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Abstract

Outsourcing can be defined as the delivery of public services by the private sector. The sign of the effect of outsourcing on public spending is ambiguous *ex-ante*. While outsourcing may reduce public spending through higher competition in the private sector, it may also increase public spending due to the presence of transaction costs or the so-called “hold-up” problem among others. Using a panel of Spanish regions over the 2002-2018 period, this paper explores the association between outsourcing and public spending empirically. Spain offers an interesting case study from a broad perspective, as the degree of decentralization of public health and education is almost complete, and the different regions have adopted quite distinct approaches as regards the public-private mix in the provision of these public services. In line with previous cross-country evidence [e.g. Alonso *et al.* (2017); Potrafke (2018)] our estimates point to a positive relationship between public spending and outsourcing. The result holds when a number of robustness exercises are carried out. By components, we find that outsourcing is associated with higher public consumption and health spending, while there is no statistical association with investment and education expenditure. In any case, it is worth mentioning that the impact of outsourcing on the efficiency of public spending cannot be ascertained with our approach, due to data limitations.

Keywords: Regional public spending, Outsourcing, Fiscal federalism, Public services, Regional analysis.

JEL classification: H6, E62, C53.

Resumen

La externalización (o subcontratación) por parte del sector público se puede definir como la prestación de servicios públicos por parte del sector privado. El signo del efecto de la subcontratación en el gasto público es ambiguo *ex ante*. Por un lado, la subcontratación privada de servicios públicos puede reducir el gasto a través de una mayor competencia en el sector privado, pero, por otro lado, puede aumentarlo debido a la presencia de costes de transacción o al llamado problema de «captura», entre otros. En este artículo se utilizan datos de las regiones españolas, durante el período 2002-2018, para explorar la asociación entre externalización y gasto público. España ofrece un marco de estudio idóneo desde una perspectiva regional, ya que el grado de descentralización de la salud pública y de la educación es casi completo, y las diferentes regiones han adoptado enfoques bastante distintos en cuanto a la combinación público-privada en la prestación de estos servicios públicos. En línea con la evidencia disponible a escala internacional [Alonso *et al.* (2017), Potrafke (2018)], nuestros resultados apuntan a una relación positiva entre el gasto público y la subcontratación. Por componentes del gasto, la externalización está asociada a un mayor consumo público y gasto en salud, mientras que no existe una asociación estadísticamente significativa al gasto en inversión y en educación. En cualquier caso, el análisis del artículo no permite identificar el efecto de la subcontratación sobre la eficiencia del gasto público, debido a la dificultad para medir la calidad en la provisión de servicios públicos.

Palabras clave: gasto público, externalización, federalismo fiscal, servicios públicos, análisis regional.

Códigos JEL: H6, E62, C53.

1 Introduction

In the public sector, outsourcing is the “contracting out” of functions that were previously provided by the public administration under the belief that there are functions which are best performed by the private sector. Outsourcing in OECD countries increased from 8.5% in 2000 to 10% of GDP in 2011 (OECD, 2011). In the case of Spain, all tiers of the Government have outsourced partially some of the production of the goods and services they provide. Indeed, Spain is a good laboratory economy for analyzing public outsourcing across regions (Comunidades Autónomas — henceforth AC)¹ because it presents one of the highest levels of decentralization across developed countries in the areas of public health and public education (94% and 96% of total public spending on those categories in 2017, respectively, vs. 29% and 63% in the European Union average). In addition, even though the legal background is quite similar among AC, they present a significant degree of heterogeneity in outsourcing levels.²

However, assessing the effectiveness of outsourcing of particular governmental functions as a fiscally sound tool poses substantial challenges for policy-makers. The sign of the effect of outsourcing on public spending is ambiguous *ex-ante*. On the one hand, outsourcing might reduce public spending for a given level of provision (i.e. increase efficiency) due to the increase in competition and private sector discipline (Clifton et al., 2006). On the other hand, outsourcing might increase public spending for a given level of provision (i.e. reduce efficiency) due to the presence of transaction costs (Williamson, 1999), the so-called “hold-up” problem (Domberger and Jensen, 1997),³ or the incentives for the private company to increase prices once the contract is already signed (Jensen and Stonecash, 2005).

As a result, identifying the effect of outsourcing on the evolution of public spending is an empirical question. However, the empirical literature exploring this issue is relatively scarce. Alonso et al. (2017) regress the share of public spending over GDP on a country-specific index of public outsourcing in a sample of European countries, and uncover a positive association between outsourcing and public spending at the central government level. Also, Potrafke (2018) explores the effect of outsourcing on public employment across OECD countries,

¹Throughout the paper we refer to regions or Comunidades Autónomas (AC) interchangeably.

²For a review of Spanish regional public spending see Domínguez Martínez et al. (2006); Pérez García and Cuarella i Tormo (2016).

³When contracts are complex, the government may need to renegotiate in case unexpected events, not included in the original contract, take place.

finding that higher public sector outsourcing is positively correlated with higher growth in public employment.

In this paper, we explore the relationship between public outsourcing and public spending across Spanish regions over the 2002-2018 period. Based on similar approaches to those in Alonso et al. (2017) and Potrafke (2018), we employ two strategies to identify the effect of outsourcing on public spending. Our first strategy is to control for region-specific factors affecting both outsourcing and public spending by including region fixed effects. While fixed effect regressions are not a panacea for omitted variable biases, they are well-suited if these omitted characteristics are, to a first approximation, time-invariant. The idea of fixed effects is to move beyond cross-regions correlations and investigate the “within-region variation”, that is, to ask whether a given region is more likely to increase its spending as it relies more on outsourcing for providing public services. While the fixed effects estimation is useful in removing the influence of time-invariant determinants of both outsourcing and spending, it does not necessarily estimate the causal effect of outsourcing on public spending. Our second strategy is to use instrumental-variables (IV) regressions to estimate such effect. In particular, we relax the exogeneity assumption by allowing current spending-to-GDP to affect future outsourcing levels. In practice, this assumption is accommodated by means of panel IV estimators using lags as instrumental variables (e.g. Anderson and Hsiao, 1982; Arellano and Bond, 1991).

Our findings suggest that outsourcing is positively associated to public spending at the regional government level, which somehow corroborates the cross-country evidence in Alonso et al. (2017) and Potrafke (2018). In order to gauge the strength of this relationship, a 10 percentage points increase in the outsourcing ratio would be associated to an increase of 4.6 percentage points in spending-to-GDP (84 euros in public spending per capita) according to our preferred specification. In any event, these numbers should be taken with a grain of salt due to the endogeneity of both variables that are simultaneously decided by regional authorities. More importantly, the impact on public spending efficiency cannot be identified from our approach given the difficulties in accounting for differences in the quality of public service provision.

The rest of the paper is organized as follows. Section 2 describes outsourcing regulations in Spain as well as the approach we use to measure outsourcing intensity across regions. It also reviews the literature on the relationship between outsourcing and public spending. Section 3 provides some details on the data and discusses the empirical specification together

with the identification strategy used in the paper. Section 4 presents our baseline results as well as some robustness exercises. Finally, some concluding considerations are provided in Section 5.

2 Outsourcing

Minicucci and Donahue (2004) define public-sector outsourcing as the delivery of public services by agents others than government employees. Therefore, government outsourcing is measured as the size of expenditures on goods and services purchased or financed by central, state and local governments (OECD, 2011). A government may outsource either by purchasing inputs (goods and services) from the private sector or by hiring a private firm to directly provide the services to the population.

Governments may interact with the private sector in numerous ways. The most common practices encompass outsourcing and public-private partnerships (the so-called PPPs). Blöndal (2005) clearly defines the difference between both concepts as follows: “outsourcing is the practice whereby governments contract with private sector providers for the provision of services to government ministries and agencies, or directly to citizens on behalf of the government”; whereas PPPs “refer to arrangements whereby the private sector finances, designs, builds, maintains, and operates infrastructure assets traditionally provided by the public sector.” PPPs are typically related to long-run projects and public investment while outsourcing is more associated to short-run public spending.

All in all, while we acknowledge the importance of public-private partnerships in determining overall public spending and efficiency in the long run, this paper focuses on the role of outsourcing practices.

2.1 Outsourcing measurement

The public sector can outsource the delivery of public services in two ways. First, by purchasing goods and services from the non-government sector in order to use them as inputs (intermediate consumption). For example, the procurement of intermediate products required for government production such as IT services. Second, by paying a firm to deliver goods or services directly to the end user (social transfers in kind). For example, medical treatments refunded by public social security payments (see OECD, 2017).

OECD (2011) introduces an empirical proxy for outsourcing that can be calculated from National Accounts and it has been used in the literature (e.g. Alonso et al., 2017; Potrafke, 2018). In particular, the outsourcing index is given by:

$$OS = \frac{P.2U + D.632}{P.3} \quad (1)$$

where P.2 U represents intermediate consumption, D.632 transfers in kind purchased in the market and P.3 public consumption.⁴ Although public consumption at the regional level in Spain is not available, it can be obtained from the public consumption definition:

$$P.3 = D.1 + P.2U + D.632 + (D.29U - D.39R) + P.51C - P.1 \quad (2)$$

where , D.1 is wages and salaries, D.29 U - D.39 R are other net taxes on production, P.51C refers to the fixed capital consumption and P.1 to sales. All variables are available in National Accounts, with the exception of fixed capital consumption that is published by the National Statistics Bureau in the Regional Accounts Statistics.

In the next section we discuss the recent evolution of the outsourcing index in Spain, and we briefly describe the Spanish legislation regarding outsourcing.

2.2 Outsourcing in Spanish regions

The Law 9/2017 on public sector contracts is the current regulation on public outsourcing in Spain.⁵ It aims to increase transparency in the public procurement both when buying goods and services to the private sector, and when outsourcing to a private company the provision of services for the general public. The law distinguishes between the services contract, the services concession contract and the public work concession contract. The main difference between the services contract and the services and public work concession contracts is the entitlement of the operational risk, being responsible the public administration in the former and the private company in the latter. Therefore, there are different levels of responsibility of the Government depending on the type of contract.

Outsourcing differs from privatization on the reversibility of the cession of the entitlement of the public service provision. Moreover, outsourcing enables governments to enjoy the benefits from the private management while keeping the control of the quality of the services

⁴This data is published by the General Comptroller of the State Administration (IGAE).

⁵This law transposes the European Directives 2014/23/UE and 2014/24/UE.

provided and the possibility of recovering the provision of the service. Once the period of validity of the contract is expired, the company will give back the building and equipment following the conditions and state required described in the contract.

Spanish outsourcing level has slightly increased in the last fifteen years (up to 41.1% in 2018). Nevertheless, as shown in Figure 1, Spanish outsourcing level is lower than the federal countries' of the European Union (Germany, Austria and Belgium) and other large European countries (France, United Kingdom and Italy). In terms of the structure of outsourcing, the weight of intermediate consumption on the index varies from a minimum of 34% in the case of Austria to a maximum of 77% in the case of the UK, being Spain's 66%.

In this paper, we focus on the outsourcing of Spanish regions because they are responsible for two key items of the spending bill, health and education, that may be object of a high level of outsourcing. Moreover, the analysis of the AC behavior enables us to compare between regions with different levels of outsourcing but similar legal and economic background. The recent evolution of expenditure over GDP and overall regional outsourcing shows a high degree of co-movement between both variables, especially from 2011 onwards (see Figure 2).

Among the different ACs, the high level of heterogeneity of outsourcing levels makes them an interesting case of study. The dispersion on the outsourcing index is significant, despite the decrease over the past 16 years, as shown in Figure 3.⁶ Since 2002, 14 AC have increased their outsourcing level, mainly in the period prior to the crisis. Catalonia has the highest level of outsourcing in spite of the decrease experienced through the period. Meanwhile, most of the AC, with the exception of Galicia and Basque Country, have increased their level of outsourcing during the 16 years analyzed. The behaviour of the AC changed before and after the crisis. Before 2007 all but Catalonia increased their outsourcing, whereas after 2007 thirteen AC decreased it (see Figure 3).

2.3 Outsourcing and public spending

From a theoretical perspective, there is no consensus on the expected impact of outsourcing on public spending. There are two main branches of the literature studying the impact of outsourcing on public spending.

On the one hand, outsourcing strategies may reduce public spending-to-GDP ratios based on the increase in service provision efficiency due to competition and private sector discipline (Clifton et al., 2006). There are different mechanisms for the spending-reducing effect of

⁶The standard deviation has decreased from 5.6 in 2002 to 4.6 in 2018.

outsourcing. First, outsourcing may reduce public expenditures due to a higher provision efficiency of the private sector as private firms may innovate more and concentrate in reducing the production cost (Shleifer and Vishny, 1994). Second, public sector bureaucrats may pursue their self-interest whilst neglecting the citizens' welfare, which would result in lower efficiency (Niskanen (1971), Onrubia et al. (2019)). Under these circumstances, introducing market discipline and competition amongst previously protected public service providers may be efficiency-enhancing and reduce public-spending ratios.

On the other hand, outsourcing may also increase public spending when there are transaction costs (Williamson, 1999), in the presence of the so-called “hold-up” problem (Domberger and Jensen, 1997),⁷ or due to the incentives for the private company to increase prices once the contract is already signed (Jensen and Stonecash, 2005). If the cost of controlling the provider firm is high or the existence of asymmetric information renders the surveillance of the public service provision difficult, the firm may have incentives to misbehave and increase the cost of provision (see Dixit, 2002).

Another possible explanation of the spending expansionary effect of outsourcing is the appearance of fiscal illusion related with the source of financing. Governments may use outsourcing to finance their spending through a source of revenue other than taxes, for instance fees. Citizens may not associate this payment as an increase in tax burden (Payton and Kennedy, 2013), reducing the impression of fiscal misbehaving and encouraging a higher demand of public services. In addition, outsourcing may generate new powerful interest groups or Lobbies which affect policy decisions. It may also exacerbate the problem of the so called “revolving doors”⁸ that may imply the capture of the regulator as it will afterward become an employee of the public-service concession company (see Blanes i Vidal et al., 2012).

According to our reading of the literature, there are mechanisms that would rationalize either a positive or a negative effect of outsourcing on public spending. A first glimpse at our regional data shows a positive associations between public spending and outsourcing in all Spanish regions except Catalonia (see figure 4).⁹

⁷The “hold-up” problem arises when the government needs to renegotiate outsourcing contracts if unexpected events occur. While this mechanism plays a more prominent role in infrastructure investments not analyzed in this paper, it may also operate in outsourcing services with multi-period contracts.

⁸The movement of public employees into the lobbying industry.

⁹This observation suggests that some form of economies of scale may play a role. This is so because Catalonia, the only region showing a negative relation between outsourcing and spending, is the AC with the highest outsourcing level during the whole sample period.

Finally, it is worth highlighting two additional considerations absent in our analysis of the relationship between outsourcing and public spending across Spanish regions. First, the analysis of efficiency should be better carried out at a more granular level (see Serra Burriel et al., 2018; López-Casasnovas and Balaguer-Puig, 2015). Second, the Spanish public sector has gone over the past decades through a process of modernization of public services management practices that has impacted the performance of public services beyond the impact of outsourcing (see López-Casasnovas et al., 2003)

3 Empirical approach

3.1 Dataset

We construct an annual panel database comprising the seventeen Spanish regions (AC) from 2002 to 2018.

In addition to the outsourcing index defined in Section 2.1, we use a set of economic, demographic and political variables by AC (see Table 1 for summary statistics). The baseline dependent variable is public spending over GDP at the regional level. We also explore the impact of outsourcing on spending per capita as well as the composition of expenditure: consumption, investment, health and education spending.

We include as control variables some economic indicators: GDP per capita, growth rate of real GDP, and the unemployment ratio (all in annual terms as published by the National Statistics Institute). We include in all specifications the lag of the fiscal target compliance margin in percentage of GDP, measured as the difference of the annual target and the budgetary balance outcome.¹⁰ The reason for this inclusion is that when an AC does not comply with the target, it would be required to reduce its deficit in next year. Therefore it could decide to further reduce its spending.

We have also accounted for the potential role of medical recipes per person in each region. Since pharmacy spending is included as transfers in kind, it may simultaneously affect the outsourcing index and overall public spending (regions may prescribe more medicines for several reasons such as the higher incidence of an specific disease or the political decision to cover a specific treatment). Some experts consider that the pharmaceutical spending should

¹⁰Fiscal targets are only available from 2003 onwards. For 2002 we consider a 0% deficit target. From 2003 to 2007 targets are in national GDP instead of regional GDP. We adjust the target to regional GDP following Delgado-Téllez et al. (2017) strategy.

not be considered as an outsourced expenditure. Anyhow, our main findings remain robust when controlling for pharmaceutical expenditures.

We also include two demographic controls: the dependency ratio and the population density. The dependency ratio is defined as the weigh of the regional population aged from 0 to 16 years and more than 65 years old over the population between 16 and 65 years old. Whereas the population density of the region is measured as the weight of the population living in cities bigger than 50,000 inhabitants over the total regional population.

Three political variables are also included in our baseline specification: the Herfindahl-Hirschman index (HHI), and the weight of left-wing and regionalist parties. The HHI measures the government concentration. It is calculated as the sum of the squared weight of each party's MPs over the total number of MPs. The left and regionalist parties are included to account for the ideology in expenditure evolution decisions. The former represents the number of MPs considered more the percentage of left-wing MPs over the total seats of regional parliaments, and the latter the percent of regionalist parties' MPs (parties that only operate in a given region, and do not form part explicitly or implicitly, of a national party) over the total number of seats of the regional parliament.

Finally, for evaluating some aspects of the quality of the services provided by the AC several variables are considered: the ratio of school drop-out , the health valuation and the health barometer. The ratio of educational drop-out measures the percentage of students that decide to resume their studies in the age range of 18 to 24 years old.¹¹ The health valuation is the average perception of the health status of the regions population obtained via a survey from the National institute of statistics. The health barometer is also obtained via survey made by the Health Ministry but, in this case, citizens provide their health system quality perception.¹²

3.2 Econometric specification

Our strategy to identify the impact of outsourcing on public spending closely follows Alonso et al. (2017). We consider the following empirical specification:

$$y_{i,t} = \gamma OS_{i,t} + \alpha y_{i,t-1} + \beta X_{i,t} + \eta_i + \delta_t + \epsilon_{i,t} \quad (3)$$

¹¹Taken from the Labor Force Survey (EPA in Spanish). Unfortunately, PISA scores are not available at the regional level for the initial years of our sample because regional-level samples in the early vintages were not representative.

¹²Barómetro sanitario published by the Health Ministry: see https://www.msrebs.gob.es/estadEstudios/estadisticas/BarometroSanitario/home_BS.htm. It measures the degree of satisfaction of the public health service (scale 1 to 10).

where y_{it} refers to the ratio of public spending to GDP of region i in year t , OS_{it} is the Outsourcing index defined above, and X_{it} denotes a $k \times 1$ vector of control variables including unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. Crucially, as public spending data display strong auto-correlation, it is important to take account of this in the estimation. We thus include the lagged dependent variable ($y_{i,t-1}$) in the regression and discuss below our identification strategy. Finally, δ_t denotes a set of year dummies capturing common shocks to all regions such as the economic cycle or the countrywide austerity measures, and η_i refers to a region-specific effect accounting for time-invariant unobserved heterogeneity at the regional level.

Figure 4 illustrates the crucial role of unobserved heterogeneity in identifying the effect of outsourcing on public spending at the regional level. The pooled regression line shows a negative slope suggesting that higher outsourcing levels are associated to lower spending-to-GDP ratios. However, the fitted regression lines for selected regions depict a completely different picture: within each region, higher outsourcing levels are associated to higher spending-to-GDP ratios. While we interpret this positive association as suggestive evidence, we explore its statistical significance, its magnitude and its causality interpretation based on our baseline specification in (3).

3.2.1 Identification strategy

One possible approach for identifying the effect of outsourcing on spending-to-GDP is based on estimating equation (3) by OLS under exogeneity. This alternative is based on the assumption that fiscal authorities ignore developments in public spending when taking the decision to outsource certain services (i.e. the outsourcing index is exogenous to other public spending shocks). In order to relax this stringent assumption, one can also assume that fiscal authorities, when deciding on outsourcing policies in year t , take into account developments in public spending up to this year but do not anticipate the future, i.e., the outsourcing index is partially endogenous.¹³ Under this partially endogenous assumption, we can make use of past values of the outsourcing index as instruments for the current index. Alternatively, we might also assume that fiscal authorities also take into account the expected evolution of spending (i.e. the outsourcing variable is correlated with the full path public spending). However, identification under this full endogeneity assumption, requires extra

¹³In the panel data terminology, partially endogenous regressors are also known as predetermined or weakly exogenous regressors.

sources of variation correlated with fiscal policy but fully uncorrelated with GDP, which are not available to the best of our knowledge. Therefore, we move from the implausible full exogeneity to the more desirable hypothesis of partially endogenous outsourcing decisions.

Formally, we estimate the model in equation (3) under two alternative identifying assumptions:

$$E(\epsilon_{i,t} \mid y_i^T, OS_i^T, X_i^T, \eta_i, \delta_t) = 0 \quad \text{(EXOGENEITY)} \quad (4)$$

$$E(\epsilon_{i,t} \mid y_i^{t-1}, OS_i^{t-1}, X_i^T, \eta_i, \delta_t) = 0 \quad \text{(ENDOGENEITY)} \quad (5)$$

where $y_i^T = (y_{i,1}, \dots, y_{i,t}, \dots, y_{i,T})'$, $OS_i^T = (OS_{i,1}, \dots, OS_{i,t}, \dots, OS_{i,T})'$, $y_i^{t-1} = (y_{i,1}, \dots, y_{i,t-1})'$, and $OS_i^{t-1} = (OS_{i,1}, \dots, OS_{i,t-1})'$.

The key difference between the two alternatives (namely, exogeneity and endogeneity) is given by the element OS_i versus OS_i^{t-1} in the conditioning set. In the exogeneity case, OS_i indicates that the full sequence of the outsourcing variable for a given region i is independent of the shocks to public spending to GDP in period t . In contrast, under the endogeneity assumption, OS_i^{t-1} implies that past and contemporaneous outsourcing values are independent of the current shock to spending-to-GDP while future values are allowed to be affected by current public spending. Additionally, note that an analogous reasoning applies to the case of the lagged dependent variable ($y_{i,t-1}$) which, given the dynamics of the model, is endogenous by construction. Finally, correlation between the region-specific effects (η_i) and the regressors ($y_{i,t-1}$, $OS_{i,t}$, and $X_{i,t}$) is allowed.

3.2.2 Estimation methods

In order to estimate the model under the exogeneity assumption in (4) we make use of a panel OLS estimator with region-specific effects. On the other hand, in order to accommodate the endogeneity assumption in (5) several estimators are available in the literature. The most common approach to handling the presence of fixed effects and endogenous regressors is to first-difference the data and use the panel IV or GMM estimators suggested in Anderson and Hsiao (1982) and Arellano and Bond (1991). The intuition behind both estimators is based on using lagged levels of the variables as instruments of their first differences.¹⁴

¹⁴Another alternative is the use of the so-called system-GMM estimator introduced by Arellano and Bover (1995) and Blundell and Bond (1998) that also exploits first differences of the variables as instruments for the equation in levels. However, this estimator requires the additional assumption of mean stationarity of the variables, which is not realistic in the case of spending-to-GDP ratios over the 2002-2018 period.

More concretely, Anderson and Hsiao (1982) propose to use one lag as instrument, while, in order to gain efficiency in the estimates, Arellano and Bond (1991) suggest a particular combination of all available lags as instruments.

In a panel setting in which neither T is small nor N is large (as it is our case with $N = 17$ regions and $T = 16$ years), the proliferation of reduced form coefficients is a concern in the Arellano and Bond (1991) estimator¹⁵ (see Arellano, 2016). All in all, our preferred option is the panel IV estimator suggested by Anderson and Hsiao (1982) because it only uses one instrument for each endogenous variable and the number of reduced form coefficients does not grow with T .

The implementation of the Anderson and Hsiao (1982) estimator consists of a regression of $\Delta y_{i,t}$ on $\Delta y_{i,t-1}$ and $\Delta OS_{i,t}$ using $y_{i,t-2}$ and $OS_{i,t-2}$ as instruments. More concretely, the moment conditions implied by the Anderson and Hsiao (1982) estimator —henceforth panel IV— can be expressed as follows:

$$E\left(\sum_{t=2}^T y_{i,t-2} \Delta \epsilon_{i,t}\right) = 0 \quad (6)$$

$$E\left(\sum_{t=2}^T OS_{i,t-2} \Delta \epsilon_{i,t}\right) = 0 \quad (7)$$

The validity of the instruments considered in (6) and (7) relies on the validity of the endogeneity assumption in (5), which can be tested. In particular, assumption (5) implies lack of autocorrelation in $\epsilon_{i,t}$ since lagged ϵ s are linear combinations of the variables in the conditioning set. Moreover, if the errors in levels (ϵ s) are serially independent, those in first-differences will exhibit first- but not second- order serial correlation. Therefore, testing for lack of second-order autocorrelation in $\Delta \epsilon_{i,t}$ is equivalent to testing the validity of assumption (5) and thus the validity of the instruments considered in our panel IV approach. For this purpose, we will make use of the AR(2) test suggested by Arellano and Bond (1991).

Finally, it is worth highlighting that all standard errors in the paper are fully robust against arbitrary heteroskedasticity and serial correlation at the region level (i.e., they are clustered at the region level).

¹⁵Intuitively, with $N = 17$ and $T = 16$, some reduced form equations would be linear projections with 17 observations and $T - 1 = 15$ regressors.

4 Results

4.1 The role of unobserved heterogeneity

We begin by estimating (3) by pooled OLS without region fixed effects in the first two columns of Table 2. These include spending-to-GDP as dependent variable and the outsourcing index as the regressor of interest. All estimations include as a control the lagged fiscal target compliance margin, as it may be a relevant variable in determining the expenditure evolution beyond outsourcing.

Column (1) of Table 2 shows the negative correlation depicted in Figure 4 while column (2) add a full set of time dummies to account for cross-section correlations among regions. Column (3) also includes lagged spending to GDP and the negative association in columns (1) and (2) is significantly reduced. Moreover, the coefficient on lagged spending is highly significant and close to 1, which confirms the high persistence of public spending.

The remaining columns of Table 2 present our basic results with region fixed effects under exogeneity. Column (4) shows that the relationship between outsourcing and public spending becomes positive and significant once fixed effects are included. Columns (5) and (6) confirm that this positive association is robust to the inclusion of lagged spending and a comprehensive set of control variables at the region level including the unemployment rate, GDP per capita, GDP growth, the dependency ratio and political variables.¹⁶ For example, in column (6) of Table 2, the estimate of γ is 0.123 with a standard error of 0.057, which makes it highly significant. In particular, an increase of 10 percentage points in the outsourcing ratio is associated to an increase in public spending over GDP of around 1.23 percentage points. The implied cumulative effect of outsourcing on public spending is substantially larger. Since lagged spending has a coefficient of 0.473, the cumulative effect of a 10 pp. increase in outsourcing is 2.33 pp. because $0.123/(1 - 0.473) = 0.233$.

4.2 The role of reverse causality

The estimates in Table 2 show that once we allow for region fixed effects, outsourcing is positively associated to public spending. However, while the fixed effects estimation is useful in removing the influence of time-invariant determinants of both outsourcing and public spending levels, it does not necessarily estimate the causal effect of outsourcing on spending.

¹⁶This positive association between outsourcing and spending is also estimated at the country level in Alonso et al. (2017).

Our second strategy is to use instrumental-variables (IV) regressions to estimate such impact in Table 3. To be more concrete, the exogeneity assumption is relaxed by using lags as instruments making use of the Anderson and Hsiao (1982) and the Arellano and Bond (1991) approaches described in section 3.2.2, which implies allowing for feedback effects from public spending to outsourcing (i.e. reverse causality).

Columns (1) and (2) in Table 3 consider the full set of instruments in the diff-GMM framework with and without control variables. While this approach is fully efficient, it is expected to suffer from overfitting in our setting with small N and relatively large T . Therefore, we restrict the number of lags used as instruments to 2 in columns (3) and (4), which suggest that estimates in the first two columns are robust to the concern of many instruments. Finally, columns (5) and (6) report our preferred specifications based on Anderson and Hsiao (1982), which exploits one single moment condition for each regressor so that the concern of overfitting is completely ruled out. The estimate of γ in column (6) points to a substantial impact of outsourcing on public spending: an increase of 10 pp. in the outsourcing ratio is expected to increase spending-to-GDP in 2.6 pp. in the short run and 4.6 pp. in the long run ($0.259/(1 - 0.443) = 0.46$).

Turning to some diagnosis tests, the assumption of no serial correlation in $\epsilon_{i,t}$ can be rejected by the AR(2) tests in all specifications, which confirms the validity of our exclusion restrictions. In addition, the presence of multiple instruments allows us to test for overidentifying restrictions using the so-called Sargan test. In our preferred specification in column (6), the overidentifying restrictions are not rejected as indicated by the high p-value of the Sargan test. In columns (1)-(4), it is worth mentioning that low Sargan p-values are not a source of concern because Sargan-type tests of overidentifying restrictions present extremely low power in the diff-GMM setting in which neither N is large nor T is short (see Bowsher, 2002).

Finally, Table 4 re-estimate the specifications in Table 3 but considering 3-year periods rather than annual data. We thus have a small- T setting ($T = 6$) in which our estimation strategy is more appropriate. Results are even higher in this case, therefore, we conclude the panel dimension in the time series is not a reason of concern.

4.3 Efficiency considerations

A crucial element not included in our analysis so far is the possible impact of outsourcing on the quality of the public services provided. When outsourcing, the public administration

losses partially the control of the service, and therefore it may be detrimental to its quality. Private firms maximize profits subject to the restriction of a given price and thus they may be tempted to decrease the quality of the service (see Hart, 2003).¹⁷ In case this mechanism is also at work, the negative consequences of outsourcing in terms of public sector efficiency would be even larger than those of spending levels per se.

In Table 5, we revisit our preferred specification but accounting for the quality of the public services provided. In particular, public spending at the regional level in Spain is mostly devoted to the provision of education and health services. We therefore include in the regression three proxies of the quality of those services available at the regional level over the sample period: the health valuation, the health barometer, and school dropout rates. Moreover, we include the number of medical recipes per citizen to correct the effect on spending of the pharmaceutical spending.

According to the estimates in Table 5, our main results remain virtually unaltered when controlling for the quality of the services provided. Our preferred specification in column (6) suggests that an increase of 10 pp. in the outsourcing ratio is expected to increase spending-to-GDP in 3.6 pp. in the short run and 7.3 pp. in the long run ($0.358/(1 - 0.507) = 0.73$). Among the quality controls included, only the self-perceived health status presents a significant (and positive) coefficient, which indicates that increases in public spending are associated to improvements in the health quality of the population. In contrast, changes in dropout rates and life expectancy are not significantly related to variations in public spending. This result might be due to the slow-moving dynamics of these indicators, which are not well-captured in our annual regressions over 16 years.

Despite this approach is admittedly simple, it shows that for a given level of quality provision of education and health services at the regional level, higher outsourcing is associated to increases in public spending. This finding suggests that outsourcing might be efficiency-reducing: it is associated to increases in the amount of inputs required (public spending) for a given level of output as measured by health status or school dropouts.

¹⁷Firm behavior depends on the incentive scheme determined by the contract. Whether outsourcing may be positive or negative for spending efficiency may depend on several factors, for instance: the nature of the service provided, the know-how accumulated by the public administration, or the level of specialization needed for a service provision. Firms tend to focus on a service that can provide to different public administrations, whereas the governments would have to assign a large amount of resources in order to provide that specific service. Thus, the decision of outsourcing should depend on the characteristics of the service, taking into account who would be more suitable to provide it.

4.4 Spanish regional financing system and spending per capita

The Spanish regional financing system includes mechanisms such as The Convergence Funds or the Guarantee Fund for Public Basic Services with the objective of bringing regions closer in terms of financing per capita and favouring territorial equity in compliance with Article 158.1 of the Constitution. As a result, public resources received by Spanish regions depend on their population rather than their GDP. Indeed, financing needs depend on population adjusted according to the financing system. In particular, the population is adjusted taking into account the cost for the region of providing public services at a homogeneous quality level across regions. For instance, the adjustment formula takes into account the population density and the proportion of elderly in the region.

In Table 6, we investigate the effects of outsourcing on per capita public spending instead of spending-to-GDP ratios.¹⁸ For that purpose, we re-estimate our baseline specifications as in Table 3 but using per capita spending measured in thousand Euros per inhabitant as the dependent variable. Moreover, we include among the control variables financing system revenues at homogeneous competences, which exclude all individual competences assumed beyond the obligatory competences.

According to the estimates of our preferred specification in column (6) of Table 6, the positive effect of outsourcing on public spending remains when taking those considerations into account. In particular, an increase of 10 pp. in the outsourcing ratio is expected to increase spending per capita in 61 euros in the short run and 84 euros in the long run ($0.612/(1 - 0.268) = 0.84$). This effect is not negligible, as it represents around 5.3% of the average spending per capita of 3,600 euros across Spanish regions in 2017. When including the financing system control, results still hold, and the effect is estimated to be even higher, with a long run effect of 86 euros of an increase in outsourcing of 10 pp.

4.5 Outsourcing and austerity

We analyze the potential role of outsourcing during the 2007-2018 period when the crisis forced regions to adjust their spending levels in order to comply with public deficit targets (the so-called austerity). In Table 7, the dependent variable is the change of spending-to-GDP ratio over these ten years in percentage points. Note that we switch the sign so that we indeed consider the minus change and thus we can label the dependent variable as austerity:

¹⁸This variable has been deflated with the Consumer Price Index (CPI)

the higher the dependent variable the higher the reduction in public spending (i.e. more austerity). According to all columns in Table 7, those regions with higher outsourcing levels reduced less their public-spending ratios over the 2007-2018 period. Columns (1)-(4) are all based on OLS estimates with different sets of controls variables. Note that the lack of degrees of freedom precludes us from including a large set of control variables as we only exploit 17 observations in these regressions. Columns (5)-(6) consider an IV approach to give a causal flavor to our estimates in the spirit of the identification in Table 3. We use lagged outsourcing (measured in the years 2002-2004) as instrument of current outsourcing. All in all, outsourcing does not seem to encourage austerity, which might be explained by the fact that contracts with the private sector are generally fixed-term. This suggests that even if the government intends to reduce its spending, it may not be possible to terminate the contract whenever they need to, unless a rescission option is available.

4.6 The role of the different components of public spending

Public spending includes public consumption, investment, and transfer payments. On average, consumption and investment account for 81% of overall public spending in Spanish regions. In a few words, the acquisition by governments of goods and services for current use is classified as government consumption expenditure while the acquisition of goods and services intended to create future benefits is classified as government investment (e.g. such as infrastructure investment or research spending).

On the other hand, regional public spending is highly concentrated in two main expenditures classified by function: health and education. Both accounted for around 62% of the regional spending in 2017.¹⁹ Note that spending by economic function includes both consumption and investment. Other previous analysis have focused on both education and health as the sectors more affected by outsourcing (for instance, see Elinder and Jordahl, 2013, for an analysis of Swedish system).

In this section, we deepen our understanding of the interrelations of outsourcing with the different public spending components. We test two hypotheses: first, whether regions with higher outsourcing adjust their investment due to cost provision reductions (increases)

¹⁹The classification of the functions of public spending (COFOG) was developed by the OECD and it includes the following main categories: general public services, defense, public order and safety, economic affairs, environmental protection, housing and community amenities, health, recreation, culture and religion, education, and social protection.

releasing (reducing) resources for investment; second, whether there are different responses by public spending function, either health or education.

Table 8 present the estimates of our baseline specification with the different items of public spending as dependent variables: public consumption, investment, health expenditures and education expenditures. The main finding is that outsourcing increases consumption and health expenditure but has no significant impact on investment or education expenditures. In particular, an increase of 10 pp. in the outsourcing ratio is expected to increase consumption-to-GDP in 1.85 pp. in the short run and 2.9 pp. in the long run ($0.185/(1 - 0.356) = 0.29$). The impact is far smaller when focusing on the health expenditure, as the long run impact represents just 0.46 pp. ($0.013/(1 - 0.72)$).

5 Conclusions

Spanish regional governments outsource to the private sector a large fraction of their public service provision. In this paper, we analyze the relationship between outsourcing on public spending across Spanish regions over the 2002-2018 period. According to our estimates, higher outsourcing is associated to higher public spending, both as a share of GDP and in per capita terms. This finding is in line with previous literature based on outsourcing a public sector spending across countries (e.g. Alonso et al., 2017; Potrafke, 2018). In any event, we acknowledge the limitations of our approach to assess the outsourcing effects on public spending efficiency given the difficulties in accounting for differences in the quality of public service provision. We thus leave for future research a comprehensive analysis of spending efficiency and its interaction with outsourcing policies.

Another promising venue for further research is the possible interactions between public and private sectors through outsourcing activities beyond the impact on public sector outcomes. For instance, di Giovanni et al. (2019) explore how public procurement projects affect the allocation of capital across firms in the private sector and the resulting impact on aggregate output and productivity. In particular, di Giovanni et al. (2019) find that firms' participation in public procurement facilitates their access to bank credit relative to other firms, and thus the allocative efficiency of the economy.

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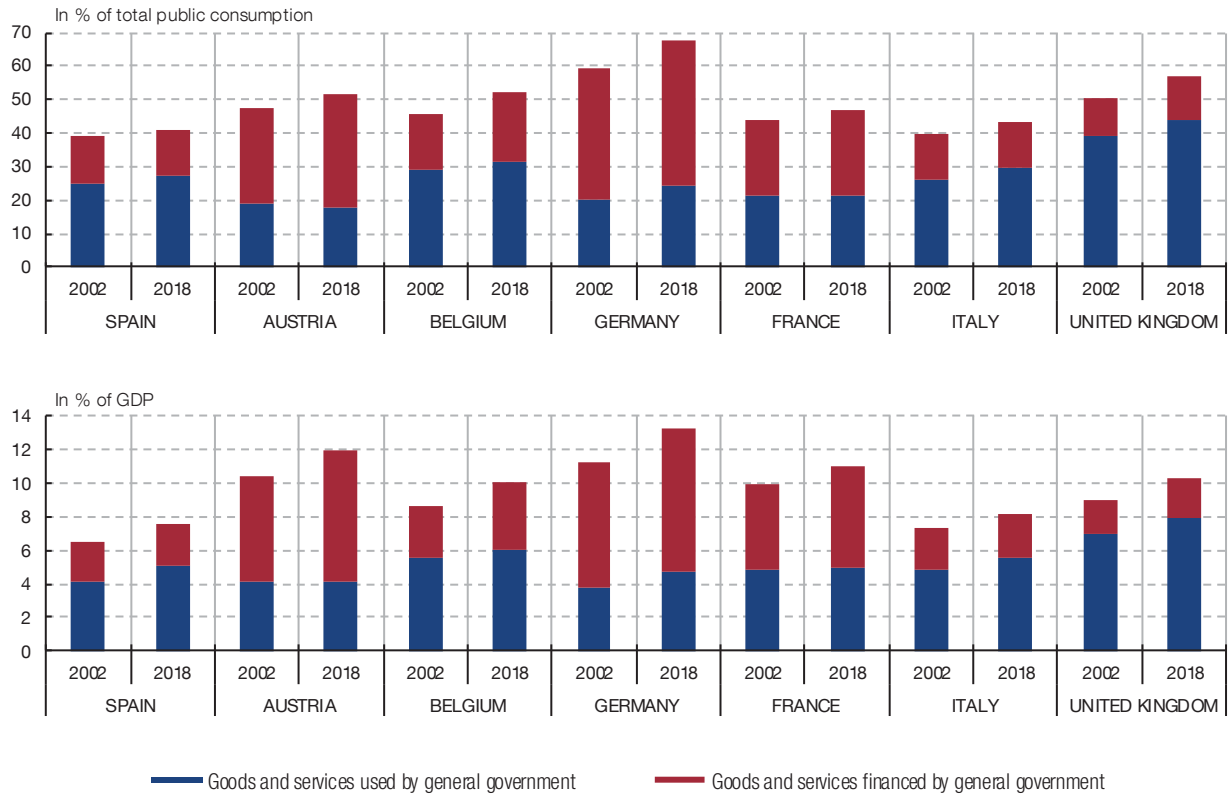
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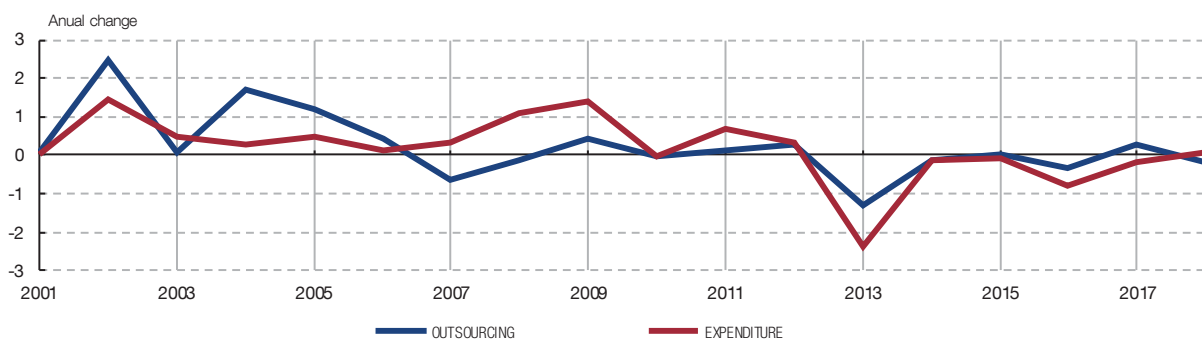
Annex

Figure 1: General Government outsourcing index



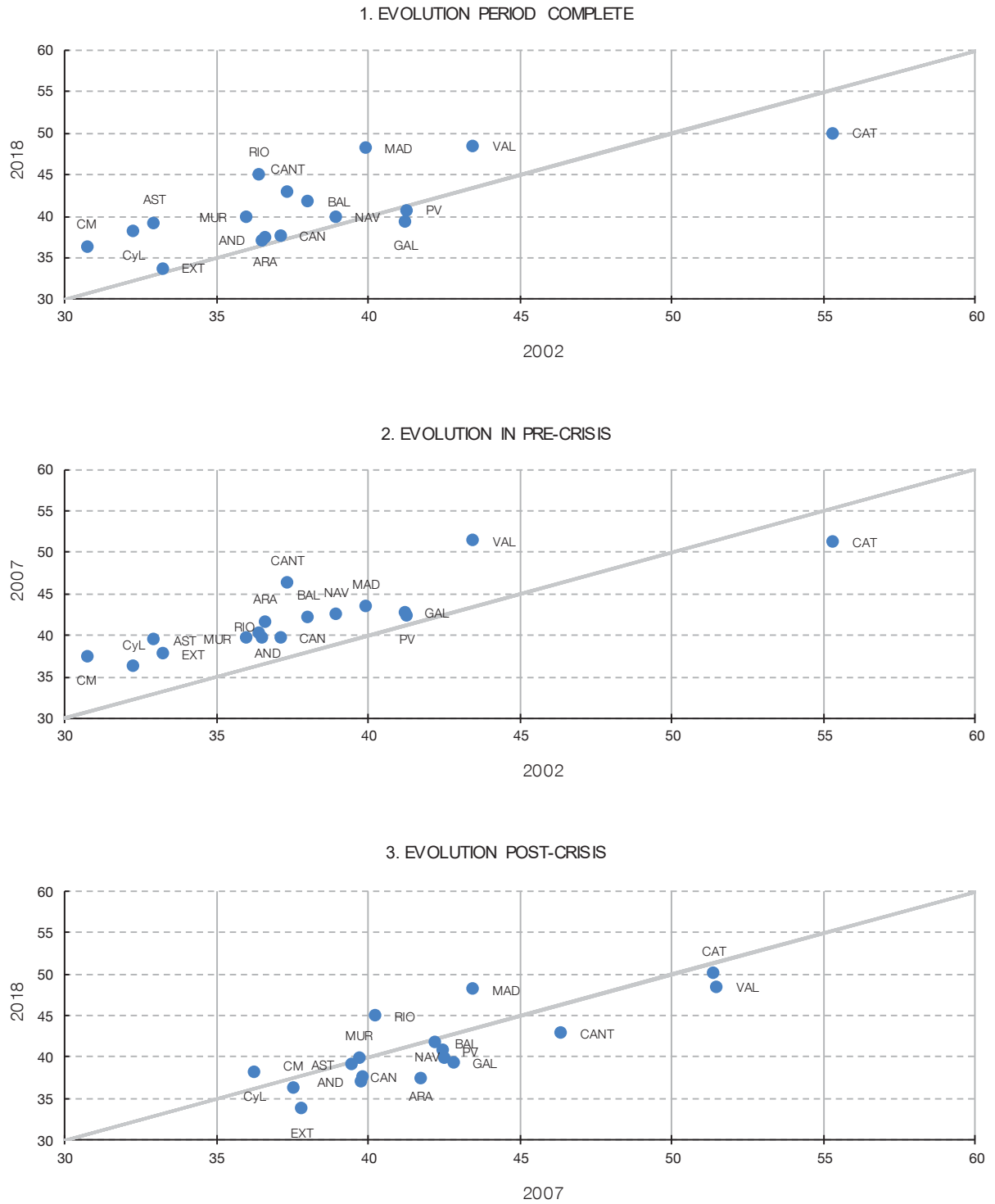
SOURCE: EUROPEAN COMMISSION

Figure 2: Regional government outsourcing index and expenditure over GDP



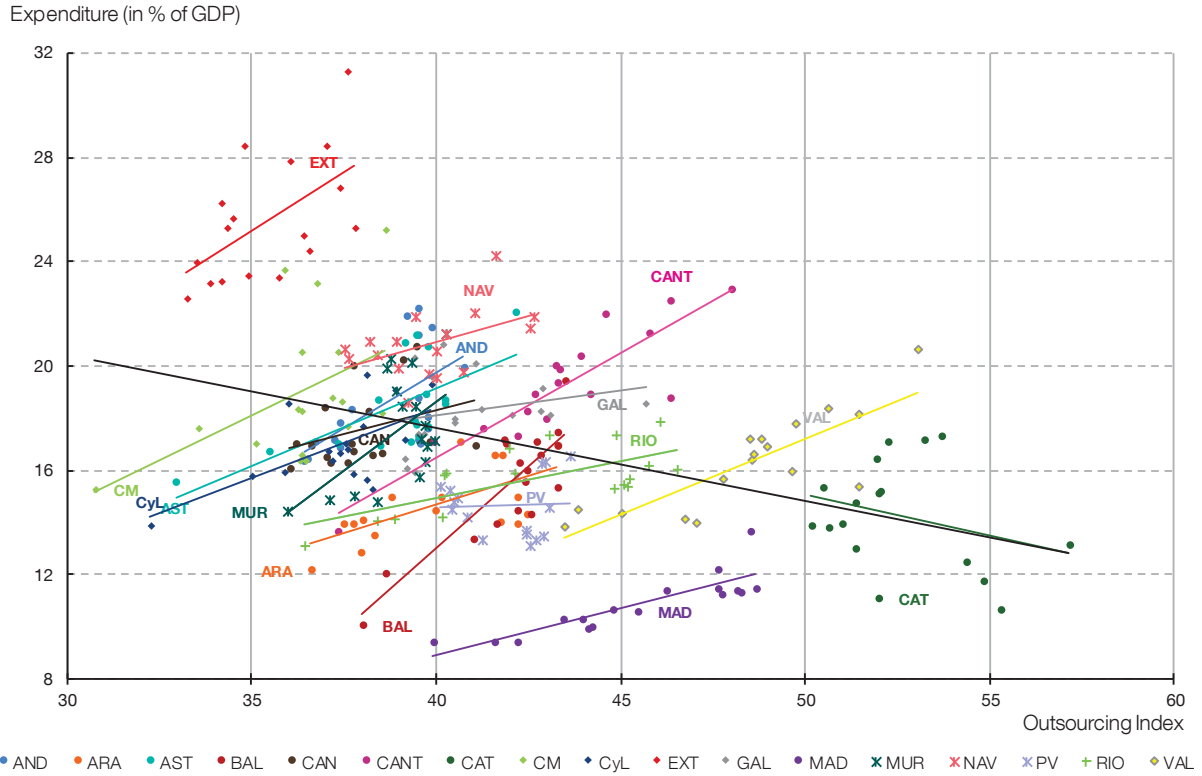
SOURCES: The General Comptroller of the State Administration (IGAE) and own calculations

Figure 3: Outsourcing index by AC (2002-2018)



SOURCES: The General Comptroller of the State Administration (IGAE) and own calculations

Figure 4: Outsourcing and public spending (2002-2018)



SOURCES: The General Comptroller of the State Administration (IGAE) and own calculations

AND=Andalusia, ARA=Aragon, AST=Asturias, BAL=Balear Islands, CAN=Canary Islands, CANT=Cantabria, CAT=Catalonia, CM=Castile-La Manche, CyL=Castile-León, EXT=Extremadura, GAL=Galicia, MAD=Madrid, MUR=Murcia, NAV=Navarre, PV=Basque Country, RIO=Rioja, VAL=Valencia.

Table 1: Summary statistics

VARIABLES	Source	# obs.	mean	sd.	min.	max.
Outsourcing index	Own calculation	289	41.21	4.699	30.74	57.17
Spending to GDP	IGAE	289	17.28	3.586	9.388	31.29
Fiscal compliance	IGAE	289	-0.374	1.052	-6.793	2.660
Investment over GDP	IGAE	289	1.657	0.774	0.466	4.058
Public Consumption exp./GDP	IGAE	289	12.29	2.771	6.080	21.19
Health exp./GDP	IGAE	272	6.025	1.303	3.252	9.965
Education exp./GDP	IGAE	272	4.086	0.882	2.247	6.684
GDP per capita	INE	289	22,210	4,724	11,567	34,916
GDP growth	INE	289	3.464	8.609	-8.739	17.62
Unemployment rate	INE	289	15.36	7.156	4.720	36.22
Dependency ratio	INE	289	18.30	3.107	12.05	25.41
Population density	INE	289	46.68	13.20	24.31	85.15
Gov. concentration	Election results	289	0.373	0.0947	0.212	0.598
Left majority	Election results	289	44.35	10.16	17.95	62.22
Regional parties seats	Election results	289	20.03	23.19	0	74
School dropout	INE	272	25.45	8.267	7	43.60
Health valuation	INE	255	71.90	4.296	58.16	81.88
Life expectancy	INE	289	81.75	1.344	78.38	84.54
Health Barometer	MH	289	6.499	0.482	5.154	7.710
Priv./total employment (educ.)	INE	238	0.366	0.0908	0.141	0.608
Priv./total employment (health)	INE	238	0.530	0.112	0.286	0.950
# of medicines recipes	MH	272	19.10	2.392	13.13	25.04

IGAE: General Comptroller of the State Administration

INE: National Statistics Institute

MH: Health Ministry

Abbreviations: exp. (expenditure), gov. (Government), priv. (Private), educ. (education), # obs. (number of observations), sd. (standard deviation), min. (minimum), max. (maximum).

Table 2: Public spending and outsourcing — Panel OLS

	(1)	(2)	(3)	(4)	(5)	(6)
Outsourcing index	-0.279*** (0.043)	-0.359*** (0.037)	-0.032* (0.016)	0.197** (0.078)	0.121** (0.056)	0.123** (0.057)
Spending (t-1)			0.904*** (0.031)		0.465*** (0.055)	0.473*** (0.060)
Constant	28.766*** (1.825)	28.372*** (1.638)	4.608*** (0.926)	7.218** (2.866)	4.297** (1.842)	3.504 (5.210)
Observations	289	289	289	289	289	289
R-squared	0.13	0.39	0.93	0.76	0.85	0.86
Region FE	NO	NO	NO	YES	YES	YES
Year FE	NO	YES	YES	YES	YES	YES
Controls	NO	NO	NO	NO	NO	YES
Number of idc				17	17	17

Notes: This table presents the results of estimating equation (3) under exogeneity of the outsourcing index. Dependent variable is spending-to-GDP ratio. Estimates in columns (1) and (2) are based on a pooled OLS estimator without region fixed effects, while columns (3)-(5) report panel OLS estimates with region fixed effects exploiting within-region variation. In both cases, identification is based on the exogeneity assumption in equation (4). The sample period is 2002-2018. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio, political variables and pharmaceutical expenditure per capita. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Table 3: Public spending and outsourcing — Baseline

	(1)	(2)	(3)	(4)	(5)	(6)
Outsourcing index	0.164*** (0.022)	0.176*** (0.025)	0.222*** (0.031)	0.252*** (0.036)	0.206*** (0.044)	0.259*** (0.082)
Spending (t-1)	0.548*** (0.038)	0.551*** (0.040)	0.494*** (0.054)	0.466*** (0.056)	0.523*** (0.082)	0.443*** (0.089)
Observations	289	289	289	289	289	289
# regions	17	17	17	17	17	17
Region FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES
IV lags	All	All	2-3	2-3	AHsiao	AHsiao
Sargan test p-value	0.00	0.01	0.00	0.00	0.00	0.00
AR(2) test p-value	0.12	0.13	0.06	0.09	0.04	0.03

Notes: This table presents the results of estimating equation (3) under endogeneity of the outsourcing index. Dependent variable is spending-to-GDP ratio. Estimates in columns (1)-(4) are based on a first-differences GMM estimator (diff-GMM), while columns (5)-(6) report estimates from the Anderson and Hsiao (1982) estimator based on the moment conditions in equations (6) and (7). In both cases, identification is based on the endogeneity assumption in equation (5). AR(2) test p-value refers to the p-values from Arellano and Bond (1991) test for the lack of second-order autocorrelation in the first-differenced errors; under this null hypothesis, the instruments are valid because the errors in levels are not correlated, as implied by our identifying assumption in equation (5). Sargan test p-value refers to the p-values from the test of overidentifying restrictions under the null that instruments are valid, i.e. moment conditions hold in the data. The sample period is 2002-2018. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Table 4: Public spending and outsourcing — Baseline 3-year periods

	(1)	(2)	(3)	(4)	(5)	(6)
Outsourcing index	0.542*** (0.157)	0.465*** (0.169)	0.607*** (0.170)	0.547*** (0.182)	0.687*** (0.215)	0.673*** (0.234)
Spending (t-1)	0.186 (0.173)	0.396** (0.183)	0.154 (0.199)	0.355* (0.198)	0.220 (0.163)	0.281** (0.137)
Observations	68	68	68	68	68	68
# regions	17	17	17	17	17	17
Region FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES
Estimator	diff-GMM	diff-GMM	diff-GMM	diff-GMM	AHsiao	AHsiao
IV lags	All	All	2-3	2-3	All	All
Sargan test p-value	0.00	0.03	0.00	0.01	0.00	0.00
AR(2) test p-value	0.03	0.05	0.03	0.03	0.07	0.28

Notes: This table presents the results of estimating equation (3) under endogeneity of the outsourcing index at 3-year intervals rather than annual data as in Table 3. Dependent variable is spending-to-GDP ratio. Estimates in columns (1)-(4) are based on a first-differences GMM estimator (diff-GMM), while columns (5)-(6) report estimates from the Anderson and Hsiao (1982) estimator based on the moment conditions in equations (6) and (7). In both cases, identification is based on the endogeneity assumption in equation (5). AR(2) test p-value refers to the p-values from Arellano and Bond (1991) test for the lack of second-order autocorrelation in the first-differenced errors; under this null hypothesis, the instruments are valid because the errors in levels are not correlated, as implied by our identifying assumption in equation (5). Sargan test p-value refers to the p-values from the test of overidentifying restrictions under the null that instruments are valid, i.e. moment conditions hold in the data. The sample period is 2002-2018. Deficit target compliance margin is included in all models. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Table 5: Public spending and outsourcing — Efficiency considerations

	(1)	(2)	(3)	(4)	(5)	(6)
Outsourcing index	0.182*** (0.031)	0.190*** (0.032)	0.316*** (0.063)	0.259*** (0.065)	0.334*** (0.072)	0.358*** (0.071)
Spending (t-1)	0.575*** (0.053)	0.567*** (0.054)	0.654*** (0.090)	0.624*** (0.092)	0.571*** (0.133)	0.507*** (0.141)
School dropout	-0.021 (0.020)	-0.031 (0.022)	-0.048* (0.028)	-0.046 (0.028)	-0.028 (0.026)	-0.032 (0.021)
Health valuation	0.042* (0.022)	0.066*** (0.024)	0.108*** (0.031)	0.088** (0.035)	0.084*** (0.033)	0.075** (0.029)
Health Barometer	0.218 (0.223)	0.273 (0.234)	-0.071 (0.331)	0.047 (0.337)	0.099 (0.324)	0.212 (0.277)
# medicines recipes	-0.135* (0.081)	-0.097 (0.085)	-0.272** (0.119)	-0.061 (0.128)	-0.336 (0.232)	-0.186 (0.228)
Observations	238	238	238	238	238	238
# regions	17	17	17	17	17	17
Region FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES
Instruments	All	All	2-3	2-3	AHsiao	AHsiao
Sargan test p-value	0.02	0.08	0.00	0.05	0.02	0.04
AR(2) test p-value	0.25	0.32	0.15	0.25	0.1	0.14

Notes: This table is analogous to Table 3 but including additional controls related to the quality of education (dropout rate) and health services (life expectancy and health status). It also includes the number of medicines recipes per capita. It presents the results of estimating equation (3) under endogeneity of the outsourcing index. Dependent variable is spending-to-GDP ratio. Estimates in columns (1)-(4) are based on a first-differences GMM estimator (diff-GMM), while columns (5)-(6) report estimates from the Anderson and Hsiao (1982) estimator based on the moment conditions in equations (6) and (7). In both cases, identification is based on the endogeneity assumption in equation (5). AR(2) test p-value refers to the p-values from Arellano and Bond (1991) test for the lack of second-order autocorrelation in the first-differenced errors; under this null hypothesis, the instruments are valid because the errors in levels are not correlated, as implied by our identifying assumption in equation (5). Sargan test p-value refers to the p-values from the test of overidentifying restrictions under the null that instruments are valid, i.e. moment conditions hold in the data. Deficit target compliance margin and number of recipes over regional population are included in all models. The sample period is 2002-2018. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Table 6: Public spending and outsourcing — Per capita terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable is per capita public spending							
Outsourcing index	0.377*** (0.053)	0.384*** (0.057)	0.508*** (0.070)	0.528*** (0.078)	0.495*** (0.118)	0.459*** (0.172)	0.612* (0.325)
Spending (t-1)	0.584*** (0.036)	0.570*** (0.039)	0.540*** (0.045)	0.504*** (0.049)	0.561*** (0.079)	0.524*** (0.063)	0.268*** (0.085)
Observations	289	289	289	289	289	289	210
# regions	17	17	17	17	17	17	15
Region FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Controls	NO	YES	NO	YES	NO	YES	YES
Instruments	All	All	2-3	2-3	AHsiao	AHsiao	AHsiao
Sargan test p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AR(2) test p-value	0.06	0.06	0.02	0.01	0.03	0.03	0.07

Notes: This table presents the results of estimating equation (3) under endogeneity of the outsourcing index. Dependent variable is spending-to-GDP ratio. Estimates in columns (1)-(4) are based on a first-differences GMM estimator (diff-GMM), while columns (5)-(7) report estimates from the Anderson and Hsiao (1982) estimator based on the moment conditions in equations (6) and (7). In column (7) we include as control the financing system revenues at homogeneous competencies. In both cases, identification is based on the endogeneity assumption in equation (5). AR(2) test p-value refers to the p-values from Arellano and Bond (1991) test for the lack of second-order autocorrelation in the first-differenced errors; under this null hypothesis, the instruments are valid because the errors in levels are not correlated, as implied by our identifying assumption in equation (5). Sargan test p-value refers to the p-values from the test of overidentifying restrictions under the null that instruments are valid, i.e. moment conditions hold in the data. The sample period is 2002-2018. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. Finally, we also include as a control the proxy for financing needs at the AC level. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Table 7: Austerity and outsourcing

	(1)	(2)	(3)	(4)	(5)	(6)
Initial outsourcing	-0.138*** (0.029)	-0.094** (0.033)	-0.154*** (0.024)	-0.115*** (0.034)	-0.115*** (0.038)	-0.117** (0.046)
Spending (t-1)		0.249*** (0.073)		0.177* (0.096)	0.176* (0.091)	0.180 (0.133)
Change outsourcing index			-0.222** (0.085)	-0.117 (0.097)	-0.118 (0.093)	-0.119 (0.103)
Constant	6.297*** (1.267)	0.301 (2.130)	6.736*** (1.122)	2.283 (2.611)	2.295 (2.524)	2.190 (3.686)
Observations	17	17	17	17	17	17
R-squared	0.219	0.488	0.442	0.527	0.527	0.527
Period	2007-2017	2007-2017	2007-2017	2007-2017	2007-2017	2007-2017
Controls	NO	NO	NO	NO	NO	YES

Notes: Dependent variable is austerity, defined as minus the change in spending-to-GDP over the 2007-2017 period (higher values correspond to more austerity). Initial outsourcing refers to the outsourcing index in 2007. Estimates in columns (1)-(4) are based on OLS, while columns (5)-(6) consider an IV approach in which outsourcing in 2007 is instrumented with lagged outsourcing. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors are reported in parentheses.

Table 8: Impact of outsourcing in the components of public spending

	(1)	(2)	(3)	(4)
	Consumption	Investment	Health	Education
Outsourcing index	0.185*** (0.037)	-0.005 (0.015)	0.013* (0.008)	-0.002 (0.005)
Dependent var. (t-1)	0.356*** (0.087)	0.730*** (0.073)	0.720*** (0.159)	0.363** (0.162)
Observations	289	289	272	272
# regions	17	17	17	17
Region FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Controls	YES	YES	YES	YES
Instruments	AHsiao	AHsiao	AHsiao	AHsiao
Sargan test p-value	0.00	0.00	0.08	0.00
AR(2) test p-value	0.35	0.38	0.51	0.91

Notes: This table presents the results of estimating equation (3) under endogeneity of the outsourcing index. Dependent variables are the different components of public spending over GDP. All estimates rely on the Anderson and Hsiao (1982) estimator based on the moment conditions in equations (6) and (7). Identification is based on the endogeneity assumption in equation (5). AR(2) test p-value refers to the p-values from Arellano and Bond (1991) test for the lack of second-order autocorrelation in the first-differenced errors; under this null hypothesis, the instruments are valid because the errors in levels are not correlated, as implied by our identifying assumption in equation (5). Sargan test p-value refers to the p-values from the test of overidentifying restrictions under the null that instruments are valid, i.e. moment conditions hold in the data. The sample period is 2002-2018. Deficit target compliance margin is included in all models. Controls include unemployment rate, GDP per capita, GDP growth, dependency ratio and political variables. We denote significance at 10%, 5%, and 1% with *, **, and ***, respectively. Standard errors clustered at the region level are reported in parentheses.

Upon request, results considering alternative outsourcing measurements based on the weight of private employment over total employment in the health and education sector are available.

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