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Interregional and interpersonal redistribution

Caterina Ferrario* and Alberto Zanardi**

April 2021

Abstract

Public expenditure and public transfers may address people (personal programmes) or places (territorial programmes), the latter often pursue the territorial redistribution of resources, especially in countries characterised by a significant economic divide, different fiscal capacities and polarised levels of economic development. This paper is conversely interested in the territorial redistributive power of *personal* public expenditure programmes, that is of public programmes that allocate resources among individuals on the basis of “socio-demographic” features, as opposed to programmes allocating resources across territories according to “territorial” features. Methodologically, this paper develops a case study to better investigate this theoretical issue: it compares the degree of interregional redistribution accomplished in Italy in 1999-2010 by a selection of expenditure programmes with the one that would arise if those expenditure programmes were driven by socio-demographic criteria only. Making use of a regression approach, first we simulate the distribution of total expenditure for each programme across regional territories if these programmes were allocated neglecting the territorial structure and territorial related criteria. Further we use regional fiscal residua to contrast interregional redistribution accomplished by the public budget in two different scenarios. The first scenario is based on actual public expenditure and receipt, while the second makes use of values of expenditure simulated under the hypothesis that only socio-demographic criteria are significant for the distribution of total expenditure across regions. Results show that overall interregional redistribution slightly declines when shifting from actual expenditure to the simulated personal distribution of expenditure, and that this result holds for most public programmes. However, results clearly disclose that even when resources were distributed according to socio-demographic criteria only, public programmes still produce a significant level of territorial redistribution in a country characterised by a stark interregional economic divide, as Italy is.

Keywords: Redistribution, Fiscal residua, Regions

JEL : classification: H23, H50, H70

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1. Introduction

The public budget may transfer resources among different areas of a country through policies and programmes specifically designed for that purpose, such as interregional equalisation schemes. In addition, resources may be redistributed across territories as a result of expenditure programmes explicitly directed to places, such as infrastructure investment programmes, whose allocation across different areas depends only on the “territorial structure” of places.

However, territorial redistribution may also be a by-product of public policies aimed at different targets, such as central government tax-financed social insurance systems, which are generally directed to individuals rather than territories or jurisdictions and redistribute among individuals on the basis of personal characteristics (age, state of health, professional status, and so forth). The territorial redistribution from these latter programmes is the result of the heterogeneous distribution across places of the individual features that inform the allocation among residents of public programmes’ costs and benefits. That is, it results from the different “socio-demographic structure” of places. For instance, in a polarised country where the population of region A consists of aged people only and the population of region B is entirely made up of young, programmes of social support for the elderly financed through payroll taxes, would result in a net transfer from region B (net financier) to region A (net recipient) and therefore positive redistribution if average per capita GDP in region A were lower than in region B (negative redistribution in the opposite case). Territorial redistribution may therefore be the by-product of policies and programs of interpersonal redistribution.

In this paper we focus on this latter kind of territorial redistribution, i.e. that stemming from expenditure programmes explicitly targeting individuals. Differences as regards the attributes of places where individual beneficiaries live are obviously neutral in this respect, as expenditure programmes are not driven by territorial features at all.

The paper aims at showing that personal programmes, that redistribute across individuals according to “socio-demographic” features, may well produce territorial redistribution, if the personal features that drive the allocation of public expenditure are negatively correlated with income. This is of particular significance for countries characterised by stark economic differences, where personal programmes, besides redistributing across individuals, may also provide a significant contribution to accomplish the territorial redistributive objectives of public policies. This theoretical aim is pursued through the analysis of a case study, focused on Italy, a country characterised by stark economic differences across territories, as well as by a polarisation of its socio-demographic structure.

The paper is organised as follows. Section 2 develops the theoretical background to our analysis. Section 3 describes the methodological approach. Section 4 illustrates the case study of Italy and the data used for the following analyses, details the methodology to

reconstruct the “personal distribution” of expenditures and the econometric model used to estimate the interregional redistributive effects. Section 5 concludes.

2. Theoretical background

Public expenditure and public transfers may address people (personal programmes) or places (territorial programmes). This classification may also be described as the existence of programmes pursuing different equity targets (Bordignon, Fontana and Peragine, 2006). In particular, territorial programmes often pursue the territorial redistribution of resources, especially in countries characterised by a significant economic divide, different fiscal capacities and polarised levels of economic development. In federal countries this articulation of public programmes is often made explicit in public transfers from the federal government to decentralised government or to individuals (e.g. Kinkaid, 2010, on the shift of federal aids “from places to persons” in the USA; Dafflon, 2014 on Switzerland). In the EU the structure of the European Social Fund (ESF) and of the European Regional Development fund (ERDF) well exemplify this dichotomy.

3. Empirical approach/methodology

The methodological approach we devise in order to measure interregional redistribution carried out by public expenditure programmes explicitly targeting individuals is structured in two steps. First we contrast the actual territorial distribution of expenditure with the distribution that would be observed if only socio-demographic criteria were used to allocate expenditure across territories. Secondly, using an econometric model, we evaluate the interregional redistributive effects of public functions, under the two scenarios for expenditure: the actual one and the “reconstructed” one, where expenditure is only driven by socio-demographic criteria. We therefore develop a methodology to “neutralise” the territorial drivers of public expenditure and reallocate total expenditure across territories *as if* expenditure were only driven by personal features. We refer to this process as to the reconstruction of the “personal distribution” of expenditure. At the end of this process, starting from actual expenditure, we end up with a distribution of expenditure across territories which only reflects the interregional distribution of the personal features of regions’ residents. As for the first part of this approach, we devise an empirical methodology structured in two steps, which uses public budget data on expenditure aggregated by functions of government and assigned to territories (e.g. regions) according to the territorial distribution of benefits. As each public function includes a multiplicity of expenditure programmes, which differ in many respects, including the drivers for the allocation of

benefits, we acknowledge that the distribution across territories of benefits may be generally conceived as reflecting both territorial and personal features. The first step of our methodology comprises the assessment, for each function, of the relative role of territorial versus personal drivers in determining the total amount of expenditure in each territory. To do so, we use an econometric model where, for each function of government, the dependent variable is public expenditure in each territory and the independent variables are a number of territorial and socio-economic drivers. As a second step, we assume that there are only differences in the distribution of socio-demographic structure, while the territorial structure is homogeneous across the country. We call this the “neutralisation” of territorial drivers on expenditure’s amount and distribution across territories, and this is done by imposing that territorial covariates are equal to their overall mean and territorial dummies are equal to zero (i.e. there are no differences across territories). After this “neutralisation”, we use our model to predict the “personal distribution” of expenditure, which therefore reflects only the interregional distribution of the socio-demographic features.

Secondly, using an econometric model, we evaluate the interregional redistributive effects of public functions. In the first place we calculate fiscal residua for each function (i.e. the difference between expenditure accruing to a territory and the amount of revenue from that same territory used to finance each function). Fiscal residua are computed both using the actual (observed) distribution of public revenue and expenditure and using the “personal distribution” of expenditure, when it is driven by socio-demographic criteria only. The first set of fiscal residua is used to estimate actual interregional redistribution. The second set conversely provides a measure of the degree of redistribution that would be produced by expenditures allocated according to personal criteria only (“personal distribution”).

The comparison of the degree of redistribution generated by the two different sets of fiscal residua allows an evaluation of the relative role of territorial and personal features in driving the territorial distribution of expenditure and as a consequence the degree of territorial redistribution. Such a comparison allows the separation of the interregional redistributive effect of the public budget due to the personal component of expenditure programmes from that due to the territorial component.

4. The case study: territorial redistribution by personal programmes in Italy

4.1. Data

We apply the above described methodology to the case of Italy, a country characterised by significant economic differences across its 20 regions, as well as by considerable interregional differences in its socio-demographic structure (table 2 in the following paragraph exemplifies these disparities, with reference to a selected number of

indicators). In Italy territorial equalisation is a significant policy issue, and therefore the interregional redistributive properties of “personal” programmes may be a significant complement to explicit redistribution by territorial equalization schemes. Therefore our analysis focuses on Italian regions as the terminus of public policies: regions are taken as the basic unit benefitting from expenditures and contributing revenues. We limit our analysis to the 15 ordinary statute Italian regions (out of the overall 20), due to the limited comparability of revenue and expenditure arrangements for the 5 special statute regions.

The empirical analysis uses data from the Italian public budget for the years 1999-2010. The data source is the Conti pubblici territoriali (Territorial Public Accounts, TPA) produced by the Italian Ministry of Economy¹. Based on general government budget, the TPA allocate on a cash basis public revenue and expenditure to the 20 Italian regions for the years 1996-2012. Fiscal flows are recorded for general government and distinctively for each level of government (central, regional, local, social security institutions). Expenditure are recorded by region, and disaggregated by economic classification and by function. Revenue are recorded by region and disaggregated by economic classification. For each level of government, revenue are allocated to the region that originated the fiscal flows, while expenditure are allocated to the region where the means of production for public services or investments are located (“expenditure principle”).

For our purposes, that is, measuring fiscal flows and reconstructing the “personal distribution” of expenditure, we introduced four adjustments to the TPA database, primarily to obtain a regional distribution of expenditure that reflects the actual benefits accruing to each Italian region. This methodology is detailed in annex 1.

We focus on the five major expenditure programmes in financial terms: general administration, social assistance and charity, education, health, social protection and income support. These functions overall account for about 83% of total public expenditure in Italy.

The distribution of per-capita public expenditure for the five selected functions across Italian regions, derived from the adjusted TPA, is depicted in table 1.

Table 1 shows that per capita overall expenditure as well as per capita expenditure for the selected functions varies significantly across Italian regions. The overall coefficient of variation of 12% is actually even higher for some functions (varying from a minimum of 11% for education to a maximum of 22% for social protection and income support). The regional distribution of expenditure for the five selected function is indeed different. In particular, table 1 shows a generally higher level of per capita expenditure in the southern regions for education and social assistance and charity, while the opposite holds for social protection and income support and for health expenditure.

¹ Ministero dell’economia e delle finanze, http://www.dps.mef.gov.it/cpt/banca_dati_home.asp, last accessed June 2014.

Table 1. Public expenditure by functions - per capita average values, 1999-2010 (constant prices, base year 2011)

	General services	Social assistance and charity	Education	Health	Social protection and income support	Total	All functions
Piemonte	460	466	876	1,671	5,849	9,323	11,193
Lombardia	387	478	845	1,749	5,327	8,785	10,220
Veneto	420	463	856	1,607	4,625	7,971	9,441
Liguria	647	619	821	1,630	6,767	10,484	12,840
Emilia Romagna	451	566	919	1,723	5,847	9,505	11,110
Toscana	477	565	1,019	1,670	5,628	9,360	11,124
Umbria	605	730	1,055	1,785	5,644	9,820	12,124
Marche	514	607	985	1,605	5,014	8,724	10,340
Lazio	384	724	1,046	1,600	6,306	10,060	12,603
Abruzzo	422	662	1,027	1,561	4,437	8,109	9,948
Molise	543	559	1,040	1,296	4,305	7,743	10,406
Campania	431	587	1,101	1,432	3,157	6,708	8,496
Puglia	314	526	980	1,496	3,690	7,006	8,446
Basilicata	499	556	1,131	1,578	3,714	7,478	10,070
Calabria	427	646	1,160	1,709	3,581	7,523	9,865
All regions (euro)	428	558	960	1,628	5,010	8,584	10,378
All regions (%)	4.1	5.4	9.2	15.7	48.3	83	100
<i>Coefficient of variation</i>	0.19	0.14	0.11	0.08	0.22	0.14	0.12

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

4.2. Estimating the “personal distribution” of public expenditure programmes

The reconstruction of the “personal distribution” of public expenditure is based on the assumption that for each one of the five expenditure functions the observed distribution may be replicated by an econometric model that includes both “territorial” and “personal” explanatory variables, as described in equation 1:

$$Y = \bar{\alpha} + \sum_{i=1}^9 \beta X_i + \sum_{j=1}^4 \gamma Z_j + \delta YD + \lambda TD + \bar{\varepsilon} \quad (1)$$

Where, for each function:

- Y is the matrix of expenditure for each region (15 rows) and year (12 columns)
- X_i are the matrices for each of the nine personal explanatory variables (age structure, state of health, unemployment levels,...) for each region (rows) and year (columns)
- Z_j are the matrices of territorial explanatory variables (per capita GDP, sector composition of the economy) for each region (rows) and year (columns)
- YD is the matrix of time dummies (years)
- TD is the matrix of territorial dummies (regions)

Table 2 reports average values for all the personal and territorial explanatory variables used in our model.² Table 2 also illustrates the marked structural and economic differences between Italian regions. These differences are to be found in a wide spectrum of regional features, ranging from surface area to population density and age composition, from average income to economic structure. This geographical dualism explains, inter alia, the particular concern for inter-regional redistribution in the Italian political and academic debate.

The estimation results for each of the five expenditure functions are reported in annex 2 (table A2). For each function the estimation procedure has gone through the iterated deletion of not significant regressors (90% significance level), so that five different models have been identified, one for each function. Further, the coefficients estimated from equation 1 ($\hat{\alpha}, \hat{\beta}, \hat{\gamma}, \hat{\delta}, \hat{\lambda}$) are then used to predict the level of expenditure that would be accomplished if there were no “territorial” differences across territories, that is, if territorial factors were neutral to the regional distribution of expenditure. In order to do so, the two matrices containing territorial regressors (Z and TD) are modified in order to “neutralise” territorial differences. This is done by assuming that all regions are equal as far as territorial factors are concerned, and that these factors in all regions assume the same value, equal to the average across all regions. Therefore, continuous “territorial” explanatory variables take the same value across regions year by year (and this value is given by their yearly mean), so that each Z_j matrix is transformed into Z_j^* (where each column contains only one, repeated, value). In addition, territorial dummies are imposed to be equal to zero for all regions and years (TD becomes TD^* , a null matrix). Equation 2 describes the new model:

$$\hat{Y}_p = \hat{\alpha} + \sum_{i=1}^9 \hat{\beta} X_i + \sum_{j=1}^4 \hat{\gamma} Z_j^* + \hat{\delta} YD + \hat{\lambda} TD^* + \hat{\varepsilon} \quad (2)$$

Table 3 reports average general government expenditure by function for each Italian region, as derived from equation 2. This table therefore shows the amount of expenditure that would be observed if there were only personal drivers, i.e. what we referred to as the “personal distribution” of expenditure. For each function table 3 shows also the difference, in percentage terms, between the reconstructed “personal distribution” of expenditure and the observed one.

² For a key to abbreviations and units of measurement, see annex 2, table A1.

Table 2. Explanatory variables for expenditure functions (average values, 1999-2010)

	Demographic structure									Territorial structure			
	POP	POPDENS	YOUNG	OLD	POVR	UN	YUN	ONED	TWOD	PRIM	SEC	TERT	GDPPC
Piemonte	4,307,247	170	13.2	21.9	6.2	6.0	17.1	37.2	19.5	1.9	30.4	67.6	25.425
Lombardia	9,331,528	391	14.4	19.0	4.3	4.1	13.3	37.4	18.1	1.4	33.8	64.8	31.102
Veneto	4,673,578	254	14.6	18.9	4.6	4.4	11.6	37.8	18.0	2.4	34.3	63.3	27.582
Liguria	1,593,463	294	11.6	26.2	6.7	6.7	18.8	40.7	21.8	1.8	19.0	79.2	24.053
Emilia R.	4,127,856	187	12.9	22.6	4.1	3.6	11.9	40.9	20.8	3.0	32.3	64.8	29.735
Toscana	3,585,888	156	12.8	22.9	5.4	5.1	15.2	39.6	20.4	2.2	27.2	70.6	25.672
Umbria	854,597	101	13.4	23.1	8.2	6.2	16.1	41.7	22.9	2.9	27.7	69.4	22.185
Marche	1,509,149	156	14.0	22.1	6.2	5.1	14.4	38.3	20.1	2.5	31.8	65.7	23.913
Lazio	5,313,289	308	14.9	18.7	8.2	8.8	28.2	37.6	20.1	1.3	15.5	83.2	27.659
Abruzzo	1,293,114	120	14.7	20.8	15.1	8.4	25.6	39.7	22.1	3.3	31.9	64.8	19.934
Molise	321,212	72	14.8	21.5	21.6	9.8	27.2	37.8	21.2	4.6	25.1	70.4	17.396
Campania	5,761,930	424	19.2	14.8	23.6	15.6	40.3	32.8	18.8	3.0	18.2	78.7	14.604
Puglia	4,052,103	209	17.3	16.8	21.6	14.0	34.2	34.2	18.8	4.9	23.8	71.3	15.372
Basilicata	595,425	60	16.1	19.2	26.2	12.6	38.6	38.9	22.5	6.0	27.1	66.9	15.767
Calabria	2,011,489	133	17.1	17.7	26.4	15.1	39.2	39.7	23.9	5.4	16.1	78.5	14.614
<i>All regions*</i>	<i>49,331,868</i>	<i>218</i>	<i>15.0</i>	<i>19.3</i>	<i>12.0</i>	<i>8.7</i>	<i>23.8</i>	<i>37.2</i>	<i>19.6</i>	<i>3.1</i>	<i>26.3</i>	<i>70.6</i>	<i>24.319</i>

* Averages for all regions for POVR, UN, YUN, ONED, TWOD are reconstructed based on ISTAT data

Source: Istat

Table 3. General government expenditure by function, personal distribution - per capita average values, 1999-2010 (euro, constant prices, base year 2011)

	General services		Social assistance and charity		Education		Health		Social protection and income support		Total	
	<i>personal distribution</i>	<i>% observed</i>	<i>personal distribution</i>	<i>% observed</i>	<i>personal distribution</i>	<i>% observed</i>	<i>personal distribution</i>	<i>% observed</i>	<i>personal distribution</i>	<i>% observed</i>	<i>personal distribution</i>	<i>% observed</i>
Piemonte	376	82	355	76	1219	139	1554	93	5785	99	9288	100
Lombardia	378	98	546	114	1202	142	1670	95	5322	100	9117	104
Veneto	431	103	567	123	947	111	1584	99	5192	112	8721	109
Liguria	571	88	1177	190	237	29	2282	140	6662	98	10930	104
Emilia Romagna	398	88	452	80	1118	122	1670	97	5919	101	9557	101
Toscana	395	83	404	71	1147	112	1616	97	5997	107	9558	102
Umbria	443	73	493	67	896	85	1635	92	6072	108	9539	97
Marche	458	89	601	99	792	80	1668	104	5782	115	9300	107
Lazio	450	117	691	95	840	80	1669	104	5065	80	8716	87
Abruzzo	439	104	472	71	901	88	1530	98	4681	105	8022	99
Molise	439	81	396	71	925	89	1494	115	4655	108	7910	102
Campania	518	120	880	150	469	43	1739	121	3317	105	6922	103
Puglia	426	136	357	68	1031	105	1373	92	3692	100	6879	98
Basilicata	420	84	279	50	1030	91	1316	83	3735	101	6781	91
Calabria	429	100	326	51	982	85	1342	79	3546	99	6625	88
<i>All regions</i>	428	100	558	100	960	100	1628	100	5010	100	8584	100

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

4.3. Evaluation of the interregional redistributive effects

We generate two sets of fiscal residua for each of the selected functions of government and for them all. The first set makes use of observed expenditure and the second uses the “personal distribution” of expenditure.

Therefore, for each function and for each year t and region i , fiscal residua are given by:

$$R_{it} = G_{it} - T_{it}$$

Table 4 displays the two sets of fiscal residua and reports the difference in percentage terms between them, for each selected function and for them all.

The distribution of observed fiscal residua across regions gives a preliminary picture of the main patterns characterising inter-regional fiscal flows in Italy for each function. First, there is substantial redistribution from the wealthier to the poorer jurisdictions (i.e. those with per capita GDP above or below the national average), the former generally in the North of the country, the latter in the South. In fact, with very few exceptions, both observed and “personal distribution” fiscal residua are positive in the South and negative in the Northern regions. Moreover, the size of the residua is to some extent negatively correlated with regions’ surface area: they are generally higher in smaller regions (Liguria, Umbria, Marche, Molise, Basilicata).

4.4. Results

Table 5 reports the degree of regional redistribution accomplished by observed fiscal residua and by fiscal residua obtained using the “personal distribution” of expenditure. For each of the selected functions of government, and for them altogether, both measures of fiscal residua generate a redistributive impact, that is they generate a positive flow of resources from the richer (Northern) regions to the poorer (Southern) ones. This was anticipated by data reported in table 4, where positive residua in the South suggested that these territories are net beneficiaries of public programmes.

However, there are differences between the degree of redistribution generated by observed fiscal residua and the one due to the reconstructed “personal distribution” of fiscal residua. In explaining these differences, obviously revenue are “neutral” (they are unaltered in the two alternative scenarios: they are unchanged when we calculated either “observed” fiscal residua or “personal distribution” fiscal residua). Therefore the observed differences in the degree of redistribution accomplished by observed and “personal distribution” fiscal residua are exclusively due to the changes made to the distribution of expenditure across regions.

Table 4. G-T for expenditure functions (per capita average values 1999-2010, euro 2011)

	General services			Social assistance and charity			Education			Health			Social protection and income support			All functions		
	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]	obs. [1]	pers. distr. [2]	diff. [(2-1)/1]
	euro	euro	%	euro	Euro	%	euro	euro	%	euro	euro	%	euro	euro	%	euro	euro	%
Piemonte	-30.2	-114.0	-277	-172.1	-283.1	-65	-222.6	120.1	154	-189.5	-307.3	-62	461.0	396.7	-14	-153.3	-187.7	-22
Lombardia	-202.3	-211.9	-5	-290.8	-222.4	24	-476.8	-119.4	75	-493.0	-572.5	-16	-1196.1	-1201.4	0	-2659.1	-2327.6	12
Veneto	-45.8	-34.8	24	-144.5	-40.3	72	-188.0	-97.1	48	-163.3	-186.5	-14	-877.2	-310.4	65	-1418.9	-669.0	53
Liguria	141.3	64.9	-54	-39.8	518.2	1401	-312.7	-896.3	-187	-292.6	360.2	223	1840.2	1734.8	-6	1336.4	1781.8	33
Emilia R.	-104.3	-157.3	-51	-157.3	-270.7	-72	-325.5	-126.9	61	-384.1	-437.8	-14	-255.6	-182.9	28	-1226.9	-1175.5	4
Toscana	-10.6	-92.7	-779	-68.7	-230.0	-235	-73.5	53.9	173	-179.6	-234.0	-30	458.7	827.2	80	126.2	324.4	157
Umbria	162.6	1.2	-99	155.3	-82.4	-153	65.0	-94.4	-245	107.9	-42.5	-139	1069.7	1497.2	40	1560.5	1279.2	-18
Marche	95.9	39.9	-58	64.3	58.4	-9	48.8	-144.0	-395	23.6	86.6	268	259.0	1026.2	296	491.5	1067.1	117
Lazio	-192.4	-126.2	34	-24.7	-57.5	-133	-244.5	-451.0	-84	-584.7	-515.2	12	200.6	-1040.1	-619	-845.7	-2190.0	-159
Abruzzo	62.9	80.2	28	193.7	3.5	-98	223.0	97.3	-56	195.6	163.9	-16	422.0	665.9	58	1097.2	1010.8	-8
Molise	222.2	118.7	-47	141.3	-21.3	-115	322.5	207.8	-36	77.4	274.6	255	860.7	1211.2	41	1624.0	1791.1	10
Campania	149.5	236.8	58	219.4	512.9	134	471.3	-161.5	-134	360.5	667.4	85	106.7	266.0	149	1307.4	1521.6	16
Puglia	33.3	145.3	336	159.6	-9.8	-106	350.5	401.5	15	425.8	302.9	-29	574.4	576.4	0	1543.6	1416.3	-8
Basilicata	213.2	134.9	-37	183.3	-93.6	-151	491.0	390.7	-20	490.9	228.8	-53	461.8	482.9	5	1840.2	1143.7	-38
Calabria	161.7	163.6	1	299.4	-20.2	-107	565.3	387.8	-31	697.4	330.1	-53	813.2	777.4	-4	2536.9	1638.8	-35
<i>All regions</i>	<i>-32.4</i>	<i>-32.4</i>	<i>0.0</i>	<i>-42.1</i>	<i>-42.1</i>	<i>0.0</i>	<i>-72.7</i>	<i>-72.7</i>	<i>0.0</i>	<i>-123.1</i>	<i>-123.1</i>	<i>0.0</i>	<i>-34.8</i>	<i>-34.8</i>	<i>0.0</i>	<i>-305.1</i>	<i>-305.1</i>	<i>0.0</i>

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

Table 5. Redistribution through fiscal residuals (percentages, 1999-2010)

		General services	Social assistance and charity	Education	Health	Social protection and income support	Total selected functions
<i>N. observations</i>		180	180	180	180	180	180
<i>Observed</i>	R ²	0.9987	0.9983	0.9968	0.9991	0.9776	-
	Redistribution	1.83	2.63	5.49	5.62	6.11	21.68
<i>Personal distribution</i>	R ²	0.9999	0.9988	0.9979	0.9992	0.9735	-
	Redistribution	2.11	1.59	2.95	5.17	7.14	18.96
<i>% difference</i>	Redistribution	15%	-40%	-46%	-8%	17%	-13%
<i>Observed - expenditure only</i>	R ²						-
	Redistribution	1.53	2.13	4.28	5.00	1.81	14.74
<i>Pers. distrib. – expenditure only</i>	R ²	0.9999	0.9988	0.9979	0.9992	0.9735	-
	Redistribution	1.79	1.20	2.12	4.58	3.05	12.75
<i>% difference</i>	Redistribution	17%	-44%	-50%	-8%	69%	-14%
<i>Pers. distrib. expenditure only/ Pers. distrib. fiscal residua</i>	Redistribution	85%	76%	72%	89%	43%	67%

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

In addition, when the behaviour of each of the five functions is analysed separately, two different patterns emerge as regards the changes from the observed to the “personal distribution” scenario. For three functions, Health, Social assistance, Education, as well as for the total selected functions, results show that the “personal distribution” of expenditure generates a lower degree of interregional redistribution than observed expenditure. Therefore, in a country characterised by a polarised distribution of socio-demographic features, we may conclude that these features alone generate a significant degree of redistribution, but not as much as is achieved when the territorial distribution of programmes’ expenditures is also driven by territorial features.

It is rather significant, though, the result obtained for the remaining two functions of government: General services and Social protection. For these functions the “personal distribution” of expenditures generates a higher degree of interregional redistribution than the observed one.

Our analysis therefore shows that there are two patterns when we move from observed to “personal distribution” fiscal residua. In pattern 1, the latter are less redistributive

than the former, and this is the case for Health, Social assistance and Education, as well as for the total selected functions. The opposite holds for pattern 2, detected for General services and Social protection. Going back to table 3 we may see that for pattern 1 functions, in southern regions the “personal distribution” of expenditure is lower than observed expenditure. Conversely, in southern regions the “personal distribution” of expenditure is higher than the observed one for pattern 2 functions.

This result seemingly suggests that for some functions (pattern 1), the omitted territorial drivers for the allocation of public expenditure have a significant redistributive role, as they increase the concentration of expenditure in the southern (poorer) regions. In contrast, for pattern 2 functions, the omitted territorial drivers do not play a significant redistributive role.

Given these results we may only try to infer the causes beneath such different patterns. We may first observe that for two functions in pattern 1 group, namely Health and Education, citizenships rights should play a significant role in the distribution of expenditure across regions. Therefore, if the omitted territorial factors generate higher levels of expenditure in southern regions, this may be due to higher inefficiencies in Southern regions, where guaranteeing the same citizenship rights as in the north becomes “more expensive”. Further, for some functions in pattern 1 group, the higher observed redistribution (due to the inclusion of territorial drivers) may be also explained if we assume that these programmes embed some implicit retributive mechanisms (for instance, income support for southern regions, as the one produced by a higher concentration of assistant teachers in southern regions) which yield a higher concentration of expenditure in poorer regions.

If these intuitions are sound, we may then conclude that these mechanisms are apparently less operating for pattern 2 functions.

5. Final remarks

Public expenditure and public transfers may address people (personal programmes) or places (territorial programmes), the latter often pursue the territorial redistribution of resources, especially in countries characterised by a significant economic divide, different fiscal capacities and polarised levels of economic development. This paper, through a case study of Italy 1999-2010, investigated the territorial redistributive power of personal public expenditure programmes, that is of public programmes that allocate resources among individuals on the basis of “socio-demographic” features, as opposed to programmes allocating resources across territories according to “territorial” features. For this purpose, we compared the observed interregional redistribution by a selection of expenditure programmes with the one that would arise if those expenditure programmes were driven by socio-demographic criteria only. Results show that overall

interregional redistribution slightly declines when shifting from actual expenditure to the simulated personal distribution of expenditure, and that this result holds for most public programmes. However, results clearly disclose that even when resources are distributed according to socio-demographic criteria only, public programmes still produce a significant level of territorial redistribution (let aside personal redistribution) in a country characterised by a stark interregional economic divide, as Italy is.

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Annex 1. Database construction

For the purpose of measuring fiscal flows and reconstructing the “personal distribution” of expenditure, we introduced four adjustments to the database taken from the Conti Pubblici Territoriali (Territorial Public Accounts, TPA) produced by the Italian Ministry of the economy.

First, we netted out interest spending and government deficit. The former is not consistent with our focus on territorial versus personal expenditures, so we simply considered total expenditure net of interests. The latter has an intertemporal nature which again is not consistent with the aim of our analysis, so we netted it out by imposing a balanced budget: we reduced overall expenditure and proportionally, its regional distribution.

Secondly, as we are interested in the “territorial” versus the “personal” distribution of expenditure, we also devised a specific approach for central government expenditures for public goods. Indeed, central government public goods benefit all citizens equally, regardless of where the expense is located, therefore the territorial distribution of benefits from national public goods reflects only the population of each region, not the “socio-demographic” features of territories and even less their “territorial structure”. Therefore, central government expenditure for pure public goods is of a specific nature, and our criteria for territorial vs personal distribution of benefits cannot be applied to it. For this reason, this expenditure was netted out from our database. Conversely, decentralised governments expenditure for local public goods was included because, net of externalities, this expenditure equally benefits all citizens of the jurisdiction where it is introduced, and the expenditure amount may reflect either the jurisdiction’s “territorial” or “personal” structure. As for central government mixed public goods, a specific procedure was applied, as described below.

The third adjustment to the regional allocation of expenditure was introduced in order to replicate the territorial location of the benefits from public expenditure (the “benefit principle”) rather than the “expenditure principle”. This is relevant for central government expenditure, while for decentralised government expenditure, the allocation according to the benefit or the expenditure principle generally coincide (net of externalities). In principle, for central government expenditures, consistency between the two principles depends on the nature of the publicly provided goods. For pure national public goods, public intervention benefits all citizens equally, so the regionalisation of financial flows according to the expenditure principle does not coincide with that according to the benefit principle, however expenditure for pure national public goods was already expunged from the dataset (see above). For publicly provided private goods, conversely, it may be presumed that the expenditure principle largely matches the benefit principle. Accordingly, in the case of publicly provided pure private goods, the regionalisation of the TPA was retained. Finally, in the case of central government mixed goods, featuring both public and private characteristics, our rule-of-

thumb was to expunge 50% of expenditure (the public good “quota”, for the reasons described above) and keep the remainder 50% (the “private good” quota) without altering its regional distribution (parallel to the approach used for pure private goods). Finally, the TPA also needed revision with reference to regional governments’ health services expenditure (which accounts for nearly 80% of total regional budgets). These flows, regionalised according to the expenditure principle, were attributed entirely to the regional jurisdiction responsible for the expenditure (where the services are provided), regardless of where the patients actually reside. This distinction proves to be significant in Italy, where there is considerable inter-regional mobility of National Health Service patients (especially from southern to northern regions). To measure the real benefits of health care to residents in each jurisdiction, the raw data on regional expenditures were adjusted for net expenditures for inter-regional patient mobility, determined, for each region, as expenditures for services to non-residents less expenditures by other regions for services to the region’s own residents. The result of these adjustments is a distribution of general government expenditure by function across regions which should reflect the regional distribution of benefits. This is the first step in order to measure fiscal residua and interregional redistribution.

Annex 2. Modelling expenditure functions

Table A1. Explanatory variables: key to measurement units and abbreviations

Demographic structure		
<i>Variable</i>	<i>Abbreviation</i>	<i>Measurement unit</i>
Population	POP	units
Square population	POPQ	thousand billions
Population density	POPDENS	inhabitants/sq.km
Population under 16 years	YOUNG	share of total population
Population 65 years and over	OLD	share of total population
Relative poverty	POVR	share of families
Unemployment	UN	share of labour force
Youth unemployment	YUN	share of unemployed youth (15-24 years) over youth labour force
Population with at least one chronic disease	ONED	share over similar population
Population with at least two chronic diseases	TWOD	share over similar population
Territorial structure		
<i>Variable</i>	<i>Abbreviation</i>	<i>Measurement unit</i>
Primary sector	PRIM	share of total added value
Secondary sector	SEC	share of total added value
Tertiary sector	TERT	share of total added value
Per capita GDP	GDPPC	thousand euro

Source: Istat

Table A2 - General administration expenditure: estimation results

Number of obs = 180
 F(18, 161) = 40.92
 Prob > F = 0.0000
 R-squared = 0.7260
 Root MSE = .0561

Dependent variable: per capita general administration expenditure

	Coefficient	Robust std. error	t	P> t	[95% Conf. interval]	
pop	-0.000000353	0.0000001	-5.020	0.000	0.000	0.000
popdens	0.001	0.000	4.210	0.000	0.000	0.001
pilpc	0.014	0.003	4.030	0.000	0.007	0.021
sec	1.935	1.052	1.840	0.068	-0.141	4.012
terz	1.937	1.103	1.760	0.081	-0.241	4.115
terr3	-0.165	0.055	-3.010	0.003	-0.273	-0.057
terr5	-0.118	0.034	-3.490	0.001	-0.185	-0.051
terr8	-0.073	0.033	-2.200	0.029	-0.139	-0.008
terr10	0.139	0.025	5.670	0.000	0.091	0.187
terr12	-0.197	0.035	-5.670	0.000	-0.266	-0.129
terr14	0.179	0.027	6.730	0.000	0.126	0.231
terr17	0.209	0.022	9.460	0.000	0.166	0.253
terr18	0.134	0.032	4.200	0.000	0.071	0.198
year5	-0.026	0.014	-1.880	0.062	-0.054	0.001
year9	0.040	0.013	2.940	0.004	0.013	0.066
year10	0.024	0.011	2.220	0.028	0.003	0.045
year11	0.023	0.013	1.800	0.073	-0.002	0.048
trend	-0.012	0.002	-6.690	0.000	-0.016	-0.009
_cons	-1.676	0.958	-1.750	0.082	-3.568	0.217

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

Table A2 - Social assistance and charity expenditure: estimation results

Number of obs = 180
 F(26, 153) = 182.49
 Prob > F = 0.0000
 R-squared = 0.9332
 Root MSE = .02728

Dependent variable: per capita social assistance and charity expenditure

	Coefficient	Robust std. error	t	P> t	[95% Conf. interval]	
pop	-0.000000857	0.000000126	-6.790	0.000	-0.0000001	-0.0000001
popdens	0.003	0.000	7.530	0.000	0.002	0.003
giov	-2.635	0.608	-4.330	0.000	-3.837	-1.434
dis	-0.007	0.004	-1.780	0.077	-0.014	0.001
disgiov	0.002	0.001	2.110	0.036	0.000	0.004
pilpc	0.008	0.003	2.630	0.009	0.002	0.014
year6	-0.079	0.009	-8.900	0.000	-0.096	-0.061
year7	-0.023	0.006	-3.720	0.000	-0.036	-0.011
year8	-0.023	0.006	-3.870	0.000	-0.035	-0.011
year9	-0.042	0.006	-6.880	0.000	-0.054	-0.030
year10	-0.048	0.007	-7.170	0.000	-0.061	-0.035
year11	-0.028	0.007	-4.090	0.000	-0.041	-0.014
year13	-0.028	0.008	-3.580	0.000	-0.043	-0.012
year14	0.050	0.010	4.920	0.000	0.030	0.070
terr1	0.177	0.030	5.980	0.000	0.118	0.235
terr7	-0.267	0.059	-4.510	0.000	-0.383	-0.150
terr8	0.169	0.016	10.710	0.000	0.138	0.200
terr9	0.238	0.026	9.040	0.000	0.186	0.290
terr10	0.367	0.025	14.870	0.000	0.318	0.416
terr11	0.149	0.016	9.210	0.000	0.117	0.181
terr12	0.167	0.018	9.250	0.000	0.131	0.202
terr13	0.332	0.034	9.780	0.000	0.265	0.400
terr14	0.306	0.043	7.160	0.000	0.221	0.390
terr16	0.319	0.048	6.600	0.000	0.224	0.415
terr17	0.404	0.055	7.320	0.000	0.295	0.513
terr18	0.467	0.053	8.770	0.000	0.362	0.573
_cons	0.354	0.103	3.450	0.001	0.151	0.556

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

Table A2 - Education expenditure: estimation results

Number of obs = 180
 F(25, 154) = 134.77
 Prob > F = 0.0000
 R-squared = 0.9396
 Root MSE = .03243

Dependent variable: per capita education expenditure

	Coefficient	Robust std. error	t	P> t	[95% Conf. interval]	
pop	0.00000071	0.00000012	5.770	0.000	0.00000046	0.00000095
popdens	-0.016	0.003	-6.170	0.000	-0.022	-0.011
giov	1.708	0.515	3.320	0.001	0.691	2.725
pilpc	-0.034	0.010	-3.580	0.000	-0.053	-0.015
sec	1.069	0.316	3.390	0.001	0.446	1.693
terr1	-4.000	0.671	-5.960	0.000	-5.326	-2.673
terr3	-3.808	0.709	-5.370	0.000	-5.209	-2.407
terr5	-2.891	0.495	-5.840	0.000	-3.868	-1.914
terr8	-3.425	0.594	-5.760	0.000	-4.600	-2.251
terr9	-3.528	0.614	-5.740	0.000	-4.742	-2.314
terr10	-2.603	0.456	-5.710	0.000	-3.504	-1.702
terr11	-2.236	0.382	-5.850	0.000	-2.991	-1.481
terr12	-2.056	0.401	-5.130	0.000	-2.848	-1.264
terr13	-2.775	0.475	-5.840	0.000	-3.714	-1.836
terr14	-2.873	0.496	-5.790	0.000	-3.853	-1.893
terr15	-0.983	0.231	-4.260	0.000	-1.439	-0.527
terr16	-3.424	0.577	-5.940	0.000	-4.564	-2.284
terr17	-3.286	0.575	-5.720	0.000	-4.422	-2.151
terr18	-2.990	0.534	-5.600	0.000	-4.044	-1.935
year5	0.032	0.010	3.140	0.002	0.012	0.051
year6	0.162	0.020	8.120	0.000	0.123	0.202
year7	0.060	0.012	5.170	0.000	0.037	0.083
year8	0.149	0.011	13.090	0.000	0.126	0.171
year9	0.097	0.009	10.370	0.000	0.079	0.116
year10	0.057	0.009	6.100	0.000	0.039	0.076
year11	0.089	0.008	11.600	0.000	0.074	0.105
year13	0.044	0.007	6.220	0.000	0.030	0.057
year14	0.072	0.007	10.690	0.000	0.059	0.085
trend	0.017	0.005	3.640	0.000	0.008	0.026
_cons	4.742	0.672	7.060	0.000	3.415	6.070

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

Table A2 - Health expenditure: estimation results

Number of obs = 180
 F(16, 163) = 25.17
 Prob > F = 0.0000
 R-squared = 0.6504
 Root MSE = .12088

Dependent variable: per capita health expenditure

	Coefficient	Robust std. error	t	P> t	[95% Conf. interval]	
pop	-0.0000000524	0.0000000213	-2.460	0.015	-0.0000000946	-0.0000000103
popdens	0.002	0.001	4.390	0.000	0.001	0.004
vec	5.388	1.182	4.560	0.000	3.053	7.723
pilpc	0.019	0.005	4.030	0.000	0.010	0.028
terz	-0.458	0.251	-1.830	0.069	-0.953	0.037
terr1	0.153	0.042	3.620	0.000	0.069	0.237
terr7	-0.492	0.126	-3.900	0.000	-0.741	-0.243
terr9	0.101	0.036	2.840	0.005	0.031	0.171
terr10	0.262	0.047	5.550	0.000	0.169	0.355
terr13	0.157	0.061	2.570	0.011	0.036	0.277
terr16	0.355	0.070	5.090	0.000	0.217	0.492
terr17	0.462	0.068	6.780	0.000	0.328	0.597
terr18	0.643	0.094	6.840	0.000	0.457	0.828
year6	0.073	0.042	1.720	0.087	-0.011	0.156
year14	0.067	0.032	2.050	0.042	0.002	0.131
trend	0.007	0.004	1.770	0.079	-0.001	0.015
_cons	-0.114	0.297	-0.380	0.702	-0.700	0.473

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze

Table A2 - Social protection and income support expenditure: estimation results

Number of obs = 180
 F(19, 160) = 507.13
 Prob > F = 0.0000
 R-squared = 0.9773
 Root MSE = .17238

Dependent variable: per capita social protection and income support expenditure

	Coefficient	Robust std. error	t	P> t	[95% Conf. interval]
vec	19.262	1.172	16.440	0.000	16.947 21.576
povr	-0.047	0.005	-9.690	0.000	-0.056 -0.037
pilpc	-0.037	0.009	-4.020	0.000	-0.055 -0.019
prim	-9.729	2.497	-3.900	0.000	-14.661 -4.798
terr1	0.597	0.053	11.180	0.000	0.492 0.702
terr3	0.716	0.052	13.850	0.000	0.614 0.818
terr7	0.652	0.111	5.870	0.000	0.432 0.871
terr8	0.628	0.063	10.000	0.000	0.504 0.752
terr9	0.188	0.053	3.510	0.001	0.082 0.293
terr11	-0.296	0.058	-5.100	0.000	-0.411 -0.182
terr12	1.806	0.080	22.640	0.000	1.649 1.964
terr14	-0.202	0.075	-2.700	0.008	-0.349 -0.054
terr15	-0.214	0.088	-2.420	0.016	-0.388 -0.040
year6	-0.193	0.049	-3.970	0.000	-0.289 -0.097
year9	-0.179	0.043	-4.180	0.000	-0.264 -0.095
year10	-0.309	0.043	-7.240	0.000	-0.393 -0.224
year11	-0.378	0.051	-7.470	0.000	-0.478 -0.278
year12	-0.357	0.038	-9.320	0.000	-0.433 -0.281
year13	-0.278	0.054	-5.170	0.000	-0.384 -0.172
_cons	2.598	0.344	7.540	0.000	1.918 3.278

Source: our elaborations based on CPT, Ministero dell'Economia e delle Finanze