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The Beach:
Tax Competition along the Italian Coasts

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Abstract

Space: the final frontier. This paper seeks to understand the spatial dimension of tax competition. We provide two novel contributions to the literature on tax competition. First, we present a spatial model of tax competition, which is an adoption of the Hotelling model of imperfect competition in the linear city. We find that tax rates are strategic complementarities, as a change in taxes of one town will lead to a similar change of tax rates in neighboring towns. Second, we test the model with data from tourism taxes along the Italian coastline. We find that towns on the Thyrennian coast reduce their tax rates in order to attract tourists and additional tax base. We do not find a similar effect on the Adriatic coast, but we still see a reaction of tax rates, pointing to yardstick competition.

JEL Codes: H20, H71, H73

Keywords: Hotelling tax competition, Spatial econometrics

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1 Introduction

Starting with Tiebout (1956) the literature has emphasized the competition over a mobile tax base by rivaling towns, regions, or countries. Whereas Tiebout focused on residents and property taxes, Wilson (1986) and Zodrow and Mieszkowski (1986) investigated mobile capital and corporate income taxes. Whilst both models require competing jurisdiction by definition, the geographical dimension was not modeled explicitly in neither of these three seminal works. By contrast, the empirical literature on tax competition (Blonigen & Davies, 2004; Neumayer, 2007) has always found an impact of geographical distance on international capital movements, and more recently on local spillovers of taxes on neighboring jurisdictions (Egger, Larch, Pfaffermayr, & Winner, 2006). This paper is a first attempt to close this gap in the literature, albeit with a very specific tax and setup.

Tourism taxes are very particular taxes. Tourism taxes are also known as tourist taxes, visitor taxes, or transient occupancy taxes. They are levied either as per diem taxes, hotel taxes, restaurant taxes, arrival or departure taxes. In most cases they are levied as excise taxes and not ad valorem taxes. Tourism taxes are not levied on residents. Very often, tourism taxes are local taxes, and can be set by every single town. The electorate is therefore not - or only indirectly - subject to the tax. Inasmuch as tourism services can be considered an "export" of services from the resort town or country to the town or country of residence of the tourists, they are also a rare case of an export duty.

We postulate that beach holidays are essentially a different product from any other type of vacation. We make use of this property, as it allows us to investigate tax competition between beach towns in a linear space. We will model tax competition explicitly taking account of the geographical dimension, assuming a linear coastline. The model is similar in spirit to Hotelling (1929). Whereas Hotelling assumes mobile firms competing over inert consumers in a linear city, we will assume towns with unchangeable borders competing over mobile tourists. We will then test the model with data on tourism taxes in Italy.

The paper proceeds as follows. The next chapter gives an introduction to the theoretical and empirical literature on tax and yardstick competition as well as tourism taxes. We will then present the model in chapter 3 before describing the data and presenting our main results. Chapter 6 concludes.

2 Related Literature

The concept that jurisdictions compete over a mobile tax base was introduced by Tiebout (1956). In his seminal paper, he demonstrated how cities set property taxes in order to attract specific segments of the population and rescind others. Tax competition lead to allocative efficiency. By contrast, Wilson (1986) and Zodrow and Mieszkowski (1986) could demonstrate that tax competition can lead to a race to the bottom between competing jurisdictions ultimately eliminating all taxes on mobile factors and an inefficiently low size of the government sector (Wilson & Wildasin, 2004). Sinn (2003) demonstrates that unless public goods are rival in consumption, jurisdictions will engage in fierce tax competition and set tax rates below efficient levels for mobile factors of production. The standard model of tax competition has been extended to accommodate more than one tax rate (Bucovetsky & Wilson, 1991) and different size of jurisdictions (Ottaviano & Van Ypersele, 2005). To our knowledge, the geographical location and distance has not been considered in models of tax competition.

Starting with Kanbur and Keen (1993), a stream of literature emerged on cross-border shopping. Nielsen (2001) demonstrates that consumer are willing to move across borders in order to benefit from tax arbitrage advantages. A good summary of the literature is presented in Andres Leal and Rodrigo (2010), where the authors show that cross-border tax arbitrage is an important influence on tax revenues.

A good overview of the empirical literature is presented in Devereux and Loretz (2013), who demonstrate the inefficient low level due to tax competition throughout the literature. Evidence for the presence of tax competition for the OECD and the US is presented in Altshuler and Goodspeed (2015). Winner (2005) estimates a panel, but lacks to explicitly specify the spatial dimension in the data. That aspect has been first addressed by Egger, Pfaffermayr, and Winner (2005), who show that competition is fiercest with countries nearby. Consumption tax competition is analyzed by Jacobs, Ligthart, and Vrijburg (2010), who find that US states compete over mobile consumers.

The literature on tax competition tests whether jurisdiction lower their tax rates in order to attract tax base from neighboring jurisdictions. This of course induces their neighbors to also reduce their tax rates, such leading to a race to the bottom. However, we sometimes observe a reduction of tax rates in reaction to a reduction nearby even if the tax base doesn't move. A reason can be that citizens request from their politicians a similar practice as observed nearby, in a form of yardstick competition, as argued in the seminal paper by Shleifer (1985). Edwards and Keen (1996) present a model where the government objective function is clearly specified, and find that in either case tax competition and yardstick competition will be present. Empirical evidence for yardstick competition comes from Besley and Case (1992) and Bordignon, Cerniglia, and Revelli (2004).

This paper looks at an aspect of taxation that has been so far neglected by the tax competition literature, despite the fact of the mobile nature of its tax base, namely tourist taxes. Mak and Nishimura (1979) discuss the economic impact of tourism taxes in general. Bonham, Fujii, Im, and Mak (1992) and more recently Biagi, Brandano, and Pulina (2017) present empirical evidence that shows that tourism taxes impact arrivals, stays, and expenditure of tourists. To our knowledge the literature has so far neglected the fact that tourists are mobile, and that changes in tourism taxes in one jurisdiction will not only reduce tourism, but may also divert tourism to neighboring jurisdictions.

This paper will investigate whether tourist towns explicitly engage in tax competition or yardstick competition by setting their tourist taxes in order to attract (mobile) tourists or in order to counteract measures undertaken in nearby towns in the spirit of yardstick competition. We will do this for towns along the Italian Thyrennian and Adriatic coast, assuming that a beach holiday is a distinguished product from any other type of holiday in the Hinterland. For this reason, all our jurisdictions are lined up along the coast, and this allows us to explicitly model the spatial dimension of tax competition.

Models of imperfect competition in a (linear) space date back to Hotelling (1929). In his seminal work, Hotelling studies competition between two firms in a linear city, where consumers are distributed normally and firms can choose their location. Firms compete over consumers, and have some degree of price setting power, as the other firm further away are an inconvenient substitute for consumers. Economides (1993) and Brenner (2005) study the Hotelling model with more than one firm. The paper maybe closest to ours is Wooders and Zissmos (2003), where they adopt the Hotelling model to accommodate two cities, where both can tax firms within their city limits. Whereas firms can move between cities, consumers remain immobile. Whereas taxes are taken as given, firms react to differences in tax rates. The model presented below has n towns, and a mobile tax base in the form of tourists who react to tourism taxes. Different to Wooders and Zissmos, here towns compete for tourists by setting their tax rates.

3 The Model

This model is an adaptation of the linear city model (Hotelling, 1929). Here we assume a linear coastline with unit length, where towns of different size are lined up[1]. Towns can levy an excise tourism tax t_i from their visitors. Tourist have a preferred spot along the coastline[2] and face a linearly increasing disutility from moving away from this spot. We abstract from different hotel prices[3], so that the decision where to spend the holidays depends entirely on preference and tax.

Figure 1 describes the model, where the coastline goes from zero to unity. Town A runs from zero to a, town B goes from a to $a + b$ and therefore has a coastline equal to b, and town Z[4] takes up the rest of the coastline from $a + b$ to $a + b + z$. We will normalize the coastline to unity, hence $a + b + z = 1$. We indicate the tax rates on the vertical axis, and assume for matters of exhibition only that $t_A > t_Z > t_B$. We have also depicted preference

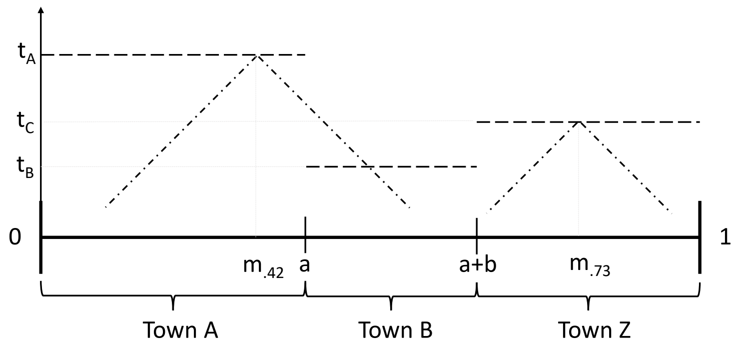
[1] We assume that municipalities in the Hinterland without access to the coast are irrelevant. This can be justified by traveling costs (both in terms of time and parking fees to and from the beach), and the absence of nightlife, from boardwalks, bars, restaurants, to nightclubs.

[2] Despite the fact that all tourists need to travel to their holiday destination, there is a lot of persistence in tourist behavior, driven by aversion to change, the possibility to reconnect to acquaintances at destination, or pleasant memories from previous trips.

[3] It is actually sufficient for the analysis that tourism taxes are not fully born by hotels, but are at least partially passed on to tourists.

[4] Denoting the last town with Z has nothing to do with the last name of the authors or their relative importance for this paper, but rather to give the reader an idea that more towns can easily be included in the analysis.

Figure 1: The linear beach



for two individual tourists[5], $m_{.42}$ and $m_{.73}$. Whereas $m_{.42}$ would be inclined to switch town, as the gain from lower taxes exceeds her loss from switching destination, tourist $m_{.73}$ would remain in town Z. Figure 2 identifies the marginal tourist, the one indifferent between vacationing in two respective towns. Tourist m_A is indifferent between town A and B, whereas m_B is indifferent between towns B and Z[6]. For any town J, tourist m_j hence identifies the individual located most to the right (east) still inclined to vacation in town J.

We assume that the preference peak for tourists are distributed equally over the unit interval, and all tourists have an identical slope of the disutlity function of $1/d$. We can identify the marginal tourist m_A as

$$m_A = a + \frac{1}{d}(t_B - t_A) \tag{1}$$

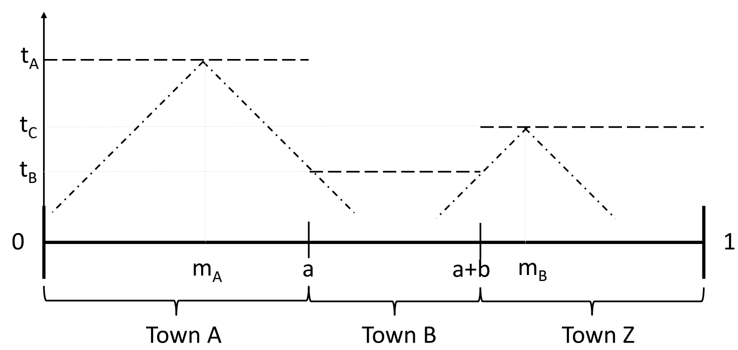
Similarly, the marginal tourist between town B and Z can be identified as

$$m_B = a + b + \frac{1}{d}(t_Z - t_B) \tag{2}$$

[5]The choice of .42 and .73 is completely casual, and has nothing to do with "the answer to life, the universe, and everything" or "the Chuck Norris of numbers".

[6]If cities are close together and/or the disutility of moving is small, it would be possible that some tourists might move over two towns. For the same reason, it could be the case that one town gets emptied out by two neighboring cities. For the sake of simplicity, we do not consider these possibilities. Empirically we observe tourists in all coastal towns, ruling out the second case. We have tested empirically whether tax rates two (and three) towns over are relevant, and we find that they are not.

Figure 2: The linear beach



Proposition 1 *An increase in its own tourism tax will reduce the number of visitors, whereas an increase in taxes of neighboring municipalities will increase the number of tourists.*

Proof The number of tourists remaining in town A equals m_A. From equation (1) we get $\partial m_A/\partial t_A = -\partial m_A/\partial t_B = -1/d$. The number of tourists remaining in town Z equals $1 - m_B$. From equation (2) we get $\partial(1 - m_B)/\partial t_Z = \partial(1 - m_B)/\partial t_B = -1/d$, which is again consistent with proposition 1. Finally, the number of tourists remaining in town B equals $m_B - m_A$. From equations (1) and (2) we get $\partial(m_B - m_A)/\partial t_B = -2/d$ and $\partial(m_B - m_A)/\partial t_A = \partial(m_B - m_A)/\partial t_Z = 1/d$. This confirms proposition 1. **q.e.d.**

Proposition 1 suggests that by lowering its tax rates, towns can attract tax base in the form of additional tourists from neighboring municipalities, unless the neighboring towns react by lowering their tax rates in return. This is consistent with the standard definition of tax competition. We can actually test this proposition and will do so in chapter 5.

Assuming that towns have tax collection costs of c_i, We can derive tax revenues of city A, which equal

$$R_A = (t_A - c_A)m_A = (t_A - c_A)[a + \frac{1}{d}(t_B - t_A)] \tag{3}$$

An increase in the tourism tax will reduce the tax base as some holidaymakers will move elsewhere, so that the revenue maximizing tourism tax rate can be derived from equation 3 by setting the first derivative equal to zero, which yields after some manipulation the reaction function of city A,

$$t_A = \frac{1}{2}(ad + c_A + t_B) \tag{4}$$

The length of the beach (a), the mobility of tourists ($1/d$), costs of tax collection, and tax rates of the neighboring community have an impact on the tax policy of town A. An increase in the neighboring municipality's tax rate allows city A to increase its tax rate as well, but only by half.

Similarly, we can identify tax revenues of town B as

$$R_B = (t_B - c_B)(m_B - m_A) = (t_B - c_B)[b + \frac{1}{d}(t_A + t_Z - 2t_B)] \tag{5}$$

As the middle town can loose tourists in both directions, both neighboring tax rates matter for its tax revenues. The reaction function can again by obtained by taking derivatives of equation 5

$$t_B = \frac{1}{4}(bd + 2c_B + t_A + t_Z) \tag{6}$$

Finally, we can identify tax revenues of town Z as

$$R_Z = (t_Z - c_Z)(1 - m_B) = (t_Z - c_Z)[1 - a - b + \frac{1}{d}(t_B - t_Z)] \tag{7}$$

The reaction function of town Z equals

$$t_Z = \frac{1}{2}(d - ad - bd + c_Z + t_B) \tag{8}$$

Proposition 2 *Tourism taxes are strategic complements.*

Proof From equations (4) and (8), we obtain $\partial t_A/\partial t_B = \partial t_Z/\partial t_B = 1/2$ and from equation (6) that $\partial t_B/\partial t_A = \partial t_B/\partial t_Z = 1/4$, which are all positive and thus confirm strategic complementarity between tax rates. **q.e.d.**

Proposition 2 finds that a reduction of the tourist tax in one town will lead to a response by neighboring towns, which will also reduce their tax rates, although less than proportional. This again suggests tax competition between towns. Both propositions 1 and 2 can and will be tested empirically in chapter 5. In case we find effects in both estimations, we can confirm tax competition between towns along the coast. If we only find an effect for proposition 2 but not for proposition 1, the only feasible explanation would be yardstick tax competition, where communities react directly to policy changes of their neighbors even if their is no economic gain in terms of a broadening tax base.

Our empirical analysis will be based on marginal tourists (proposition 1) and reaction functions (proposition 2), which show that tourists and towns react to neighboring tax rates. For completeness, we can also derive the optimal tax rates for each town, by first substituting equation 4 and 8 into 6, to yield after some reformulation,

$$t_B = \frac{1}{6}(c_A + 4c_B + c_Z) + \frac{d}{6}(a + 2b + z) \tag{9}$$

Tax collection costs matter, with own costs more important than costs of neighbors. If costs are identical, $c_A = c_b = c_Z$, then town B will set taxes above costs by the second expression, $t_B > c$. Product differentiation (a different spot on the coast) permits towns to generate tax revenues from tourist taxes despite competition from neighboring towns. There is no "race to the bottom" as in standard tax competition models, but at best a "race to the mezzanine". Note that the less elastic consumers (higher d), the higher will be tax rates. The length of the total coastline $(a + b + z)$ and its own coast (b), the higher tax rates will be.

We can also identify tax rates of town A and Z as

$$t_B = \frac{1}{12}(7c_A + 4c_B + c_Z) + \frac{d}{12}(7a + 2b + z) \tag{10}$$

and

$$t_Z = \frac{1}{12}(c_A + 4c_B + 7c_Z) + \frac{d}{12}(a + 2b + 7z) \tag{11}$$

Note that if tax collection costs and the size of towns is identical, we would see higher tax rates in A and Z with respect to B.

4 The data

The Italian tourism tax (*Imposta di soggiorno*) is a local tax applied to those who stay in an accommodation facility located in a municipality where this tax has been established.[7] Historically, the tourism tax was set for the first time in Italy in 1910 giving the possibility to the local communities provided with spas or seaside resorts to collect this tax from tourists. After being abrogated in 1989, the tourism tax was introduced again by the Italian government in 2010. Specifically, starting from 2012, an increasingly number of the Italian municipalities has decided to apply this tax, reaching several hundred in 2020. In particular, the taxable person is an individual who stays overnight in some accommodation facility and pays according to the number of nights spent. In fact, rates vary according to the municipality in which the accommodation is located, the type of facility, the number

[7] In Italy, not all accommodation facilities apply tourism tax since it is at the discretion of the individual municipalities whether adopt it or not.

of overnight stays and, in some cases, the tourism tax amount depends on the period of the year in which you decide to stay.

With the aim of analyzing the interdependence among the fiscal policy choices by the neighboring municipalities in relation to the amount of the tourism tax, we decide to evaluate the behavior of the coastal municipalities of Northern Italy, and in particular those of Liguria, Toscana, Veneto, Friuli-Venezia-Giulia and Emilia Romagna, in relation to the application of the tax itself, thus investigating whether, in defining the extent of their tax, the municipal administrations are affected by the rates determined by their neighbors. We choose to focus our attention only on the North of Italy, as recovering reliable data in the south proved to be particularly hard, due to the difficulty of contacting southern municipalities and the poorly maintained documentation.

Therefore, the lack of coordination between the Italian Government and local realities produces relevant political implications: in fact, the central administration has limited itself to introducing the tourism tax on the Italian territory, without controlling or taking part at the process by which the individual municipalities fix the amount of this tax. This is the reason why we choose to investigate the mechanism that leads institutions to determine an amount rather than another with reference to tourism tax. For this purpose, we first build a panel dataset with the introduction year of the tourism tax as well as the maximum number of nights required for the application of the charge and the related amounts divided for each category of accommodation facilities for every Municipality, ordered from west to east. In fact, in the Italian peninsula, most accommodation facilities (Hotels, RTA, holiday villages, campsites) are classified according to the number of stars (generally from one to luxury five stars), whereas other categories, such as B&B, holiday homes, hostels, farmhouse, guesthouse, do not provide this type of subdivision. It is important to underline that the tourism tax respects a progressive character: it normally grows with the increase of stars number. Moreover, we observe a high correlation, with a coefficient of correlation above 0.9 in most cases.

More specifically, the analysis covers the period 2011 to 2019[8]. The type of facilities considered are 20 and the number of municipalities included in our research is equal to 123. On average, 2012 is the year in which most of the municipal administrations introduced this tax in their territory, but several only started applying it as late as 2018. The joint dataset ranges from 2014 to 2019, covering 32 municipalities on the Adriatic coast and 91 along the Tyrrhenian coast. Data collection was done by checking official websites of seaside municipalities, and in case the information was not available by phoning the municipal tax office. We obtained complete data for the entire period for all municipalities in Northern Italy, but failed to do so for the south, where coverage was spotty and best, and - true to form - due to the absence of personnel in the tax office (for instance due to home office during the pandemic) impossible to obtain.

[8]2020 and 2021 were not taken into consideration in our analysis due to the Covid-19 pandemic, during which many towns suspended the tourist tax application.

Data on tourist arrivals and overnight presences by municipalities is well documented and could be obtained from Istat[9] for the period 2014 - 2019. Both are again highly correlated, so we will restrict the analysis to arrivals.

The length of the coastline was also provided by Istat, and due to erosion not straightforward to measure. The difference is negligible for our purpose. Unfortunately, we cannot distinguish between the type of coast, whether it is a sandy beach, rocks, or cliffs.

Several municipalities stand out. Genova is the capital of the region Liguria, while La Spezia is the second largest Ligurian city by number of inhabitants. Both are located along the Tyrrhenian coast and, particularly, the latter lies near the border with Tuscany. Livorno is a city in Tuscany. All are important port cities and may attract a different type of visitor. As regards to tourism tax, both in Genova and in La Spezia, it was introduced for the first time in 2012. Venice and Trieste are two famous cities of northern Italy, which extend along the Adriatic Sea: the former is a municipality in Veneto, while the latter is situated in Friuli – Venezia – Giulia. The Venetian municipality established the tourist tax in 2011, however in Trieste this tax appeared for the first time in the latest 2018. Both are important port cities, and Venice is ... well, Venice. We will control for these special cases in the empirical analysis.

5 Results

The data exhibit a clear panel structure, with annual observations from 2014 to 2019. There is a clear spatial relationship in the data, as all the municipalities are aligned along the coast. Due to a lack of data in the south, we split the sample into two. The Tyrrhenian sea runs from Ventimiglia in the northwest to Capalbio in the southeast. The Adriatic sea runs from Cattolica in the southwest to Trieste in the Northeast. We can exploit these two full panels for our our analysis. Moreover, given the clear spatial dimension of the dataset, we can implement a spatial lag (one municipality to the west) and lead (one municipality to the east). In order to avoid reverse causality, we also lag the spatial lag and lead variables by one period.

Tables 1 and 2 show the result for arrivals on the Tyrrhenian and Adriatic coast respectively. We run 6 specifications, unless otherwise specified we use random effects. The first column presents a standard estimation of tax elasticities, where we do not account for the spatial dimension. The second specification adds the spatial lag and the length of the coastline (in km) according to proposition 1. Column 3 controls for regional effects, and column 4 for port cities, Genova, La Spezia and Livorno on the Tyrrhenian, and Trieste and Venezia on the Adriatic Sea. Column 5 controls for year fixed effects, whereas

[9] The Italian National Institute of Statistics (Istat) is the main producer of official statistics in Italy: its activities include the census of population, economic censuses and a number of social, economic and environmental surveys and analyses. Istat is by far the largest producer of statistical information in Italy and is an active member of the European Statistical System, coordinated by Eurostat.

	(1)	(2)	(3)	(4)	(5)	(6)
tourism tax	-0.033	-0.060*	-0.059*	-0.068**	-0.059*	-0.064*
	(0.079)	(0.032)	(0.033)	(0.034)	(0.034)	(0.033)
... lag (east)		0.070**	0.066*	0.075**	0.075**	0.105**
		(0.035)	(0.036)	(0.036)	(0.035)	(0.047)
... lead (west)		0.012	0.008	0.013	0.015	-0.008
		(0.036)	(0.037)	(0.037)	(0.036)	(0.047)
Coastal length			x	x	x	x
Liguria control			x			
Port city controls				x		
Year FE					x	
Interaction effects						x
R2 within	0.1	0.1	0.2	0.2	0.8	0.2
R2 between	1.2	9.6	9.6	11.5	9.8	12.4
R2 overall	0.3	1.6	1.6	1.8	2.2	1.8
Observations	455	445	445	445	445	445

Standard errors in parenthesis. **(*) indicates significance at the 5% (10%) level.

Table 1: Arrivals on the Tyrrhenian coast

column 6 adds interaction terms between neighboring town's tax rates and the length of their coastline, to test whether bigger neighbors have a stronger impact on competitive behavior.

We find that increasing the local tourism tax reduces arrivals in that particular town, as would be expected. We also find that an increase in the tourism tax in a neighboring town (to the east) increases arrivals along the Tyrrhenian Sea, so tourists move southwest as taxes increase. The difference between their own tax rate and the tax rate of their eastern neighbor is statistically insignificant, which is in line with theory. The asymmetry may be due to the fact that the disutility of changing destination is not equal. Tourists may have a lower disutilty moving east (which, along the Tyrrhenian coast corresponds to a move further north and hence closer to the populated cneters of Italy), as opposed to moving west (or south, and thus further away from home).

We do not observe an effect for towns to the west, nor can we verify the same for tourism taxes along the Adriatic Sea. However, a longer stretch of coast matters along the Adriatic coast, where towns are generally larger and command a longer beach. They use this fact in their favor by charging slightly higher taxes. Given the low number of observations on the Adriatic coast, we wouldn't put too much weight on the results, and

	(1)	(2)	(3)	(4)	(5)	(6)
tourism tax	-0.016*	-0.020**	-0.016	-0.025**	-0.021**	-0.018*
	(0.009)	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)
... lag (east)		0.002	0.002	0.003	-0.002	0.009
		(0.010)	(0.010)	(0.010)	(0.010)	(0.016)
... lead (west)		0.007	0.008	0.008	0.006	-0.002
		(0.010)	(0.010)	(0.010)	(0.010)	(0.015)
length (coast)		0.001**	0.001	0.001*	0.001**	0.001*
		(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Emilia control			x			
Port city controls				x		
Year FE					x	
Interaction effects						x
R2 within	0.2	0.3	0.8	0.2	7.8	6.7
R2 between	15.8	24.9	34.5	32.7	24.4	26.6
R2 overall	2.0	4.3	5.8	5.2	10.8	5.0
Observations	154	144	144	144	144	144

Standard errors in parenthesis. **(*) indicates significance at the 5% (10%) level.

Table 2: Arrivals on the Adriatic coast

would conclude overall that there is some evidence in support of proposition 1.

Tables 3 and 4 use the tourism tax as dependent variable directly. Once again we run a spatial dynamic panel, using spatially lagged and lead tourism taxes of the previous year to control for reverse causality. In this way, we estimate reaction functions according to proposition 2. Results are positive and significant for all variables except for eastward neighbors on the Adriatic. Tourism taxes of neighboring communities are strategic complements, as a reduction in the tourism tax of a neighboring city will induce a city to reduce its tourism tax in turn. A ten percent reduction in tourism taxes to the east and west will lead to a seven percent reduction along the Tyrrhenian Sea, and a 3% percent decline along the Adriatic coast.

Finally, it is interesting to confront the results. The Tyrrhenian coast seems to confirm traditional tax competition between municipalities, whereas the lack of any effect in table 2 for the Adriatic coast indicates that yardstick competition might be the motivation for regional spillovers in tourism taxes here.

Apart from tax competition, other factors may explain the correlation between tax rates. Local elections are typically held on the same day across the region, so a political

	(1)	(2)	(3)	(4)	(5)
tourism tax (east)	0.323**	0.334**	0.321**	0.230**	0.386**
	(0.053)	(0.054)	(0.053)	(0.053)	(0.064)
tourism tax (west)	0.389**	0.401**	0.380**	0.300**	0.265**
	(0.054)	(0.055)	(0.054)	(0.054)	(0.073)
length (coast)	0.011**	0.013**	0.003	0.011**	0.011**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
tax&length (east)					-0.004
					(0.002)
tax&length (west)					0.009**
					(0.004)
Liguria control		x			
Port city controls			x		
Year FE				x	
R2 within	29.4	29.4	29.4	37.9	31.1
R2 between	22.5	22.2	30.0	23.3	21.7
R2 overall	23.8	23.4	28.8	28.4	23.7
Observations	445	445	445	445	445

Standard errors in parenthesis. **(*) indicates significance at the 5% (10%) level.

Table 3: Tourism tax spillovers on the Tyrrhenian coast

business cycle may drive results. But national political trends (from business friendly center right governments to tax and spend governments on the center left) could lead to common trends. We should mention here that most municipalities are run by unaffiliated civil lists. Finally, a tax reform such as the abolition of property taxes on first homes (less of a revenue issue in tourist destinations where most apartments are second homes) could also lead to a similar need to raise other means of financing, such as tourism taxes.

6 Conclusions

This paper has made a theoretical and empirical contribution to the tax competition literature. First, we have presented a spatial model of tax competition where towns lined up in a one dimensional space. The model is based on the Hotelling (1929) model of imperfect competition due to spatial differentiation. An application for the model are tourism taxes along the coast, where towns compete over mobile tourists only with other resort towns

	(1)	(2)	(3)	(4)	(5)
tourism tax (east)	0.139	0.121	0.1201	-0.025	0.336**
	(0.098)	(0.098)	(0.095)	(0.097)	(0.144)
tourism tax (west)	0.321**	0.316**	0.311**	0.167*	0.247**
	(0.090)	(0.090)	(0.089)	(0.091)	(0.121)
length (coast)	0.020**	0.023**	0.021**	0.016*	0.021**
	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)
tax&length (east)					-0.012*
					(0.006)
tax&length (west)					0.006
					(0.009)
Emilia control		x			
Port city controls			x		
Year FE				x	
R2 within	13.7	13.7	13.7	30.6	15.0
R2 between	10.7	17.2	28.7	11.2	16.2
R2 overall	11.0	16.3	25.6	14.8	15.7
Observations	445	445	445	445	445

Standard errors in parenthesis. **(*) indicates significance at the 5% (10%) level.

Table 4: Tourism tax spillovers on the Adriatic coast

along the beach. We were able to derive two testable predictions from the model, one based on tourist movements, one based on tax reaction functions.

The empirical contribution was to test the model with data from Italian tourism taxes along the Tyrrhennian and Adriatic coast. We can confirm that tourists react to lower tourism taxes in neigboring towns by switching destination, at least for the Tyrrhenian coast. We do find more robust effects when testing tax reaction functions, where we can show that tourism taxes are strategic complementarities. A reduction of tourism taxes in neighboring towns leads a municipality to also lower their taxes. This holds on both coasts, even if we do not see an effect of taxes on the tax base on the Adriatic coast. We can interpret these results as tax competition along the Tyrrhenian coast and yardstick competition along the Adriatic coast.

References

Altshuler, R., & Goodspeed, T. J. (2015). Follow the leader? evidence on european and us tax competition. *Public Finance Review*, *43*(4), 485–504.

Andres Leal, J. L.-L., & Rodrigo, F. (2010). Cross-border shopping: A survey. *International Advances in Economic Research*, *16*(1), 135–148.

Besley, T., & Case, A. (1992). *Incumbent behavior: Vote seeking, tax setting and yardstick competition.* National bureau of economic research Cambridge, Mass., USA.

Biagi, B., Brandano, M. G., & Pulina, M. (2017). Tourism taxation: A synthetic control method for policy evaluation. *International Journal of Tourism Research*, *19*, 504–514.

Blonigen, B. A., & Davies, R. B. (2004). The effects of bilateral tax treaties on US FDI activity. *International Tax and Public Finance*, *11*(5), 601–622.

Bonham, C., Fujii, E., Im, E., & Mak, J. (1992). The impact of the hotel room tax: An interrupted time series approach. *National Tax Journal*, *45*, 433–441.

Bordignon, M., Cerniglia, F., & Revelli, F. (2004). Yardstick competition in intergovernmental relationships: theory and empirical predictions. *Economics letters*, *83*(3), 325–333.

Brenner, S. (2005). Hotelling games with three, four, and more players. *Journal of Regional Science*, *45*(4), 851–864.

Bucovetsky, S., & Wilson, J. D. (1991). Tax competition with two tax instruments. *Regional Science and Urban Economics*, *21*(3), 333–350.

Devereux, M. P., & Loretz, S. (2013). What do we know about corporate tax competition? *National Tax Journal*, *66*(3), 745–773.

Economides, N. (1993). Hotelling's main street with more than two competitors. *Journal of Regional Science*, *33*(3), 303–319.

Edwards, J., & Keen, M. (1996). Tax competition and leviathan. *European Economic Review*, *40*(1), 113–134.

Egger, P., Larch, M., Pfaffermayr, M., & Winner, H. (2006). The impact of endogenous tax treaties on foreign direct investment: Theory and evidence. *Canadian Journal of Economics*, *39*(3), 901-–931.

Egger, P., Pfaffermayr, M., & Winner, H. (2005). An unbalanced spatial panel data approach to us state tax competition. *Economics Letters*, *88*(3), 329–335.

Hotelling, H. (1929). Stability in competition. *The Economic Journal*, *3*, 41–57.

Jacobs, J., Ligthart, J. E., & Vrijburg, H. (2010). Consumption tax competition among governments: Evidence from the united states. *International Tax and Public Finance*, *17*(3), 271–294.

Kanbur, R., & Keen, M. (1993). Jeux sans frontières: Tax competition and tax coordination when countries differ in size. *American Economic Review*, *83*(4), 877–892.

Mak, J., & Nishimura, E. (1979). The economics of a hotel room tax. *Journal of Travel Research*, *17*(4), 2-6.

Neumayer, E. (2007). Do double taxation treaties increase foreign direct investment to developing countries? *The Journal of Development Studies*, *43*(8), 1501-–1519.

Nielsen, S. B. (2001). A simple model of commodity taxation and cross-border shopping. *The Scandinavian Journal of Economics*, *103*(4), 599–623.

Ottaviano, G. I., & Van Ypersele, T. (2005). Market size and tax competition. *Journal of International Economics*, *67*(1), 25–46.

Shleifer, A. (1985). A theory of yardstick competition. *The RAND journal of Economics*, 319–327.

Sinn, H.-W. (2003). The new systems competition. *Blackwell*, *Chapter 2*.

Tiebout, C. (1956). A pure theory of public expenditures. *Journal of Political Economy*, *64*(5), 416–424.

Wilson, J. D. (1986). A theory of interregional tax competition. *Journal of Urban Economics*, *19*(3), 296–315.

Wilson, J. D., & Wildasin, D. E. (2004). Capital tax competition: bane or boon. *Journal of Public Economics*, *88*(6), 1065–1091.

Winner, H. (2005). Has tax competition emerged in oecd countries? evidence from panel data. *International Tax and Public Finance*, *12*(5), 667–687.

Wooders, M., & Zissmos, B. (2003). Hotelling tax competition. *CESifo Working Paper*(932).

Zodrow, G., & Mieszkowski, P. (1986). Pigou, tiebout, property taxation, and the underprovision of local public goods. *Journal of Urban Economics*, *19*(3), 356–370.