



Discussing structural breaks in the Portuguese regulation on forest fires—An economic approach



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ABSTRACT

Governments and national parliaments regulate the fight against forest fires by responding to public protests, not only for moral and ethical reasons but also for economic reasons. In this paper, we investigate whether Portuguese legislation focused on forest fires follows a reactive profile (meaning that the regulations follow forest fire disasters) or has a preventive aim (meaning that the regulations are created to prevent forest fires). Using a time series analysis (based on structural breaks and VAR), we found that between 1980 and 2013, Portuguese legislation exhibited a reactive profile.

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1. Introduction

Forestry is (still) an important economic sector that makes substantial contributions in the rural socioeconomic context and influences environmental conditions. Indeed, forestry can complement traditional agricultural production, generating more income in less dense zones and creating employment. However, forestry's contribution to the environment is unequivocal, especially in terms of carbon sequestering. Moreover, the forestry sector contributes to the performance of several upstream and downstream sectors, specifically to activities related to forestry consultancy and to several industries associated with paper, timber and furniture. Portuguese policy makers have bet on forestry as an economic determinant in terms of structural investments, and significant financial investments have been received from structural funds to modernize the entire economy.

Despite this context of the forestry sector's structural importance to the Portuguese economy and the significant amounts that have been invested, forestry is an activity that is very vulnerable to biotic and abiotic factors, specifically to nematodes and fires. Indeed, in recent decades, the forestry sector has been subject to relatively frequent and severe fires. Fire is a major calamity for Portugal's forests but also for other countries, particularly in the Mediterranean Basin.

In considering the dimension of the consequences associated with forest fires in Portugal, the study presented here is intended to investigate the relations among the number of forest fires, the burnt area per fire and the number of legislative documents related to these fires. Therefore, we can identify this work's two major objectives and primary intention. The first objective is to discuss the production of Portuguese legislation in Portugal focused on fighting forest fires in recent decades. The second objective is to determine whether this legislation has followed the pressure of hot years or promoted significant changes in controlling forest fires. The primary intention is to test whether forest fire policies and legislation are reactive or preventive in relation to fire frequency, incidence and severity.

We analyzed the Portuguese legislation related to forest fires and the statistical variables for the number of forest fires and the burnt area per fire. We used official data for the 1980–2013 period. To analyze these questions properly in empirical terms, we investigated structural breakpoints in the time series, and we complemented that investigation with a VAR analysis, which led us to investigate impulse-response functions and the related Granger causality.

The remaining sections of this paper are described as follows. Section 2 reviews the rationale behind forest fire legislation and discusses regulations as an instrument of public policy related to forest fires. In this section, we also analyzed Portuguese legislation on forest fires since 1980 and the evolution of the number of legislative documents on forest fires. Section 3 is the empirical section, which is focused on a study of the structural breakpoints and VARs for Portuguese forest fires, the burnt areas and related

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legislation. Section 3 also discusses our findings in terms of their political implications. Finally, Section 4 concludes the paper.

2. Why forest fire legislation? Regulation as an instrument of public policy on forest fires

According to Kraft and Furlong (2015), there are three sets of reasons for government intervention to correct a socioeconomic problem, namely political reasons, moral or ethical reasons, and economic and market failures. Therefore, these reasons prompt the issuance of public policies on forest fires.

Political reasons are related to changes in public opinion that demand stronger action by political actors on a given issue. One good example of how public opinion has pressured politicians to act in response to forest fires was the pressure that Europeans exerted on the European Commission from 2002–2003, motivating significant changes in European legislation that appeared in 2004–2005 (European Commission, 2004). Moral and ethical reasons arise when, even without public pressure, most citizens agree that the expected public action is the correct and most obvious thing to do. For most people, it is justifiable to support families and producers affected by the severe economic and environmental consequences of forest fires, regardless of those people's party preferences (Kraft and Furlong, 2015). Finally, economic and market failures are diverse; among their causes, we can identify fires' significant externalities that affect the development of rural and urban economies (Mourão and Martinho, 2014), information failures related to the unjustified appropriation of forest resources by an economic agent (Field and Field, 1994), and the sustainable management of pure public goods, such as national parks, protected areas and rivers (Bergstrom and Randall, 1987).

When it is considered useful or pertinent, governments create public policy mechanisms. To create these mechanisms, public actors employ a diverse range of public policy instruments, such as regulation, government management, taxing and spending, market mechanisms, and education, information, and persuasion (Kraft and Furlong, 2015). Among these instruments, regulation is identified as one of the most common instruments, independent of the government's democratic nature and independent of the political wing.

Through regulation, public actors produce legislative documents. These documents have two ends, namely either preventing individuals, corporations, or other units of government from performing actions that have negative societal consequences or responding to a problem that has emerged as significant in the country's recent past.

Although regulation may focus on all socioeconomic fields, we focus first on regulation about environmental and energy policies and second on regulation about forest fires. There are several issues to consider during this discussion, namely the increasing number of legislative documents (focused on preventing and controlling forest fires) that have been published since the 1970s, both globally and in Portugal.

Environmental and energy policies were created much more recently than income inequality, public security or public health policies. As noted by Kraft and Furlong (2015), before the 1970s, environmental and energy policies were not matters of serious governmental concern. After the 1970s, a new perspective appeared around the world and was promoted by new generations of economists (who were also discussing fields such as environmental economics, development economics, and growth economics) and by new generations of politicians concerned about climate changes and sustainable production and consumption (Field and Field, 1994; Bergstrom and Randall, 1987).

A study performed for the FAO by Morgera and Cirelli (2009) provides a good example of an analysis of forest legislation from around the world. It stresses the specificity of the legislative documents related to these issues, taking into account the realities of each country. However, it is important both to adjust legislation to the given actors and to consider interrelations with other laws related to forest fires.

In Portugal, the volume of legislation on forestry has increased, mostly after 1980, not only because of changes in the Portuguese political and socioeconomic context but also because of the nation's entrance into the European Economic Community/European Union. Some authors argue that this latter event resulted in new legislation related to many of the subjects associated with the forest sector as a consequence of the several Common Agricultural Policy reforms and the various Community Support Framework implementations.

A significant portion of Portugal's forestry legislation addresses the forest's abiotic vulnerabilities (fires), biotic attacks (nematodes) and the implementation of Common Agricultural Policy reforms and structural instruments from the different Community Support Frameworks. Indeed, despite the dimension of the Portuguese forest sector's current problems, there have been many investments made to improve forestry structures, and a significant portion of those investments have been supported by the European Union. These programs have been committed to Portugal since 1986; they originated from several Community Support Frameworks and were funded by European structural funds, namely cohesion funds.

In the next sub-section, we detail the Portuguese legislation on forest fires.

2.1. Portuguese legislation on forest fires

2.1.1. Constructing a table for Portuguese legislation on forest fires

We drew upon two sources to construct an exhaustive list of Portuguese documents on forest fires. The first source is the most extensive, up-to-date data source on legislative production in Portugal, located at <http://www.pgdlisboa.pt/home.php>. Several works have been based on this widely recognized data source (Dias, 2008).

The second data source is focused on the Portuguese forest sector. This data source is managed by the Nature and Forest Conservation Institute (ICNF, 2015) and it can be found at <http://www.icnf.pt/portal/icnf/legisl/legislacao>.

These data sources have allowed us to construct Table 1. This table was created after an exhaustive identification of the principal legislation governing the Portuguese forestry sector, specifically the portion related to forest fires. We used the following three primary criteria for considering a document to be related to forest fires:

- The legislation was from a Parliamentary initiative (of the Portuguese National Assembly);
- The legislation was focused on forest fires (directly identified in the title of the document or indirectly revealed in the contents of the document);
- Even if the legislation was focused on other dimensions (such as planning, volunteering, or associativism), the legislation also influenced forestry policies and had direct consequences for forest fires.

2.1.2. Comments about the Portuguese legislative documents on forest fires

From Table 1, we highlight the following:

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