How Should Culture Be Taxed? A Study of the Effects of the 2012 VAT Rise on the Expenditure on Live Shows, Cinema and Theater in Catalonia

Master's Thesis – Policy Economics

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Abstract

This paper aims to find the change in cultural expenditure in Catalonia due to the rise in VAT from 8% to 21% that occurred in 2012. The Canary Islands were the only region in Spain that ware exempted from the VAT increment, creating a source of exogenous variation that allows us to carry on a two-step method based on performing a Difference-in-differences estimation first and a Matching methods approach later. The conclusions of the analysis imply that households that show a non-zero consumption of cultural goods (30.17% of total households in the year before the tax reform) increased their expenditure by 158.73€. On the contrary, the participation rate of cultural activities decreased by 5.4%. These two effects move in opposite directions, cancelling each other out and leaving expenditure in cultural goods almost unchanged.

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1 Introduction

In 2008 a financial crisis struck the American economy and rapidly expanded worldwide. In Spain, the debt-to-GDP ratio increased from 39.7% in 2008 to 100.7% in 2014. In addition, the budget deficit in 2009 was as high as 11.28% of the GDP and in the consecutive years the Government kept generating important deficits. In 2012 the financial situation of some Spanish banks was so dreadful that the Eurogroup had to inject 100 billion euros in order to rescue Spanish banks. But this financial bailout came at a price. The European Union started controlling the Spanish economy much more and the European Commission created and enforced the Stability and Growth Pact (SGP), which was based on limiting governments' debt to 60% of GDP and deficit to 3% of GDP.

In order to comply with the SGP the Government of Spain launched austerity measures. The package of measures affected areas such as public services, health, pensions, civil servants, research, education and culture. Apart from cutting its total expenditure, the Government also raised taxes in order to increase its total budget. One of the sectors that experienced a bigger blow in terms of increased fiscal pressure was culture.

More specifically, in 2012 the Government introduced a measure that implied an increase in the Value Added Tax for live shows, theater and cinema from 8% to 21%. This significant raise took place because both the reduced and the general VAT rate increased (from 8% to 10% and from 18% to 21%, respectively). Moreover, live shows, cinema and theater used to be taxed at the reduced VAT rate and were reclassified to the general rate. Thus, not only did the reduced VAT rate increase from 8% to 10%, but also cultural goods were reclassified to the general rate (which also increased from 18% to 21%).

This policy became a reality on September 1st 2012 but its effects are still unclear. Whereas some papers have already studied the effect of this fiscal change on the demand for cultural goods in Spain, the effects in the region of Catalonia are still unanalyzed. Therefore, this paper aims to contribute to the existing literature by finding the effects of household spending on cinema and performing arts in Catalonia after the change in indirect taxation from 8% to 21% in 2012. More precisely, we will find out the difference in cultural spending (in euros) due to the VAT rise.

Moreover, most of the empirical papers mentioned before, those that studied the effects of the VAT rise in Spain, used complex demand systems to calculate the elasticity of cultural goods, relying on behavioural assumptions. In this paper we will use a quasi-natural ex-

perimental approach which does not need to rely on these behavioral assumptions anymore but will yield a result on the change in cultural consumption due to the VAT rise.

This quasi-natural experiment will be possible because the new fiscal setting that became a reality on September 1st 2012 did not affect the whole country in the same way. It did affect the Spanish mainland (in which Catalonia is located) and the Balearic Islands, but the Canary Islands were exempt from the reclassification of the VAT on live performances, cinema and theater to the general rate. As a result, a source of exogenous variation is generated which makes it attractive to make comparisons between the treated region of Catalonia and the untreated region of the Canary Islands.

Our identification strategy will be based on using a two-step method based on performing a Difference-in-differences approach first and Matching methods later. Abadie (2005) explains that the Differences-in-differences method relies on the assumption that, in the absence of treatment, Catalonia (treated region) and the Canary Islands (untreated region) would have followed parallel trends over time (common trend assumption). If the parallel trend assumption holds, Difference-in-differences will identify the causal effect of the VAT rise by comparing the change in cultural spending before and after the new fiscal policy (Bertrand, Duflo, and Mullainathan 2004). Nonetheless, it is unclear if the common trend assumption will hold. In fact, O'Neill et al. (2016) explain that the common trend assumption can be difficult to hold because it does allow the average of time-invariant unobserved variables to change between treatment and control groups, but only if their effects do not change over time. Nonetheless, in many settings there are unobservable time-varying characteristics that generate bias in the estimation and make the common trend assumption unfeasible.

Since in many settings the common trend assumption can be difficult to hold, O'Neill et al. (2016) present alternative methods that allow for more flexible assumptions. More concretely, he refers to using Matching methods under the *independence conditional on past outcomes assumption.* This assumption implies that individuals with similar outcomes in the period before treatment have similar treatment-free potential outcomes in post-treatment periods conditioned on observed covariates. This is particularly useful in our setting, because we are able to observe some observations twice: once before treatment and once after treatment. Hence, we are able to include pre-treatment consumption of cultural goods in our analysis for these group of observations. Abadie, Diamond, and Hainmueller (2010) explain

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the importance of including past outcomes. They state that past outcomes are influenced by both observed and unobserved confounders and, therefore, households with similar past outcomes are likely to be also similar in terms of their unobserved confounders.

Therefore, the second step of our estimation will be based on using a Matching methods approach under the *independence conditional on past outcomes* assumption. Matching controls for pre-treatment outcomes and covariates by generating a matched control group (observations not affected by the VAT rise) that is similar to the treated group (Catalan households facing the VAT rise) (Heckman 1997). Moreover, matching on past outcomes acts as a proxy for time-varying effects of the unobserved confounders, which caused the violation of the common trend assumption (O'Neill et al. 2016). Hence, under with this Matching method we are able to solve the violation of the common trend assumption incurred in the Difference-in-differences approach.

O'Neill et al. (2016) perform a Monte Carlo simulation that investigates this double-step method performance and conclude that, when the parallel trend assumption does not hold, the matching method provides less biased estimates of treatment effects. Ateca-Amestoy, Gardeazabal, and Ugidos (2019) also use this two-step approach to carry on their analysis of the change in cultural spending in Spain after the VAT rise in 2012. First they perform a Difference-in-differences estimation and, when the common trend assumption is violated they carry on with a matching methods approach. They did so for Spain and we will add to the existing literature by focusing on Catalonia.

Keating (2001) explains that the Government of Catalonia has been subsidizing the development of cultural performances in the local language, Catalan, for decades. He also underlies that Catalan citizens have been exposed to a broader cultural offer than in other Spanish regions due to the superior public spending in culture previously mentioned. This, together with the fact that Catalonia is one of the richest regions in Spain (Cantarero and Gonzalez 2009) motivate the objective of this paper. We consider that Catalonia might have experienced a change in household spending on cultural goods slightly different than in Spain due to its higher exposure on culture and higher availability of economic resources to spend on culture. We aim to find out if this supposition is true or not.

In order to perform all the analysis we will use data from the Spanish National Institute of Statistics. More concretely, they perform a Household Budget Survey that allows us to use data from 2011, 2012 and 2013 to perform empirical tests. This survey is standardized by

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Eurostat and contains very useful information not just on household spending, but also on the characteristics of each household. Moreover, we are also able to observe some households twice in two consecutive years, which is particularly important because it allows us to conduct the matching methods approach conditional on previous year consumption.

Theory suggests that the change in VAT can affect consumption through two channels: price elasticity of the demand and price. Calculating the effect of the change in price on the demand for a good is complex, but in the case of cinema, theater and performing arts it is extremely difficult. In this kind of goods prices change a lot depending on the location of the show, the technical resources needed, the cast, the time in which the show takes place, etc. Hence, it is extremely hard to draw inference on the effect of the price and it requires highly disaggregated data, which is currently unavailable in Spain. Nonetheless, the VAT change affects all the potential consumers in the exact same way, which creates a source of exogenous variation that makes the identification of the effect possible (Ateca-Amestoy, Gardeazabal, and Ugidos 2019).

Moreover, one might think that the financial crisis that was going on in Spain may have caused a downturn in cultural spending. In fact, if cultural goods were to be considered luxury goods economic theory suggests that this downturn would be sharp. Nonetheless, there is not an agreement in the academia on whether cultural goods should be considered luxury goods or not (Seaman 2006). However, either if they are luxury goods or not, our data contains information on the disposable income of each household analyzed, which allows us to control for this variable and make sure that our results are not affected by the complicated economic and financial situation that Spain, Catalonia and the Canary Islands were facing in 2012.

Nevertheless, net disposable income is not the only confounding factor that we use in our empirical analysis. The Difference-in-differences estimation is made using age, gender, nationality, education, size of the town of residence and income as covariates. And even though this method does not yield statistically significant results on the effect of the VAT change in the spending of cultural goods, we do get statistically significant results on some of the covariates used in the empirical analysis. Education, nationality, age and income ara statistically significant determinants of cultural consumption in our Difference-in-differences analysis.

Hence, our Difference-in-differences estimation gives us the appropriate covariates to

perform the second step of the approach, matching methods. With these covariates we perform matching methods and show that, conditional on participation on cultural events (households that showed non-zero expenditures), Catalan households spent 158.3€ more after the VAT rise. That is, households that were already consuming cultural goods (30.17% of total households in 2011), increased their total consumption by 158.3€. Moreover, we also prove that the participation rate in cultural events decreased due to the rise of VAT. More precisely, it decreased 5.3 percentage points. Hence, both empirical results move in two different directions: avid cultural consumers further increase their consumption but the participation rate declines more than 5%.

This paper is structured as follows. Section 2 makes an extensive review of the literature. Section 3 broadly explains the data used in our estimations. Section 4 contains the results of the difference in differences and matching methods estimation. Section 5 summarizes the conclusions of all the analysis carried out.

2 Literature Review

In the literature one can find several papers discussing which are the main determinants of cultural consumption. Seaman (2006) made an extensive literature review in which he first focused on the profile of cultural consumers. He highlights the fact that age plays an important role in determining whether an individual is more likely to attend cultural events or not. Baumol, Bowen, et al. (1993) made an audience survey to study the relative cultural consumption frequency of different age groups with respect to the relative weight of those age groups in the total population in the 60s. Surprisingly, they concluded that the age group 20-24 was the one with a higher relative participation rate both in the United States and in the United Kingdom. Also, they found that relative frequencies declined with age. More modern studies showed that this pattern is not as straightforward as it might seem with the previous statements. Wiesand (1995) studied the propensity of different age groups in Germany to consume four types of music: music theater, classical music, commercial music and rock/jazz. He found that young age groups (younger than 35) have higher participation rates than older groups (older than 50). Nonetheless, he emphasized that young Germans have more propensity to consume commercial music and rock/jazz than classical music. Similarly, Favaro and Frateschi (2007), made an empirical analysis of the patterns of musical

choice in Italy and concluded that young individuals have a higher probability of attending popular music concerts and older individuals have a higher probability of going to highbrow musical concerts. Furthermore, Molina, Campaña, and Ortega (2015) studied the time that consumers dedicate to different cultural goods in 2009 in Spain using data from the Spanish Time Use Survey. They found that young people spend more time going to the cinema whereas old people spend more time in art exhibits and museums, which made them conclude that age influences cultural consumption in different ways.

Apart from age, gender happens to be one of the most discussed culture consumption determinants in the literature. Both Favaro and Frateschi (2007) and Molina, Campaña, and Ortega (2015) highlight the importance of gender in the cultural consumption pattern. The first concludes that snob concerts are predominantly female, whereas popular music concerts are predominantly male. The second emphasizes that men tend to attend sporting events relatively more than women. Similarly, Gray (2003) explains that for socio-cultural reasons men and women have been more or less exposed to certain goods depending on their gender, and the more an individual is exposed to a cultural good, the higher is their propensity to consume this kind of cultural goods again. Nonetheless, Prieto-Rodrıguez and Fernández-Blanco (2000) study the socioeconomic characteristics of classical and popular music audiences in Spain in the 90s and they do not find different gender behavior between the audiences of the two different kinds of music genres. All in all, most papers suggest that gender plays a role in determining cultural consumption but its pattern has not been fully studied yet and it is difficult to resolve how it affects cultural spending patterns.

As Seaman Seaman (2006) emphasizes, there is a general agreement that education and income play a very important role in cultural consumption propensity. Nonetheless, many papers have focused on separating their two independent effects to find out which one is relatively more important. Heilbrun and Gray (2001) make a multivariate regression analysis to conclude that education plays a larger role than income. Similarly, the National Endowment for the Arts 2004 concludes that education is the demographic factor that better describes cultural consumption patterns. Diniz and Machado (2011) explain that the marginal utility of cultural goods increases with its consumption. They evaluate the determinants of cultural consumption in Brazil and conclude that it is mainly determined by education and income. They show that the higher the level of both variables the higher the propensity that an individual will consume cultural goods. Ateca-Amestoy (2008) estimates a model

of theater participation in the US and concludes, again, that income and education have a large positive relationship with cultural consumption. Moreover, she states that the effect of specific cultural education on the consumption of cultural goods is much higher than the effect of formal education. This is the case because the individual makes a voluntary choice to accumulate specific cultural education. Therefore, accumulated cultural capital plays a very important role in understanding cultural consumption patterns. Ateca-Amestoy (2008) also highlights that theater consumption is mainly an urban and feminine phenomenon. This last sentence is connected to another factor that determines cultural consumption: town of residence.

Some cultural equipment, such as theater, is concentrated in urban areas. Therefore, one might think that town of residence might have an effect in determining cultural consumption, at least for some types of culture. Bajic (1985) analyzed the impact of commuting time on theater attendance in Toronto. He concluded that people who specially like theater locate closer to the city center. Nonetheless, he also wrote that most consumers attach larger weights to other factors in order to determine where to buy a house. Even though there is not much literature calculating the specific impact of town of residence on cultural consumption most scholars agree that it does play a role.

Apart from the determinants of cultural consumption, it is obvious that price acts as a necessary mediator between the raise in the VAT and the consumer demand of cultural goods (this will be further explained in the next section). Thus, studying own-price elasticities of cultural goods becomes a must in our analysis.

Seaman (2006) collects 16 studies that empirically estimate the magnitude of own-price elasticities for the demand of cultural goods. Among them, 12 found that the demand for cultural goods is price inelastic and 4 determined that the price demand is elastic. All in all, it looks like there is not enough econometric evidence to support the common belief that the demand for cultural goods is price elastic. Actually, both Seaman (2006) and Lévy-Garboua and Montmarquette (2003) tend to defend that the demand for cultural goods is rather inelastic. Nonetheless, there is not a general agreement on the matter.

Seaman (2006) also highlights the fact that there are price elasticity differences by level of aggregation. That is, the previously explained result that the own-price elasticity for cultural goods is rather inelastic is more pronounced in those studies that use aggregated data across different cultural activities.

Throsby ([1994](#)) makes an interesting distinction between *immediately accessible arts* and *higher arts that imply an acquired taste*. On the one hand, he states that cultural products that imply and acquired taste have lower own-price elasticities because their consumers value the quality of the product much more. On the other hand, immediately accessible cultural products have higher price elasticity because there are more substitutes available.

Nonetheless, the price of the ticket is not the only component to take into account when analyzing consumption of cultural goods. Seaman ([2006](#)) remarks that apart from price, one must consider other components such as opportunity cost of time or commuting costs. Actually, Globerman ([1989](#)) defends that the demand for cultural goods is price inelastic in part because the opportunity cost of time is the highest cost for attending live performances. That point is used by Garboua and Montmarquette ([1996](#)) to make a distinction between a market price-inelastic demand for cultural goods and a shadow-price elastic demand for art appreciation.

Substitutive opportunities and the direction of the income effect play a major role in determining price elasticity. In our particular case, Frank et al. ([2008](#)) compared price elasticities of demand for various products, including theater and opera. He explains that the price elasticity demand for green peas is 14 times higher than for theater and opera because of two reasons. First, because art consumers have relatively higher incomes, so their real income effect after a change in the price of tickets would be relatively lower. Second, because there are many more and closer substitutes for green peas than for theater and opera.

All in all, Seaman ([2006](#)) states that it seems that arts have low own-price elasticities of demand, especially compared to other goods, but this might reflect pricing in the inelastic range of demand curves. Also, he clarifies that this result might change when using more disaggregated data. Finally, he points out that the low weight that the price of the ticket has in the total cost of cultural consumption might explain the low elasticity.

Following Seaman's point, Legoux et al. ([2014](#)) found that the price elasticity of demand for cultural goods increased over the last five decades. They argue that this might happen due to the availability of more substitutes and the fact that the high status associated with culture is least present nowadays and cultural consumers consume a wider selection of cultural goods.

In the particular case of Spain, the geographical area we are analyzing, some authors have

empirically calculated own price elasticities of cultural goods. Prieto-Rodriguez, Romero-Jordán, and Sanz-Sanz (2005) made the calculation for cinema, theater, museums and other events and concluded that their own price elasticity is -1.23. Similarly, Garcıa-Enrıquez and Echevarrıa (2018) found that the price elasticity of demand for shows, museums, internet, radio and TV licenses is -0.12. Finally, Fernandez-Blanco, Orea, and Prieto-Rodriguez (2013) explained that the price elasticity of demand for cinema is -1.07. These results are in line with the statement made before about the different own price elasticity for different kinds of cultural goods.

There are several papers that analyzed the effects of the VAT rise in Spain in 2012. Enrıquez (2015) analyzes the welfare effects of the indirect taxation increase in food and non-alcoholic goods by modeling a demand as a Quadratic Almost Ideal Demand System (QUAIDS). The QUAIDS is a consumer demand model that analyzes consumer behavior and was introduced by Banks, Blundell, and Lewbel (1997). Nonetheless, it has some caveats. First, we do not have disaggregated information on prices for different cultural goods. When using a QUAIDS model we need to add prices in the equation but in the case of culture it is highly complicated not only because there is not enough information available but also because prices change a lot depending on the location of the show, the city and the hour of the day in which it is performed, etc. Most importantly, the QUAIDS system faces difficulties when there are zero quantity problems. We refer to households that report zero consumption on, in our case, cultural goods. In that case, as Enrıquez (2015) mentions, the model should not be estimated by an OLS estimator because it would be biased and inconsistent. Analyzing our data we observe that in 2011 around 70% of households report zero consumption on cultural goods, and this number increases in the following years. Hence, if we were to make our estimation using QUAIDS we would have to incur further assumptions in order to carry on our analysis.

Anyways, Enrıquez (2015) finds out that the higher the income level of a household, the lower its welfare loss relative to its annual income, which implies that this policy had regressive effects. On the contrary, Prieto-Rodriguez, Romero-Jordán, and Sanz-Sanz (2005) use a microsimulation to obtain expenditure and price elasticities for various cultural goods. They simulate tax cuts using these elasticities and conclude that this policy leads to welfare and efficiency gains, but these gains are unequally distributed, making it regressive. More specifically, Garcıa-Enrıquez and Echevarrıa (2018) analyze the welfare effects of the VAT

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rise in Spain for cultural goods and conclude that the welfare loss increases with income. Thus, they also conclude that the policy analyzed was regressive and that the size of the welfare loss would depend on the society's inequality aversion.

Nonetheless, when analyzing the desirability and the redistributive effects of an indirect tax change one must take into account the Atkinson-Stiglitz Theorem. Atkinson and Stiglitz (1976) derive the condition under which indirect taxation is unnecessary and explain that commodity taxation is superfluous when the marginal willingness to pay for one good in terms of another is independent from labor effort. In that case, taxing one good more than another does not reduce labor market distortions but it does create consumption pattern distortions. Hence, taxing one good less than another is a *de facto* subsidy. Moreover, the Corlett-Hague rule (Corlett and Hague 1953) explains that differentiation on the taxation of two different goods might be desirable if goods that are more complementary to leisure are taxed higher. In this case, the adverse incentives from commodity taxation on labor supply are reduced. Hence, when the Spanish Government set cultural goods at the reduced VAT rate culture was being *de-facto* subsidized. Nonetheless, this reduced rate could be justified if culture yields beneficial externalities, and according to Bucci and Segre (2009) it does. More concretely, they show that culture can be an important driver for economic growth. They create a model in which cultural capital and human capital interact with each other and come to the conclusion that creativity and a talented labour force foster economic growth

Finally, Ateca-Amestoy, Gardeazabal, and Ugidos (2019) also analyze the effects of the VAT rise in 2012 for cultural goods. Their study, which will be used as a clear reference for this paper, uses a difference in differences approach to calculate how much money each household spent more -or less- in culture due to the tax change. After combining the difference in difference approach with a matching methods estimation, they conclude that Spanish households that did consume culture (around 30% of total households) spent 52€ more. They did not have to rely on strong assumptions as the previous papers mentioned, but used a quasi-experimental framework to draw their conclusions. Their results account for Spain, but this paper will add to the existing literature by focusing on the region of Catalonia.

3 Data

In order to conduct the analysis we will use data from the Spanish Household Budget Survey (HBS) developed by the Instituto Nacional de Estadística (INE, *National Institute of Statistics*). The HBS is made on a yearly basis with the objective of obtaining information regarding the spending pattern of Spanish households as well as which are the characteristics of these households. The Spanish National Institute of Statistics follows the methodological guidelines recommended by Eurostat in order to have comparable data among EU members. With the data obtained in the HBS one can calculate the spending of Spanish households in the whole country and in each autonomous region, year-to-year changes in spending and the consumption bundle of Spanish households in different periods and regions.

Each wave collects data from around 22,000 households in Spain, divided in all the 19 regions that constitute the country and selected from a random sample according to geographic and demographic factors. More specifically, in the case of Catalonia around 2,000 households are interviewed every year and 1,000 in the Canary Islands. Each household participates during two weeks and has to keep track of all the expenses incurred in that period of time. Every month two groups of households start participating in the HBS, one in the first week of the month and another one in the third week. That will help us separate the households that were interviewed before –and after- September 1st 2012. Moreover, some households participate just once in the survey and some households participate twice in two consecutive years.

With the purpose of classifying all the expenses, INE follows COICOP, the international distribution model used by Eurostat. COICOP is structured in 12 groups of expenses: 1. Food and non-alcoholic beverages, 2. Alcoholic beverages, tobacco and narcotics, 3. Clothing and footwear, 4. Housing, water, electricity, gas and other fuels, 5. Furnishings, household equipment and routine household maintenance, 6. Health, 7. Transport, 8. Information and communication, 9. Recreation, sport and culture, 10. Education, 11. Restaurants and accommodation services and 12. Others goods and services

In our particular analysis we will use group 9: *recreation, sport and culture.* Among this group there are many items that do not apply to the analysis we want to carry on, but HBS contains spending estimations that are specific enough for the purpose of this paper. More concretely, group 09.4 shows information on *recreational and cultural services* and 09.4.2 narrows the analysis to *cultural services.* Nonetheless, this item is not specific enough

because it contains services that were not reclassified from the reduced to the general VAT rate (museums, libraries, etc.) and, therefore, would create noise in our empirical analysis. Thus, we selected item 09.4.2.1., which includes information on *cinemas, theaters and live shows*. More specifically, this item describes household spending on cinemas, theaters, operas, concerts, ballet, other musical shows, circus, light and sound shows, bullfighting, club tickets when they include live performances and public dances. All these cultural events faced the effects of the increase in VAT from 8% to 21%.

Given all this explanation and with the objective to construct our analysis with data from before and after the rise in VAT, we will use the Household Budget Surveys for 2011, 2012 and 2013, the year before the raise, the year in which the VAT rose and the year after it happened.

Table 1 summarizes households' characteristics in Catalonia in 2011, the year before the VAT raise. The total number of observations is 1969, but just 594 of them spent money on cinema, theaters and live shows. Thus, just 30.17% of the households who took part in the interview consumed the goods previously mentioned. If we were to take into account all households in the HBS the average consumption of cultural goods is 114.87€. Among people who decide to purchase cultural goods, the mean increases to 380.76€. In Spain, the participation rate is slightly higher (33.76%), but the average expenditure of cultural participants is of 283.51€, almost 100€ lower than in Catalonia (Ateca-Amestoy, Gardeazabal, and Ugidos 2019).

Table 1 also contains information on a number of households' characteristics that were considered important in determining cultural consumption in the literature review section. Starting with household income, considered one of the most important determinants of cultural consumption, the average net monthly income per household in 2011 was 2196.33€. Education is another important determinant and we observe that average number of persons with university studies in each household is 0.63. In the case of higher secondary school studies, the mean is 0.51. Gender also plays a role in cultural consumption and data from the 2011 HBS shows that Catalan households had 1.42 female members and 1.35 male members. Moreover, just 0.27 members were foreigners and 2.49 were Spanish. Regarding age, each household had 1.12 members younger than 35, 1.19 members between 35 and 65 and 0.46 members older than 65. Also we observe that most households, 43.2%, are located in towns with a population of more than 100,000 inhabitants.

Variable	Obs	Mean	Std. Dev.	Min	Max
Annual household expendiure					
Total cultural expenditure	1969	114.867	380.161	0	5.448.933
Participation rate	1969	.302	.459	0	1
Number of household members	1969	2.767	1.252	1	9
Household members by nationality					
Spanish	1969	2.49	1.286	0	7
Foreigners	1969	.277	.959	0	8
Number of members by age					
0-4	1969	.177	.473	0	3
5-15	1969	.338	.676	0	5
16-24	1969	.249	.569	0	5
25-34	1969	.348	.648	0	4
35-64	1969	1.193	.877	0	5
65-84	1969	.41	.707	0	3
85 or more	1969	.052	.246	0	2
Number of members by labor status					
Employed members	1969	1.126	.917	0	5
Inactive members	1969	.855	.895	0	5
Unemployed members	1969	1.126	.984	0	6
Number of members by gender					
Men	1969	1.349	.859	0	7
Women	1969	1.417	.836	0	6
Number of members by education level					
Primary education	1969	.325	.685	0	6
Lower Secondary education	1969	.784	.943	0	6
Higher Secondary education	1969	.514	.779	0	5
University studies	1969	.63	.832	0	7
Size of town of residence					
More than 100,000	1969	.433	.496	0	1
50,000-99,999	1969	.128	.335	0	1
20,000-49,999	1969	.161	.368	0	1
10,000-19,999	1969	.092	.29	0	1
Less than 10,000	1969	.185	.389	0	1
Disposable income interval					
0-500	1969	.029	.169	0	1
500-1,000	1969	.118	.323	0	1
1,000-1,500	1969	.197	.398	0	1
1,500-2,000	1969	.156	.363	0	1
2,000-2,500	1969	.137	.344	0	1
2,500-3,000	1969	.148	.355	0	1
3,000-5,000	1969	.181	.385	0	1
5,000-7,000	1969	.025	.156	0	1
More than 7,000	1969	.008	.09	0	1

Table 1: Summary of statistics - Catalonia 2011

In order to construct our two-step method (Difference-in-differences and matching method), we needed information not publicly available. We required two additional sources of information: 1) data to separate which households were interviewed before -and after- September 1st 2012. This information was important to perform our Difference-in-differences estimation. 2) Data describing which households were interviewed twice (in two consecutive years) and the amount of their previous year expenditure. This information was necessary to perform our matching method conditional on past outcomes approach. Hence, we made an inquiry at INE and they provided us with a new dataset that included the specific date at which all the households were interviewed and previous year spending of households that were interviewed twice.

As it has been mentioned, in our dataset we can observe two kinds of households: those that were interviewed just once and those that were interviewed twice. In the group of households that were interviewed once we have observations all in 2011, 2012 and 2013. Similarly households interviewed twice are present in every year of the dataset.

Among the group of households interviewed twice it is worth separating them into two subgroups: households that were interviewed twice and both times before or after the VAT rise and households that were interviewed twice but one time before the tax reform and one time after the tax reform. This last group is particularly important for our matching method conditional on past outcomes because it allows us to include previous year consumption of treated households in the matching. Being more precise, we observe households that were interviewed in 2011 and in 2012 after September 1st and households that were interviewed in 2012 before the tax reform and in 2013.

In conclusion, with our dataset we can observe households that were interviewed for a first time when the VAT for cultural goods was 8% and for a second time when it had increased to 21%. This group of households will be used for the matching methods approach.

4   Empirical methods and results

This section explains the methods used in our empirical estimation and the results obtained.

4.1 Difference-in-differences method

For this subsection we will use the Difference-in-differences framework described by Abadie
(2005) and Ateca-Amestoy, Gardeazabal, and Ugidos (2019).

Our Difference-in-differences model is estimated using the following equation:

$$Y_{irt} = \gamma_r + \lambda_t + \delta D_{irt} + X'_{irt} + \varepsilon_{irt}$$

Y_{irt} is the observed outcome, spending on cinema and performing arts by household
i, who lives in region r, in period t. More specifically, households can be observed before
treatment *(t=0)* or after the VAT rise *(t=1)* and in Catalonia *(r=1)* or the Canary Islands
(r=0). As mentioned before, some households are observed twice, but in this case they ap-
pear in our data as two separate observations. We denote $D_{irt} = 1$ when household i resides
in Catalonia *(r=1)* and has been exposed to treatment *(t=1)*. Similarly, we denote $D_{irt} = 0$
if household i has not been exposed to treatment (VAT rise). Hence, $D_{irt} = 1$ are treated
households and $D_{irt} = 0$ are untreated households (control group). γ_r represents a region-
specific effect. If the Common Trend Assumption holds, this effect should not change over
the years, which would mean that both regions follow parallel trends. Nonetheless, in order
to control for unobserved region confounding factors we will include regional fixed effects by
adding a full set of regional dummies in the analysis. λ_t is a time-specific component. Again,
to account for unobserved time-varying confounding factors we will use a full set of yearly
dummies that act as time fixed effects. X'_{irt} is a vector of household characteristics and ε_{irt}
is a zero mean random disturbance. Finally, δ contains the causal effect of the VAT rise on
average household expenditure in cultural goods. Hence, it has the Difference-in-differences
interpretation, the average treatment effect of the treated households (ATET).

In order to increase the internal validity of our estimation, we will include several house-
hold covariates. These variables are in line with the cultural consumption determinants
found in the literature review section. More concretely, we use the following: household net
income, population size of town of residence, number of household members by gender, level
of studies, number of household members by age intervals, number of household members
by nationality and number of household members by labor status.

With all this information we will run an OLS regression that will take household expen-
diture in cinema and performing arts as a dependant variable. Also, we include regional

fixed effects and time fixed effects to control for unobserved confounding factors and several household covariates to aim for an unbiased estimate.

Nonetheless, we must take into account that if the effects of the unobserved confounders on the outcome change over time we will not be able to fully control for bias due to omitted variable bias (O'Neill et al. 2016). In this case, the common trend assumption will be violated because in the absence of treatment Catalonia and the Canary Island would have followed different trends in cultural consumption.

4.2 Difference-in-differences results

Table 2 summarizes the results of the Difference-in-differences estimation. As mentioned, the results use household spending on cultural goods as the dependent variable and all the regressions use time fixed effects, region fixed effects and several household covariates as control variables. Regarding the standard errors, all the regressions use standard errors that are clustered at the household level, as Ateca-Amestoy, Gardeazabal, and Ugidos (2019) recommend.

Column 1 summarizes the results of an OLS regression with all the available observations. Thus, it includes all the households interviewed in 2011, 2012 and 2013. This accounts for a total of 8969 observations, which are divided in the treatment region of Catalonia (5917 observations) and the control region of the Canary Islands (3052 observations).

Column 2 shows another OLS regression of households observed twice: once before the VAT rise and once after the VAT rise, like in many Difference-in-difference settings. This group is particularly important because it will be further used to conduct the second step of our method (matching method conditioned on past outcomes) since this pool of households is the only one in our data that contains information on past year consumption. Hence, using this group of households will also be helpful to be able to compare our results in both methods. The total number of observations is 3940, divided between Catalonia (2587) and the Canary Islands (1353).

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Table 2: *Difference-in-differences results*

	(1)	(2)
Causal effect of VAT rise on cultural expenditure (δ)	-2.883	-1.178
	(16.83)	(28.60)
Number of households members by age intervals		
0-4	-7.037	10.19
	(11.80)	(19.98)
5-15	5.032	4.660
	(6.741)	(9.664)
16-24	50.01***	60.51**
	(13.35)	(24.68)
25-34	24.91**	22.24*
	(10.00)	(13.28)
35-64	19.23**	27.27*
	(9.537)	(14.68)
65-84	-1.075	3.061
	(14.31)	(23.91)
85 or more	-25.67	-15.85
	(17.28)	(30.02)
Number of households members by labor status (Ref: employed)		
Active members	7.557	11.00
	(8.731)	(13.48)
Inactive members	-6.508	-16.75
	(8.225)	(12.57)
Number of household members by gender (Ref: male)		
Female	-2.937	-3.935
	(7.100)	(10.92)
Number of household members by education level (Ref: Primary or less)		
Lower Secondary education	1.131	1.857
	(6.601)	(10.22)

Table 2: *Difference-in-differences results*

	(1)	(2)
Higher Secondary education	12.93*	-1.586
	(7.302)	(11.73)
University education	20.14**	13.24
	(7.990)	(13.20)
Number of household members by nationality (Ref: Spanish members)		
Foreigners	-12.15***	-13.34***
	(3.468)	(5.077)
Number of household members by size of the town of residence. Ref: less than 10,000)		
100,000 or more	17.84	10.68
	(11.16)	(16.08)
50,000-99,999	3.455	-2.852
	(15.59)	(25.66)
20,000-49,999	8.519	16.47
	(13.83)	(22.90)
10,000-19,999	-3.450	-29.86
	(13.61)	(19.20)
Number of household members by disposable income level (Ref: less than 500€)		
500€-1,000€	6.327	13.22
	(8.075)	(9.741)
1,000€-1,500€	25.84**	52.53**
	(12.40)	(21.01)
1,500€-2,000€	36.20**	42.39**
	(15.60)	(19.18)
2,000€-2,500€	38.67**	40.61**
	(15.04)	(20.06)
2,500€-3,000€	74.27***	78.56***
	(17.49)	(27.07)
3,000€-5,000€	108.9***	101.9***
	(20.30)	(31.82)

Table 2: *Difference-in-differences results*

	(1)	(2)
5,000€-7,000€	183.7***	288.7***
	(55.43)	(101.6)
More than 7,000€	159.1*	172.2
	(88.66)	(123.5)
Constant	-29.08*	-29.03
	(16.41)	(24.50)
Observations	8,969	3,940
R-squared	0.037	0.035

Robust standard errors in parentheses

Table 2: *One, two and three asterisks indicate significance at 10%, 5% and 1%, respectively*

The parameter of the interaction term between the after tax rise dummy and the region dummy, δ, yields the result of the effect of the VAT rise on cultural spending in Catalonia. We observe that the results are negative and between -2.88€ and -1.18€. The implication of these results is that Catalan households spent between 2.88€ and 1.18€ less due to the VAT rise from 8% to 21%. Nonetheless, all these results are statistically non-significant and, therefore, we cannot draw any conclusion with them.

Even though those results are not statistically significant, some of the covariates used to control for endogeneity draw statistically significant outcomes. In the literature review section we tried to grasp the variables that enhance cultural consumption and found that the most important ones were gender, age, income, education and size of town of residence. All these components, among others, were used as covariates.

Starting with age, we divided households by the number of members in different age groups: 0-4 years, 5-15 years, 16-24 years, 25-34 years, 35-64 years, 65-84 years and 85 years or more. We found statistically significant results indicating that households with members in the age group 16-24 increase cultural consumption between 50€ and 60.50€ yearly. Similarly, members in the age group 25-34 yield a positive effect on cultural consumption that ranges from 22.24€ to 24.91€. Households with members between 35 and 64 years old

also yield positive results on cultural consumption, more concretely increasing it between 19.23€ and 27.27€. In conclusion, our results on age are in line with most of the literature on the topic, which finds a lower amount of spending on culture in younger ages (although statistically non-significant in our results), higher and decreasing with age on adults and lower again in old ages (again, present but non-statistically significant in our results).

Another important determinant of cultural consumption discussed in the literature review is education. In our analysis we used primary education as a reference variable and found statistically significant results indicating that household members with university studies consume 20.14€ more per year on culture. These results coincide with the literature that states that education enhances cultural consumption.

Income seems to be one of the most important determinants of cultural consumption and this is ratified in our analysis. We took households that generate a net monthly income of less than 500€ as reference, and observed how cultural consumption positively increases with income. Starting with households with an income interval of 1000€ to 1500€ we observe that their total spending on culture increases between 25.84€ and 52.53€. Similarly, households with earnings in the 1500€-2000€ interval experience a raise of between 36.2€ and 42.39€. This increase is further highlighted in the next groups: 38.67€ to 40.61€ (earnings of 2000€-2500€), 74.27€ to 78.56€ (earnings of 2500€-3000€), 101.9€ to 108.9€ (earnings of 3000€-3500€) and 183.66€ to 288.7€ (earnings of 3500€-4000€). Thus, our analysis confirms with statistically significant results that cultural consumption is positively related to disposable income.

Living in urban areas that include cultural equipment is regarded to be a factor that plays an important in determining total cultural consumption. Also, people living in big cities incur a lower amount of commuting costs when going to cultural activities. In our empirical analysis we took households living in towns with a population of less than 10,000 inhabitants as reference, and the results show that the bigger the town of residence, the more people spend on culture (even though our results are non-statistically significant). In the case of gender, it seems like it plays a minor role in determining cultural consumption, with around 3€ less spent by women. On the contrary nationality of the household members does yield statistically significant results that show that households with foreigners consume relatively less culture than households with Spanish members. The difference ranges from 12.15€ to 13.34€ less with the presence of foreigners.

Therefore, we found empirical evidence of the importance that age, education, income and nationality have on determining the consumption of cultural goods. Nonetheless, we could not conclude anything about the effect that the increase in VAT from 8% to 21% had on cultural spending because our results were not statistically significant. There can be different reasons that explain why it happened.

First of all, we should consider the idea that the new fiscal policy did not have a significant impact on Catalan households. It is plausible that prices increased due to higher fiscal pressure which made Catalan households consume less culture than before. If both effects cancel out, household expenditure in cultural goods did not change much after September 1st 2012.

The second reason could be related to the fact that we did not take into account the price of cultural goods in our analysis. We could not include it because the HBS does not provide information about prices. Also, information about prices is only available at the regional level, which means that there is not price variation within regions but between region (Ateca-Amestoy, Gardeazabal, and Ugidos 2019). Moreover, we control for between region time-varying confounding factors with our regional dummies, period dummies and their interaction. Thus, we are not incurring in an omitted variable bias problem.

Therefore, the most plausible explanation about why our identifying assumption did not work appropriately is because the parallel trend assumption was violated. Figure 1 shows total expenditure of cultural services in Catalonia and Canary Islands from 2006 to 2014. Analyzing the graph we observe that both regions had more or less the same average expenditure in 2006 but then they followed different patterns: it increased in Catalonia and decreased in the Canary Islands. Also, in 2010 we observe a reduction in expenditure in Catalonia and an increase in the Canary Islands. Hence, looking at average expenditure in the years before the tax rise we are not able to prove that the common trend assumption holds.

Even though this reduces the internal validity of our estimation, we have mentioned several times that when the parallel trend assumption is violated we can use a matching method conditional on past outcomes. Moreover, we were able to find many statically significant determinants of culture spending in Catalonia, so we carry on with the second part of our empirical analysis.

4.3   Matching methods approach

In our previous specification we needed a parallel trend between the treated and the untreated region, but matching methods allows for heterogeneous effects. In this specification we rely on the *Independence conditional on past outcomes* assumption. With this assumption, individuals with similar outcomes in the pre-treatment period are assumed to have similar potential treatment-free outcomes in the post-treatment period after conditioning on observed covariates (O'Neill et al. 2016). We are able to observe past year consumption of those households that were interviewed twice (once before the VAT rise and once after VAT rise). Hence, for the Matching method we will use this group of households. This, combined with the set of observed covariates used in the Difference-in-differences method allows us to comply with the requirements of the *Independence conditional on past outcomes* assumption.

The importance of including past outcomes on the analysis is explained by Abadie, Diamond, and Hainmueller (2010). They state that past outcomes are influenced by both observed and unobserved confounders and, therefore, households with similar past outcomes are likely to be also similar in terms of their unobserved confounders. Hence, including a variable with lagged consumption acts as a proxy for time-varying effects of the unobserved confounders, which were the reason why the common trend assumption was violated in the Difference-in-differences approach.

Therefore, matching aims to create a pool of households that have characteristics that imply that, in the absence of treatment, control and treated households would have had the same potential outcomes. In order to create this matched control group with lagged consumption and cultural consumption covariates, we will use the *Nearest Neighbor Matching*. This method is one of the most commonly used (Thoemmes and Kim 2011) and it is based on choosing the control group household that is closer to each treatment group household according to the covariates indicated. In this setting, treated households are those that were exposed to the VAT rise in Catalonia. The control group is formed by households that were not exposed to the VAT rise.

Hence, we need to find untreated households that have similar characteristics than households in Catalonia that faced the VAT rise. In order to do so, we will use the covariates that yielded statistically significant results in the Difference-in-differences analysis: age, nationality, income, education and town of residence. All these variables will be used in the

matching methods estimation along with previous year consumption.

Using this approach we will be able to extract the average treatment effect for the treated (ATET). That means that we estimate the average treatment effect of household expenditure on cinema and performing arts in Catalonia if the VAT rate had not changed (as it happened in the Canary Islands). The ATET can be written as:

$$E[Y_{1ir} - Y_{0ir}|D_i = 1] = E[Y_{1ir}|D_i = 1] - E[Y_{0ir}]|D_i = 1]$$

This means that the ATET is captured by the average consumption in cultural goods given the fact that VAT increased minus the average expenditure in cultural goods had VAT not risen. This is unobservable, but we rely on the matching made with cultural consumption determinants to end up with a consistent estimate.

Ateca-Amestoy, Gardeazabal, and Ugidos (2019) explain that ATET contains the average value of the difference between the time variation of potential expenditure under treatment and time variation of potential expenditure under no treatment, which is an average value of the difference between two time differences. Hence, it can be viewed as a Difference-in-differences estimator. Thus, as a Difference-in-differences estimator, it controls for time-invariant unobserved confounding factors. Moreover, we must acknowledge that only 30.17% of Catalan households reported positive expenditure in cinema and performing arts, which implies that 69.83% of households did not spend in culture. Since most households report zero expenditure in cultural goods, we will decompose the treatment effect in two terms, like in Angrist and Pischke (2008).

First, we will capture the participation effect, which is the difference in the probability that expenditures are non-zero. Second, we will find the Conditional-on-Positive (COP) effect, which is the difference in means conditional on participation (positive expenditure in cultural goods). The expectation of expenditure outcomes in terms of the participation effect and the Conditional-on-Positive effect can be expressed as:

$$E(Y_{irt}) = E(Y_{irt}|Y_{irt} > 0)P(Y_{irt} > 0)$$

$E(Y_{irt}|Y_{irt} > 0)$ expresses the Conditional-on-Positive effect and $P(Y_{irt} > 0)$ expresses the participation effect.

In order to show our results, we will separate them into the ATET of households that

participated twice in the survey (once before VAT rise and once after), the ATET of the Conditional-on-Positive effect and the ATET of the participation effect. In order to calculate the participation effect, we will use a dummy that captures participation (it equals 1 when households show a positive expenditure in cultural goods and 0 otherwise) as the dependant variable.

With all this information we carry on with the Matching Method approach.

4.4 Matching Methods results

Using the tools previously explained, the Nearest Neighbor Matching method creates a control group of households that has very similar characteristics than the treated group. In order to assess the similarity between the treatment and control group we show a covariate balance table. Greifer (2020) explains that a covariate balance is the degree to which the distribution of covariates is similar across levels of treatment. He states that it is a powerful tool to assess the quality of the matching results. Also, he recommends two indicators to check the balance between treatment and control groups. First, he mentions *Standardized mean differences*, which captures the difference in the means of each covariate between treatment and control groups standardized by a standardization factor so that it is on the same scale for all covariates. The standardization factor is the standard deviation of the covariate in the treated group. A standardized mean difference close to zero indicates good balance between treatment and control groups. Second, Greifer (2020) mentions *Variance ratios*, which is the ratio of a covariate in one group to that in the other. If the variance ratio is close to 1 it indicates that the variances of the samples are similar and, therefore, there is a good balance.

With all this information in mind, Table 3 summarizes the covariate balance between raw and matched groups. Therefore, the similarity between treatment and controlled groups is assessed an, as one can clearly see, it improves significantly with the matching estimator. On the one hand, the standardized mean difference is reduced in our matched group compared to the raw one. In fact, in covariates like number of members with a primary level of education or monthly net income the standardized mean difference is drastically reduced (from -0.27 to 0.04 and from 0.19 to 0.08, respectively). On the other hand, the variance ratio should be kept close to 1 and it is also improved with the Nearest Neighbor Matching estimation. As an example, the covariate that captures past year expenditure in cultural

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	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
Previous expenditure on cultural goods	-.200877	(.0521728)	.4980824	104.002
Members 0-4 years	.0737984	.0500224	1.530.124	1.373.229
Members 5-15 years	.1256013	.048616	1.403.873	1.240.256
Members 16-24 years	(.1242091)	.058726	.8233847	1.129.741
Members 25-34 years	-.112446	.0590798	.9159867	1.172.451
Members 35-64 years	(.0424852)	0	103.573	113.428
Members 65-84 years	.0702854	.0478869	1.145.661	1.075.844
Members 85 or more years	.0814696	.0173933	1.246.657	107.923
Members primary education	(.2666489)	.0405708	.5795217	1.101.045
Members Lower Secondary ed.	.0383676	.0700836	1.063.234	1.099.675
Members Higher Secondary ed.	.0393891	(.0045412)	1.011.943	1.123.058
Members University studies	(.0022331)	.0133141	.9040605	1.059.919
Foreign members	.0840069	.0829089	1.685.792	1.277.629
Disposable Income	.1929748	.0886401	1.136.481	1.200.683

Table 3: Covariate balance before and after matching methods. For optimal matching, the standardized difference should be close to 0 and the variance ratio close to 1

	(1)	(2)	(3)
	All households	Conditional-on-Participation (COP)	Participation rate
Results	-0.187	158.726***	-0.053***
	(18.621)	(47.190)	(0.019)
Observations	3,940	1,221	3,940

Table 4: Matching Methods results. One, two and three asterisks indicate significance at 10%, 5% and 1%, respectively

goods improves its variance ratio from 0.49 to 1.04. Similarly, the variable that contains the number of members with only primary education improves from 0.58 to 1.1. Hence, the matching methods approach properly assures that the households matched have similar characteristics and, as a result, the treatment and control groups are properly balanced.

Once we have showed that our matching is appropriately done, Table 4 shows the average treatment effect of the treated with the information obtained from households that were interviewed both before and after the VAT rise.

The first column shows the average treatment effect for the treated (ATET) of all the households included in the matching estimation. The result implies that Catalan households spent 0.19€ less due to the new fiscal policy implemented by the Spanish Government, but this result is not statistically significant. Nonetheless, this result is close to the one we found in the Difference-in-difference estimation. In fact, using the same group of households (those

interviewed both before and after VAT rise), we found a decrease in cultural spending of 1.18€ in the Difference-in-differences estimation and a decrease of 0.19€ with the Matching method. Hence, both methods show similar results.

Column 2 summarizes the average treatment effect for the treated (ATET) for a more restricted sample: the analysis is restricted to those households that did show a positive spending in cultural goods. We are referring to the Conditional-on-Participation (COP) estimator. With this sample we get a statistically significant result of 158.73€. Hence, we can conclude that Catalan households that did show a non-zero expenditure on cultural goods spent 158.73€ more due to the increase in VAT .

Column 3 summarizes the ATET of the change in participation rate on cultural activities due to the new fiscal policy. We have stated before in this paper that just 30.17% of Catalan households spend on live shows, cinema and theater, but this percentage was reduced due to the increase in the VAT. Our estimation shows statistically significant results: the participation rate in live shows, cinema and theater was reduced by 5.3% due to the new fiscal policy.

In conclusion, we have two effects moving in opposite directions. On the one hand, households that had a positive expenditure in cultural goods showed an important increase in their total spending: 158.73€ more per year. If we take into account that Catalan households are formed, on average, by 2.77 members it means that each individual in those households increased its yearly expenditure on cinema, theater and live shows by 57.3€. On the other hand we observe that the participation rate in cultural events decreased by 5.3% due to the VAT rise. The non-statistically significant results we obtained both in the Differences-in-differences and Matching method seem to reflect that total expenditure on cultural goods did not change much due to the VAT rise (we found that it decreased between 1.18€ and 0.19€). Hence, the most plausible explanation is that both effects (decrease in participation rate and increase in Conditional-on-positive expenditure) end up almost cancelling each other out.

5   Conclusion

This paper analyzes the impact of the raise in the Value Added Tax introduced by the Spanish Government in 2012. More precisely, it calculates the shift in cultural spending by

Catalan households due to the reclassification of cultural goods from the reduced rate to the general one.

Since the Canary Islands have a special fiscal treaty and were not exposed to the reclassification of live shows, cinema and theater we had a source of exogenous variation to perform a two-step method based on estimating a Differences-in-differences approach first and a Matching methods later. The Difference-in-differences estimation yielded statistically non-significant results on the change in cultural consumption due to the VAT rise. This might be due to the fact that the common trend assumption may have been violated and, therefore, we could not get robust results. Nonetheless, the Difference-in-differences approach was very helpful in finding evidence on which variables determine cultural consumption in Catalonia. With this useful information we were able to perform a matching methods approach with covariates that were empirically shown to be determinant and previous year consumption of cultural goods. Hence, we matched households from Catalonia with households from the Canary Islands with very similar characteristics. The results obtained are clear: Catalan households that showed a non-zero expenditure in cultural goods increased their consumption by 158.73€. Also, the participation rate in cultural activities suffered a decrease of 5.3%. Therefore, these two effects moved in two different directions. On the one hand, there was an increase in the expenditure of live shows, cinema and theater by avid cultural consumers and on the other hand the total percentage of the population that consumed culture decreased due to the rise in the Value Added Tax.

In 2011, the average consumption of cultural goods in Catalonia Conditional-on-Participation was 380.76€. Hence, the increase of 158.73€ experienced by this group implies a rise of 41.6%. Ateca-Amestoy, Gardeazabal, and Ugidos (2019) does the same analysis for Spain and finds a lower increase in consumption conditional-on-participation, which accounts for 53€, an increase of 18.5% with respect to their spending in 2011. Regarding the participation rate, they find a decrease of 7.77% in Spain (even though non-statistically significant) and we show a decrease of 5.3% in Catalonia. Also, in 2011 Catalan households that showed a non-zero expenditure in cultural goods were already spending 100€ more than the same group of Spanish households. These numbers could imply that Catalonia has a more solid group of cultural participants.

There might be two reasons that explain the increase in expenditure conditional-on-participation and the decrease in participation rate. First, this might be explained using

Fernandez-Blanco, Orea, and Prieto-Rodriguez (2009) description of cinema audience. They separated cinema participants into enthusiasts, cinema-goers and non-attendants. Since the new fiscal measure was very disputed by the cultural sector and they raised awareness campaigns trying to advertise that people had to support the theaters, cinemas and concert halls or they would have to close, enthusiasts might have acted as militants and fiercely increased their cultural consumption. Second, prices went up due to the increase in VAT, so to maintain the same level of cultural participation consumers might have had to spend a higher amount of money. To summarize, it looks like cultural participants responded to the raise in VAT by increasing their annual consumption, either acting as militants to protect the sector or maintaining their level of cultural consumption even if prices were going up.

On the contrary, we also proved that the participation rate in live shows, cinema and theater experienced a decrease of 5.4% due to the rise in VAT. In 2011, before the new fiscal policy, just 30.17% of Catalan households had a positive expenditure in cultural goods, with an average expenditure of 114.87€ (now we refer to all households, not conditional-on-participation). Looking at our dataset we observe that in 2013 the average participation rate dropped to 24.74%. The difference between the participation rate in 2011 and in 2013 is exactly the drop in participation rate that we found in our empirical estimation. Hence, the rise in VAT was the main reason that explained why some Catalans households stopped spending in live shows, cinema and theaters.

Thus, we have two effects moving in opposite directions: some households increased their total expenditure in culture and some others did not spend on culture anymore. These results could be cancelling each other out if we look at the very modest changes in cultural spending due to the VAT rise that we found both in the Difference-in-difference estimation and the Matching methods, but our results are not statistically significant.

There are some aspects that are out of the scope of this paper but are worth mentioning. First, it is obvious that substitutes might have played an important role in understanding why the participation rate in culture decreased after September 1st 2012. In the case of cinema, people might have shifted the activity of going to the cinema to watching movies at home, using paid-per-view TV (Video On Demand platforms such as Netflix and Amazon Prime Video appeared later in Spain), or just watching Youtube videos. Also, in that moment illegal downloads of movies were common in Spain and potential viewers might have started watching more movies using that method. Even though it is harder to find substi-

tutes for theater, it might have experienced a similar process, with more people choosing movies over more expensive theater plays. Regarding concerts and other kinds of culture individuals might have also shifted to cheaper imperfect substitutes. Since no one has analyzed yet which substitutes individuals chose when they decreased their participation in culture, it might be an interesting topic for further research.

Moreover, Ateca-Amestoy (2008) mentions that the effect of specific education on culture has a higher effect in determining future culture spending than formal education. Thus, the decrease in the participation rate that the cultural sector experienced due to the VAT rise might provoke negative effects for the sector in the future. Some people that would have been exposed to culture in the absence of the fiscal change were not exposed, which could imply that their specific cultural education would have been higher in the absence of the VAT change. It would also be interesting to calculate the mid-term and long-term effects of the 2012 change in VAT on the specific cultural education and how it affects future cultural consumption.

6   References

References

[Aba05]   Alberto Abadie. "Semiparametric difference-in-differences estimators". In: *The Review of Economic Studies* 72.1 (2005), pp. 1–19.

[ADH10]   Alberto Abadie, Alexis Diamond, and Jens Hainmueller. "Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program". In: *Journal of the American statistical Association* 105.490 (2010), pp. 493–505.

[AGU19]   Victoria Ateca-Amestoy, Javier Gardeazabal, and Arantza Ugidos. "On the response of household expenditure on cinema and performing arts to changes in indirect taxation: a natural experiment in Spain". In: *Journal of Cultural Economics* (2019), pp. 1–41.

[AP08]   Joshua D Angrist and Jörn-Steffen Pischke. *Mostly harmless econometrics*. Princeton university press, 2008.

[AS76]   Anthony Barnes Atkinson and Joseph E Stiglitz. "The design of tax structure: direct versus indirect taxation". In: *Journal of public Economics* 6.1-2 (1976), pp. 55–75.

[Ate08]   Victoria Ateca-Amestoy. "Determining heterogeneous behavior for theater attendance". In: *Journal of Cultural Economics* 32.2 (2008), p. 127.

[Baj85]   Vladimir Bajic. "Determinants of theatre going: The effects on the choice of residential location". In: *Journal of Cultural Economics* 9.2 (1985), pp. 60–70.

[BB+93]   William J Baumol, William G Bowen, et al. *Performing arts-the economic dilemma: a study of problems common to theater, opera, music and dance.* Gregg Revivals, 1993.

[BBL97]   James Banks, Richard Blundell, and Arthur Lewbel. "Quadratic Engel curves and consumer demand". In: *Review of Economics and statistics* 79.4 (1997), pp. 527–539.

[BDM04]   Marianne Bertrand, Esther Duflo, and Sendhil Mullainathan. "How much should we trust differences-in-differences estimates?" In: *The Quarterly journal of economics* 119.1 (2004), pp. 249–275.

[BS09]   Alberto Bucci and Giovanna Segre. "Human and cultural capital complementarities and externalities in economic growth". In: (2009).

[CG09]   David Cantarero and Patricio Perez Gonzalez. "Fiscal decentralization and economic growth: Evidence from Spanish regions". In: *Public Budgeting & Finance* 29.4 (2009), pp. 24–44.

[CH53]   Wilfred J Corlett and Douglas C Hague. "Complementarity and the excess burden of taxation". In: *The Review of Economic Studies* 21.1 (1953), pp. 21–30.

[DM11]   Sibelle Cornélio Diniz and Ana Flávia Machado. "Analysis of the consumption of artistic-cultural goods and services in Brazil". In: *Journal of Cultural Economics* 35.1 (2011), pp. 1–18.

[Enr15]   Javier Garcıa Enrıquez. "2012 VAT Reform in Spain: The Food and Non-Alcoholic Beverages Case. Welfare Consequences". In: *XXII Encuentro de Economıa Pública: reformas y nuevos retos de los estados de bienestar. Eficiencia y equidad.* Universidade de Vigo. 2015, p. 35.

[FF07]   Donata Favaro and Carlofilippo Frateschi. "A discrete choice model of consumption of cultural goods: the case of music". In: *Journal of Cultural Economics* 31.3 (2007), pp. 205–234.

[FOP09]   Victor Fernandez-Blanco, Luis Orea, and Juan Prieto-Rodriguez. "Analyzing consumers heterogeneity and self-reported tastes: An approach consistent with the consumer's decision making process". In: *Journal of Economic Psychology* 30.4 (2009), pp. 622–633.

[FOP13]   Victor Fernandez-Blanco, Luis Orea, and Juan Prieto-Rodriguez. "Endogeneity and measurement errors when estimating demand functions with average prices: An example from the movie market". In: *Empirical Economics* 44.3 (2013), pp. 1477–1496.

[Fra+08] Robert H Frank et al. *Microeconomics and behavior.* Boston: McGraw-Hill Irwin, 2008.

[GE18]   Javier Garcıa-Enrıquez and Cruz A Echevarrıa. "Demand for culture in Spain and the 2012 VAT rise". In: *Journal of Cultural Economics* 42.3 (2018), pp. 469–506.

[Glo89]   Steven Globerman. "What we know and don't know about the economics of culture". In: *Cultural economics* 88 (1989), pp. 1–20.

[GM96]   Louis Lévy Garboua and Claude Montmarquette. "A microeconometric study of theatre demand". In: *Journal of cultural economics* 20.1 (1996), pp. 25–50.

[Gra03]   Charles M Gray. "46 Participation". In: *A handbook of cultural economics* (2003), p. 356.

[Gre20]   Noah Greifer. *Assessing Balance.* 2020.

[HG01]   James Heilbrun and Charles M Gray. *The economics of art and culture.* Cambridge University Press, 2001.

[Kea01]   Michael Keating. "Rethinking the region: culture, institutions and economic development in Catalonia and Galicia". In: *European urban and regional studies* 8.3 (2001), pp. 217–234.

[Leg+14]   RENAUD Legoux et al. "A meta-analysis of demand and income elasticity in the performing arts". In: *ACEI conference*. 2014.

[LM03]   Louis Lévy-Garboua and Claude Montmarquette. "26 Demand". In: *A Handbook of Cultural Economics* (2003), p. 201.

[MCO15]   Jose Alberto Molina, Juan Carlos Campaña, and Raquel Ortega. "Time dedicated by consumers to cultural goods: determinants for Spain". In: (2015).

[ONe+16]   Stephen O'Neill et al. "Estimating causal effects: considering three alternatives to difference-in-differences estimation". In: *Health Services and Outcomes Research Methodology* 16.1 (2016), pp. 1–21.

[PF00]   Juan Prieto-Rodrıguez and Vıctor Fernández-Blanco. "Are popular and classical music listeners the same people?" In: *Journal of Cultural Economics* 24.2 (2000), pp. 147–164.

[PRS05]   Juan Prieto-Rodriguez, Desiderio Romero-Jordán, and José Felix Sanz-Sanz. "Is a tax cut on cultural goods consumption actually desirable? A microsimulation analysis applied to Spain". In: *Fiscal Studies* 26.4 (2005), pp. 549–575.

[Sea06]   Bruce A Seaman. "Empirical studies of demand for the performing arts". In: *Handbook of the economics of art and culture* 1 (2006), pp. 415–472.

[Thr94]   David Throsby. "The production and consumption of the arts: A view of cultural economics". In: *Journal of economic literature* 32.1 (1994), pp. 1–29.

[TK11]   Felix J Thoemmes and Eun Sook Kim. "A systematic review of propensity score methods in the social sciences". In: *Multivariate behavioral research* 46.1 (2011), pp. 90–118.

[Wie95]   Andreas Wiesand. "Musiktheater und Konzerte: Mehr Rückhalt in der Bevölkerung. Aus den Ergebnissen des 5. Kulturbarometers". In: *Das Orchester* 6.95 (1995), pp. 2–14.
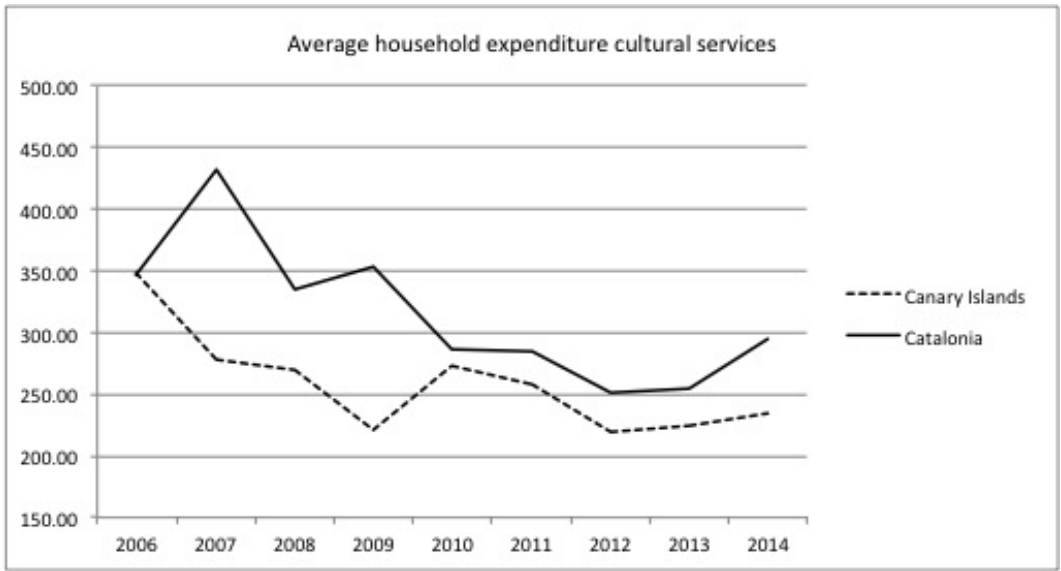
Figure 1: Expenditure in cultural services in Catalonia and the Canary Islands, 2006-2014