



Série Documentos de Trabalho

Working Papers Series

**Why did people pay taxes ?
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making in times of political struggle
(1500-1680)**

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DT/WP nº 59

ISSN 2183-1785

Instituto Superior de Economia e Gestão
Universidade de Lisboa
Lisboa – 2018

Why did people pay taxes ?

Fiscal innovation in Portugal and state making in times of political struggle (1500-1680) *

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First draft 12.7.2018

*A first and very preliminary version of this paper was presented in 2007 at the Third Iberian Economic History Workshop: Iberometrics, Universidad Mendez Pelayo (Valencia). We thank Rui Pedro Esteves for his comments and encouragement to improve the theoretical support of the argument, after this first presentation. The current version has been presented in seminars at University of Lisbon (Lisbon Economic History Seminars, 2016) and the University of Groningen (Joint Economic History Seminars, 2017), at the 12th European Historical Economics Society Conference, held by the University of Tübingen (2017), and at the University College London symposium on Politics and State Finance in the Peripheries of the Global Economy in Historical Perspective (2018). We thank suggestions and comments of participants in those venues, and, in particular, to Luciano Amaral, Tim Besley, Alejandra Irigoin, Herman de Jong, Joost Jonker, Elena Korchmina, Pedro Lains, Larry Neal, Nuno Palma, Jaime Reis, Oïrol Sabaté, João Paulo Salvado, Álvaro Ferreira da Silva, Sara Torregrosa-Hetland, Coşkun Tunçer and Leonardo Weller. Naturally, all remaining errors and misunderstandings are entirely ours. This article is part of GHES's strategic project UID/SOC/04521/2013 and of UECE's strategic project PEst-OE/EGE/UI0436/2014. Both GHES and UECE have financial support from national funds by FCT (Fundação para a Ciência e a Tecnologia).

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Abstract

This paper considers growing fiscal capacity of the European early modern states as contingent to taxpayer's consent in higher tax loads. It puts forward the hypothesis that war damages were the main factor guiding the taxpayer's cost-benefit assessment of consenting or violently resisting to a fiscal innovation. To test the hypotheses, we consider data on Portugal in times of political struggle against the Habsburgs to restore and keep the political autonomy after 1640. The war was financed by an entirely new, universal income tax, remaining in the Portuguese fiscal system well until the liberal revolution in 1820, although enforced by a decentralized and non-specialized administration. A model derives the optimal tax rate from the standpoint of the taxpayer as a function of war intensity, risk aversion, and awareness that evasion would enhance war damages. Data on damages, contemporary assessments of the tax base, and amounts enforced allow the model's calibration. Results suggest the accuracy of the hypothesis and draw the conclusion that taxpayers' utility in paying the new tax determined the effective tax rate (tax enforced). This paper claims that ultimately improvements in the fiscal capacity of states needed taxpayer's perception of high levels of destruction, hence any political regime in early modern Europe must have found in war damages a persuasive argument to make effective a fiscal innovation. The other contribution of this case study is pointing out the advantage of the assignment of the tax collection to local, non-professional administration, for the endurance of a fiscal system, which incorporated an income tax that withstood the liberal revolution. It enhanced the role of peer monitoring and turned out to be an effective way of instilling social norms contributing to build up the taxpayer's liability, which somehow the liberal state in 19th century exploited within a different technological environment.

KEYWORDS: Portugal, early modern economies, income tax, state capacity

JEL CODES: N13, H31, H26

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1 Introduction

Quantitative and comparative analyses of fiscal efficacy in early modern Europe acknowledge the coercive components of fiscal systems, as much as evasion ([Bonney \(1999\)](#), [Hoffman and Norberg \(1994\)](#), [Tilly \(1990\)](#), [Brewer \(1989\)](#), [O'Brien and Hunt \(1999\)](#)). Evasion is the flipside of consent; thus taxpayer's cooperative behavior is another dimension of the problem, although harder to apprehend in a historical perspective of state building. This paper takes this challenge as motivation and searches the incentives for taxpayers' consent in fiscal innovations, particularly if fiscal innovations increased the tax load. A full understanding of the rise of early modern states' fiscal capacity should consider plural paths towards lower political costs of extraction. We put forward the hypothesis that the rulers' capacity to extract revenues depended on the taxpayer's utility in diverting the threat of losing income and property in war contexts, in as much as on tax collection systems based on local, ad hoc organizations. State making processes may imply taxpayers' cooperative behavior, which in turn may have required institutional arrangements diverse from those found in modern, Weberian ideal-type states, assisted by centralized and efficient tax administrations ([Arden \(1975\)](#), [Besley and Persson \(2011\)](#), [Epstein \(2000\)](#), [Mann \(1986\)](#), [Ogilvie and Carus \(2014\)](#), [Tilly \(1975, 1990\)](#)). If informational costs were high, local administration involving peer monitoring and reputational devices may have contributed to build up taxpayers' liability.

Portugal in the 17th century can be an illustrative case to test our hypothesis. This country history tells us the political limits of taxation in early modern Europe entailing the fragmentation of large units, like the Habsburg monarchy. Portugal restored independence in 1640, after a period of widespread unrest incited by several new levies. The rule of the new king John IV doubled the state's fiscal capacity through means repudiated a few years earlier. The war against the Habsburg Philip IV was thus financed by an entirely new, uniform income tax, levied at 10% rate ([Costa \(2005\)](#), [Costa and Cunha \(2006\)](#), [Magalhães \(2004\)](#)). Once the war was over, the endurance of the tax was assured by a reduction of the rate to 4.5%, which allowed this tax to withstand the liberal revolution in 1821. The shifting behavior of the Portuguese taxpayer from 1638 to 1641, within four years of political contention, supports the notion that consent was a determinant variable in the fiscal innovation success, since the legitimation of the new king's authority was not entirely established and no administrative infrastructure could efficiently control evasion¹.

This paper relates the taxpayer's behavior, modelled as a variant of the [Allingham and](#)

¹Political legitimacy has received scarce attention in state making literature ([Greif and Rubin \(2015\)](#))

[Sandmo \(1972\)](#) tax evasion, to data on war damages and intensity of the war. In this case the tax-payer can gamble jointly with the tax authority (as in that paper) and with war damages. Although war damages are random, the tax-payer derives benefits from taxes as a way to keep war at bay. Data on damages, contemporary assessments of the tax base, and amounts collected allow the model's calibration to test the accuracy of the hypothesis. Those two reasons for paying taxes, penalty avoidance and protection provided by taxes, which we can call extrinsic motives, add to intrinsic motives, which we assume deriving from a tax morale instilled by tax collection systems ([Luttmer and Singhal \(2014\)](#)) and a clearer perceived legitimacy of the decision process.

The notion that increasing levels of destruction improved fiscal capacity is a critical inference from the model. Results also show the consistency of a lower rate, close to the optimal rate, once the war was over, which suggests the efficacy of substituting the coercive component ascribed to a centralized administration by peer monitoring and reputational constraints at the community level.

This research broadens the current view on fiscal capacity, which has been most focused on political constitutions since North and Weingast seminal work ([North and Weingast \(1989\)](#)) and on tax systems (centralized versus decentralized), whereas the methods of collection and taxpayers' willingness to pay are topics less covered in the theoretical literature ([Dincecco \(2009\)](#), [Van Zanden and Prak \(2006\)](#), [Karaman and Pamuk \(2010\)](#)). Our conclusions point to war damages on capital as a condition to make valid a fiscal innovation, which is an inference applied either to absolutist or parliamentary regimes in early modern Europe. Besides, this study adds historical evidence of the local collection of centralized taxes, curtailing moral hazard issues and regional free riding, which compensated the low enforcement capacity of the centralized administration.

2 War and taxes

Since the fall of the Roman Empire, military rivalry and political fragmentation describe the European political and financial development. Rulers took part in a winner-take-all game, whose spillovers in technological improvements underpinned Europe's ability to capture rents at a global scale after 1500. This military background challenged the integrity of large units, such as the Habsburg monarchy, and hampered the rise of continental empires like China in Asia ([Hoffman \(2015\)](#)). Above all, in its long-term consequences, military might underpinned

a social order based on what J. Schumpeter called the tax state ([Schumpeter \(1991\)](#)(1918)) allowing the rulers to extract a share of the economic surplus as a means to finance such a violent environment. An impressive body of scholarly works has addressed the history of the fiscal state and questioned the factors for growing fiscal capacity. An extended sample of studies has observed the sources of revenue, expenditure, and tax structures ([Bonney \(1999\)](#), [Brewer \(1989\)](#), [Ormrod et al. \(1999\)](#), [O'Brien \(1988, 2001\)](#) [Fritschy \(2003\)](#), [Hart \(1993\)](#), [Hoffman and Norberg \(1994\)](#), [Yun Casalilla \(2004\)](#)). Another significant strand of researchers delve into the factors for the state's financial credibility, pursuing the lead of Dickson's ([Dickson \(1967\)](#)) work on English financial revolution and North and Weingast's ([North and Weingast \(1989\)](#)) view on political constitution impacts on fiscal efficiency ([Hoffman and Norberg \(1994\)](#), [Epstein \(2000\)](#), [Carruthers \(1996\)](#), [Cox \(2011\)](#), [Dincecco \(2009\)](#), [Van Zanden and Prak \(2006\)](#), [Grafe \(2012\)](#), [Grafe and Irigoien \(2012\)](#), [Coffman et al. \(2013\)](#)).

Recently a theoretical literature has explored the causal links between political institutions and fiscal income. Significant contributions have shown that centralized taxation ([Dincecco \(2009\)](#)), the size of the territory and the partisan composition of parliaments ([Carruthers \(1996\)](#), [Stasavage \(2010, 2011\)](#), [Dincecco and Katz \(2016\)](#)) mattered. Nevertheless, economic fundamentals should also be included in the list of causes, since the degree of monetization and the sectoral composition of the GDP affect the statistical significance of political constitutions. Thus, political regime mattered, but as Karaman and Pamuk demonstrated, it did it in a contingent way ([Karaman and Pamuk \(2010\)](#)).

Taking into account the regularities in the process of state-making in Europe we have just pointed out, the case we address in this paper presents some unusual features regarding the tax structure, the administration of tax collection, and the political constitution that supports the state's ability to raise extraordinary taxation.

Firstly, considering tax structures, Great Britain and the United Provinces illustrate the success of indirect taxation and public debt to wage long-lasting wars ([Fritschy \(2003\)](#), [Hart \(1993\)](#), [O'Brien \(1988\)](#), [O'Brien and Hunt \(1999\)](#)). Apart from Great Britain's experience during the Napoleonic wars ([O'Brien \(2001\)](#)), there is no study documenting the introduction of an income tax financing a war and becoming a permanent component of a tax system. Portugal raised an income tax in 1640 and kept it in its fiscal system after the war against the Habsburgs ended in 1668. Although Portugal and United Provinces emerged victorious in their fight for political autonomy, remarkable differences separate both cases concerning the financial solutions adopted.

There is evidence of direct taxation raising informational and negotiation costs (Bonney, 1999, p. 434), when compared with other forms of taxation. The successful cases in northwestern Europe led scholars to emphasize the advantages of indirect taxes in the first stages of political development. However, a comparison between operational costs of direct versus indirect taxation is missing, so there is no demonstration that direct taxation imposed unsurmountable costs of compliance. Administrative issues have a part in the range of variables affecting the fiscal capacity of states, and well-grounded literature has consistently shown that centralization increased fiscal efficiency. Yet, centralized taxation is often a loosely defined concept (Summerhill, 2008, p.222-3) either denoting uniform tax rates or professional and centralized bureaucracy neutralizing local elites' resistance and regional free riding (Dincecco (2009) and Dincecco and Katz (2016)). In any event, centralized tax rates and local, non-professional, administrations worked together in early modern Europe. This same combination enforced the Land Tax in England and still propelled public revenue after the Glorious Revolution (Beckett (1985), Beckett and Turner (1990)). Growing fiscal efficiency counted on the sovereigns' exploitation of taxpayers' social safety nets which raised reputational restraints to free riding (Greif et al. (2013)), and made local administration as effective as a centralized bureaucracy to raise taxes. The success of the financial innovation in Portugal rested on a universal tax rate, on the centralization of both the revenue and expenditure, while the collection was left to local, ad-hoc administration, encroached in taxpayers' nets.

Secondly, considering the political constitution which proved better in improving fiscal capacity, parliamentary representation is deemed more effective because it monitored government's expenditure and made it easier to authorize more funds to wage wars. The benefits of this institutional arrangement rely on consent rather than coercion. Still, any other means of informing the taxpayer's decisions as it happened when the quartering of troops affected the daily life of villages and households may eventually incite consent on higher tax burden and improve the state's fiscal capacity as much as political representation did. The literature concerned with state's capacity has thus not carefully examined the diversity of mechanisms which could frame taxpayers' rationale.

Finally, since Schumpeter's foundational paper, taxes and public debt are thought a consequence of the rulers' monopoly of violence, meaning that protection (to property and people's physical integrity) was the public good at stake in any process of state making (Besley and Persson (2009)). However, war could be in many respects a "private good of

princes in their search for glory and personal power, with financing often meeting the resistance of taxpayers” (Gennaioli and Voth (2015)). In that case, the question turns out to be: how did a private war of princes become a taxpayer’s private concern? We dwelve into this issue by conceding that legitimation of expenditure and information asymmetry severely constrained early modern states’ capacity. Still, political representation and tax centralization (the ideal-type in a modern state) were means among others of releasing these constraints. Therefore, absolutist regimes could have also improved fiscal capacity not necessarily by resting on higher levels of coercion. For further discussion of the factors for improving state’s fiscal capacity we need to pointing out Portuguese taxation main features. In the next section, we describe the institutionally distinct sources of revenue and systematize the uniform and centralized taxes that characterized the Portuguese fiscal system since medieval times, which will tell us whether the new income tax introduced in 1640 consistently changed the state’s fiscal capacity.

3 Portugal’s fiscal history: 1500-1638

3.1 Government sources of income

The institutional framework of taxation demands an analytical distinction between the revenue derived from the exploitation of the colonial empire and that depending on the domestic economy. A significant part of the state’s colonial revenues were domain rights, regularly farmed out to private investors, which duly endorses historians’ view on early modern Portugal as an entrepreneurial variant of a domain State (Ormrod et al., 1999, p. 12-15). Besides, the economy overseas generated fiscal revenues not transferred to Portugal, respecting the principle of the colonies’ ficial self-sufficiency. Hence, ruling and defending the colonial empire was not supposed to require tax streams to back up the royal power overseas (Pedreira (2007)). Notwithstanding its domain features, the role of the empire stood out in the 16th century (see Table 1) by granting 57 percent of total revenues. Conversely, the impact of the colonial trade on Portugal’s GDP by that time was almost insignificant. In the golden age of Brazil (1700-1780), colonial rents hovered around 31-33 percent, but then the trade in the colonial system boosted the kingdom’s GDP per capita significantly (Costa et al. (2015)). Hence, the contribution of the empire to the state’s total income did not necessarily go in tandem with its contribution to the macroeconomic performance of the mother country.

State making meant increasing fiscal efficiency together with a territorialized system of

Table 1: Government’s sources of revenue

	empire ¹	kingdom ²
1500-1549	57	12
1550-1599	42	34
1600-1639	35	59
1640-1699	8.2	82
1716	14	106
1765	34	114
1804	32	152

¹ percentage of total revenue

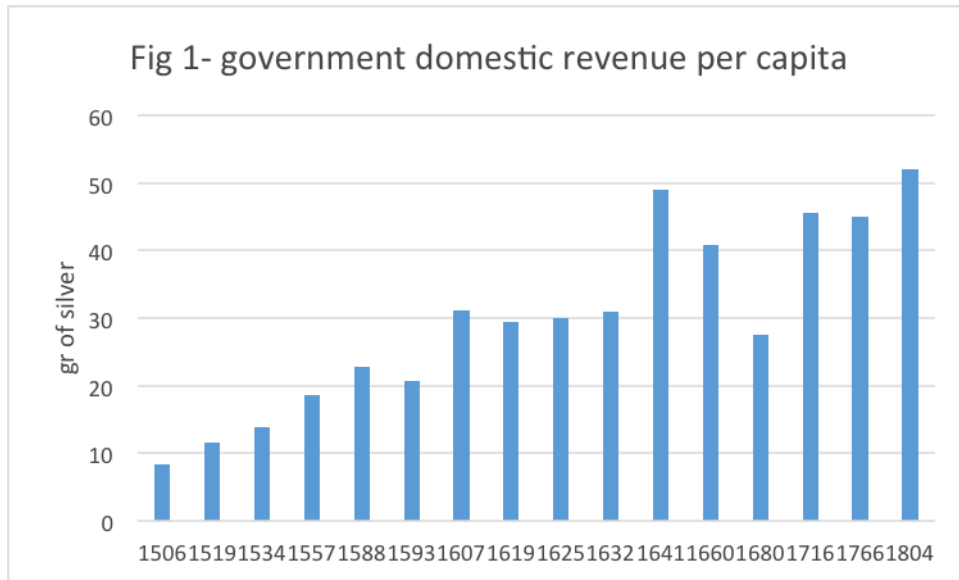
² annual average in tons of silver

Source: Appendix A.

coordination of local forms of political order (Epstein (2000)). Using this lens, we can identify periods in which the growing size of Portuguese budgets did not reflect higher levels of "stateness". Fiscal income could rise just because the empire offered additional domain sources, as it happened with dyewood, gold or diamond extraction in Brazil farmed out to powerful consortia. When leasing property rights over colonial resources, the kings underwrote a contract, incurring the risk of the other party’s moral hazard or default. Differently, taxes collected in the kingdom had implementation mechanisms involving both parties’ sharing moral hazard risks. Taxpayers could breach the fiscal pact, because of either they free ride as a strategy or suspect the ruler’s default if expenditure did not meet the alleged cause for collecting more money. Therefore, to find how much the fiscal innovation during the war of restoration heightened state’s capacity, we must focus on domestic taxation only and reassess the values in column 2 (Table 1). Figure 1 displays government revenues net of colonial rents. It shows that the restoration boosted revenues, collected through a new income tax (the *décima* tax legally set at 10%), and lost momentum afterwards, so that 1680 capitation was below any other observation in the 17th century. This decline stemmed both from the lower rate of the *décima* tax, now set at 4.5% in times of peace, and economic contraction.

International comparisons using daily wages broaden the view on the *décima* impact and social implications (Table 2). The national cases gathered in table 2 are representative for different reasons. Portugal, Spain and the Netherlands were belligerents in the same wars, the fact making any comparison of tax loads worth of mention. England and France

Figure 1



Source: Appendix A.

are illustrative of divergent paths due to contrasting political institutions, the former for its early-centralized tax system assisted by representative institutions, and the latter for its absolutist regime's low fiscal capacity (Dincecco (2009) Hoffman and Norberg (1994)).

Confirming the uniqueness of the Dutch path, data show this country's heavy taxation already in the first decades of the 17th century, the reason why scholars have referred to a tax revolution waging the war against the Habsburgs (Fritschy (2003)). However, according to data in Table 2, the fight against Philippe IV to regain political autonomy (1641-1668) also became a landmark in Portugal's fiscal history. After a period marked by a significant gap relatively to Castile (1600-1649), the restoration pushed the tax load up to a level quite above the English one. It appears that Portugal's absolutist political constitution allowed a fiscal capacity higher, or quite close, to that of England, still in the first half of the 18th century.

3.2 Tax structure from the medieval age

Portugal's fiscal performance from 1640 onwards owed much to an income tax that heightened at an unprecedented level the importance of direct taxation for the royal treasury. The tax

Table 2: Per capita government revenue in daily wages for unskilled workers

	Portugal	Spain	Dutch Rep.	England	France
1500-1549	2.6	3.0		1.5	2.6
1550-1599	3.8	4.0		2.7	3.2
1600-1649	4.5	7.2	12.0	2.6	3.0
1650-1699	7.2	7.7	13.6	4.2	8.0
1700-1749	7.1	4.6	24.1	8.9	6.7
1750-1799	8.0	10.0	22.8	12.6	11.4
1800-1849	9.1	8.6		13.5	14.3

Sources: Portugal 1500-1819 in Appendix A, and Portugal 1800-1849 and other cases in [Palma and Reis \(2016\)](#), based on [Karaman and Pamuk \(2010\)](#)

base of the *décima* tax (wages, rents, interests, and profits) became legitimate in Cortes, from 1641 onwards, which enforced a 10% rate. In peace time it went down to 4.5%. Hence, Portuguese taxpayers' liability for an income tax had a long-lasting tradition when the liberal regime, in the nineteenth century, reformed the operational costs of this source of revenue.

Before this enduring innovation, the kingdoms' fiscal system had rested on indirect taxation. Indeed, the prior statements on resources from the colonial empire demanding an institutionally particular framework, go without saying that the colonial extension of the Portuguese economy was marginal to the kingdom's tax revenue. Portugal's foreign trade comprised the imports and re-exports of exotic commodities, which drove up customs duties right from the turn of the 15th century to the 16th century (([Godinho, 1978](#), pp. 31-74), [Pereira \(2003\)](#)). In the last decade of the 16th-century, customs and other fiscal revenues exacted from maritime sectors hovered around 33-35% of the total levied in the domestic market. There were no constitutional constraints to the crown's alteration on tariffs, although they were not uniform taxes.

The role of indirect taxation was a feature of the Iberian kingdoms, altogether distinct in this respect from other European political units at the outset of the colonial expansion. Elsewhere in Europe, direct taxation (mainly based on land) performed the bulk of revenue extraction. In Portugal, market-oriented production granted the base of a sales tax called *sisá*, the equivalent to the *alcabala* enforced in Castile (([Tortella and Comn, 1993](#), p. 146), ([Dominguez Ortiz, 1983](#), p. 195)). It was administrated by six *Almoxarifados* (fiscal and administrative regions), contributing approximately 90% of revenue collected in these fiscal agencies. Revenues from *Almoxarifados* tended to equal customs, both sources performing

two-thirds of the domestic fiscal revenue.

The *sis*a moulded the Portuguese fiscal system. Firstly, it allowed the Crown to leave the land to the aristocracy and the church to tax. As a legacy of the extended period of the war of Reconquista to the Muslims, those two political bodies, and leading contenders to the kings' power, had their means of extracting an economic surplus from direct taxation. Secondly, the *sis*a was in its origins a local tax, consigned to local expenditure under the management of municipal assemblies. It turned out to be a uniform, centralized tax, to finance the war against Castile in 1383. The alteration was approved in Courts and determined a first and vital step towards fiscal centralization. Thirdly, the transfer of rights over the *sis*a from local assemblies to the crown was legitimized as a donation, which was more than symbolic procedure. It meant that this tax yields never contributed to the rewards the kings granted the nobility. Finally, this medieval innovation demonstrated the capacity of the crown to make uniform taxes to endure beyond the particular context that had legitimized it. The complaints of the Third Estate (commoners) in later Courts insisting on the *sis*a regaining its county characteristics had never deserved a positive response from sovereigns ([Oliveira, 1972](#), pp. 298-320).

In 1565 the crown devolved collection to the municipalities but kept the yields centralized. The reform implied the delivery of lump sums to the royal treasury, the amounts being renegotiated every three to six years. The contract allowed some degree of freedom to handle tax bases, so no wonder the amounts lost their initial tie to sales. The so-called "encabeçamento" (fixed amount) of the *sis*a may have halted the path towards fiscal centralization, as some historians have claimed ([Ferreira da Silva, 2004](#), p. 244). However, negotiation with local powers did not necessarily penalize the political core, since fiscal decentralization assigned the risk to local powers. There is evidence of municipal authorities creating new tax bases to raise enough money to accomplish the sums contracted. Thus, 30 to 60% of the value of the lump-sum ("cabeção") needed occasional levies on wealth ([Oliveira, 1972](#), p. 308, tables pp. 348 and 359). The new administration of the *sis*a made it similar to any system of quotas common in Europe. The scheme of quotas, in Portugal as elsewhere, could solve operational costs, as it happened in England with the Monthly Assessment taxes. It also respected better the principle of a fiscal federation, as it happened in the Dutch Republic, wherein the assignment of quotas to each Province went together with the centralized decision over expenditures (([Beckett, 1985](#), pp. 285-308), ([t Hart, 1993](#), p. 79)).

Hence, centralized decision over tax rates and expenditure together with tax collection

assigned to local powers rooted the process of state-making in Europe. It occurred in the absolutist Castile, as well as in parliamentary regimes, or federalist republics like England or the Dutch Republic (Dincecco (2009); Dincecco and Katz (2016), Yun Casalilla (2004)). Thus, it is worth mentioning that improvements in state's fiscal capacity everywhere rested on institutional arrangements that involved local powers and non-professional administrations, still in 18th-century, as it happened in England with the Land Tax.

Importantly, in the case of Portugal the fiscal contract ruling the *sis*a, which involved municipalities, contributed to smooth out the coercive character inherent to centralized decision over expenditure. However, it also prevented the use of this source for raising extraordinary money, which severely constrained the central power in periods of war. In the next section we find the fundamentals of Philip IV setbacks due to this fiscal constitution and the underpinnings of Portugal's political independence.

4 Philip IV and John IV tax burdens

In the 1630s, multiple fronts of war in Asia asked for increasing funds, whilst the war in Flanders diverted Castilian resources. Philip IV's purpose of raising the quota of the *sis*a (encabeçamento) in 25% went together with the demand for other taxes, one based on income and the other on excises on wine and meat. The budget dated from 1632 is the best archive evidence available to assess how much these requests aggravated the current tax burden. The domestic revenue totaled 822.5 million *r*éis, of which 175.5 million came from *Almoxarifados* and depended on more than 90% on the yields of the *sis*a. If this source were set to rise by 25%, it would add 43.9 million *r*éis. To this amount, impositions on wine and meat in the municipalities of the whole kingdom would contribute more 160 million *r*éis. In short, Philip IV was counting on raising further 200 million *r*éis.

To gauge the impact of the additional 200 million over 822.5 million *r*éis, estimated as total tax receipts in the budget, we use prices of wheat, which also allows measuring the impact of the financial request on the tax load. We take the average, between the lower and upper bounds, of the price of one bushel in Lisbon, the largest urban center (220 *r*éis), and in Évora, the town in the southern area of Alentejo, where wheat took the most significant share of the agrarian output (196 *r*éis)². We thus estimate a tax receipt between 62,949,949

²Price per bushel in 1636: 196 *r*éis (5 years moving average). Each bushel = 15 kg. See data on prices in Santos (2003), Appendices, and [http://pwr-portugal.ics.ul.pt/\(Price,wages,andrentsinPortugal,PWRproject\)](http://pwr-portugal.ics.ul.pt/(Price,wages,andrentsinPortugal,PWRproject)).

Table 3: Phillip IV and John IV fiscal demands

dates	capitation ¹	tax load ²
1633	30	4.5
1635	40	7.3
1641	55	10.0

¹ kg of wheat at Lisbon prices;

² capitation/total consumption
total consumption = 547 kg

kg and 56,082,682 kg. The population at the time was close to 2,000,000 inhabitants ((Palma and Reis, 2016, table A7)), pointing to a capitation 33-30 kg (table 3). Scholars have found a similar capitation in Ancient Rome (Bonney, 1999, p. 9) so that our estimation points to a capitation common to other agrarian economies.

The ratio capitation/consumption of wheat gives a measure of the tax load (see Table 3). Assuming the annual consumption per person could vary from 547 kg to 730 kg of wheat (Oliveira (1980)), 33 kg per capita represented a tax burden hovering around 4.5- 6%. The additional 200 million *réis* that Philip IV requested would set the capitation at 40 to 45 kg, meaning a 1% increase in the tax burden. Hence, 4.5% tax load appears to have been a threshold, above which political costs would have risen.

The Spanish rule looked for extra money without summoning the Cortes in Portugal which disregarded the kingdom's fiscal constitution. Furthermore, Portuguese taxpayers did not handle well the Hapsburg's claim for more money to wage wars in places the majority of the people had not heard about. Colonial endeavors were in far distant territories overseas, usually associated to the origin of riches, not to the need of higher taxes. The military campaigns in North Africa had been an exception when they forced the kings John III and Sebastião to ask for money in the 16th century. Such requests faced no resistance from Catholic subjects convinced that the Crusade was worthy a subsidy.

Philip IV determination to increase the "encabeçamento" of *sisá* in 25% to provide military protection to possessions in Asia in the 1630s caused the first wave of discontentment. But it was the king's orders to introduce an income tax in 1638 which faced the most severe resistance triggering the *coup d'État* in 1640. Portugal's revolt against the Habsburg was not an extraordinary event in the European history of state-making. Royal levies caused popular uprisings and often not because of the peoples' economic constraints, but rather

due to fiscal constitutional principles. However, uprisings in Portugal reached long-lasting consequences, for they threw the seeds of political fragmentation in the Iberian Peninsula. We ask why did Philip IV face such a stiff resistance from taxpayers. Tax load could be already too heavy by late 1630s, as it was almost two times that in England, but on the other hand, it was under the Castilian threshold.

If riots paved the way for the *coup d'État* in 1640, they may indicate the taxpayer's unwillingness to pay for removing a threat over too far-distant territories, where the majority of the common people had no capital or interest. Besides, there were no constitutional means of monitoring the expenditure of the money raised in Portugal. Thus constitutional constraints could have also framed the events of 1640, but there is no doubt that taxpayers showed sympathy for John IV. The same taxpayer who repudiated Philip IV's needs endorsed the rights of John Duke of Braganza to the throne of Portugal on December the 1st, 1640. The new king eventually asked for one third more than the amount the Spanish king demanded and met no resistance at all.

How the revolt unfolded is not a matter here, nor the full analysis of the political speech building up the legitimacy of the *coup d'État* (Costa and Cunha (2006)). It is worth mentioning, however, that the church played an active part in the revolt. The sermons, particularly after 1630, had supported the public view of a Spanish usurpation of power and extortion. The process of political autonomy began on December, 1st of 1640 when noblemen invaded the palace where the Vice Roy (the Duchess of Mantua) resided. At the county level, local oligarchies (municipal assemblies) adhered to the secession immediately afterwards, justifying the country's military mobilization.

Between 1641 and 1642 an ambitious fiscal reform introduced a universal income tax to wage a war mainly fought along the borders and in the plains of Alentejo, in southern Portugal. The tax called *décima* had a 10% rate levied on rents (of urban or rural property), profits, interests, and wages. It was expected to yield 680 million *réis*. Still, the remainder 189 million the new king asked for counted on indirect taxation. Eventually, the people accepted levies on wine and meat, making the riots against Philip IV a demonstration that taxpayers' willingness to pay was a determinant variable of the fiscal capacity of absolutist regimes. According to 1641 budget, the domestic economy sustained a revenue equivalent to 90,308,123 kg of wheat (at Lisbon prices), that is, approximately 55 kg per capita, about 25% more than what had been refused to Philip IV. Such an increase of the tax load did not leave archive evidence of riots or of any other form of political unrest after 1640. Hence, our

findings trace back an innovation and an increase in the tax burden with small political costs.

Portugal won the war, which is the expected outcome considering the chance of victory depended not only on the military technology but also on the small political costs inherent to the confrontation (Hoffman (2015)). However, tax evasion, as a silent form of resistance, could have been the new king's great challenge, given the revolutionary backdrop against which the *décima* was being implemented. In the next section, we analyze the administrative architecture of this fiscal reform and the taxpayers' motivation in consenting to a more burdensome taxation.

5 The *décima* tax: 1640-1800

The *décima* tax was sanctioned in Cortes to pay for the costs of the political autonomy as if this was a common interest and not just the goal of a duke enthroned king. It demanded a specific administration to assess and collect its yield. Local powers were involved in the system right from the beginning. Considering that state making meant increasing fiscal efficiency together with a territorialized system of coordination of local forms of political order (Epstein (2000)), this fiscal innovation encompassed the features that altered the level of stateness of the Portuguese political unit as much as the *sisá* tax did in medieval times.

Municipalities were ruled by elected senates, whose members were of the middling sort, usually in the network of aristocrats with local influence either for the extension of their estates, or for seigniorial and jurisdictional rights in the region granted by the king. Every three years, the name list of the elected members of senates required the kings to approve it formally. These elected municipal senates administered local taxes and expenditure, as well as the collection of central taxes as it happened with the *sisá* tax. As for the *décima* tax, the aldermen appointed the assessors of taxable income under the supervision of local agents of a central bureau known as *Junta dos Três Estados* (Council of the Three Estates). This bureau worked as a royal council and gathered members from the three political bodies assembled in Cortes (the church, the nobility, and the commoners - the Third Estate). The money collected locally was redistributed among the military districts by this central bureau.

Resorting to aldermen and assigning the assessment and collection to decentralized structures not only lowered operational costs but also solved compliance issues by close monitoring³. However, assessing the tax base had also high informational costs which initially called for

³Magalhães (2004) and legislation published in (Silva, 1856, p. 143-148) also on <http://www.>

Table 4: Enforcement of the *décima*

	assessment M <i>réis</i>	enforcement M <i>réis</i>	enforcement %	effective tax %
1641-1649	680.0	397.0	58.4	5.8
1644	428.0	408.0	95.3	9.5
1650	628.2	502.6	80.0	8.0
1651	632.7	454.7	71.9	7.2
1652	635.8	296.6	46.6	4.7
1653	642.2	523.3	81.5	8.2

Sources: (Hespanha, 1994, p. 182); Lisbon Archives, Biblioteca da Ajuda 51-VI-19, fol. 127 and next; (Costa, 2004a, p. 41)

the expertise of agents outside the state administration. According to the law from 1642, the modes of collection should follow the procedures well known to church agents (not necessarily clergies) who handled the tithe, presuming these men knew how to evaluate income from a given asset (capital or land). Hence, the church delivered information which allowed checking the ledgers of the *décima* assessment. Studies in state building have seldom considered such a role of religious administrations for their organizational and informational expertise ⁴.

The amounts assessed and collected provide us evidence of the administrative accomplishments (Table 4). The numbers from the whole decade of the 1640s point to critical hurdles in the implementation of the system, widening the gap between the amount authorized in Cortes and the sum actually received by the *Junta dos Três Estados* (680 million against 397 million *réis*). However, data referring the particular year of 1644, for which we know in detail the efficacy of the tax collection, tell us that even in a phase implementation of the new tax, the assessed revenue could be quite close to the amounts enforced. This year coincided with the only decisive battle fought in the first decade of war.

From the standpoint of the central power, taxpayers' evasion was the main concern from the onset of the process. The state's perception of flaws in the assessment procedures led to the enactment of legislation deciding when and how the agents of the central administration (*Junta dos Três Estados*) should referee the process assigned to local administrations, accepting the possibility of influential taxpayers bullying local assessors. Still, figures in

governodosoutros.ics.ul.pt/?menu=arquivo).

⁴The role of religion in the process of state building is usually considered only for legitimation issues. See, Rubin (2017).

Table 4 point to a reasonable level of efficacy of a centralized income tax, locally collected and implemented in a context of social turmoil. Enforcement reached an average 70% rate, which may be considered an impressive outcome. At the same token, there is no evidence of the use of violent means to exact the amounts, contrary to what happened in seventeenth century France (Bonney, 1999, p. 434-435).

Explaining this innovation success is the main issue. Indeed, the Cortes assembling every three-years created an institutional environment suited to tone down taxpayers' resistance. There was time to complain about the army disturbing the daily life of households, and contend that taxes and conscription meant a double charge on taxpayers (Costa (2004b,a)). There were further reasons for contention. In 1645, the municipalities claimed the money was not properly managed, and a lot was being diverted by military officers' bribery to relieve some men from conscription. Usually the government dealt with the protests by creating the expectation that the war would be over by the time of the next summon of Cortes (Costa (2004a)). Such expectations on the short-livedness of the war smoothed out resistance and improved the efficacy of the fiscal innovation. (Ames and Rapp (1977)). As for more educated and wealthy taxpayers, juridical arguments claiming the king's rights to the throne, and underlining the risks of expropriation should Philip IV have regained the throne, certainly contributed to their low resistance to a heavier tax burden too. Indeed, Cortes' summoning helped to strengthen the bonds between king and subjects. Both the king and the people learned about the other party's expectations, the Cortes working as a Parliament in this regard. Although it lacked the constitutional basis to restrain the kings' decision and to control expenditures, Cortes may have had an effect on taxpayers' consent.

However, extrinsic mechanisms, possibly more powerful, must have made people accept a fiscal deal that asked for a 30% rise in the tax burden, closer to an equilibrium tax rate, as data on tax avoidance presented in Table 4 suggests. We conjecture that the rate of enforcement was the fair price to pay for a perceived service, which consisted in diverting a threat on daily lives of households, which a war fought in the proximity entailed. Independently from the intrinsic motives, outlined previously, the extrinsic motives to pay taxes could be fundamentally related to the place in which the war financed by the new tax was fought. During the Habsburgs' rule, the war waged by new taxes triggering violent resistance, took place in territories distant from the taxpayers' location. Conversely, during the restoration war the consent for a high tax burden encompassed disturbances in closed proximity to households, which accompanied the frequent quartering of troupes in villages.

Table 5: The *décima* tax: 1641-1800

period	tax rate (%)
1641-1668	10.0
1669-1702	4.5
1703-1714	10.0
1715-1760	4.5
1761-1800	10.0

This implied people’s loss of capital due to well-documented requests of horses and cattle, the accommodation of soldiers for an uncertain time, robbery perpetrated by both sides of the conflict, and women victims of rape (Freitas (2007)). The accommodation of troupes in villages of Alentejo (Mourão, for instance), destroyed most of the housing during the military campaigns from 1659 onwards. The war also had maritime extensions, which endangered in great extent colonial shipping.

The intimate relationship between the *décima* and war financing continued throughout the rest of the early modern period, until the Seven Years’ war, as we can see in table 5: it was set at 4.5% in peaceful times and at 10% in war times. Because 4.5% rate is equal to minimum tax load we have found for the period in which we have data (see Table 3) we conjecture that it was, more generically, paid for intrinsic reasons. In the next section, we analyze the factors which could justify the rate of execution of the *décima* tax by extrinsic motives.

6 Restoration war: data on damages and war intensity

Portugal’s fiscal capacity, like that of any other political unit undergoing a process of state making, must have counted on taxpayers’ self-interest in complying with fiscal authorities in times of war. Tracking a well-grounded literature, we recognize the critical role played by in-doors warfare in state building. Before presenting and applying a model linking disorder in a context of defensive war to taxpayers’ incentives, we need to examine the extent of damages and the intensity of war.

To estimate war damages, we take data from the Alentejo as representative of inland war losses. In this southward region of the country, many towns and villages were on the route of the Spanish armies in case of invasion. Here stationed 50% of the infantry and 73% of the

cavalry. The military district of Alentejo demanded 71% of the war budget, which is in clear contrast with 1.7% spent with sea fortresses in the Lisbon / Cascais, Peniche and Setúbal ⁵. No doubt the Alentejo was the area most exposed to military pressure. It appears to be the best area to evaluate the impact of the conflict in agriculture.

The rental market in 31 properties provides data to calculate an average rate of damage. Two series are available from Santos (2003). One contains the contract specified rent, and the other contains the rents paid. The difference was the outcome of many loss-making situations; environmental factors interfered alongside war damages, inciting the tenants to renegotiate the lease with the landlord. Rui Santos' estimation of a risk index in agriculture point to 6.4% in the 1640's, 5.5% in the 1650's, and 9.3% in the 1660's. Apart from the difference between nominal and actual rents, this risk index covers the turnover of tenants as reflecting the instability of the land market. In this paper, however, only the reduction in rent is significant information. We need to compare uncertainty in the agrarian economy with that in maritime contexts, affecting shipping. The shipmasters' turnovers in freight contracts did not necessarily signal higher risk in the sector. Hence, for our purposes, the ratio of contracted rents and actual rents is the information we use to estimate damages in each property and an annual average of losses in the agrarian sector (Table ?? appendix and Figure 2)

Rates of losses below 10% are largely more frequent than above that level. In peace years, between 1668 and 1680, the average fell to 1.39%, which indicates the standard risk in agriculture under normal weather. Conversely, a few peaks draw the attention to the first year of the 1650s and early 1660s. The fact that the 1660s depict a dangerous phase, whereas tenants' default became occasional once the peace resumed, grants credibility to the data we use to estimate war damages. We estimate a 4.6 % average rate of loss in the whole period of war (1641-1668). In such a scenario, the enforcement of a tax rate above this threshold would require taxpayer's high aversion to risk, for him to consent, or substantial means of coercion.

However, damages were also a liability at sea. Depletion of capital in shipping and the loss of revenues depending on freights bring about a different picture. Although the Spanish navy did not perpetrate attacks to Portuguese fleets, and despite Portugal's different political alignment after 1640, the Dutch privateering threatened Portuguese colonial shipping, the assaults remaining a critical issue in two years (1647 and 1648), when half of the fleet

⁵Lisbon Archives, Biblioteca da Ajuda, Manuscripts, 51-VI-19, fl. 359-364.

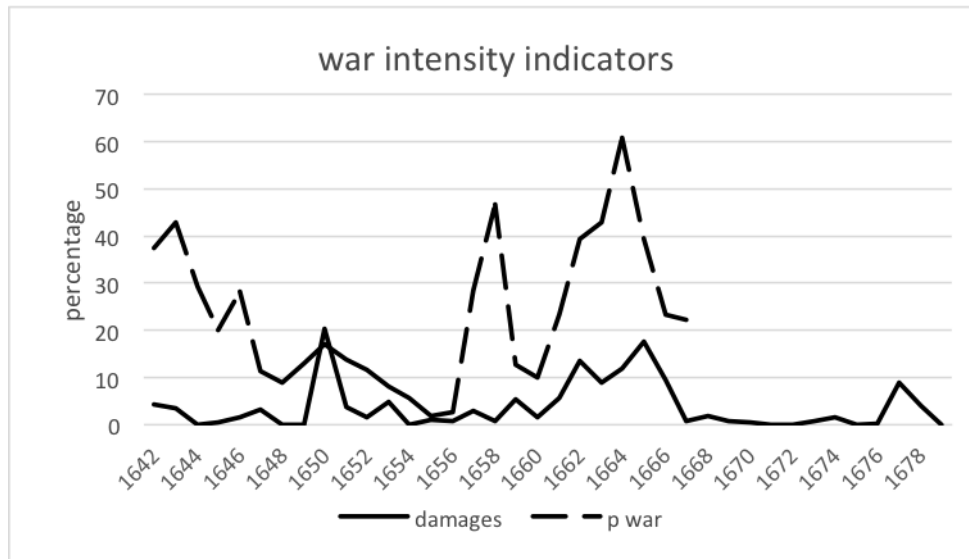
allocated to sugar transportation (104 ships), was lost (see the appendix for sources). The war at sea prolonged the status quo that had started in the early 1630s when the WIC conquered Pernambuco. The conflict ended in 1654 when the Portuguese chartered company, the *Companhia Geral do Comércio do Brasil*, forced the WIC to capitulate. Information on ships afloat and total casualties allow us to estimate a rate of damages, considering the value of the ship, outfitting costs, freights and value of cargo (Table III in the appendix). This calculation contemplates the loss of capital, while that in the agrarian sector considered income flows of tenants and landlords. So, in our estimation of losses in shipping, we included a discount factor that observed interest rates charged on bottomry loans. Results of this educated guess point to a rate of damages hovering around 16.8%, which was close to the insurance paid in Amsterdam (14%) for securing Portuguese capital back and forth from Lisbon and Bahia, or from Lisbon and Rio de Janeiro in the 1640s⁶. The coincidence of values warrants the credibility of the estimation.

To sum up, considering losses at sea and on land together, the legal tax rate could have been closer to the aggregate rate of damages. If we assume the state's revenues reflected somehow the part of the maritime sector in the economy, a budget from 1660 suggest that the sea contributed around 22% to the GDP. Taking those weights to calculate a geometric mean (0.78 to damages in land and 0.22 at sea), we find a 7.2% aggregate rate of damages.

Throughout 28 years, however, the war went through considerably different phases of intensity (Figure 2), which could affect the tax rate of enforcement. After the first years marked by the persistent fear of the Spanish invasion (1641-1645), although with one single battle fought in 1644, the 1650s were mostly a time for the Spanish releasing the military pressure on Portuguese territory. From 1656 onwards, mainly after the Treaty of Pyrenees (1659), the Castilian army concentrated in the Peninsula borders and the attacks gained momentum. The decisive battles occurred in the 1660s. The data on war intensity are based on the number of events reported by contemporary military chronicles (see [Conde da Ericeira \(1698\)](#)). We considered the number of battles and smaller assaults, the total men conscripted in infantry and cavalry, giving to cavalry a weight five times higher than infantry. We build a synthetic index of war intensity, explained in the appendix, as a geometrical average of the weighted war episodes and conscription. Table [B8](#) and Figure [2](#) gathers the data on the war intensity as we estimated it. Once we know the evolution of damages and war intensity, we can go further in explaining the rate of the *décima* enforcement as displayed in table [4](#).

⁶([Spooner, 1983](#), p. 57)

Figure 2



Source: Santos (2003) and our calculation (see the Appendix B).

This is the central topic of the next section.

7 The taxpayer compliance behavior

The literature on tax compliance (surveyed, for instance, in Andreoni et al. (1998), Slemrod and Yitzhaki (2002), Slemrod (2007), and Luttmer and Singhal (2014)), usually dealing with the taxpayer behavior in a context of uncertainty, generically distinguishes the motives for paying taxes into extrinsic and intrinsic motives. Intrinsic motives are non-pecuniary and relate to the existence of a minimum tax that the taxpayer is voluntarily willing to pay on morality, fairness, social identification, social pressure or similar grounds. Extrinsic motives are associated to rational compliance when there are direct benefits, pecuniary or not, for compliance with or avoidance to paying taxes. There are two main strands in the literature featuring extrinsic motives. A first strand, initiated by Allingham and Sandmo (1972)(see also Cowell (1985)), models tax compliance as a solution to a gamble with the tax authority where the incentive to pay taxes stems from the potential penalties that would be incurred if there is tax avoidance. A second strand in the literature, that we can trace back to Cowell

and Gordon (1988), incorporates another incentive for paying taxes arising from the awareness that taxes finance public goods deemed beneficial by the taxpayer and that will not be provided otherwise, even though there is the potential for free-riding.

In the rest of this section we try to identify the motives for tax compliance, before and after the introduction of the *décima* tax, by appealing to that literature. To do this, we have to accept that the tax authority fixes a legal tax rate, in a context of asymmetric information in which the taxpayer knows the true income but the tax authority only knows the income reported by the taxpayer or assessed by the tax assessor. In this environment, there is tax evasion/avoidance if there is income under-reporting, which implies that the effective tax rate, τ , is smaller than the legal tax rate t (10% in most of the period).

Firstly, we introduce the extrinsic motive to pay taxes. In order to relate the model to data we take the information on the effective tax rate already presented in table 4, and consider two extrinsic motives for paying taxes: playing the Allingham and Sandmo (1972) gamble with the tax authority, and identifying the Cowell and Gordon (1988) benefit with the reduction of war damages by financing the king John IV army. For the period starting in 1638 until the end of the restoration war we can consider four possible states of nature (non-existence of penalties and no war, existence of war but no penalties, existence of war but no penalties and existence of both penalties and war) whose probabilities are tabulate as follows:

		Penalties		
		No	Yes	
War	No	$(1 - p)(1 - q)$	$(1 - p)q$	$1 - p$
	Yes	$p(1 - q)$	p, q	p
		$1 - q$	q	

The rows present the probabilities of the two states of nature associated to the existence of war ($1 - p$ if there is no war and p if there is war) and in the columns the probabilities of the two states of nature associated to the existence of penalties for tax avoidance ($1 - q$ if there are no penalties and q if there are penalties war). While the outer cells display unconditional probabilities, the inner cells present conditional probabilities: $(1 - p)(1 - q)$ is the joint probability of not having both war and penalties, $(1 - p)q$ is the joint probability of not having war but of having penalties, $p(1 - q)$ is the joint probability of having war but not penalties, and pq is the probability of having both war and penalties.

The associated disposable income, that is entirely consumed, associated to every state of nature previously identified can also be tabulated as follows:

		Penalties	
		No	Yes
War	No	$y(1 - \tau)$	$y \left(1 - \tau + \delta_T \left(\frac{\tau}{t} - 1 \right) \right)$
	Yes	$y \left(1 - \tau - d + \delta_W \left(\frac{\tau}{t} - 1 \right) \right)$	$y \left(1 - \tau - d + (\delta_T + \delta_W) \left(\frac{\tau}{t} - 1 \right) \right)$

In the event in which there are no war damages and no penalties the disposable income is equal to $y(1 - \tau)$, that is, it is equal to pre-tax income, y , minus the effective tax paid τy , which we assume is not higher than the tax payment if there were no tax avoidance ty . In the events where penalties for tax avoidance exist, we take the [Allingham and Sandmo \(1972\)](#) penalty. This is a linear function, with parameter $\delta_T > 0$, of the taxpayer unreported income ⁷, implying that his disposable income will be diminished by the amount $\delta_T \left(1 - \frac{\tau}{t} \right) y$. In the events in which there are war damages, we assume that the taxpayer faces a damage proportional to his income, d , and which he believes can be reduced by its participation in financing the war effort by paying taxes proportional, with parameter $\delta_W > 0$, to its unreported income. The net reduction of his disposable income in the event of war damages is thus $y \left(d + \delta_W \left(1 - \frac{\tau}{t} \right) \right)$. If there are both war and tax penalties we add the two effects. In this case the disposable income is thus $y \left(1 - \tau - d + (\delta_T + \delta_W) \left(\frac{\tau}{t} - 1 \right) \right)$.

The extrinsic dimension of tax compliance is modelled by assuming that the value of paying taxes is captured by maximizing a von-Neumann-Morgenstern utility function, $\mathbb{E}[u(C)]$, where the Bernoulli function ($u(C)$) is concave for encoding risk aversion. Although consumption is random, we saw that every possible outcome is a function of effective tax rate, τ , which allows us to use it as the decision variable for the taxpayer.

Secondly, we can also infer, from the people's reaction to Phillip IV tax innovation, from the history of the *décima* tax, that intrinsic motives for paying taxes were also present. We estimate, from the minimum effective tax which was observed (4.7% in table 4) and from the tax rate in peaceful times (in table 5), that there was a tacit acceptance of a minimum tax rate of 4.5%.

Therefore, taking into consideration both extrinsic and intrinsic motives, the taxpayer problem consists in finding the optimal effective tax that maximizes expected utility, such

⁷It can be proved that the [Yitzhaki \(1974\)](#) version, in which the penalty is proportional to the unpaid tax, although looking more realistic produces less intuitive results.

that it is higher than the minimum (intrinsic) tax and lower than the legal tax ⁸. Formally, the problem is

$$\max_{\tau} \mathbb{E}[u(C(\tau)) \mid \tau_{min} \leq \tau \leq t]$$

where we assume that $\tau_{min} \leq t$.

Solving the problem (see Appendix C) we find that the optimal tax, which is the effective tax the taxpayer would willingly pay, depends on the risk aversion parameter, on the parameters δ_T and δ_W , representing respectively the penalty for tax avoidance and the war damage relief, on the war damages d , on both probabilities, p and q , and on the legal tax t .

If we consider the optimal tax as a function of the legal tax, taking other parameters and variables as given, that is $\tau^* = \tau(t, .)$, and represent it graphically as in figure 3, we find that tax-payers find optimal to have one of three types of behavior: total compliance, partial compliance or minimum compliance. Total compliers (see figure 3a) report truthfully and, therefore, their optimal effective tax rate is equal to the legal tax rate. Minimum compliers (see figure 3c) will only be willing to pay the minimum (intrinsic) tax rate. Partial compliers/evaders (see figure 3b) will be in an intermediate situation, by finding optimal to pay a tax higher than the minimum but below the legal tax rate. Figure 3 provides a geometrical illustration of the fiscal strain associated to the enacted legal tax, as the vertical distance between the optimal tax from the perspective of the tax payer (in the point labelled "equal compliance") and the legal tax rate (in the point labelled "full compliance").

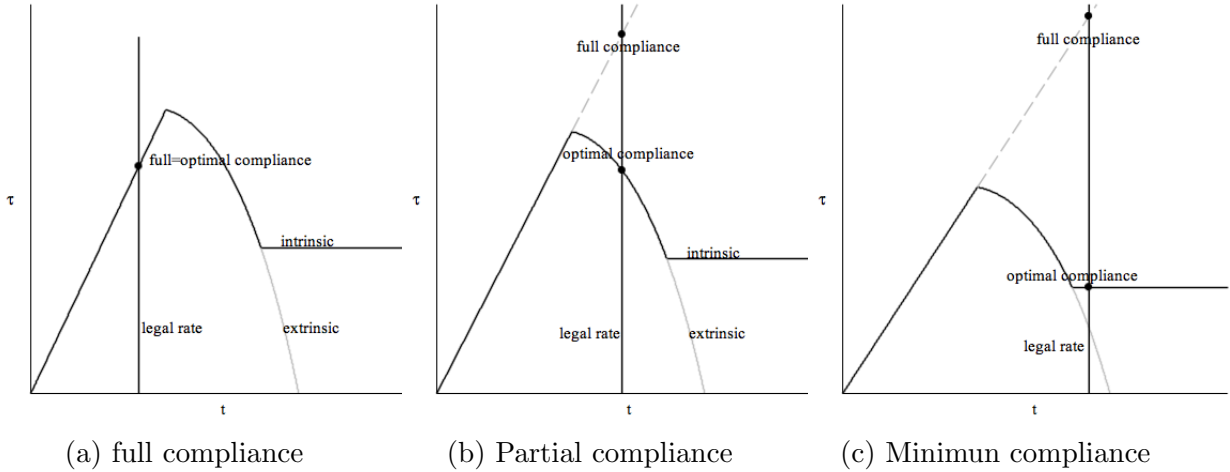
We can apply this model to the two historical experiments we mentioned earlier: first, the Phillip IV attempt to increase taxation, and second, the financing of the Restoration war shortly after 1640.

The first experiment, following Phillip IV's decision, corresponds to a case in which $p = \delta_W = d = 0$. The only uncertainty for the tax-payer was related to the gamble with tax authorities. We can conjecture that the attempted tax increase would increase the fiscal strain either by transferring the taxpayer from a state of partial commitment (as in figure 3b) to a state of minimum commitment (as in figure 3c), or from two states of minimum commitment in which the difference of the optimal tax and the legal tax would increase. In any case, although we have no data to corroborate this conjecture, the large increase in the fiscal strain was certainly instrumental in triggering the revolt.

The second experiment, the financing of the Restoration war, provides us with some data

⁸It is easy to prove that it would not be rational to pay taxes higher than the legal tax, unless the consumer derives utility from being a donor.

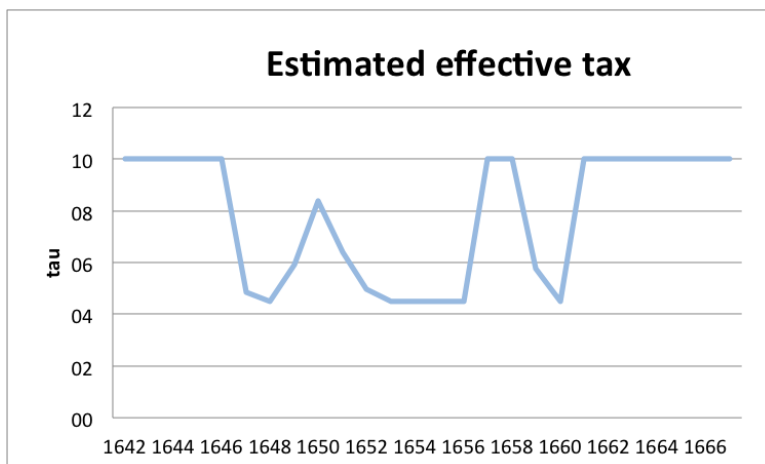
Figure 3: Types of optimal behavior



allowing for empirical verification of our theory: we have yearly data for τ , for the period between 1650 and 1653, and we constructed a time series for the rate of damage d (see table B6 and figure 2). Two observations can be extracted from the data on the effective tax paid and the damages computed for the period between 1650 and 1653: first, the effective tax rate hovering between 4.7% and 8.2%, corresponds to the partial compliance case; second, there is a positive correlation between our effective tax rate and the rate of damages (the elasticity is 0.26). This positive correlation can only be consistent with a case in which, although war depredations decreased income, the taxpayer expected to be in an even worse situation if the Portuguese army were under-financed and militarily weaker. This is clearly consistent with a [Cowell and Gordon \(1988\)](#) motive to pay taxes consisting in avoiding war destruction.

We find this enables us to go a step further and calibrate the effective tax rate for the whole period between 1640 and 1667 taking the data on war damages and war intensity. To carry this exercise, we start by setting $q = \delta_T = 0$, which is justified by the fact that, in that period, the tax collection rested mainly on a decentralized administration and therefore it was very dependent on voluntary tax compliance. Second, we assume an isoelastic Bernoulli utility function and set the Arrow-Pratt coefficient of relative risk aversion to 2. Third, we match the model with the previous regression to find an approximation for both the parameter δ_W and a level for the probability p for the period 1650-1653. At last, using the previous parameters values and the series for d and p in figure 2 we simulated our model for

Figure 4



Simulated effective tax for: $\sigma = 2$, $\delta_W = 0.5$, $t = 0.1$, $\tau_{min} = 0.045$ and for the series for d and p in table C11

the effective tax rate for the period 1642-1667 (see the Appendix C for a detailed derivation and calibration of the model).

The results of that simulation are depicted in figure 4. We not only find all three types of taxpayer behavior within that period, but we also find that they are highly correlated to the intensity of the war. There is full compliance in the years of high belligerence and war damages (in early 1640s and in most of the 1660s), there is minimum compliance in the intermediate periods with low belligerence and low damages (in most of the 1650s), and there is partial compliance in intermediate cases (in late 1640s and early 1650s).

Therefore, state capacity and war are positively correlated only if taxpayers find utility in financing the war effort. In the absence of taxpayers' compliance, war financing may increase tax strain thereby increasing the political costs of waging war. It is possible that compliance with taxes financing wars are positively correlated to the distance between the war theatre and the location of the taxpayer.

8 Final remarks

This paper questioned the factors for the success of financial innovations, which made up early modern states' increasing fiscal capacity. The case under analysis rested on an universal income tax, and on the centralization of both the revenue and expenditure, while the collec-

tion of the new tax was left to local, ad-hoc administrations, encroached in taxpayers' nets. In this regard, the Portuguese fiscal history points to a deviant path, in which the relative inefficiency of absolutist regimes and of decentralized tax administrations is not observed. The case under scrutiny bore the advantage of making it clear the taxpayers' behavior is a crucial element in the processes of state making. The same taxpayer who refused the Habsburg's king high tax load, payed willingly a higher tax, around one third superior, to finance a war that ensued the *coup d'état* in 1640 to regain political autonomy. In the short period of time between the 1638 fiscal riots, and revolt, and the enthronement of the Portuguese king in 1640 we deem the introduction of structural improvements in the state's capacity, permitting the enforcement of the new taxation, as highly improbable. Historical events thus fundament the hypothesis, put forward in this study, that taxpayer's consent for taxation under absolutist regimes could be a critical variable in the enhancement of the state's fiscal capacity. For the success of the income tax introduced into the Portuguese fiscal system, and which withstood the liberal revolution in 1820, the assignment to local administrations of the tax collection may have been a crucial device. It enhanced the role of peer monitoring that, in this regard, may not be a sign of resilient, traditional institutional arrangements. It may instead be the most effective way of instilling social norms that contributed to build up the taxpayer's liability, which somehow the liberal state in 19th century exploited within a different technological environment.

This study suggests that intrinsic motives driving taxpayers' tax morale allowed for a 4.5% rate as a minimum optimal tax rate, ensuring fiscal income without critical political costs. The fact that this level for the income tax remained in the Portuguese fiscal system as the legal tax rate in times of peace points to a government's acknowledgement of the potential existence of a fiscal strain and of the advantages of substituting the coercive component ascribed to a centralized administration by reputational constraints exerted at the community level.

The notion that high levels of destruction improved fiscal capacity through taxpayer's self-interest in diverting a threat on capital and income is another inference from the analysis conducted in this article. That being the case, more capitalized economies, as those more dependent on the maritime sectors, could have been assisted by higher levels of taxpayers' consent in the rise of taxation. Through different lens, this study meets other studies' conclusions, which have highlighted the importance of market-oriented activities in the enhancement of states' fiscal capacity, based on modern tax centralization and political rep-

resentation.

Finally, this case study proved that a significant gap between fiscal income and effective fiscal capacity can occur, due to observed gaps between legal tax rates and optimal tax rate from the point of view of the taxpayer. In many instances, historical data do not allow us to measure evasion, and, when measuring fiscal capacity, the important difference between legal and effective tax rates are overlooked. In Portuguese history, as it has been documented, that gap was not necessarily due to taxpayers economic constrains leading to evasion, rather it presents a case where political variables conditioned taxpayers' perception of the use of taxation. In this respect, war at home was the main factor for inducing taxpayers in paying taxes. In some points in European history, the desintegration of the Habsburg unit can be observed through this dynamic between war inside borders and war in distant territories as the main source of taxpayers' affection or disaffection.

References

- Allingham, M. G. and Sandmo, A. (1972). Income tax evasion: a theoretical analysis. *Journal of Public Economics*, 1(3/4):323–338.
- Ames, E. and Rapp, R. T. (1977). The birth and death of taxes: a hypothesis. *Journal of Economic History*, 32(1):161–178.
- Andreoni, J., Erard, B., and Feinstein, J. (1998). Tax Compliance. *Journal of Economic Literature*, 36(2):818–860.
- Ardent, G. (1975). Financial policy and economic infrastructures. In Tilly, C., editor, *The Formation of National States in Western Europe*. Princeton University Press, Princeton.
- Beckett, J. (1985). Land tax or excise: the levying of taxation in Seventeenth-and-Eighteenth century England. *The English Historical Review*, 100(395):285–308.
- Beckett, J. and Turner, M. (1990). Taxation and economic growth in eighteenth century England. *The Economic History Review*, 43(3):277–403.
- Besley, T. and Persson, T. (2009). The origins of state capacity: property rights, taxation and politics. *American Economic Review*, 99(4):1218–1244.
- Besley, T. and Persson, T. (2011). *Pillars of Prosperity*. Princeton University Press, Princeton.
- Bonney, R., editor (1999). *Economic Systems and State Finance*. Oxford University Press, Oxford.
- Boxer, C. (1957). *The Dutch in Brazil, 1624-1654*. Clarendon Press, Oxford.
- Brewer, J. (1989). *The Sinews of Power. War, Money and the English State, 1688-1783*. Alfred A. Knopf, New York.
- Brito, P. (2013a). Estimativa das receitas e despesas anuais do Reino e da Índia. *Fragmenta Historica: História, Paleografia e Diplomática*, 1.
- Brito, P. (2013b). Folha da receita e despesa do Reino para 1563. *Fragmenta Historica: História, Paleografia e Diplomática*, 1.

- Carrara, A. (2011). *Receitas Imperiais Portuguesas, estrutura e conjunturas, séculos xvi/xviii*. Technical Report Working Paper, Universidade Federal de Juiz de Fora.
- Carruthers, B. (1996). *City of Capital, politics and markets in English Financial revolution*. Princeton University Press.
- Coffman, D., Leonard, A., and Neal, L., editors (2013). *Questioning Credible Commitment*. Number 9781107039018 in Cambridge Books. Cambridge University Press.
- Conde da Ericeira (1679-1698). *História de Portugal Restaurado*. Civilização, Porto, Anotações e Prefácio de António Álvaro Dória, 1945-1946, 4 v. edition.
- Costa, F. D. (2004a). *A Guerra da Restauração, 1641-1668*. Livros Horizonte.
- Costa, F. D. (2004b). Milícia e sociedade. In Barata, M. T. and Teixeira, N. S., editors, *Nova História Militar de Portugal*, volume II, pages 68–111. Círculo de Leitores, Lisboa.
- Costa, F. D. (2005). Interpreting the portuguese war of restoration (1641-1668) in a european context. *e-Journal of Portuguese History*, 3(1).
- Costa, F. D. (2008). Army size, military recruitment and financing in portugal during the period of Peninsula War - 1808-1811. *e-Journal of Portuguese History*, 6(2).
- Costa, L. F. (2002). *O Transporte no Atlântico e a Companhia Geral do Comércio do Brasil (1580-1663)*, volume I-II. CNCDP, Lisboa.
- Costa, L. F. and Cunha, M. S. (2006). *D. João IV*. Círculo dos Leitores, Lisboa.
- Costa, L. F., Palma, N., and Reis, J. (2015). The Great Escape? the contribution of the empire to Portugals economic growth, 1500-1800. *European Review of Economic History*, 19(1):1–22.
- Cowell, F. A. (1985). The economic analysis of tax evasion. *Bulletin of Economic Research*, 37.
- Cowell, F. A. and Gordon, J. P. (1988). Unwillingness to pay: Tax evasion and public good provision. *Journal of Public Economics*, 36.
- Cox, G. W. (2011). Fiscal centralization, limited government and public revenues in europe, 1650/1913. *Journal of Economic History*, 71(1):133–161.

- Dias, J. A. (1985). Um documento financeiro do século xvii. *Nova História*, VII(3/4).
- Dickson, P. (1967). *The Financial Revolution in England: A Study in the Development of Public Credit, 1688-1756*. Modern Revivals in History. Routledge.
- Dincecco, M. (2009). Fiscal centralization, limited government and public revenues in europe. *Journal of Economic History*, 69(1):48–103.
- Dincecco, M. and Katz, G. (2016). State capacity and long-run performance. *Economic Journal*, 126(590):189–218.
- Documentação Ultramarina Portuguesa (1973). *Colecção São Lourenço*, volume VI. Lisboa.
- Dominguez Ortiz, A. (1983). *Política y Hacienda de Felipe IV*. Ediciones Pegaso, Madrid.
- Epstein, S. R. (2000). *Freedom and Growth: the Rise of States and Markets in Europe, 1300-1750*. Routledge, London.
- Falcão, L. F. (1859). *Livro em que se contem toda a fazenda e real património dos reinos de Portugal, Índia e Ilhas Adjacentes*.
- Ferreira da Silva, A. (2004). Finanças públicas. In Lains, P. and Ferreira da Silva, A., editors, *História Económica de Portugal, 1800-2000*, volume I. ICS, Lisboa.
- Freitas, J. P. (2007). *O combatente durante a guerra da Restauração. Vivência e comportamentos dos militares ao serviço da coroa Portuguesa*. Prefácio, Lisboa.
- Fritschy, W. (2003). A 'Financial Revolution' reconsidered: Public finance in Holland during the Dutch Revolt, 1568-1648. *The Economic History Review*, 56(1):57–89.
- Gennaioli, N. and Voth, H.-J. (2015). State Capacity and Military Conflict. *Review of Economic Studies*, 82(4):1409–1448.
- Godinho, V. M. (1978). *Ensaio. Sobre história de Portugal*, volume II, chapter Finanças públicas e estrutura do estado, pages 29–74. Almedina, Lisboa, 2nd edition.
- Grafe, R. (2012). *Distant Tyranny. Markets, power, and backwardness in Spain, 1650-1800*. Princeton University Press.

- Grafe, R. and Irigoin, A. (2012). A stakeholder empire: the political economy of spanish imperial rule in america. *Economic History Review*, 65(2):609–651.
- Greif, A., Iyigun, M., and Saxon, D. (2013). Social institutions and economic growth: Why England rather than China became the first modern economy. Working paper 465, Stanford Center for International Development.
- Greif, A. and Rubin, J. (2015). Endogenous political legitimacy: The english reformation and the institutional foundations of limited government.
- Hespanha, A. M. (1994). *As Vésperas do Leviathan. Instituições e poder político. Portugal, século XVII*. Almedina, Lisboa.
- Hoffman, P. (2015). *Why did Europe conquer the world ?* Stanford University Press, Stanford.
- Hoffman, P. and Norberg, K., editors (1994). *Fiscal Crises, Liberty, and Representative Government, 1450-1789*. Stanford University Press, Stanford.
- Karaman, K. K. and Pamuk, Ş. (2010). Ottoman State Finances in European Perspective, 1500-1914. *The Journal of Economic History*, 70(03):593–629.
- Laet, J. (1925). *História ou Anais dos Feitos da Companhia Privilegiada das Índias Ocidentais, desde o seu começo até ao fim do ano de 1636*, volume II. Biblioteca Nacional do Rio de Janeiro, Rio de Janeiro.
- Luttmer, E. F. P. and Singhal, M. (2014). Tax morale. *Journal of Economic Perspectives*, 28(4):149–168.
- Magalhães, J. R. (2004). Dinheiro para a guerra: as décimas da restauração. *Hispânia. Revista Española de Historia*, 64(1):157–182.
- Mann, M. (1986). *The sources of social power*. Cambridge University Press.
- Mauro, F. (1983). *Le Portugal, le Brésil et l'Atlantique au XVII ème Siècle*. Fondation Calouste Gulbenkian, Paris.
- Mendes da Luz, F., editor (1949). *Relação de toas as rendas da coroa deste reino de Portugal que nele se arrecadão de que procedem, modo e lugares em que se pagão*. Biblioteca da Universidade, Coimbra.

- North, D. C. and Weingast, B. (1989). Constitutions and commitment: the evolution of institutions governing public choice in seventeenth-century England. *The Journal of Economic History*, 49(4):803–832.
- O’Brien, P. (1988). The political economy of british taxation, 1660-1815. *Economic History Review*.
- O’Brien, P. (2001). Fiscal exceptionalism: Great Britain and its European rivals: from civil war to triumph at Trafalgar and Waterloo. Economic History Working Papers 22369, London School of Economics and Political Science, Department of Economic History.
- O’Brien, P. and Hunt, P. A. (1999). England, 1485-1815. In Bonney, R., editor, *The Rise of the Fiscal State in Europe, c.1200-1815*. Oxford University Press, Oxford.
- Ogilvie, S. and Carus, A. (2014). Institutions and economic growth in historical perspective. In *Handbook of Economic Growth*, volume 2, chapter 08, pages 403–513. Elsevier, 1 edition.
- Oliveira, A. (1972). *Vida Económica e Social de Coimbra de 1537-1640*. Faculdade de Letras da Universidade de Coimbra, Coimbra.
- Oliveira, A. d. (1980). A renda agrícola em Portugal durante o Antigo Regime (séculos xvii-xviii). alguns aspectos e problemas. *Revista de História Económica e Social*, 6.
- Ormrod, W., M., B., and Bonney, R., editors (1999). *Crises, Revolutions and Self-Sustained Growth. Essays in European Fiscal History, 1130-1830*. Shaun Tyas, Stamford.
- Palma, N. and Reis, J. (2016). From convergence to divergence: Portuguese demography and economic growth, 1500-1850. Research Memorandum 161, GGDC, University of Groningen.
- Pedreira, J. (2007). Costs and financial trends in the Portuguese Empire, 1415-1822. In Bethencourt, F. and Curto, D. R., editors, *Portuguese Oceanic Expansion, 1400-1800*. Cambridge University Press, Cambridge.
- Pereira, J. C. (2003). *Portugal na Era de Quinhentos*. Patrimnia Histrica, Cascais.
- Prestage, E. (1920). Três consultas do Conselho da Fazenda de 1656 a 1657. *Revista de História*, (34).

- Rubin, J. (2017). *Rulers, Religion, and Riches: Why the West Got Rich and the Middle East Did Not*. Cambridge University Press.
- Santos, R. (2003). *Sociogénesis do latifundismo moderno. Mercados, crises e mudança social na região de Évora. Séculos XVII a XIX*. Banco de Portugal, Lisboa.
- Schumpeter, J. (1991). The crisis of the tax state. In Swedberg, R., editor, *The Economics and Sociology of Capitalism*. Princeton University Press.
- Schwartz, S. (1988). *Sugar Plantations in the Formation of Brazilian Society Bahia, 1550-1835*. Companhia das Letras, São Paulo, Brazilian edition.
- Silva, J. J. A. (1856). *Collecção Chronologica de Legislação Portuguesa*.
- Slemrod, J. (2007). Cheating ourselves: The economics of tax evasion. *Journal of Economic Perspectives*, 21.
- Slemrod, J. and Yitzhaki, S. (2002). Tax avoidance, evasion, and administration. In Auerbach, A. and Feldstein, M., editors, *Handbook of Public Economics*, volume 3, chapter 22, pages 1423–1470. Elsevier.
- Spooner, F. C. (1983). *Risks at Sea: Amsterdam Insurance and Maritime Europe, 1766-1780*. Cambridge University Press, Cambridge.
- Stasavage, D. (2010). When distance mattered: geographic scale and the development of european representative assemblies. *American Political Science Review*, 104(4):625–643.
- Stasavage, D. (2011). *States of credit: size, power, and the development of European polities*. Princeton University Press, Princeton.
- Summerhill, W. R. (2008). Fiscal bargains, political institutions, and economic performance. *Hispanic American Historical Review*, 88(2):219–233.
- Tilly, C., editor (1975). *The Formation of national States in Western Europe*. Princeton University Press.
- Tilly, C. (1990). *Coercion, Capital and European States, AD 990-1990*. Blackwell, Oxford.

- Tortella, G. and Comn, F. (1993). Fiscal and monetary institutions in Spain (1600-1900). In Bordo, M. and Corts-Conde, R., editors, *Transferring Wealth and Power from the Old to the New World. Monetary and Fiscal Institutions in the 17th through the 19th centuries*. Cambridge University Press, Cambridge.
- Van Zanden, J. L. and Prak, M. (2006). Towards an economic interpretation of citizenship: The Dutch Republic between medieval communes and modern nation-states. *European Review of Economic History*, 10(02):111–145.
- Yitzhaki, S. (1974). Income tax evasion: A theoretical analysis. *Journal of Public Economics*, 3.
- Yun Casalilla, B. (2004). *Marte contra Minerva. El Precio del Imperio Español*. Ed. Crítica, Barcelona.
- Hart, M. C. (1993). *The making of a Bourgeois State. War, Politics and Finance during the Dutch Revolt*. Manchester University Press, New York.

Appendix A Sources on Portuguese state capacity

Published budgets

- Documentação Ultramarina Portuguesa (1973). *Colecção São Lourenço*, volume VI. Lisboa, p. 37-9
- Brito, P. (2013a). Estimativa das receitas e despesas anuais do Reino e da Índia. *Fragmenta Historica: História, Paleografia e Diplomática*, 1, p. 153-9
- Brito, P. (2013b). Folha da receita e despesa do Reino para 1563. *Fragmenta Historica: História, Paleografia e Diplomática*, 1, p. 169-172
- Carrara, A. (2011). Receitas Imperiais Portuguesas, estrutura e conjunturas, séculos xvi/xviii. Technical Report Working Paper, Universidade Federal de Juiz de Fora
- Description de ville de Lisbonne Pierre Humbert, 1730, p. 166-168. Revenue de la Couronne de Portugal.
- Costa, F. D. (2008). Army size, military recruitment and financing in Portugal during the period of Peninsula War - 1808-1811. *e-Journal of Portuguese History*, 6(2)
- Dias, J. A. (1985). Um documento financeiro do século xvii. *Nova História*, VII(3/4) and Lisbon Archives, Ajuda Library, Manuscripts, 51-VI-19, fl. 127
- Falcão, L. F. (1859). *Livro em que se contem toda a fazenda e real património dos reinos de Portugal, Índia e Ilhas Adjacentes*
- *Gavetas da Torre do Tombo*, vol I, p.893
- Godinho, V. M. (1978). *Ensaio. Sobre história de Portugal*, volume II, chapter Finanças públicas e estrutura do estado, pages 29–74. Almedina, Lisboa, 2nd edition, p. 29-74
- Hespanha, A. M. (1994). *As Vésperas do Leviathan. Instituições e poder político. Portugal, século XVII*. Almedina, Lisboa, p. 114 and p.158
- Mendes da Luz, F., editor (1949). *Relação de toas as rendas da coroa deste reino de Portugal que nele se arrecadão de que procedem, modo e lugares em que se pagão*. Biblioteca da Universidade, Coimbra

- Nicolau de Oliveira, Tratado da Grandeza de Lisboa, data provided by ([Godinho, 1978](#), p.31-74)
- Prestage, E. (1920). Três consultas do Conselho da Fazenda de 1656 a 1657. *Revista de História*, (34), p. 9

Unpublished data

Lisbon Archives:

- Arquivo Histórico Ultramarino, *Conselho Ultramarino*, cod. 37, fl. 74
- Biblioteca da Ajuda (Ajuda Library), Manuscripts, 51-VI-19, fl 359-364

Appendix B War damages and war data

Damages on land and sea

- Damages on land: see table B6. Source:

Santos, R. (2003). *Sociogénese do latifundismo moderno. Mercados, crises e mudança social na região de Évora. Séculos XVII a XIX*. Banco de Portugal, Lisboa
- Damages in sea: see table B7. Computations and sources:
 - Capital at sea: estimation based on costs of setting up a ship (accounting for 210-day voyage back and forth and interest rates), on the rate of optimal exploitation of each ship payload tonnage, freight rates per ton, and total number of ships annually transporting sugar

Costa, L. F. (2002). *O Transporte no Atlântico e a Companhia Geral do Comércio do Brasil (1580-1663)*, volume I-II. CNCDP, Lisboa pp. 175-178, p.319, p. 360 and Appendix V).
 - Data on cargo value (prices of sugar only): (Costa, 2002, p. 241),

Mauro, F. (1983). *Le Portugal, le Brésil et l'Atlantique au XVII ème Siècle*. Fondation Calouste Gulbenkian, Paris, pp. 298-299,

Schwartz, S. (1988). *Sugar Plantations in the Formation of Brazilian Society Bahia, 1550-1835*. Companhia das Letras, São Paulo, Brazilian edition, pp. 400-401.
 - Sources on casualties:

Laet, J. (1925). *História ou Anais dos Feitos da Companhia Privilegiada das Índias Ocidentais, desde o seu começo até ao fim do ano de 1636*, volume II. Biblioteca Nacional do Rio de Janeiro, Rio de Janeiro, pp. 621-636.

Boxer, C. (1957). *The Dutch in Brazil, 1624-1654*. Clarendon Press, Oxford, Appendix III.

War data

War data, see table B8, source: Conde da Ericeira (1679-1698). *História de Portugal Restaurado*. Civilização, Porto, Anotações e Prefácio de António Álvaro Dória, 1945-1946, 4 v. edition

Table B6: Damages in land

Date	Rents		Damages	
	contracted	levied	total	proportional
1641	5807.8	5299.4	508.4	0.088
1642	2762.3	2568.8	193.6	0.070
1643	5499.9	5103.0	396.9	0.072
1644	2653.2	2653.2	0.0	0.000
1645	5374.3	5109.3	265.1	0.049
1646	5536.9	5315.9	221.0	0.040
1647	5637.3	5205.3	432.1	0.077
1648	5499.5	5499.5	0.0	0.000
1649	5391.9	5391.9	0.0	0.000
1650	5209.3	3900.1	1309.2	0.251
1651	2871.5	2680.0	191.6	0.067
1652	2777.5	2680.1	97.4	0.035
1653	4952.2	4342.3	609.9	0.123
1654	5778.2	5778.2	0.0	0.000
1655	5523.5	5280.5	243.0	0.044
1656	5892.5	5606.5	286.0	0.049
1657	5102.9	4756.8	346.1	0.068
1658	5349.9	5062.6	287.2	0.054
1659	5625.8	4918.7	707.1	0.126
1660	5845.6	5496.4	349.2	0.060
1661	5296.8	4779.7	517.1	0.098
1662	2150.7	1524.3	626.4	0.291
1663	3748.2	2853.4	894.9	0.239
1664	4831.5	3655.9	1175.5	0.243
1665	4210.3	3108.1	1102.2	0.262
1666	4033.9	3556.6	477.3	0.118
1667	5624.2	5322.1	302.1	0.054
1668	5500.9	5070.8	430.1	0.078
1669	5408.4	5154.6	253.9	0.047
1670	5687.9	5435.2	252.8	0.044
1671	4908.6	4683.9	224.7	0.046
1672	4942.3	4716.2	226.1	0.046
1673	5403.1	5103.1	300.0	0.056
1674	4298.5	3977.1	321.4	0.075
1675	5029.2	4785.7	243.5	0.048
1676	5529.3	5282.9	246.4	0.045
1677	5087.1	4385.7	701.4	0.138
1678	4685.9	4180.6	505.2	0.108
1679	5623.4	5373.7	250.3	0.045

Source: Santos (2003).

Table B7: Damages at sea

Date	Bottomry loan interest rate	Capital at sea	Damages	
			level	rate
1624	0.5	1072538400	210346785.9	0.196
1625	0.5	1263929048	36247577.5	0.029
1626	0.5	1163185632	21724028.9	0.019
1627	0.5	1496119740	373415881.4	0.250
1628	0.7	1726200240	162582428.8	0.094
1629	0.85	2322847415	63626633.3	0.027
1630	1	2051873133	190986550.2	0.093
1631	1.025	1489311510	194555687.7	0.131
1632	1.05	1654242900	167111678.8	0.101
1633	1.075	1833100215	596319203.5	0.325
1634	1.1	1319659248	333249038.9	0.253
1635	1.2	1261805160	105165952.9	0.083
1636	1.275	1159401504	57477309.0	0.050
1637	1.35			
1638	1.35			
1639	1.35			
1640				
1641				
1642				
1643				
1644				
1645				
1646				
1647	0.75	1518315000	450555000	0.297
1648	0.8	1815540000	938655000	0.517
average		1543204610	694605000	0.169

Sources: see main text

Table B8: War episodes and enlistings

year	episodes	enlistings	
		infantry	cavalry
1642	23	21700	4380
1643	30	26700	3490
1644	19	14800	3600
1645	12	8900	3000
1646	12	30700	3400
1647	10	3900	1110
1648	4	5000	1900
1649	10	2820	1890
1650	12	1300	3260
1651	9	3350	2350
1652	6	2750	2700
1653	4	1375	2100
1654	3	0	1500
1655	1	2200	0
1656	4	0	250
1657	16	20000	3344
1658	16	42500	11220
1659	5	11000	2500
1660	3	8300	3200
1661	10	9800	5900
1662	24	25400	4200
1663	19	37000	6550
1664	22	48000	14700
1665	14	34700	8900
1666	8	9600	7800
1667	12	6500	4600

Source: [Conde da Ericeira \(1698\)](#)

Appendix C The taxpayer problem in the war-damage case

There are two states of nature, no war or war, with probabilities $1 - p$ and p . In the event of no war consumption is equal to income net of taxes, and in the event of war consumption is equal to net income minus the destruction caused by war.

The legal tax rate is denoted by t and the before-tax income of the taxpayer is y . However, the effective tax rate, from the perspective of the tax-payer is τ . Using the [Allingham and Sandmo \(1972\)](#) approach it is defined such as $\tau y = t y^r$, where y^r is the reported income. Therefore tax avoidance (or evasion) is $e = y - y^r$. Denoting $\varepsilon = e/y$ the effective tax is $\tau = t(1 - \varepsilon)$.

There are several reasons for paying taxes. In our case we consider just two: fairness and contribution to a public good in the form of war avoidance. We model the first motive by assuming that $\tau \geq \tau_{min}$, where τ_{min} is the fair tax and the second motive is implicitly incorporated by assuming that the war damage takes the form $D = (d + \delta \varepsilon)y$, where d are war damage in the absence of tax evasion if there was no tax evasion and $\delta \varepsilon$ is the additional war damage associated to the fact that tax evasion will reduce resources to fight the war, meaning the the invaders would be stronger and, though both armies generate war damages, the damages cause by invaders are worst. We assume that damages are a random variable

Consumption C is a random variable with the possible realizations $C = (c_{no\ war}, c_{war})$ with probabilities $p = \mathbb{P}(\text{war})$ and $1 - p = \mathbb{P}(\text{no war})$

$$\begin{aligned} c_{no\ war} &= y(1 - \tau) \\ c_{war} &= y(1 - \tau) - d - \delta \left(1 - \frac{\tau}{t}\right). \end{aligned} \tag{1}$$

We assume the taxpayer evaluates its random consumption through a von-Neumann-Morgenstern utility function.

$$\mathbb{E}[u(C)] = (1 - p) u(c_{no\ war}) + p u(c_{war})$$

displaying risk-aversion, i.e., $u(\cdot)$ is a concave function. We assume a constant risk-averse utility function, which allows us to parameterize risk aversion, by a parameter σ , because of its homogeneity properties allows us to compare the model with data.

Therefore

$$\mathbb{E}[u(C)] = (1 - p) \frac{(c_{no\ war})^{1-\sigma}}{1 - \sigma} + p \frac{(c_{war})^{1-\sigma}}{1 - \sigma}$$

for $\sigma \geq 1$. Because the consumption realizations in each of the two states of nature, in equation (1), is a function of the effective tax rate, we assume that the tax-payer chooses that tax rate by solving the problem:

$$\max_{\tau} \mathbb{E}[u(C(\tau)) | \tau_{\min} \leq \tau \leq t].$$

The constraint is justified by the fact that the consumer, by intrinsic reasons, is willing to pay a minimum tax, τ_{\min} and that it will not be rational to pay more than the legal tax rate t .

We introduce the magnitude

$$\theta = \theta(t, p, \delta, \sigma) \equiv \left(\frac{p(\delta - t)}{(1 - p)t} \right)^{\frac{1}{\sigma}} \in [0, \infty) \quad (2)$$

which is only defined for $0 < \delta \leq t < 1$.

The optimal tax rate from the perspective of the tax-payer (see the appendix) is

$$\tau^* = \begin{cases} t & \text{if } 0 < t \leq t_1 < \delta \\ t \frac{(1 - \delta - \theta - d)}{(1 - \theta)t - \delta} & \text{if } t_1 < t < t_2 < \delta \\ \tau_{\min} & \text{if } t_2 \leq t \leq \delta, \text{ or } t > \delta \end{cases} \quad (3)$$

where the critical levels for the legal tax rate are given implicitly by $t_j = \{t : d_j(t) = d\}$ where

$$d_1(t) \equiv (1 - \theta(t, \cdot))(1 - t) \text{ and } d_2(t) \equiv (1 - \theta(t, \cdot))(1 - \tau_{\min}) - \delta \left(1 - \frac{\tau_{\min}}{t}\right)$$

Because $d_1(t) = d_2(t)$ if $t = \tau_{\min}$ or $t = \delta$ and $d_1(t) > d_2(t)$ if $\tau_{\min} < t < \delta$ then $t_1 < t_2$ for $t < \delta$.

The optimal income tax rate, from the perspective of the tax-payer, $\tau^* = \tau(t, d, \sigma, p, \delta, \tau_{\min})$ is a random variable which is a function of the legal tax rate, the probability of war, the coefficient of relative risk aversion, the destruction parameter and the intrinsic motive represented by the minimum tax. The response to increases in the legal tax rate is ambiguous, but it is an unambiguously increasing function of the probability of war and the degree of risk aversion and it is a decreasing function of the degree of damages.

Furthermore, the tax-payer can have three different types of optimal behavior, depending on the legal tax rate: if the tax rate is low (lower than t_1) he behaves as a full complier, if

the tax rate has intermediate values (between t_1 and t_2) it will be a partial complier; and if it is too high (higher than t_2) or the reduction in damages by paying taxes is too low he pays only the "fair" tax rate τ_{min} .

In our application we assume that σ and δ are set parametrically, the damages d is a random variable, and the probability p can change, depending on the intensity of war. However, while the relationship with p is ambiguous, there is a positive relationship of the optimal tax rate τ and d :

$$\frac{\partial \tau}{\partial d} = \frac{t}{\delta - (1 - \theta)t} > 0^9$$

Therefore, one important test to our One important feature of the model is that, when the tax-payer finds optimal to be a partial complier, i.e, for $\tau_{min} < \tau < t$ the tax rate is a positive function of the damages, d

Proof of equation (3)

First we write the Lagrangean

$$\mathcal{L} = \mathbb{E}[u(C(\tau))] + \mu_-(\tau - \tau_{min}) + \mu_+(t - \tau)$$

From Karush-Kuhn-Tucker optimality conditions, and the assumption that $\tau_{min} < t$, three cases are possible

1. interior solution

$$\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] = 0, \tau_{min} < \tau < t, \mu_- = \mu_+ = 0$$

2. corner solution at the minimum tax

$$\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] < 0, \tau_{min} = \tau < t, 0 = \mu_+ < \mu_-$$

3. corner solution at the maximum tax

$$\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] > 0, \tau_{min} < \tau = t, 0 = \mu_- < \mu_+$$

⁹To prove this let $\delta < 1$

Because

$$\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] = -y^{1-\sigma} \left[(1-p)(1-\tau)^{-\sigma} + p \left(1 - \tau - d - \delta \left(1 - \frac{\tau}{t} \right) \right)^{-\sigma} \left(\frac{t-\delta}{t} \right) \right]$$

we readily see that: (1) a necessary condition for $\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] \geq 0$ is that $\delta > t$ and (2) a sufficient condition for $\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] < 0$ is that $\delta \leq t$.

Furthermore, $\mathbb{E} \left[u'(C(\tau)) \frac{\partial C}{\partial \tau} \right] = 0$ if and only if $\tau = \tau^*$ where

$$\tau^* = t \left(\frac{\theta + d + \delta - 1}{\delta - (1 - \theta)t} \right)$$

for θ as in equation (2), which is only defined for $\delta \geq t$. Within this domain, we can obtain critical values for t , which are associated to the corner solutions. However, we can only obtain implicit values: first, for the case in which $\tau^* = t$ we obtain

$$t_1 = \{t : (1-t)(1-\theta(t)) = d\};$$

second, for the case in which $\tau^* = \tau_{min}$,

$$t_2 = \left\{ t : t \left(\frac{\theta + d + \delta - 1}{\delta - (1 - \theta)t} \right) = \tau_{min} \right\};$$

As $\frac{\partial \tau^*}{\partial t} > 0$ then $t_1 < t_2$.

Calibrating the model

To study the likelihood and the implications of the model we consider the only relevant data we have for the average effective tax rate, τ , together with the data obtained for the rate of damages d . Unfortunately the only data we have, with common information for the two variables, is for a very short period and is assembled in table C9: an average for the 1641-1649 and yearly data between 1650 and 1653. We observe that there is always partial compliance, possibly with the exception of the year 1652 in which the tax rate is close to what we consider to be the minimum tax $\tau_{min} \approx 4.5\%$. Furthermore, there is clearly a positive correlation between the average tax paid and the average damages d . This lends for a generic confirmation to the model.

We use this information to calibrate the parameter δ and to build a series for the probability p . We follow several steps:

Table C9: Data and model calibration (in percentages)

	1641-1649	1650	1651	1652	1653
	observed				
τ	5.8	8	7.2	4.7	8.2
d	12.6	19.6	5.2	2.7	9.6

1. First, we take data for the years 1650 and 1653 and ran regressions between τ and d . The best fit was obtained by a logarithmic equation $\log \tau = \beta_0 + \beta_1 \log d$. We obtained the results reported in table C10

Table C10: Regression results

β	σ	t_β	$Pr(> t)$	
$\hat{\beta}_0$	-1.9872	0.3140	-6.328	0.0241
$\hat{\beta}_1$	0.2643	0.1150	2.299	0.1483
$R^2 = 0.5582, F = 5.285, p\text{-value} = 14.8\%$				

Taking exponentials we have a non-linear statistical model for the effective tax rate $\tau = e^{\beta_0} d^{\beta_1}$

2. Second, looking at the partial compliance case, we obtained a theoretical linear model for the tax rate $\tau = \alpha_0 + \alpha_1 d$ where

$$\alpha_0 \equiv \frac{t(\theta + \delta - 1)}{\delta - (1 - \theta)t}, \quad \alpha_1 \equiv \frac{t}{\delta - (1 - \theta)t}$$

3. Third, we approximate locally the non-linear statistical model at the average values for the tax rate and the damages: $(\bar{\tau}, \bar{d}) = (0.07, 0.09287)$, obtaining the estimates

$$\hat{\alpha}_1 = \beta_1 e^{\beta_0} \bar{d}^{\beta_1 - 1} \approx 0.2082$$

$$\hat{\alpha}_0 = \bar{\tau} - \hat{\alpha}_1 \bar{d} \approx 0.0507.$$

4. Fourth, assuming that $\sigma = 2$ and knowing that $t = 0.1$ we solve jointly $\alpha_0(\delta, p, \cdot) = \hat{\alpha}_0$ and $\alpha_1(\delta, p, \cdot) = \hat{\alpha}_1$ we obtain $\delta \approx 0.5067$ and $p = 0.1177$
5. Fifth, we use data in table B8 to build a probability index, by taking into account data on the war episodes, the yearly new enlistings of infantry and cavalry, as a weighted

geometric mean such as

$$\hat{p} = \exp \left(\omega \log \left(\frac{\textit{episodes}}{12} \right) + (1 - \omega) \log \left(\max \left\{ \frac{\textit{infantry} + 5 \times \textit{cavalry}}{1800000/3}, -1 \right\} \right) \right)$$

with a weight ω . We divide the number of episodes by the 12, the number of months in a year, and assume that damages caused by cavalry are 5 times those generated by infantry and divided the value obtained by one-third of the portuguese population at the time (1.8 millions). We compute the weight ω such that the average for the period 1650 to 1653 for \hat{p} matches closely the calibrated value for p (i.e. $p = 0.1177$). We get $\hat{p} \approx 0.12$ if $\omega \approx \frac{1}{2}$.

6. At last, we applied the parameters thus obtained, together with the data for the damages and the estimate of the war probability to equation (3) to obtain the last column in table C11.

Table C11: Data and calibration of the tax rate

<i>year</i>	<i>d</i>	<i>p</i>	τ
1642	0.07	0.37	10.0
1643	0.07	0.43	10.0
1644	0.00	0.29	10.0
1645	0.05	0.20	10.0
1646	0.04	0.28	10.0
1647	0.08	0.11	4.8
1648	0.00	0.09	4.5
1649	0.00	0.13	5.9
1650	0.25	0.17	8.4
1651	0.07	0.14	6.4
1652	0.04	0.12	5.0
1653	0.12	0.08	4.5
1654	0.00	0.06	4.5
1655	0.04	0.02	4.5
1656	0.05	0.03	4.5
1657	0.07	0.29	10.0
1658	0.05	0.47	10.0
1659	0.13	0.13	5.7
1660	0.06	0.10	4.5
1661	0.10	0.23	10.0
1662	0.29	0.39	10.0
1663	0.24	0.43	10.0
1664	0.24	0.61	10.0
1665	0.26	0.39	10.0
1666	0.12	0.23	10.0
1667	0.05	0.22	10.0