini, Richard Epstein, Cristina Giorgiantonio, Naci Mocan, for their invaluable advice and comments on a preliminary draft of this research. An earlier version of this paper was presented at the 33nd annual conference of the European Association of Law and Economics, Bologna (Italy) September 15-17, 2016, and at the Annual Meeting of American Economic Association held in Chicago (IL), January 6-8, 2017. All the views expressed and errors made are the author’s.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.strueco.2021.03.004.

## Appendix

A.1. First Order and transversality conditions.

$$\frac{\partial H}{\partial C} = C^{-\varepsilon} - \lambda_1 = 0, \tag{A.1}$$

$$\frac{\partial H}{\partial B} = B^{-\eta} - \lambda_1 = 0, \tag{A.2}$$

$$\frac{\partial H}{\partial w} = \lambda_1 \beta \frac{RK^{\alpha} w^{\beta} Z^{-\rho}}{w} \left(\frac{G}{K}\right)^{\psi} - \mu\lambda_2 R = 0, \tag{A.3}$$

$$\frac{\partial H}{\partial Z} = -\rho\lambda_2 \frac{Y}{Z} = 0, \tag{A.4}$$

$$\dot{\lambda}_1 = \delta\lambda_1 - \frac{\partial H}{\partial K} = \delta\lambda_1 - \lambda_1 \frac{Y}{K}\left(\alpha - \frac{\psi}{K}\right), \tag{A.5}$$

$$\dot{\lambda}_2 = \delta\lambda_2 - \frac{\partial H}{\partial R} = \delta\lambda_2 - K^{\alpha} w^{\beta} Z^{-\rho} \left(\frac{G}{K}\right)^{\psi} - \lambda_2[(1-w)\mu - \vartheta)], \tag{A.6}$$

The growth rates of dynamic multipliers are

$$g_{\lambda_1} = \frac{\dot{\lambda}_1}{\lambda_1} = \delta - \frac{Y}{K}\left(\alpha - \frac{\psi}{K}\right), \tag{A.7}$$

$$g_{\lambda_2} = \frac{\dot{\lambda}_2}{\lambda_2} = \delta - \frac{K^{\alpha} w^{\beta} Z^{-\rho} \left(\frac{G}{K}\right)^{\psi}}{\lambda_2} - [(1-w)\mu - \vartheta], \tag{A.8}$$

The transversality conditions (Michel, 1982) are

$$\lim_{t\to\infty} e^{-\delta t} H(t) = 0, \tag{A.9}$$

$$\lim_{t\to\infty} e^{-\delta t} \lambda_1(t) K(t) = 0, \tag{A.10}$$

$$\lim_{t\to\infty} e^{-\delta t} \lambda_2(t) R(t) = 0, \tag{A.11}$$

Deriving logarithmically (A.1) and (A.2) we obtain:

$$-\varepsilon g_C = g_{\lambda_1} \tag{A.12}$$

$$-\eta g_B = g_{\lambda_1} \tag{A.13}$$

(A.12) and (A.13) are the same only when the two marginal elasticities of private consumption and political consumption are the same.

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