

**REVENUE AUTONOMY AND REGIONAL GROWTH:
AN ANALYSIS FOR THE 25 YEAR-PROCESS OF
FISCAL DECENTRALISATION IN SPAIN**

**RAMIRO GIL-SERRATE
JULIO LÓPEZ-LABORDA
JESÚS MUR**

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REVENUE AUTONOMY AND REGIONAL GROWTH: AN ANALYSIS FOR THE 25 YEAR-PROCESS OF FISCAL DECENTRALISATION IN SPAIN

*Ramiro Gil-Serrate**
*Julio López-Laborda***
*Jesús Mur****

ABSTRACT:

This paper discusses the existing research on the relationship between fiscal decentralisation and economic growth and proposes some changes on the analyzing approach with regard to the measure of fiscal decentralisation and the estimation of the relationship compared with previous works. These proposals are implemented in the case of the Spanish decentralisation process (1984-2008). As a result a group of revenue autonomy indicators, specific to the Spanish case, is presented and a group of VAR models is estimated for the relationship between revenue autonomy of Spanish regional governments and regional growth. The results of the analysis point to a possible slightly positive effect of revenue autonomy of Spanish regional governments on regional growth. On the other hand, revenue autonomy appears to be not determined by growth but only by political decisions.

Keywords: revenue autonomy; regional growth; fiscal decentralisation; Spanish regions

JEL classification: C31; H71; H 77; R11

*London School of Economics. Department of Geography and Environment. Houghton Street, London WC2A 2AE, UK.

** Universidad de Zaragoza. Departamento de Economía Pública. Gran Vía 2, Zaragoza 50005, España.

***Universidad de Zaragoza. Departamento de Análisis Económico. Gran Vía 2, Zaragoza 50005, España.

1. INTRODUCTION

Traditionally, arguments in favour of fiscal decentralisation, based on the seminal works of Tiebout (1956), Stiegler (1957), Musgrave (1959), Oates (1972) and Brennan and Buchanan (1980), claimed it stimulated government efficiency in delivering services, generated greater transparency and accountability in government action and controlled government size. These results were a consequence of proximity and information advantages of local governments, population mobility across local communities and competition among local governments in the provision of public goods. More recently, Oates (1993) transposed the essence of the proposition concerning the promotion of economic efficiency by a decentralisation process to the dynamic sphere of economic growth, thought without formal analysis. Later, several works developed a theoretical framework reflecting the relationship between fiscal decentralisation and economic growth. Different theoretical proposals can be seen in Xie et al (1999), Zhang and Zou (2001) and Gong and Zou (2003), where optimal levels of fiscal decentralisation (maximisers of economic growth) are identified in excess of which the effects of decentralisation upon growth become negative; Brueckner (2006) showed that economic growth can be promoted when public goods are tailored to young and old individuals under fiscal federalism and Gil-Serrate and López-Laborda (2009) obtained the optimal level of tax decentralisation and its determinants in a two-tier framework of local and federal government.

Nevertheless, from an empirical point of view, the literature is not conclusive about the statistical significance and sign of the effect of fiscal decentralization on growth. Xie et al (1999) found no statistically significant relationship between expenditure decentralisation and income growth in the US during almost the second half of the 20th century, however, Akai and Sakata (2002) found that the ratios of expenditure and revenue decentralisation from state to local governments had a positive and significant impact on state GDP in the first half of the 90s. Zhang and Zou (1998) reported a negative relation between expenditure decentralisation and income growth in Chinese provinces, although, Lin and Liu (2000), when considering a similar period of study, found that the marginal retention rate of national budget revenues collected at the provincial level had a positive and statistically significant impact on Chinese provincial

growth. Desai et al (2003) found a positive effect of the retention rate of national budget revenues collected at the Russian regions upon the recovery of regional industrial production in the late 90s. When the analysis is undertaken for groups of countries, Davoodi and Zou (1998) reported no relationship between expenditure decentralisation and economic growth in developing and developed countries during the 70s and the 80s, and this is also the case in Fukasaku and de Mello (1998) when considering revenue decentralisation in a group of developed and developing countries from the beginning of the 70s to the beginning of the 90s, in Woller and Phillips (1998) for expenditure and revenue decentralisation and economic growth in less developed countries from 1974 to 1991, and in Thornton (2007) for economic growth in 19 OECD member countries over the 80s and the 90s when considering fiscal autonomy of sub-national governments in 1995. At the same time, Yilmaz (2000) found that expenditure decentralisation had a positive and statistically significant impact on economic growth in 17 unitary states from 1971 to 1990, Iimi (2005) reported a significant and positive effect of expenditure decentralization on per capita GDP growth for a group of developed and developing countries from 1997 to 2001, and Thießen (2003) reported, for the period 1973-1998, a positive relation between expenditure decentralization and growth for a group of OECD economies when decentralisation is increasing from low levels. Finally, Rodríguez-Pose and Kroijer (2009) analysed the case of 16 Central and Eastern European countries and reported a negative relationship between the two magnitudes over the 1990-2004 period.

Several reasons can explain these differences in results, apart from the differing economic or time scenarios analysed in each case. On the one hand, the different levels of economic development and fiscal decentralisation among the countries considered. According to Bahl and Linn (1992) there is the necessity of exceeding a certain threshold of development in order for fiscal decentralisation to provide positive effects upon economic growth. The different levels of fiscal decentralisation achieved might be also an explanation, in accordance with some of the theoretical proposals mentioned above and with Thießen (2003) where it is argued that as decentralisation increases its positive relationship with economic growth eventually turns negative. On the other hand the different results can also be explained by the different fiscal decentralisation indicators employed. Specifically, the fiscal decentralisation indicators which are normally utilised are the sub-central/total government ratios of expenditure and revenue,

compiled using data from the *Government Financial Statistics* (GFS) of the International Monetary Fund (IMF) or national statistical offices. These indicators, although highly operative, in many cases do not provide adequate information regarding the degree of sub-central government's autonomy with respect to central control.

As stated in Thornton (2007, p. 65) "A serious problem with much of the literature on the macroeconomic impact of fiscal decentralization is that it fails to make an appropriate distinction between 'administrative' and 'substantive' decentralization by not recognizing that high sub-national revenue and spending shares do not necessarily indicate high local autonomy". That is to say, in line with Rodden (2004), the indicators usually employed do not reflect the basis of the majority of the theoretical arguments which refer to the advantages produced by a process of fiscal decentralisation. In response to this situation, several studies have been published (Ebel and Yilmaz, 2002; Meloche et al, 2004; Stegarescu, 2005; Thornton, 2007) which, without abandoning the quantitative nature of the indicators, have proposed a more diligent employment of the data available for a series of countries. The essential idea is that it is important to take into account not only the volume of decentralised resources, but also the degree of control that sub-central governments exert over them; consequently, an important element of the theory of fiscal federalism would be captured and, as a result, the empirical analysis of decentralisation processes would become more accurate.

Another reason that could explain the differences in results in the empirical analysis of the relationship between fiscal decentralisation and economic growth is the methodology used in the analysis. The most common approach is to estimate a growth equation according to the different theories of economic growth using cross-section, see for example Iimi (2005) and Thornton (2007), time series, as in Xie et al (1999) or, most of the times, panel techniques, see among others Zhang and Zou (1998) and Rodríguez-Pose and Kroijer (2009). This approach in some occasions could present problems regarding the specification of the equation and the possible presence of endogeneity in the estimation that would affect the results obtained. With regard to the specification of the equation, the omission of relevant control variables or the manner in which fiscal decentralisation is considered in the equation may lead to a biased result regarding the relationship between this variable and economic growth. In addition, failing to consider the presence of endogeneity and reverse causation may hamper the conclusions obtained

from the analysis in case all the right-hand side variables are not exogenous. However, the question of endogeneity is rarely tackled in the specific literature, an exception is Desai et al (2003), due to the fact that it is difficult to select appropriate instruments for the variable of fiscal decentralisation for which continuous data are available. In order to overcome these methodological problems we consider that a Vector Autoregressive Regressions (VAR) analysis is more appropriate in the study of the relationship between fiscal decentralisation and economic growth since this approach allows us to consider the possible existence of mutual interactions in a relevant framework where additional hypothesis do not need to be included, resulting this in a more objective and clear estimation of the relationship¹.

Taking into account these caveats regarding the measurement of fiscal decentralisation and the methodology used, this paper analyses the effect that fiscal decentralisation had on economic growth in the Spanish regions from the beginning of the decentralisation process in democratic Spain to present. Using a data sample of the 17 Spanish regions we test over the time period 1984-2008 the relationship between revenue autonomy and economic growth rate at regional level². Specifically, three different categories of revenue autonomy are considered and defined according to the specific characteristics of the process of fiscal decentralisation in Spain and the economic classification of Spanish public accounts. The economic growth of the regions is measured through the rate of growth of regional GDP at constant prices.

The Spanish case is particularly interesting for the analysis of the macroeconomic impact of fiscal decentralisation because, after Franco's dictatorship ended in the 70s, the country embarked in a transition from a highly centralized administrative system to a federal structure system with 17 regions where a strong decentralisation process has taken place in a relatively short period of time. This process has included 'own-source' revenues for sub-central governments and important tax sharing agreements among the different regions and the central government which left the formers with power to influence the revenues accruing to them individually through

¹ The effect of economic growth on fiscal decentralisation is also analysed in the literature. A significant and positive effect is identified, which is explained considering fiscal decentralisation a superior good, see among others Panizza (1999) and Letelier (2005).

² The new Spanish constitution was approved at the end of 1978, however, the set up of the named "Autonomic State" was finished in 1983.

some degree of control over tax rates. These characteristics of the Spanish fiscal decentralisation process, together with the profusion and high quality of the existing data with regard to the fiscal relations among the different levels of governments, result in a very relevant case of analysis which experience can be of high interest for countries that are at present implementing fiscal decentralisation reforms.

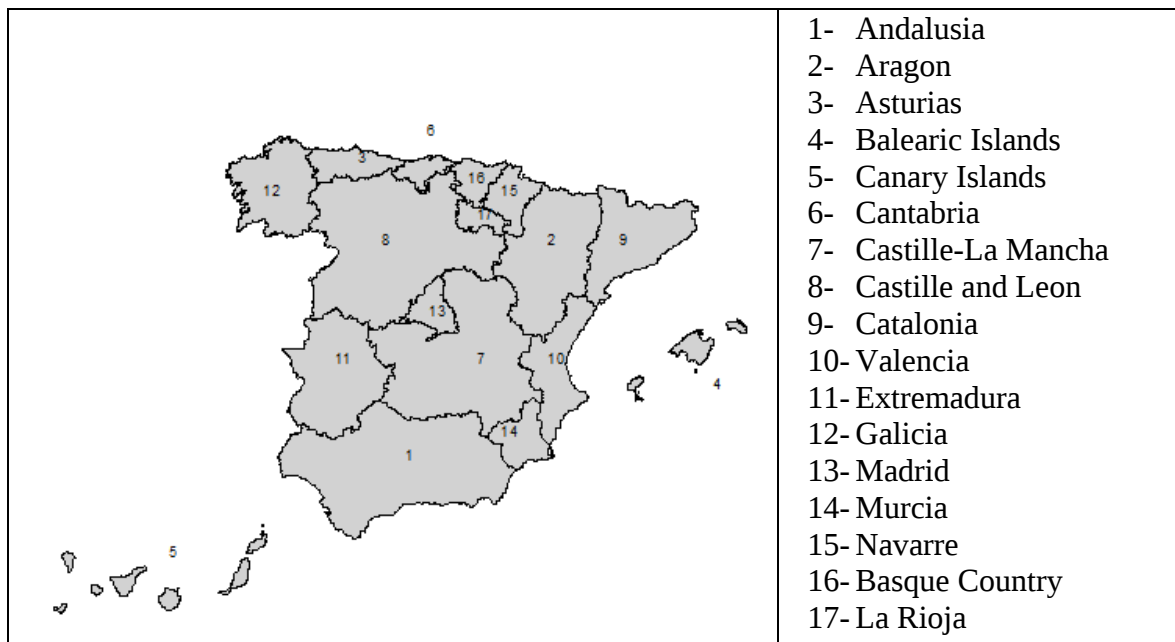
The main results of the analysis point out that revenue autonomy in Spanish regional governments has had a slightly positive impact on regional growth throughout the 25 years of fiscal decentralisation experienced in Spain. On the other hand, the relevant growth experienced by the Spanish regional economies along this period has not had any effect on the progress on regulatory powers that regional governments have over their revenues which it seems that is basically determined by political decisions.

The paper is structured as follows. In the next section we describe the process of fiscal decentralisation that has taken place in Spain from 1984 to 2008. In the third section, we propose a set of indicators of revenue autonomy of the Spanish regional governments which take into account the different degree of control that exert over their ‘own-source’ and tax-shared revenue. The following section describes the data and methodology that we use to test the relationship between fiscal decentralisation and economic growth in Spanish regions according to the indicators proposed previously and includes a discussion and interpretation of the principal results obtained. The final section presents the main conclusions reached.

1. 25 YEARS OF FISCAL DECENTRALISATION IN SPAIN: 1984 - 2008

The Spanish Constitution of 1978 marked the beginning of democracy in Spain after almost 40 years of dictatorship. In it was recognised the right to regional self-government. The development of this right resulted in what has been called the “Autonomic State” which is formed by 17 “Autonomous Communities” (regions, see Figure 1) and 2 “Autonomous Cities”³. The Spanish regions are very diverse in terms of population, per capita income and size. Table 1 presents a summary of these features of Spanish regions together with the number of local jurisdictions (provinces and municipalities) included in each territory⁴, the year each “Autonomous Community” was founded, the level of devolution achieved at that moment and the type of financing system applied to its devolution process.

Figure 1. Regional map of Spain



³ These are Ceuta and Melilla, both of them in North Africa.

⁴ The Spanish province is a tier of local government which groups a number of municipalities within certain geographical boundaries. It's main purpose is to assist these municipalities with the performance of their functions. There are seven Spanish regions consisting of a single province, in these cases, the provincial administration, budgeting included, is integrated into the regional administration.

Table 1. Main geo-economic and devolution features of Spanish regions

	POPULATION		PER CAPITA GDP		AREA		Provinces	Municipalities	Foundation of the Autonomous Community	Level of devolution at foundation	Type of financing system
	(2008)		(2008)								
	Population	%	€	Index	Km²	%					
	Average=100										
Andalusia	8,202,220	17.77	14,580	77.34	87,598	17.31	8	770	1981	High	Common
Aragon	1,326,918	2.87	20,481	108.64	47,720	9.43	3	731	1982	Low	Common
Asturias	1,080,138	2.34	17,654	93.65	10,604	2.10	1	78	1981	Low	Common
Balearic Islands	1,072,844	2.32	20,505	108.77	4,992	0.99	1	67	1983	Low	Common
Canary Islands	2,075,968	4.50	17,312	91.83	7,447	1.47	2	88	1982	High	Common
Cantabria	582,138	1.26	19,328	102.52	5,321	1.05	1	102	1981	Low	Common
Castile and Leon	2,557,330	5.54	18,281	96.97	94,225	18.62	9	2,248	1983	Low	Common
Castile-La Mancha	2,043,100	4.43	14,363	76.19	79,462	15.70	5	919	1982	Low	Common
Catalonia	7,364,078	15.95	21,614	114.65	32,113	6.35	4	946	1979	High	Common
Valencia	5,029,601	10.90	16,860	89.43	23,255	4.60	3	542	1982	High	Common
Extremadura	1,097,744	2.38	13,492	71.57	41,635	8.23	2	383	1983	Low	Common
Galicia	2,784,169	6.03	16,087	85.33	29,574	5.84	4	315	1981	High	Common
Madrid	6,271,638	13.59	24,694	130.99	8,028	1.59	1	179	1983	Low	Common
Murcia	1,426,109	3.09	15,475	82.09	11,313	2.24	1	45	1982	Low	Common
Navarre	620,377	1.34	24,042	127.53	10,390	2.05	1	272	1982	High	Charter
Basque Country	2,157,112	4.67	25,338	134.40	7,235	1.43	3	251	1979	High	Charter
La Rioja	317,501	0.69	20,115	106.70	5,045	1.00	1	174	1982	Low	Common
SPAIN	46,157,822	100.00	18,852	100.00	505,990	100.00	50	8,112	-	-	-

Source: *Instituto Nacional de Estadística* (Spain), *Ministerio de Política Territorial* (Spain) and López-Laborda and Monasterio (2007).

The distribution of power between the regions and the central government is established by the constitution, which nevertheless sets out only general principles in the matter of revenue assignment. The central government has exclusive power over those areas related with economic stabilisation, defence, foreign policy and trade, basic social security legislation and funding and the provision of national public goods and services, such as national public works, infrastructure and transport. With regard to the regions, they have responsibility for the provision of a wide range of regional public goods and services which specifically impact the well-being of people living within their territory. These include town and country planning, housing, regional public works, infrastructure and transport, farming, environment, culture, tourism and sports, as well as health and education, the two basic public services provided by the Welfare State. At first, due to historical reasons, only a small group of regions were granted powers in the areas of education and health, these resulted in two different levels of devolution, high and low, see Table 1. However, later on these two responsibilities were also transferred to the rest of the regions, education between 1995 and 1999 and health in 2002. As a result it may fairly be said that since then, although certain minor differences persisted⁵, the Spanish regions had practically the same responsibilities. It should be made clear that the regions do not exercise their powers within a framework of complete freedom. While they have exclusive responsibility in some areas without the intervention from any other level of government, this is the case, for example, of regional public works, infrastructure and transport, their actions in others are subject to certain restrictions, as happen in the areas of education and health where the central government establishes basic legislation⁶.

Currently, in order to carry out with their responsibilities, regional governments are responsible for more than 35 percent of total public expenditure and for more than 50 percent of general government employment. The constitution establishes two different systems for the funding of regional expenditure, as shows Table 1, the named “common” system applicable to all of the regions with the exception of the Basque Country and Navarre, and the named “charter” system applicable to the latter based on

⁵ For example, Catalonia, Navarre and the Basque Country share policing responsibilities with the central government in their territories.

⁶ In these areas, this is intended to ensure that the conditions of the service remain substantially the same nationwide.

their historical charters on fiscal and economic matters. The “common” system has been progressively modified as regional governments have taken on more responsibilities. The most significant reviews of the system took place in 1986, 1992, 1996, 2001 and 2009⁷. Initially, the devolved responsibilities to regional governments were financed by way of lump-sum general grants. However, this type of funding thwarted the effective action of two main criteria for fiscal decentralisation: the principle of financial autonomy, which requires each jurisdiction to be in a position to decide the level and structure of its revenues and spending; and the principle of accountability, which establishes that the cost of providing regional and public goods and services should be directly borne by the beneficiaries. Consequently, the funding based exclusively on general purpose grants was soon abandoned and replaced with a mix of grants and transferred taxes, more in line with fiscal federalism theoretical arguments and the experience of other decentralised countries.

The transferred taxes are regulated at the central level, which assigns certain control over them to the regional governments. Until 1997 this control comprised only collection and administration of the tax. The regions were not given any powers to determine the rate or the base of the transferred taxes, and the system should therefore properly be described as a tax sharing arrangement rather than own taxes. However, since the review of the system in 1996, the regional governments were allowed to set the tax rate and establish tax credits and allowances for some taxes. From then onward some transferred taxes may be defined as own regional taxes, as long as the regional governments have discretion, at least, to set the tax rate (Bird, 1993). Table 2 shows the taxes transferred and the powers that regional governments had over them from 1997 to the end of 2008. The last column of the table classifies the taxes between own taxes and tax sharing arrangements, according to the literature. Central government retains all powers over the collection, administration and regulation of corporate income tax, the tax on insurance premiums, carbon tax, payroll taxes, import duties and non-resident taxes. Regarding the personal income tax, in principle, each region receives 33 percent of the total tax take in its territory, however, since the regional government may increase or reduce the rate, as well as establishing their own tax credits, the take may be higher or lower than 33 percent.

⁷ These resulted from periodical official negotiations between the regions and the central level of government.

Table 2. Taxes transferred to the regional level under the “common” financing system

TAX	SHARING OF COLLECTION	ADMINISTRATION BY REGIONAL GOVERNMENT	REGULATION BY REGIONAL GOVERNMENT	CLASSIFICATION
Personal Income Tax	33%	NO	Tax schedule and tax credits	Own tax
Tax on Net Wealth	100%	YES	Threshold, tax schedule and tax credits	Own tax
Inheritance and Gift Tax	100%	YES	Allowances, tax schedule, tax credits, administration and collection	Own tax
Capital Transfer Tax, Tax on the Raising of Capital, and Stamp Duties	100%	YES	Tax rates, tax credits, administration and collection	Own tax
Gaming Tax	100%	YES	Allowances, taxable base, tax rates, administration, collection and inspection	Own tax
Vehicles excise (at registration)	100%	YES	Tax rates	Own tax
Hydrocarbons Retail Sale Tax	100%	YES	Tax rates, administration, collection and inspection	Own tax
Value Added Tax (VAT)	35%	NO	NO	Tax sharing
Alcoholic beverages, tobacco and petrol excise duties	40%	NO	NO	Tax sharing
Electricity Tax	100%	NO	NO	Tax sharing

Source: López-Laborda and Monasterio (2007).

In addition, the Spanish regional governments are allowed to establish genuine regional taxes and surcharges over which they have full powers of collection, administration and regulation. However, there are strict limits to this power in order to prevent the regions from trespassing on the terrain already occupied by other levels of government. This limitation explains why there have been established so few regional taxes in Spain, basically in the areas of environment and gaming, and with a very small yield.

Finally, the grants received by the Spanish regional governments under the “common” system are of two different types, general purpose equalisation grants and specific purpose grants, the latter are intended to reduce differences in income and wealth among regions mainly through public investment, as is the case of the revenues obtained from the European Regional Development Fund (ERDF). In year 2008 grants received by regional governments under the “common” system of funding represented 42.68 percent of their total non financial revenues (general grants accounted for 22.54 percent and specific grants for 20.14 percent), tax sharing revenues rose to 20.51 percent and own revenues represented the remaining 36.81 percent.

On the other hand, the “charter” financing system applies to Navarre and the Basque Country. Unlike the “common” system, this system is not based on the assignment of specific revenues to fund regional expenditure needs, but on the provision of direct fiscal autonomy to the two regions concerned. Both regions have the capacity to establish and regulate their own fiscal system provided that free movement of persons, capital, goods and services is ensured. Their expenditure is financed exclusively through what is called “agreed” taxes between the central and regional governments, over which the recognised powers of the regions are considerably greater than in the case of the “common” system. Table 3 details the taxes concerned using the same structure as Table 2. The only taxes currently outside of the “charter” system are import duties and payroll taxes. As can be seen in Table 3, the two regions under this system of funding have full powers over all personal and corporate income taxes and also have an extensive control of the VAT and other excise duties, but without regulatory powers, in this case due to the restrictions established by European rules governing the harmonisation of indirect taxes. The regulatory powers over personal and corporate income taxes have been widely used by the two regional governments, generally to reduce the tax burden. That is to say, in these regions, tax rates in general are lower than in the regions under the “common” system of funding resulting in a problem of asymmetric tax competition.

Table 3. Taxes assigned to the regional level under the “charter” financing system

TAX	SHARING OF COLLECTION	ADMINISTRATION BY REGIONAL GOVERNMENT	REGULATION BY REGIONAL GOVERNMENT	CLASSIFICATION
Personal Income Tax	100%	YES	Complete	Own tax
Tax on Net Wealth	100%	YES	Complete	Own tax
Inheritance and Gift Tax	100%	YES	Complete	Own tax
Corporate Income Tax	100%	YES	Complete	Own tax
Non-Resident Tax	100%	YES	Complete (for permanent establishments)	Own tax
Capital Transfer Tax, Tax on the Raising of Capital, and Stamp Duties	100%	YES	Complete (with some exceptions)	Own tax
Gaming Tax	100%	YES	Complete (with some exceptions)	Own tax
Vehicles excise (at registration)	100%	YES	Tax rates, declaration and payment form and periods	Own tax
Hydrocarbons Retail Sale Tax	100%	YES	Tax rates, declaration and payment form and periods	Own tax
Value Added Tax (VAT)	100%	YES	Tax declaration and payment form and periods	Tax sharing
Alcoholic beverages, tobacco and petrol excise duties	100%	YES	Tax declaration and payment form and periods	Tax sharing
Electricity Tax	100%	YES	Tax declaration and payment form and periods	Tax sharing
Carbon Tax	100%	YES	Tax declaration and payment form and periods	Tax sharing
Tax on Insurance Premiums	100%	YES	Tax declaration and payment form and periods	Tax sharing

Source: López-Laborda and Monasterio (2007).

Thanks to their favourable system of funding and high levels of income, see Table 1, the Basque Country and Navarre do not require additional grants to finance their expenditures. In fact, these two regional governments, due to their full powers over most of the taxes, have to negotiate with the central government a single payment

transfer as a contribution of the cost of providing federal services. Therefore, the degree of fiscal autonomy provided by the “charter” financing system is quite unique in the international experience and even greater than that existing in the world’s most fiscally decentralised countries such as the United States, Switzerland or Canada.

3. REVENUE AUTONOMY OF THE SPANISH REGIONAL GOVERNMENTS: INDICATORS

Considering the characteristics of the process of fiscal decentralisation experienced in Spain in the last 25 years described in the previous section, we propose a set of revenue autonomy indicators for the Spanish regional governments, on the basis of accrual revenue of such governments and according to the economic classification of Spanish public accounts. The economic classification of Spanish public accounts establishes seven different types of government non-financial revenue: direct taxes (section 1), indirect taxes (section 2), administrative fees, user charges and other revenue (section 3), running expense grants (section 4), income from business operations and property (section 5), divestment of property investments (section 6) and capital grants (section 7). The proposed indicators are the following:

1. Low revenue autonomy indicator (LOW): revenues which the regional tier receives, at least, under the formula of participation (that is to say, grants are excluded) as a proportion of total recognised non-financial revenues. In the Spanish case, such revenues correspond to sections 1, 2, 3, 5 and 6. Thus, in order to construct this indicator, for all the regions, the totality of the revenues listed in those five sections must be considered from the beginning of the process of fiscal decentralisation.
2. Medium revenue autonomy indicator (MED): revenues over which the regional tier enjoys, at least, the power to determine the sum or level of such revenues⁸, as a proportion of total regional non-financial revenues. Currently, in the case of Spanish regional governments, these revenues correspond to sections 3, 5 and 6 and part of sections 1 and 2. Nevertheless, should be

⁸ In the case of taxes and following from among many authors Bird (1993), the power to determine, at least, the tax rate.

taken into account that it was not until 1997 that regional governments under the “common” financing system acquired regulatory authority over direct transferred taxes (these were the Personal Income Tax, Tax on Net Wealth and Inheritance and Gift Tax) and some indirect transferred taxes (these were, mainly, the Capital Transfer Tax and Stamp Duties). However, Navarre and the Basque Country, which are under the “charter” system of funding, have possessed wide-ranging regulatory authority over the above-mentioned direct and indirect taxes since the beginning of the process of fiscal decentralisation. Thus, for the construction of this indicator, as far as the regions under the “common” financing system are concerned, sections 3, 5 and 6 must be included since the beginning of such process and, from 1997 onwards, so must all of section 1 and the Capital Transfer Tax and Stamp Duties of section 2. While for Navarre and the Basque Country, this same inclusion, referring to sections 1 and 2, must be performed from the beginning, together with sections 3, 5 and 6.

3. Full revenue autonomy indicator (FULL): revenues over which the regional governments may exercise their powers without restrictions, as a proportion of total regional non-financial revenues. Such revenues, in the case of Spanish regional governments, correspond to sections 3, 5 and 6.

These indicators will be our variables of interest in the analysis we shall subsequently perform of the possible existence of a relationship between the process of fiscal decentralisation and economic growth in the Spanish regions. They clearly reflect the different degree of control which regional governments exert over their ‘own-source’ and tax-shared revenue and, consequently, the basis of the majority of the theoretical arguments which refer to the advantages produced by a process of fiscal decentralisation, according to Rodden (2004). Table 4 summarizes how the proposed indicators are constructed.

Table 4. Revenue autonomy of the Spanish regional governments: indicators

	<i>REVENUE AUTONOMY</i>		
	<i>LOW</i>	<i>MEDIUM</i>	<i>FULL</i>
<i>DESCRIPTION</i>	LOW: Revenues of the regions in sections 1, 2, 3, 5 and 6 as a proportion of total regional non-financial revenues, in accordance with the economic classification.	MED: Revenues of the regions in sections 3, 5 and 6 and in sections 1 and 2 (only Capital Transfer Tax and Stamp Duties), from 1997 onwards, for regions with the “common” system of financing and for the complete period for those under the “charter” system, as a proportion of total regional non-financial revenues, in accordance with the economic classification.	FULL: Revenues of the regions in sections 3, 5 and 6, as a proportion of total regional non-financial revenues, in accordance with the economic classification.

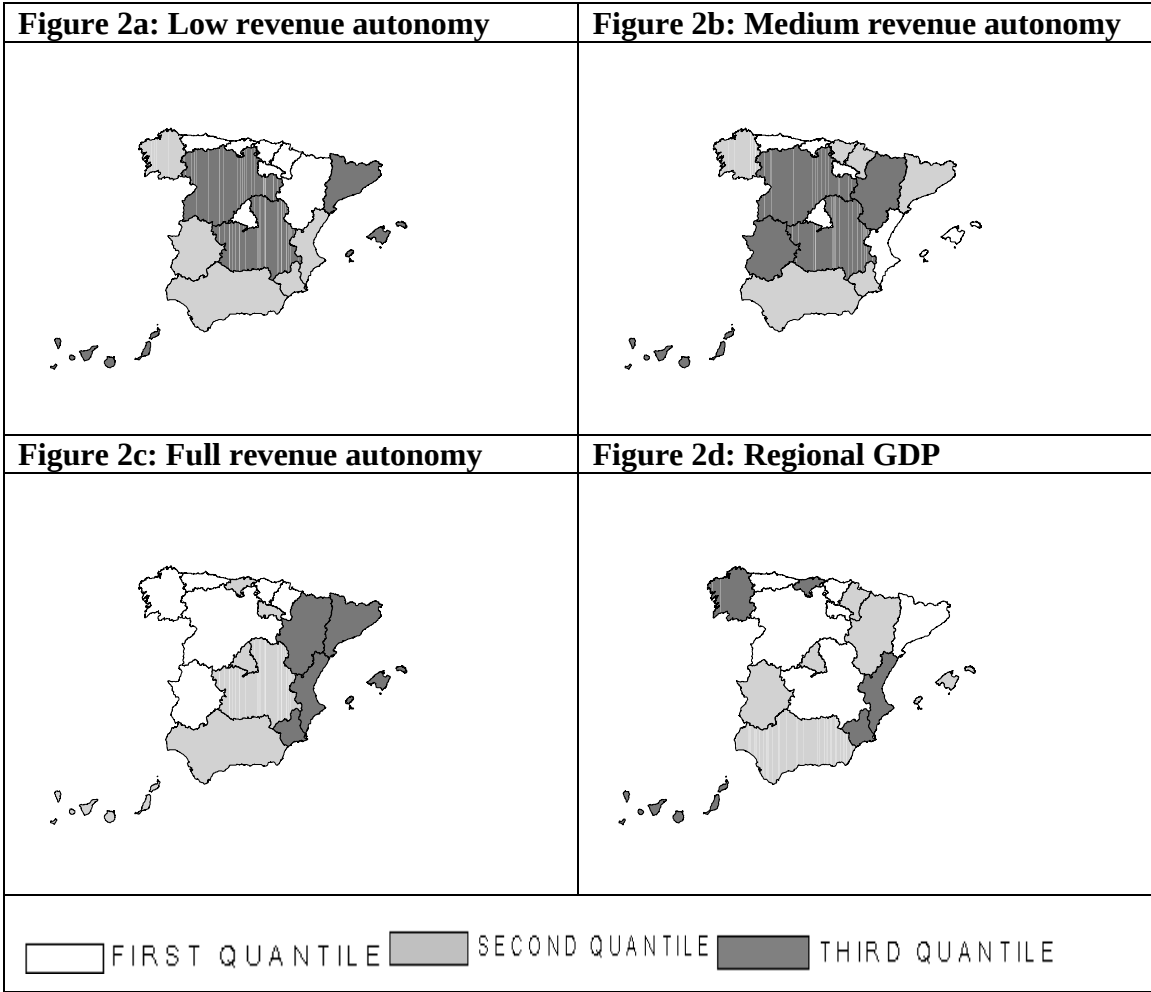
4. EMPIRICAL ANALYSIS: REVENUE AUTONOMY AND REGIONAL GROWTH IN SPAIN

In this section we will examine if there has been any relationship between fiscal decentralisation and economic growth in the Spanish regions during the last 25 years (1984-2008). To do this we will use the three different indicators of revenue autonomy presented in section 3, which overcome the problems associated with the measurement of fiscal decentralisation existing in some of the previous literature. Also, we will use a VAR approach, since we consider that the usual procedure of estimating a traditional growth equation where fiscal decentralisation is included in an ad-hoc manner might present severe problems regarding the correct specification of the equation and the possible existence of endogeneity. In addition, the sampling information is appropriate for a VAR analysis since presents a relatively low number of cross-section observations in relation to a relatively high number of time observations.

The indicators of revenue autonomy are constructed on the basis of the information provided by the Subcentral Funding Statistics of the Spanish Treasury. The rate of economic growth of the Spanish regions is constructed using the regional GDP, at constant 2001 prices, provided by the Regional Accounts of the Spanish Statistics Office which are in accordance with the methodology established in the European

System of National and Regional Accounts (ESA-1995). It is clear from Table 1 and Figure 1 that the sampling units of the analysis, the Spanish regions, are very different both in size and shape. Regarding the possible existence of spatial dependence among the units of analysis we shall perform a preliminary visual analysis in addition to the subsequent statistical analysis. This visual analysis is carried out in Figure 2, where Figures 2a to 2c present the variation of each of the three revenue autonomy indicators between years 1984 and 2008 and Figure 2d presents the variation of regional GDP for the same period. The median variation is in the second quantile and low and high variations correspond to the first and the third quantile respectively. The main result of this preliminary analysis is the possible existence of a spatial pattern.

Figure 2. Variation of revenue autonomy indicators and regional GDP (1984-2008). Quantiles distribution



According to section 3, revenue autonomy indicators are constructed as a proportion of total non-financial revenues of the region in a 0-100 scale. These are

binomial, $B(n, p)$, variables with parameters $n=100$ and p equal to the level of revenue autonomy. However, the variation of regional GDP is unrestricted. This imbalance might affect the analysis of the relationship between the two variables. In order to avoid potential problems resulting from this situation, we use the following logistic transformation for the three revenue autonomy indicators:

$$x^* = \frac{\ln[x / (100 - x)]}{\sqrt{x(100 - x)}} \quad (1)$$

where x refers to the indicator and x^* is the transformed one. This is a monotonous transformation which preserves all the existing information regarding the original indicator and which helps to solve the imbalance between the two variables.

Table 5 shows the results of a series of unit root tests with regard to the first differences of the variables, the three indicators of revenue autonomy and the regional GDP, that all of them seem to be stationary⁹. The LLC, t_α , W_{tbar} , P_{MW} and Z_μ statistics belong to the so-called ‘*first generation*’ panel unit root test in the sense that they assume independence among the individuals. If the hypothesis of independence is not fulfilled, this type of tests may be very unstable, O’Connel (1998). The ‘*second generation*’ tests, like the CADF, Z^c , and the S_N tests are robust to cross-sectional dependence. In general, all these tests are quite different in construction, foundation and scope. Among them the null hypothesis is different, LLC and t_α statistics test for a unit root process common to all individuals in the sample, on the contrary, Hadri’s Z_μ statistic tests for stationarity in the whole sample, the other tests allow for individual unit root processes.

⁹ The variables in levels are non-stationary, we do not include these results for the sake of brevity.

Table 5. Unit root tests

INTEGRATION TEST	Δ GDP	Δ LOW*	Δ MED*	Δ FULL*
LLC Null: Common unit root process	0.1034 (0.5412)	0.7993 (0.2120)	-7.1227 (0.0023)	-5.6758 (0.0000)
t_α Null: Common unit root process	-5.0640 (0.0000)	-5.4088 (0.0000)	-6.2378 (0.0002)	-3.1594 (0.0008)
W_{tbar} Null: Individual unit root process	-3.7837 (0.0001)	-9.8702 (0.0000)	-10.4700 (0.0000)	-10.610 (0.0000)
P_{MW} Null: Individual unit root process	64.4848 (0.0012)	158.384 (0.0000)	169.557 (0.0000)	172.251 (0.0000)
Z_μ Null: Common no unit root process	0.1338 (0.4468)	2.95874 (0.0015)	0.8109 (0.2087)	5.0572 (0.0000)
CADF (robust to cross-dependence) Null: Individual unit root process	3.4467 (0.0000)	-3.3033 (0.0000)	-3.5641 (0.0000)	-3.8894 (0.0000)
Z^c (robust to cross-dependence) Null: Individual unit root process	1.5502 (0.0755)	5.5513 (0.0000)	4.0578 (0.0000)	3.4062 (0.0000)
S_N (robust to cross-dependence) Null: Individual unit root process	-7.3356 (0.0000)	-14.8717 (0.0000)	-15.0338 (0.0000)	-15.3339 (0.0000)

Notes: LLC: Levin, Lin and Chu (2002) statistic; t_α : Breitung and Meyer (1994) statistic; W_{tbar} : Im, Pesaran and Shin (2003) statistic; P_{MW} : Maddala and Wu's (1999) statistic; Z_μ : Hadri's (2000) statistic; CADF: Pesaran (2003) CADF statistic; Z^c : Bai and Ng (2004) factor common statistic; S_N : Chang (2002) test. In all the cases, the assumed data generating process contains a constant; p-value in parenthesis.

The results of the tests are not uniform. They present minor contradictions that maybe caused by the heterogeneity of the tests considered and intrinsic limitations to the sampling information. Nevertheless, the results clearly point to the assumption that the annual variation of the indicators of revenue autonomy (Δ LOW*, Δ MED* and Δ FULL*) and the annual growth of GDP (Δ GDP) are stationary.

Furthermore, Table 5 shows no differences between 'first' and 'second generation' tests results, a clear symptom of the weakness of the existing spatial effects in the sample. In addition, we have performed the Moran's I test of spatial dependence, see Cliff and Ord (1981), for the variation of the three indicators of revenue autonomy

and regional GDP growth. The results of this test for a set of representative years of the time period covered are presented in Table 6 and point out that cross-sectional dependence is not significant in spite of the appearance of the maps in Figure 2, where spatial regularities seem to emerge. This contradiction between the visual and the statistical analysis is probably due to the small number of cross-sectional observations in addition to the fact that regional data result from considerable aggregation which produces similar final data.

Table 6. Spatial dependence measures (Moran's I)

YEAR	Δ GDP	Δ LOW*	Δ MED*	Δ FULL*
1985	0.1827 (0.1565)	0.0226 (0.2820)	0.0575 (0.1510)	0.0396 (0.2000)
1990	-0.0632 (0.4898)	-0.0082 (0.6420)	-0.0660 (0.4780)	0.0392 (0.2000)
1995	-0.0775 (0.4840)	-0.1245 (0.3040)	0.0147 (0.3220)	0.0399 (0.2001)
2000	-0.1508 (0.2570)	-0.0558 (0.4980)	-0.1009 (0.3070)	-0.0108 (0.6560)
2005	0.1763 (0.1366)	0.0700 (0.0820)	-0.1462 (0.2220)	-0.1226 (0.3160)
2008	-0.0088 (0.5402)	-0.2310 (0.1120)	-0.1093 (0.2420)	0.0833 (0.1490)

Notes: A first order row-standardized contiguity matrix has been used; randomized p-value after 999 bootstraps in parenthesis.

Table 7 shows the results of the tests of homogeneity of the means performed to determine the possible existence of a panel structure in the data. We can see that, in spite of the apparent heterogeneity of the spatial units, as shown in Table 1, the impact of the individual unobserved effects on the final data is not significant¹⁰. This absence of a panel structure in the data might be again a result of the considerable level of aggregation existing in regional data.

¹⁰ Wilks' lambda tests for differences between the means of groups of individuals on a variable. It takes values between 0 and 1, values close to zero indicate that the means are very different and the opposite in the case of values near to one.

Table 7. Impact of the individual effects: tests of homogeneity of the means

	Δ GDP	Δ LOW*	Δ MED*	Δ FULL*
TSS	3061.17	1122.16	2004.11	2183.17
BSS	132.66	25.26	32.03	38.55
WSS	2928.51	1096.90	1972.08	2144.62
LR	8.1763 (0.9434)	4.0344 (0.9988)	2.8551 (0.9999)	3.1571 (0.9998)
Wilks' lambda	0.9617 (0.4867)	0.9999 (0.9988)	0.9939 (0.9999)	0.9823 (0.9715)

Notes: TSS: Total Sum of Squares; BSS: Between Sum of Squares; WSS: Within Sum of Squares. LR: LR statistic; p-value in parenthesis.

The situation of stationarity, no correlation and homogeneity among the individuals allows us to specify formal Granger causality tests in the usual way. The results of this test are presented in Table 8. As we can see, there is a bidirectional causality relationship between low revenue autonomy and regional GDP growth and a unidirectional causality between the other two indicators of revenue autonomy and regional GDP growth. That is, medium and full revenue autonomy have an effect on the growth of the regional economy but it cannot be rejected the opposite null hypothesis that regional growth does not cause medium and full revenue autonomy.

Table 8. Granger causality test

HYPOTHESIS OF CAUSALITY	F STATISTIC	P-VALUE
Δ LOW* does not Granger cause Δ GDP	4.1128	0.0426
Δ GDP does not Granger cause Δ LOW*	6.2279	0.0126
Δ MED* does not Granger cause Δ GDP	21.0031	0.0000
Δ GDP does not Granger cause Δ MED*	1.7508	0.4167
Δ FULL* does not Granger cause Δ GDP	12.2934	0.0021
Δ GDP does not Granger cause Δ FULL*	0.3726	0.8300

The causality tests result from the estimated VAR equations shown in Table 9. The lag length criteria selects a VAR (1) model in the case of low revenue autonomy and a VAR (2) model in the case of the other two indicators. A simple deterministic structure made of a constant term and a linear trend, common to all regions, has been considered in all the models together with a set of dummy variables. The latter have been included to moderate the impact of a series of outliers present in the data. There are not problems of heteroskedasticity nor of serial correlation in the estimated models

and the adjustment is reasonably good. In addition, Figure 3 shows the impulse-response functions of the estimated VAR models, following the Pesaran and Shin (1998) approach. As can be seen, the impact of changes of revenue autonomy on regional growth is small but still present four years after the consideration of a shock in the indicator (Figure 3b). With regard to the response of revenue autonomy to a shock in regional GDP, this is more elastic and maintains activity even six years after the impulse (Figure 3d). In the latter case, the impacts are positive and the time sequence is depressing in general terms, although with different profiles according to the indicator. In the case of the LOW and FULL indicators exists a time lag of 2 years between the regional GDP shock and the point of maximum incidence, while in the case of the MED indicator that time lag is only of 1 year¹¹.

Table 9. Estimated VAR models

	Δ GDP	Δ LOW*		Δ GDP	Δ MED*		Δ GDP	Δ FULL*
Δ GDP(-1)	0.3965	3.2184	Δ GDP(-1)	0.4031	2.2006	Δ GDP(-1)	0.4121	3.0957
t-ratio	(12.439)	(2.496)	t-ratio	(11.433)	(0.911)	t-ratio	(11.377)	(1.070)
			Δ GDP(-2)	-0.0092	0.7152	Δ GDP(-2)	-0.0041	-0.0017
			t-ratio	(-0.276)	(0.312)	t-ratio	(-0.120)	(-0.001)
Δ LOW*(-1)	-0.0001	-0.0452	Δ MED*(-1)	0.0008	0.0285	Δ FULL*(-1)	-0.0001	-0.0677
t-ratio	(-2.028)	(-2.427)	t-ratio	(1.706)	(0.915)	t-ratio	(-1.315)	(-1.830)
			Δ MED*(-2)	0.0016	-0.0169	Δ FULL*(-2)	0.0014	-0.0296
			t-ratio	(4.674)	(0.726)	t-ratio	(2.797)	(-1.023)
constant	0.0241	-0.3187	constant	-0.0853	-45.25	constant	0.0219	-0.2782
t-ratio	(11.349)	(-3.701)	t-ratio	(-0.346)	(-2.685)	t-ratio	(9.147)	(-1.449)
time trend	-0.0003	0.0142	time trend	0.0001	0.0225	time trend	0.0002	-0.0299
t-ratio	(-0.221)	(2.918)	t-ratio	(0.436)	(2.676)	t-ratio	(0.211)	(-2.787)
$\hat{\sigma}$	0.0153	0.6169	$\hat{\sigma}$	0.0147	1.0101	$\hat{\sigma}$	0.0153	1.2277
R ²	0.6211	0.5628	R ²	0.6291	0.6324	R ²	0.5973	0.4737
LM (p=2)	8.756		LM (p=3)	4.7526		LM (p=3)	8.8755	
pvalue	(0.067)		pvalue	(0.3136)		pvalue	(0.064)	
White	36.212		White	54.604		White	48.232	
pvalue	(0.111)		pvalue	(0.131)		pvalue	(0.306)	

Notes: LM: Lagrange Multiplier test for residual serial correlation up to the specified order (Johansen, 1995); White: White test of no heteroskedasticity (Davidson, 2000).

These results point out that revenue autonomy may have had a slightly positive effect on regional growth throughout the 25 years of fiscal decentralisation in Spain. As can be seen in Table 9, medium and full revenue autonomy indicators, which refer to

¹¹It should be taken into account that when analyzing the impulse-response functions of the estimated VAR models the significance of the relationship between the variables is not considered.

those revenue sources over which regional governments exert regulatory powers, present significant and positive coefficients with regard to their effect on regional GDP, particularly after two periods. On the contrary, the low revenue autonomy indicator which refer to all revenue sources that regional governments have, with the exception of grants from the central government, presents a very low, significant and negative coefficient. Since the latter indicator collects, at the same time, revenue sources over which regional governments have, and do not have, regulatory powers is not possible to conclude a clear statement from its coefficient with regard to the impact of revenue autonomy on regional growth. On the other hand, the low revenue autonomy indicator is clearly and positively determined by the rate of regional growth. This result shows that regional economic growth stimulates the relative volume of decentralised regional revenue sources, fact that can be explained because regional economic activity makes these sources growing faster than grants coming from the central government. In addition, from table 8 and 9 can be concluded that the effect of regional economic growth on the medium and high revenue autonomy indicators is not relevant indicating that the evolution of revenue sources over which regional governments have regulatory powers is mainly determined by political decisions.

Finally, two additional comments have to be made with regard to these results. First, the estimated coefficients for the effect of revenue autonomy on regional economic growth are so low probably due to the fact that regional governments have not made an extensive use of their regulatory powers so far. Spanish regional governments have not had a clear willingness to use their discretion over their revenue sources and on doing so to turn revenue sharing into own taxes. In fact, they have opted to a greater extent to bargain with the central government for a higher sharing level of the ceded taxes than to change the tax rates when additional revenue needs have emerged. This behaviour has affected regional government efficiency, transparency and accountability. Consequently, only if there are appropriate incentives for an accountable fiscal behaviour of Spanish regional governments, an effective progress in the level of their revenue autonomy, that is less grants and tax sharing and more regulatory powers and own taxes, will clearly have the expected effects according to the theory. Second, we should take into account that along the period analysed, 1984-2008, the Spanish economy experienced high growth rates and a process of increasing fiscal effort directed to converge with other developed countries, which allowed an increasing provision of

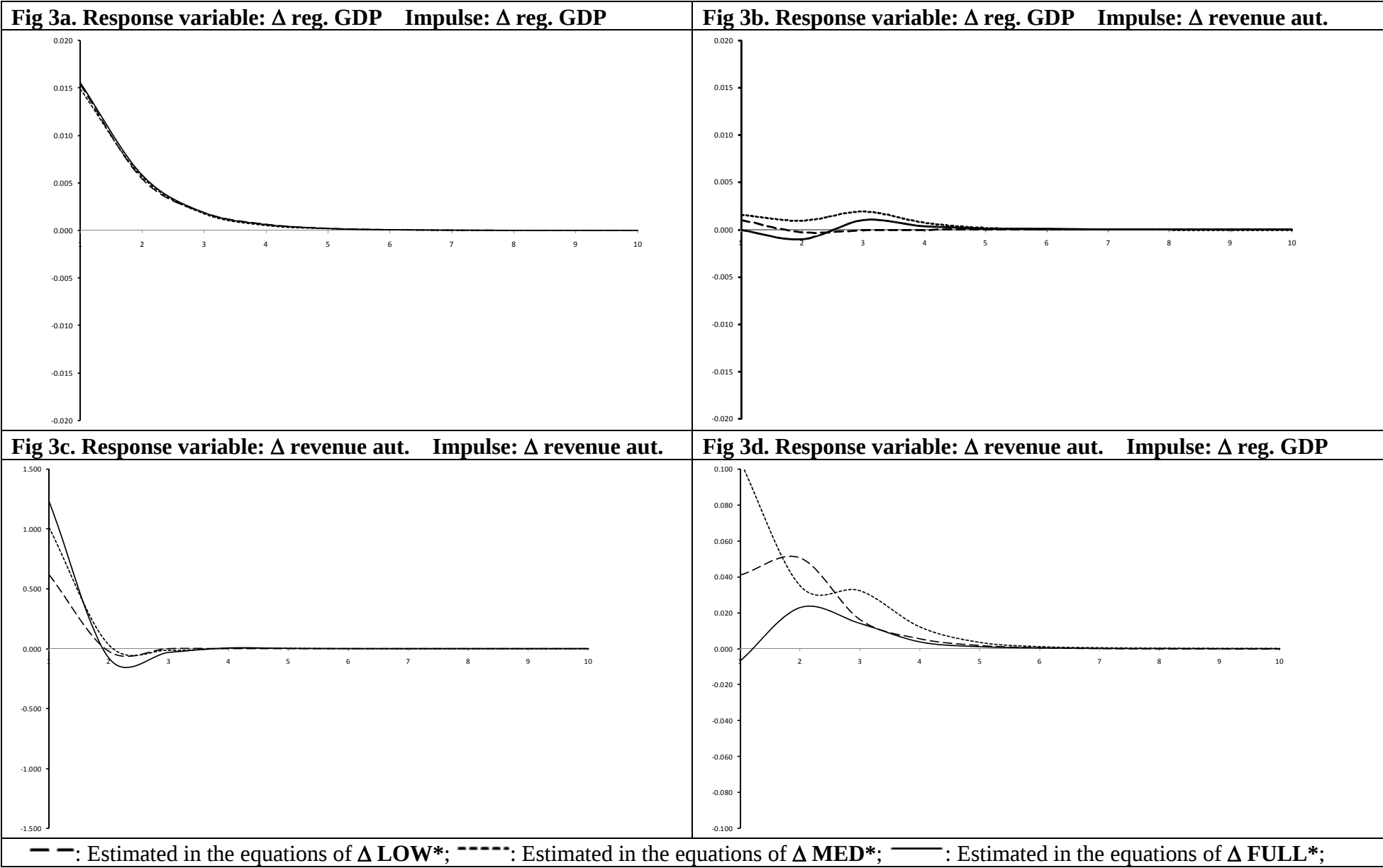
public goods and services to the population and the development of the different levels of Spanish government. The extension to which this expansion scenario conditions the results obtained in this paper will be determined once data for following years under a situation of economic crisis will be available.

5. CONCLUSIONS

In this paper we have analysed the relationship between revenue autonomy of Spanish regional governments and regional growth along the process of fiscal decentralisation experienced in Spain from 1984 to 2008. This analysis is part of a broader line of research which studies the relationship between fiscal decentralisation and economic growth and which has not been conclusive about the existence and the sign of the relationship so far. A group of three indicators of revenue autonomy for the specific case of fiscal decentralisation in Spain has been proposed in order to overcome possible measurement problems existing in previous analyses, and a VAR approach is used to estimate the relationship between the two variables. This methodology is unusual among previous papers although it seems to be more appropriate since avoids some severe problems generally associated to the most common approach of estimating a growth equation.

The results presented in the previous section show that our data are stationary, do not present spatial dependence, and are homogeneous among the individuals, and, when a Granger causality test is done, point out to a slightly positive effect of revenue autonomy of Spanish regional governments on regional growth. Also may be deduced from our analysis that progress on revenue autonomy of Spanish regional governments has not been caused by regional economic growth but mainly determined by political decisions.

Figure 3. Impulse-Response functions. Pesaran and Shin (1998) approach



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