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**URBAN DEVELOPMENT AND FISCAL
INTERDEPENDENCIES IN METROPOLITAN AREAS:
A PRELIMINARY ASSESSMENT BASED ON EVIDENCE
FROM THE METROPOLITAN AREA OF TURIN**

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Santino Piazza*, Stefano Piperno*

*IRES Istituto di Ricerche Economico-Sociali del Piemonte
Via Nizza 18 - 10125 Torino
piazza@ires.piemonte.it
piperno@ires.piemonte.it

INDICE

1. Introduction

The advantages of decentralization have been amply described in the literature on fiscal federalism (Oates, 1972, 2004). The main advantage is that decentralization allows a better match between the supply of public goods and local preferences, thus improving the allocative efficiency of the public sector. This outcome requires that those who receive the benefits of public goods reside in the jurisdictions that provide them and thus finance them through the payment of local taxes. In fact, the principle of fiscal equivalence implies that the electors coincide with the taxpayers. The result is an efficient supply of local public goods that reflects the preferences and willingness of local electors to pay. However, the equivalence between the administrative borders and the benefit area of local public services is difficult to achieve in larger metropolitan areas characterized by high mobility. Metropolitan areas have been defined as territorial entities centred on a core city that attracts different populations from suburban communities for reasons of study, work and leisure. These populations therefore exploit the city's services without having to pay for them. This is a complex phenomenon that has profound implications for the fiscal health of all of the municipalities within the metropolitan area.

This paper is a preliminary study dealing with issues concerning the relationship between urban/metropolitan development and local finance during a phase of growing fiscal autonomy. It draws mainly on evidence from the metropolitan area of Turin, Italy. In the first section, we attempt to apply the theory of the urban development cycle to the Italian case. In particular, we investigate whether the urban development process determines higher fiscal stress in central cities than in suburban municipalities. The second section deals with the issue of fiscal interdependency between central cities and suburban areas both from a theoretical and an applied point of view. We conclude with some suggestions for the development of a new model of local finance in metropolitan areas.

2. Urban development and local finance

At the crux of the metropolitan issue is urban sprawl. A discussion of the criteria proposed by several disciplines for the definition of the borders of a metropolitan area (socio-demographic citeria, commuting, etc.) goes beyond the scope of this paper. For our purposes we may simply refer to urban development theory and its possible consequences on local finance: *"In the urbanisation phase, population and economic activity concentrates in urban centres.In the suburbanisation phasethe growth of the suburbs outstripsthat of the city centre and,eventually, there is a shift of population and jobs to the suburbs.In the deurbanisation phase the wider conurbation as a whole loses population, smaller urban areas grow and a more decentralised urban system develops. In the reurbanisation phase, cities which have been losing population begin to grow again"* (Commission of the European Communities, 1992*)*. Throughout these different stages, central cities continue to attract people not only from the immediately outlying areas but also from more distant locations. The result is the presence of a heterogeneous population ranging from commuters to different types of city users (Martinotti 1999, Nuvolati, 2002). This undermines the very foundations of the political theory resting on the assumption that local government is made up of 'one population, one territory'. Yet the growing mobility of population implies not only the existence of more than one population per territory but also of more than one territory per population.

These changes are bound to affect local financing of central cities. But how and to what extent? American scholars (Oakland, 1979) have pointed to evidence from several large cities in the 70s and the 80s that the phases of deurbanization and suburbanization pose the risk for a vicious circle of progressive urban decline. This can corrode the economic and financial conditions of a large number of central cities, while the suburban areas enjoy social-economic growth and better fiscal health instead.
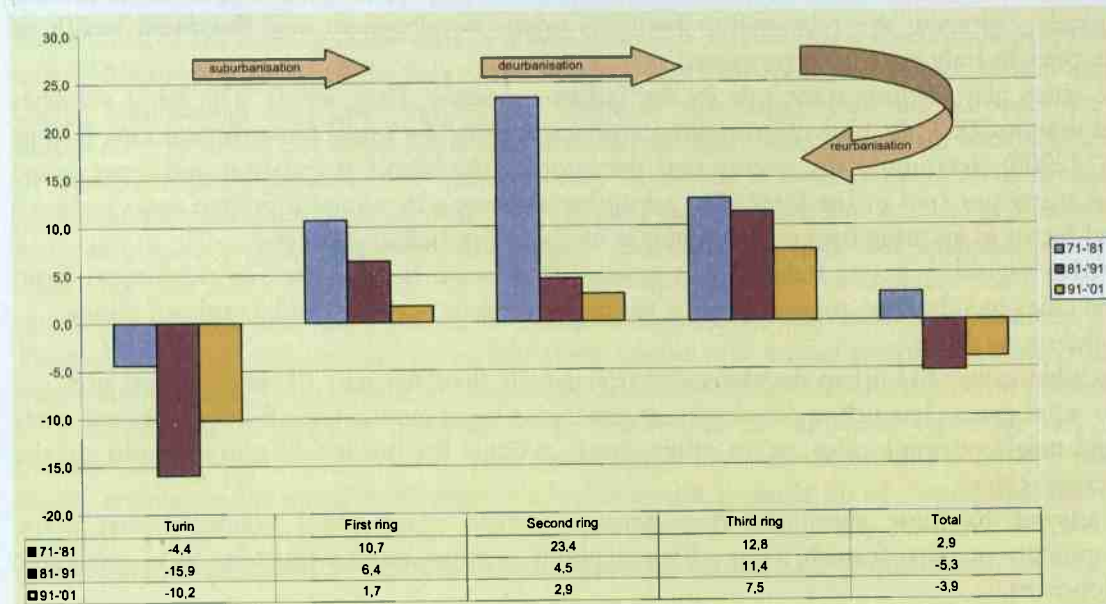
Several major cities in the United States have faced a number of fiscal challenges over the past fifteen years. At the root of the problem lies the shift of high and middle-income populations towards suburban areas. Added to this is industrial decline in the central cities, in terms of decreased industrial activity and employment, which is not counterbalanced by increased employment in the service sector. This causes a huge drop in the tax bases and revenues of central cities, which in turn leads to a decrease in expenditures and services unless these can be matched by increased fiscal pressure.

At the same time, central cities are experiencing an increase of social problems stemming from higher concentrations of poverty and unemployment (e.g., drugs, crime, social dependence).

Thus, local administrators are faced with diminishing tax-bases that are unable to keep pace with growing expenditure needs. Moreover, the services they offer are enjoyed not only by local residents but also by residents from neighbouring locales, who "exploit" the central cities whenever they visit them for the purposes of work, study, leisure and shopping. Barring an increase in productivity or drastic reductions in services, increased fiscal pressure is the inevitable result. This further induces migration of the wealthiest, leading to the perverse cycle underlying the current fiscal crisis in the largest American cities. In addition, from a political stance, the constituency of the central cities is experiencing the growing influence of low and middle-income electors whose preference for redistributive policies mainly weighs on the wealthiest. This creates further incentives for them to out-migrate.

In sum, this model explains the mobility of citizens and businesses in terms of fiscal motivation. It is marred by a number of limits, however. First, it does not contemplate a role for possible policies carried out against this process. Nor does it make allowance for productivity increases to cover losses in tax bases. Moreover, it disregards other factors potentially affecting mobility. Finally, this model is not well-suited for the Italian (and
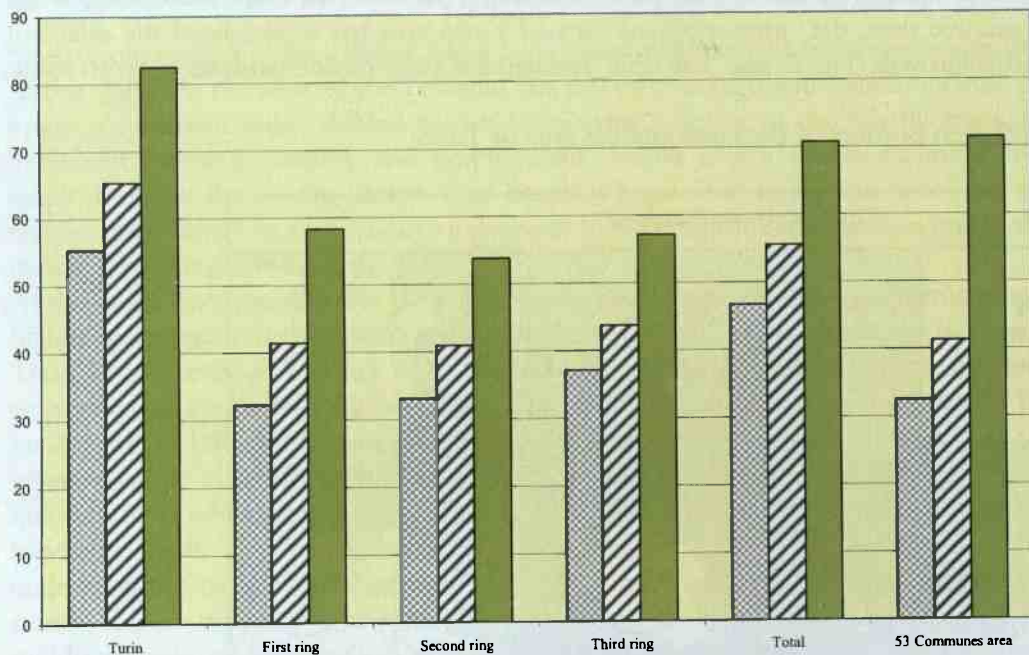
probably European) context, where local finance is characterized by limited recourse to income tax and by much lower levels of mobility. However, for the moment, no other models adequately capturing the relationship between urban development and the fiscal health of major cities in Italy have been proposed.

Large cities play an important role in the Italian economy (RUR, 2004). The latest statistics reveal that, in 2000, the nine metropolitan areas established by Local Government Law (D.Lgs n. 267/2000), accounted for twenty-two per cent of the whole population and represented almost thirty per cent of the GNP. The administrative capacity of metropolitan areas is thus a critical factor in granting the competitiveness of the entire Italian economy.

Over the last thirty years, Italian metropolitan areas have faced a shift in population from central cities to suburban areas according to the urban development model outlined above.

Two questions arise:

i) to what extent has urban development affected the fiscal capacity of central cities; and

ii) to what extent has urban development generated fiscal externalities between central cities and neighbouring locales, or, in other words, what is the burden of non-residents on the central cities?

The answer to these questions may provide several institutional solutions that allow metropolitan areas to furnish more efficient public services and to promote local economic development.

In this paper, these two issues are dealt with in reference to the metropolitan area of Turin (Italy), and more specifically, to two areas previously defined by IRES (Fig. 1). The first corresponds to an administrative jurisdiction defined by the regional government in 1972 which comprises Turin and the 52 bordering communes contained in the two rings outside Turin.

The second is composed of the 56 communes bordering the first two rings. According to the latest demographic data, the metropolitana area of Turin area has experienced the different stages of urban growth (Fig. 2) and has now reached the stage of deurbanization, with some

Figure 1 - Different borders of the metropolitan area of Turin

Figure 2 - The urban development cycle in Turin: 1971-2001

	Turin	First ring	Second ring	Third ring	Total
71-'81	-4,4	10,7	23,4	12,8	2,9
81-91	-15,9	6,4	4,5	11,4	-5,3
91-'01	-10,2	1,7	2,9	7,5	-3,9

Source: ISTAT.

Figure 3 - Share of tertiary employment in the metropolitana area of Turin: 1981-2001

Source: ISTAT.

evidence of reurbanization. This has been accompanied by a shift from an industrial economic base to a service oriented economy. Discussion of tertiarization risks being meaningless, unless we spell out its main features in a specific context. In the Turin area, the service sector

is strongly tied to the city's industrial structure and is therefore characterized by high value added components.

The 2001 Census indicated that the service sector made up 71 per cent of total employment in the metropolitan area (covering both areas previously defined), although Turin accounts for a significant portion of this, with an 81 per cent share (Fig. 3).

This reflects a decline in industrial employment from 408,000 in 1981 to 208,000 employees in 2001. The share of industrial jobs in the 53 communes area slid from 82 to 35 per cent in 2001 (Fig. 4).

Figure 4 - Share of industrial employment in the metropolitan area of Turin: (56 communes) 1951-2001
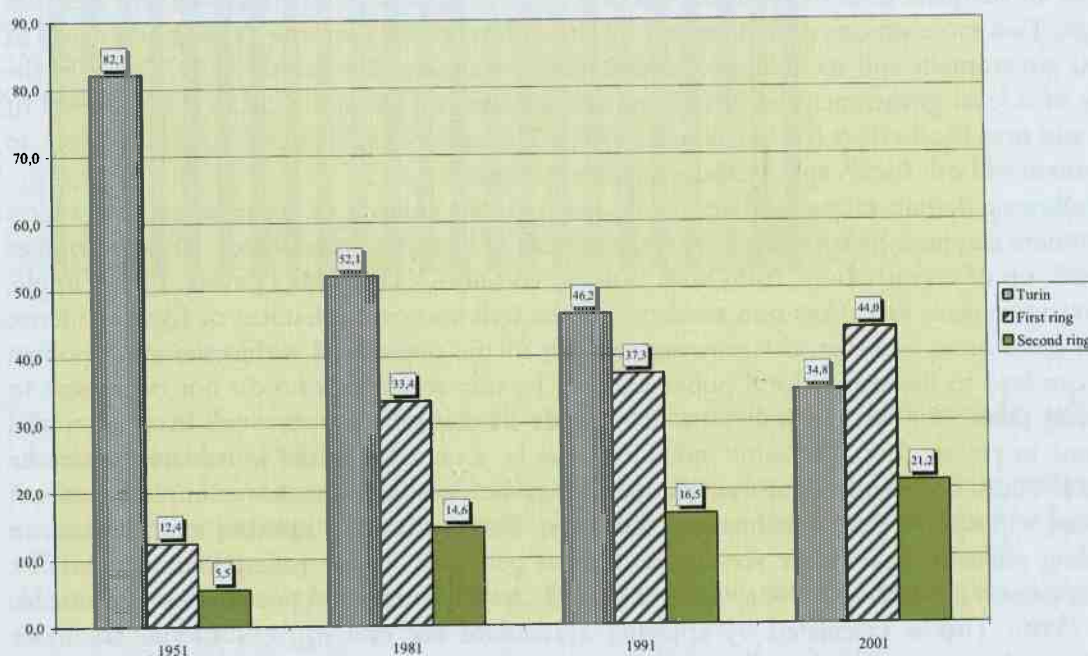
Source: ISTAT.

Total employment declined by 3 per cent between 1991 and 2001 as a consequence of the nearly 50 per cent drop in industrial employment (from about 140,000 to 70,000 employees) which was not matched by an equal increase in the service sector (which grew only from about 277,000 to 340,000 employees). In general, however, the decline in population from 1981 to 2001 (about 252,000 residents) was more significant than the loss of jobs (about 62,000 employees). This disparity in the growth of population and employment underlines the increasing separation of people's places of residence, work and leisure. At the same time, it may also have caused a change in the tax-base of the municipalities located in the area. For example, a number of industrial areas have been converted into residential neighbourhoods or commercial zones, influencing the value added produced as well as real estate value.

3. The fiscal health of large cities

3.1 How to measure fiscal health

The effects of the different stages of urban development on fiscal equilibrium are difficult to evaluate. First of all, it is difficult to come up with an adequate definition of the concept of fiscal equilibrium.

American scholars use the term "fiscal health", which, however, does not refer to the mere matching between revenues and expenditures, but to the ability of local governments to provide an adequate level of services by means of an average level of fiscal pressure and user charges. Two more precise definitions are: (i) the difference between the expenditure needs of a local government and its ability to raise its own revenues (Reschovsky, 1997) and (ii) the ability of a local government to furnish an average level of services with an average level of fiscal and non-fiscal effort (Ladd e Yinger, 1991). This sort of evaluation therefore requires an assessment of both fiscal capacity and expenditure needs.

The following definition may suffice: fiscal capacity is the amount of tax revenues that a local government can raise by applying an average tax rate to its different tax-bases. These resources are made up of contributions from both resident and non-resident tax –payers. For example, local business taxes can affect non-residents via the well-known mechanism of fiscal incidence. At the same time, however, the growing mobility of the population within the metropolitan areas can lead to the use of local public services by non-residents who do not contribute to financing them[1]. In fact, an individual may reside in one jurisdiction, work in another and consume in yet another. The same individual may be a taxpayer in the jurisdiction where he lives and votes, but also in other jurisdictions where he does not vote, for example, whenever he owns a property that is subject to local tax. This leads to a number of problems in providing efficient local public services and, more generally, in controlling externalities. The usual approach (Chernick, 1998) to assessing fiscal capacity is referred to as the *representative tax system* (STR). This is calculated by applying a standard tax rate ($t_{i=1...n}$) to the tax bases $BIMP_{i=1...n}$ throughout the jurisdiction. In general, the standard tax rates correspond to the simple or weighted average[2] for every source of tax-revenue in the area under consideration (in this case the metropolitan area).

Formally this can be represented as:

$$FC_{STR} = \sum_{i=1}^{n} t_i \, BIMP_i$$

Obviously this is purely hypothetical in that not all jurisdictions can apply the same tax rate. Despite its simplicity, this formula is still not easy to calculate when we face several different types of local taxes. Moreover (at least in Italy), data concerning the tax bases is almost always either missing, or incomplete and unreliable. As a consequence, one must refer to data on actual revenues, eliminating the possibility of assessing the effective fiscal capacity of the local government.

Local government expenditure needs are generally identified as the level of expenditure necessary to provide a standard level of service, taking into account only the external factors

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[1] Unless the charges fully cover the costs.
[2] In the case of weighted average the weights correspond to the tax bases of the various local governments. In this case the choice implies a more unified view of the area under consideration.

beyond its control. Yet reliable measures of central cities' expenditure needs are not available for Italian metropolitan areas.

Figure 5 - Index-numbers of per-capita current expenditures in the metropolitan communes compared with per capita current expenditures of the other communes in Italy (1982-2004)
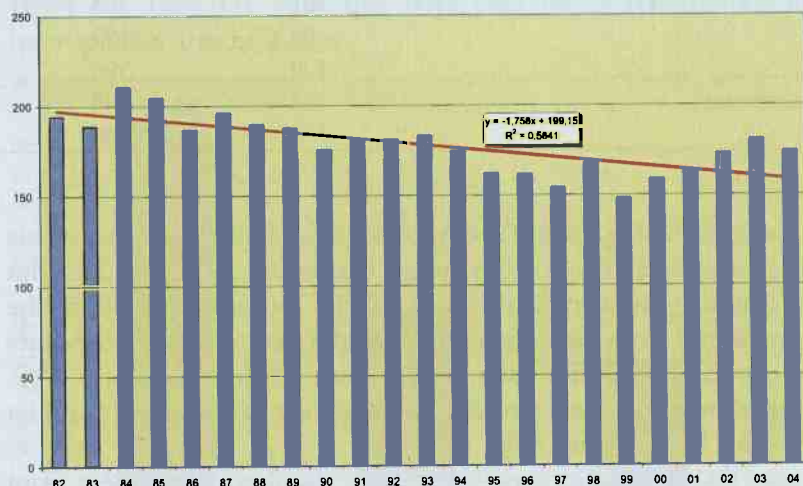
Source: IRES calculations on ISTAT data.

The only possible measure of fiscal health is the difference between fiscal capacity and need, commonly known as "fiscal gap".
Lacking such information, the fiscal health of large cities can only be indirectly evaluated by comparing their per-capita current expenditures with that of the other municipalities by means of an index number.
Although it offers only a rough estimate, this index shows overall deterioration in the fiscal health of the central cities (Fig. 5).

3.2   Evidence from the Turin metropolitan area

The fiscal disparities within the Turin metropolitan area can be assessed using three different sorts of data at the communal level:
i)   personal income tax base according to tax-payer residence from 1998 to 2000;
ii)   IRAP tax-base and net IRAP paid according to type and legal address of business;
iii)   budgets of communes containing the main categories of tax and non-tax revenues in terms of budgeted and actual revenues for the period 1998-2001.

3.3   Personal income tax (IRPEF)

With regards to personal income tax (IRPEF), the fiscal capacity of the central city continues to be much higher than in outlying areas. Per capita personal income tax in the commune of Turin in 1995 and 2000 was higher (Table 1) than both the average in the whole metropolitan area and the average in the two outlying rings (in this case by about ten per cent). However, this contrasts with data from some of the smallest communes close to the central city, such as the "hill communes" in the first ring, and those defined by IRES as "dynamic hill communes".

Table 1 - Fiscal capacity (Personal income tax-base) of the central city and the rings in the metropolitan area of Turin 1995 e 2000

	Deviation from the average (index numbers)	
	1995	2000
Turin	111	112
First ring	101	104
Second ring	99	97
Whole metropolitan area	100	100
Hill Communes (average of three communes)	142	148
Dynamic hill Communes	134	138

Source: Ancitel, 2003.

The tax base of the former is 36% higher than Turin's, and 48% higher than the whole metropolitan area, while in the latter areas the corresponding figures are 24% and 36%.But what are the fiscal effects deriving from redistribution of the population within the metropolitan area over the past twenty-five years? Unfortunately, the data available are scanty and inconsistent, based only on the distribution of taxpayers per tax bracket since 1995. Analysis of these data reveals that most members (66.3%) in the highest tax brackets (with an income of over 69,721 euro) resided in the central city.

However, it is interesting to note that Turin also contains a higher number of members from the lowest tax brackets than the two surroundings rings (Table 2).

Although the differences are slight – just a bit more than 3% overall – they may be symptomatic of an initial form of urban dualism, marked by the outflow of the middle classes from the central city. However, the phenomenon is by no means significant.

Table 2 - Percentage of tax payers according to income bracket in ITL (2000)

	Tax base <=7746,84	Tax base 7747-15494	Tax base 15945-30897	Tax base 30898-69722	Tax base >69722	Total
Turin	33,53	26,09	31,37	7,19	1,82	100
First ring	30,66	28,25	33,69	6,21	1,19	100
Second ring	32,17	29,00	31,87	5,92	1,04	100
Total	32,45	27,16	32,15	6,71	1,52	100

Source: Ancitel.

3.4 Business tax (IRAP)

Private IRAP data on tax base and revenues from businesses located in Piedmont[3] are a valuable new source of fiscal information that makes it possible to evaluate the value added produced in the central city separately from that produced in the rings. These figures do not necessarily correspond to the actual value added produced in these areas because they reflect total production throughout Piemonte. However we can plausibly assume that most business-tax payers (in particular, one-man companies, partnerships and non-commercial bodies)

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[3] IRAP (imposta regionale sulle attività produttive) is a regional tax on productive activities which was introduced in 1998 to replace several formerly existing regional taxes. It is levied on companies, parterships and individuals carrying out business activity. The IRAP tax base is the value added (net of depreciation) produced in a region. In case a tax payer runs busieness activities in more than one region, the value added is apportioned according to the labor cost in each region. The uniform tax rate is 4.25 per cent. Banks aand insurance companies paid a higher rate until 2006, while agricultural businesses pay a reduced rate. Regions are entitled to vary the tax rate up or down to 1 per cent and to differentiate tax rates for certain types of businesses within these limits.

operate only inside the metropolitan area. In addition, IRAP data for the others (corporations) are tied to the distribution of the fiscal capacity inside the metropolitan area. Figure 6 shows that the ratio in Turin between tax base and the number of tax declarations, which can be considered a proxy of the productive potential, is almost double that of the second ring (169,000 euro vs. 87,000 euro).

Figure 6 - IRAP tax base and IRAP paid per – declarations in the different rings of the metropolitan area of Turin
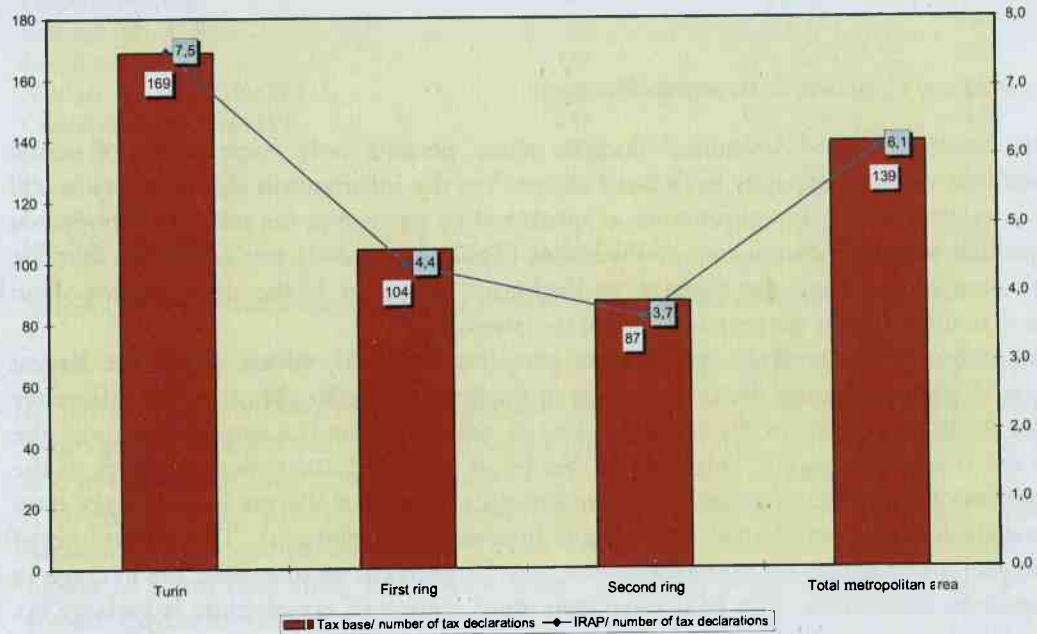
Source: IRES calculations on the basis of 2000 IRAP declarations on 1999 income. Private IRAP only.
Figures in thousand of euro.

Figure 7 - IRAP per capita tax base in the metropolitan area of Turin by location
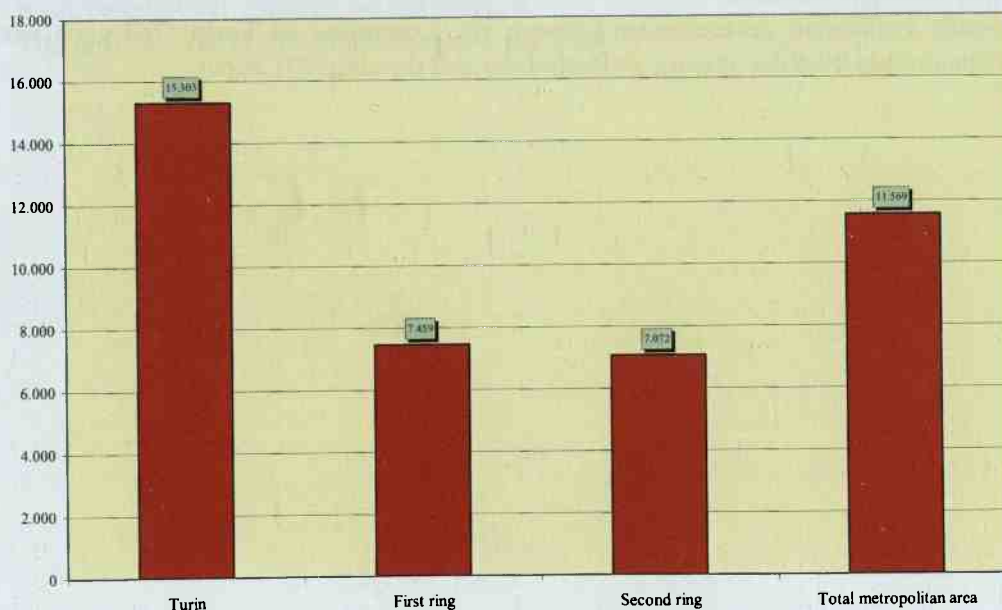
Source: IRES calculations on the basis of 2000 IRAP declarations on 1999 income. Private IRAP only.
Figures in euro.

11

The IRAP paid per declaration is even more than double: 7,500 euro vs. 3,700 euro, with an implicit tax rate of 4.45% (4.19% in the second ring), which is slightly higher than the established rate of 4.25%. The amount of IRAP value added that was declared per resident is therefore about 15,000 euro in the Commune of Turin as opposed to 7,400 euro in the first ring and 7,200 euro in the second (Fig. 7).

These data also confirm the greater fiscal capacity of the central city in relation to suburban areas stemming from greater employment (residents and non residents) in high value added sectors.

3.5   Tax revenues of Communes in the metropolitan area

An analysis based on the Communes' budgets alone permits only comparison of actual revenues and not of fiscal capacity as defined above. Yet the information this provides is still significant in relative terms. Fiscal pressure as measured by per-capita tax revenue is higher in the metropolitan area than in the rest of Piedmont (Table 3). In 2001 per capita tax revenue was 14 per cent higher than the average in Piedmont, while it is the non- metropolitan communes that show higher current and capital transfers.

Among the different tax revenues per- capita property tax (ICI), which yields the largest revenue, was 12 per cent higher than the average in Piedmont in 2001, although this difference seems to be decreasing. Instead the average value in the two rings has remained almost the same as in the rest of Piedmont. This may be due to an increased assessment capacity of the non metropolitan piedmontese communes in addition to growth of the tax base and tax rates in some communes (e.g. residential sprawl and business development). The commune of Turin alone had a per capita ICI assessment that was 55 per cent greater than the average in non-metropolitan communes. The next most important source of tax revenue is garbage tax (TARSU), which does not vary very much between the whole metropolitan area and the rest of Piedmont. In this case too, however, the per-capita garbage tax assessement in the Commune of Turin is 50 per cent higher than the average in the other piedmontese communes and is also 30 per cent higher than in the rings. Finally, per-capita non-tax revenues are consistently lower than in the rest of Piedmont.

This data reveails a different performance between the Commune of Turin (283 euro per capita, nearly the double than the average in Piedmont) and the rings (91 euro).

Table 3. Per-capita revenues of communes in the metropolitan area of Turin and in the rest of Piedmont (euro)

Revenues	Metropolitan area (Turin included)	Rest of Piedmont	Turin	Rings (I e II)
	2001	2001	2001	2001
Tax revenues (Title I)	298	260	380	296
Property tax (ICI)	180	160	247	179
Garbage tax (TARSU)	68	60	90	68
Transfers (Title II)	134	258	591	125
Non-tax revenues (Title III)	95	154	283	91
Capital revenues (Title IV)	181	658	309	179
Loans (Title V)	57	102	237	53
Current expenditures	500	595	1241	486
Capital expenditures (average 1998-2001)	223	528	650	214

Source: Osservatorio sulla finanza locale IRES. Per capita assessments at constant prices 1995.

In terms of fiscal effort ther is no significant difference within the metropolitan area.

Average tax rates are only slightly lower in the first (5.91 per thousand of the assessed value) and in the second ring (5.94 per thousand) than in Turin (6.0 per thousand).

The greater fiscal needs of the central city are met by higher real estate value in Turin. Moreover, even per capita transfers from higher levels of government in 2001 were much higher to Turin (521 euro) than in the rings (125 euro), compared with a middle value to the rest of Piedmont (258 euro).

Per-capita current expenditures in Turin in 2001 were 70 per cent higher than the non metropolitan average and higher still than the rings. This is due to the higher fiscal needs of central cities in metropolitan areas explained by scholars: greater number of services provided (ii) higher unitary costs of services and (iii) the effects of greater mobility which is tied to positive spill-over towards the communes.

The next section of the paper discusses this issue.

4. Fiscal interdependencies between central cities and rings: the case of Turin

4.1   Issues and methodology

As seen from the data presented in the previous sections, Turin does not show any decline in fiscal capacity. However, we cannot assess the fiscal health of the central city since we lack any precise data on fiscal needs. What is clear is that the city faces extra- fiscal needs due to externalities between the central city and the rings. The residents of the latter can exploit the central city by using its services for the purposes of work and leisure time activities. This is true independently of the the vicious circle of urban decline discussed above. Therefore, an adequate approach to local finance requires analysis of the non-resident users of the city's services to fairly assess its fiscal health.

Such analysis should assess the net incidence of the non resident population on the central city in different expenditure sectorrs, adopting a similar appproach to that of recent research conducted on the Commune of Milano (Bernareggi, 2004a and 2004b).
This requires identification of different populations which use central city services as well as of the different kinds of services provided, based on their degree of publicness.

This should allow estimation of non resident use of central city services at no charge, that is, of their positive externalities. In any case, it must be stressed that this is only a partial equilibrium analysis and does not take into account the overall effect of the non resident population on the central city in terms of value added and employment.The ecomentric tools required are too complex to be considered here.

4.2   The different populations

Ther are three types of populations that use city services. The first are registered residents of the city, who have voting rights and tax duties in the city and therefore determine the demand for local public services. The second are non-registered populations who live in the coomune, although they are officially registered in another commune or abroad. They can be defined as "non-resident inhabitants" similarly to Bernareggi's definition (quoted). The last population to be considered are daily and occasional commuters who travel to the city for various reasons (work, leisure, etc.) where they use the city services. Ther is a basic distinction between the registered and the non-registered populations. The former, even if they spend periods of time away from the city, by definition vote and pay local taxes. The latter does not have the right to vote althogh they may pay local taxes including property tax (ICI) if they own property, refuse removal tax (TARSU) and electricity consumption surcharge for renters[4].
It is easy to quantify the resident population by consulting the public registry (867,857 inhabitants in 2003). However this is more difficult for non-residents, particularly in the absence of direct surveys aimed at estimating their number and assessing their use of the different local services. For this study we have estimated the non-resident populations to be 46,728 non-resident inhabitants (that is 5.7% of the resident population), and 368,000 daily and occasional commuters. This is an addition to the 868,000 residents in 2003. However, these figures must be weighted according to a discounted factor determined by the actual time spent in the central city. Therefore the absolute values are discounted and translated into equivalent values according to the hypoteheses described in the Appendix in order to determine a standardized value in terms of days' presence per year.

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[4] We will disregard any possibile incidence of property tax (ICI) on renters.

Table 4 - Non-resident population: number of non-residents according to the Census data

| | Reasons of presence in the lodging | | | | | |
	Holiday	Work	Study	Presence of relatives	Other	Total
Length of stay = from 91 to 180 days						
Discounted factor	0.37	0.37	0.37	0.37	0.37	0.37
Turin	187	2,196	1,428	2,983	1,483	8,277
Equivalent population	*69*	*812*	*528*	*1,103*	*549*	*3,061*
Length of stay = from 181 to 270 days						
Discounted factor	0.618	0.618	0.618	0.618	0.618	0.618
Turin	123	2,278	2,090	1,635	853	6,979
Equivalent population	*76*	*1,407*	*10,1291*	*1,010*	*527*	*4,312*
Length of stay = from 271 to 365 days.						
Discounted factor	0.871	0.871	0.871	0.871	0.871	0.871
Turin	23	2,816	1,489	2,975	2,090	9,393
Equivalent population	*20*	*2,453*	*1,297*	*2,592*	*1,821*	*8,183*
Total equivalent population	*165*	*4,672*	*3,116*	*4,705*	*2,897*	*15,556*

Table 5 - Non resident population: cohabitations (Source: Census of Pop)

Type of community	Number of Individuals	Discounting factor	Equivalent value
SCHOOLS AND COLLEGES (a)	1,334	1.056	1,409
ASYLUMS (a)	1,619	1.056	1,710
°Reformatories	265	1.056	280
°Old Peoples Homes and Long-Term Hospices	401	1.056	423
°Immigrant Asylums	222	1.056	234
°Others	731	1.056	772
HOSPITALS (a)	5,131	1.056	5,418
°Public	4,753	1.056	4,753
°Pivate	378	1.056	378
PRISONS (a)	7	1.056	7
RELIGIOUS COMMUNITIES (a)	332	0.952	316
HOTELS, BOARDINGHOUSES, INNS, ETC. (a) (b)	81	0.952	77
OTHERS (a) (c)	3,324	0.952	3164
Total (a)	11,828		1,3810
Inmates (Prisons) (d)	1,462	1.056	1,544
Hotel guests (all motives) (e)	4,850	1.056	5,122
Vagrants (f)	1,500	1.056	1,584
Gipsies	2,439	1.056	2,576
All Population with Lodging	22,079		24,636

(a) Source: ISTAT-CENSUS of population 2001.

(b) Does not include hotel's guests.

(c) Includes barracks.

(d) Source DAP-Ministero della Giustizia.

(e) Source: Provincia di Torino, average numb. of guests in 2003.

(f) Source: Caritas.

(g) Source: IRES.

4.3 Temporary residents

2001 population census data were used to identify the non- resident population. This was the first Census that made information available concerning the number of non residents, the

reasons for their presence and the length of their stay. Therefore, we considered as residents anyone declaring the Commune as their usual place of residence[5]. This allowed more precise information than the indirect estimate provided by Bernareggi (quot.). The estimate of the equivalent population is reported in table 4.

Then we made use of the Census data on cohabitation by category, combined with information from other sources. Table 5 shows the outcome in terms of equivalent population. Summing the data of the two tables gives the result of 40,191 equivalent inhabitants. We have not been able to include a precise estimate of the non-resident alien population for lack of information, although a rough estimate would amount to about 6,000.

4.4 Daily non-resident population

The estimate of the daily non-resident population drew on rough data collected for the biannual GTT survey which covers the entire population in Piedmont over the age of ten (more than 60,000). The main advantage of this survey over the ISTAT Census is that it includes information about the residence of the people surveyed allowing us to identify the daily non- resident population[6].

Through the ISTAT Census data one can determine the influx towards the central city for reasons of study or work alone analyzing the data from the individual communes. The GTT survey instead offers the main advantages of simplicity and the greater level of detail concerning the reasons for commuting (shopping, sports, leisure activities, etc.), making it easier to identify which services of the central city are exploited by the non resident population. Table 6 reports the estimated daily influx in terms of equivalent population equal to about 300,000 inhabitants.

Table 6 - Daily movements of population

Influx by reasons (2004)	Interviews in Turin (mainly residents in Piemonte)	Interviews outside Turin	Total	% of resident population	Discounting factor	Equivalent population
Commuters to work (a) *	130,479	13,900	144,379	16.6	0.749	108,140
Work reasons **	21,654	3,147	24,801	2.9	0.749	18,576
Study / commuting to school *	42,995	9,056	52,051	6	0.665	34,614
Shopping / errands **	53,371	1,619	54,990	6.3	0.956	52,570
Drive / Pick-up persons**	13,561	404	13,965	1.6	0.79	11,032
Health visits **	12,581	506	13,087	1.5	0.749	9,802
Sport / recreation **	37,532	1,759	39,291	4.5	1.056	41,491
Visit relatives / friends **	19,108	1,309	20,417	2.4	1	20,417
Other **	5,228	522	5,750	0.7	0.755	4,341
Total	336,509	32,222	368,731	42.5		300,983

* Population identified as commuter.
** Population defined as non-commuter.
Source: GTT Torino, indagine sulla mobilità 2004.

[5] Although, according to the Census definitions, not all these residents are included in the City register.
[6] The Census ISTAT data, instead, does not reveal this information, including data only for people commuting for reasons of study or work.

This survey allows us to distinguish the portion of the non resident daily population which regularly commute to the city for the purposes of work or study from those we can refer to as " the proximity population", who go to the city for reasons tied to the use of free time or domestic necessity.

The data fails to provide a breakdown of:

- what grade of school pupils are attending;
- which local public services are actually used by the proximity population (e.g.: facilities for sport and leisure, entertainment and shopping).

Therefore, only an estmate of the share of costs related to the non resident population can be provided.

4.5   Local public services

After breaking down the non resident population into temporary and daily residents, the communal services benefiting each can be determined through the equivalency coefficients of local public services. Most, although not all, services are available to the non resident population. The literature provides two approaches to the assessment of the incidence of the benefits deriving from these services. The first one is based on the net unit cost of each public service and the intensity of its use. For instance, the individual benefit of a museum visitor is given by the product of the cost of the single visit net of paid fees and the total number of visits over a certain period of time. The second approach is calculated by assessing the area under the demand curve for local public goods, that is, the total consumer's surplus value. In other words, by assessing the total benefit deriving from the local public good in terms of of willingness to pay, again net of any fee incurred. Although this second approach is undoubtedly sounder analytically, it is difficult to apply without conducting *ad hoc* surveys. Therefore, we generally make use of some variant of the first.

In this study, we relied on an estimate of the share of non resident population, assuming that this is a rough indicator of the share of the use of the services. Therefore, we attributed the budget allocations for 2003, net of incoming fees, to the different populations according to their relative size.

One group of services benefits only the resident population (Table 7), even though positive externalities in favour of non residents cannot be entirely ruled out. This group includes city registry and voting services, neighbourhood councils, kindergardens, and cemeteries, means tested social services only for residents, and public housing.

Table 7 - Services for Resident Population

Functions	Services	Total outlays*	%	% total net outlays
General Services, Management and Control	Decentralization	94,200,919	19.6	4.4
	Public Records Office; Draft, Polls Registration Office	19,410,788	4	0.9
Public Education	Kindergarten	97,848,886	20.4	4.6
	Social welfare and other services	57,536,615	12	2.7
Urban and Land Planning	Public Housing	31,343,592	6.5	1.5
Social Welfare	Welfare Institutions and Charities	153,521,971	32	7.2
	Cemetery	26,513,770	5.5	1.2
Total		480,376,542	100	22.5

*Total of Capital Outlays, Salaries and Loans.
Sources: Data processed by IRES using the official budget of the Commune of Torino, 2003.

Using these criteria, the expenses in favour of residents only amounted to 480 million euro, equivalent to 22.5% of total expenditures in 2003.

Table 8 - Final Estimate of Outlays for PNR

Outlays for Services used also by Non-Resident-Population

A) General purposes	Total Net Outlays	Total Outlays for PNR
Function 3	*78.099.009*	*9.232.193*
City Police	76.161.294	9.043.445
Administrative Police	1.937.715	188.748
Function 8	*255.842.506*	*26.063.678*
Road Services and Traffic	146.749.402	17.425.126
Parking	-7.513.597	-1.282.137
Street Lighting	30.012.275	3.633.379
Public Transport*	87.103.615	6.287.310
Airports (SAGAT)	-509.189	n/a
Function 9	*101.428.738*	*9.875.183*
City and Land Planning	16.569.009	1.613.945
Environment, Public Safety	543.993	52.989
Water Supply**	2.288.829	n/a
Refuse collection and Garbage Disposal (AMIAT)***	7.708.433	969.077
Parks, Public Space Designs	74.318.474	7.239.172
Function 11		
Power and Gas (AEM Torino)	-8626213	n/a
Total Net Outlays	**426744040**	**45171054**

B) Special Purposes	Total Net Outlays	Total Outlays for PNR
Function 1		
Tribunals	38.382.939	1.228.886
Function 3		
Market Police	2.467.371	152.033
Function 4		
Education	65.811.551	2.816.191
Function 5		
Recreational Services	121.670.492	8.197.744
Function 6		
Swimming Pools	5.704.522	272.802
Soccer Stadium and other sporting venues	53.804.491	2.573.041
Fairs and Exhibitions	32.815.318	1.569.296
Function 7		
Tourism	51.753.271	1.524.485
Function 10		
Social Protection	202.482.418	4.689.872
Function 11		
Economic Development	11.813.805	638.902
Total Net Outlays	**586.706.179**	**23.663.251**

Following Bernareggi's approach (2004b) we divided the services available to the non residents into two categories: those used by all types of non residents and those used only by certain subsets. In the first group, we include all expenses related to physical presence in a city, such as law and order, streets, transport, traffic control, public lighting, environment, parks

and public space design. The second category includes expenses for culture, education, sport, tourism and so on. Again, both categories must be calculated net of any fees paid by users, and, in the case of local public corporations managing public utilities, net of any other extra revenue (interest, dividends, concessions) the city receives from them.

More precise information regarding the intensity of use would be especially valuable in order to evaluate the actual net impact of non residents. Table 8 reports the tentative results derived from applying the non resident population share to net local expenditure.

The second group of services was estimated to account for about 23 million euro (that is 11 per cent of the total expenses of this type). To this is added 45 million euro related to the first group (those used by all types of non residents), totalling 68 million euro (that is 4 per cent of the total expenses of this type). This represents 6.8 per cent of the total net communal expenses. It must be stressed that these values are significantly lower than those in Milano. They are likely to be underestimated for two reasons: first,
because of missing categories of expenses and, second, because of lack of reliable data concerning the various components of the daily non resident population. Equally, the same applies to the temporary residents. For this reason we made recourse to a simplified assumption regarding the average length of residence. However, this does not account for the presence of unregistered aliens. Moreover, our estimation has not taken into account several aother categories, such as nomadic populations and illegal immigrants, due to lack of data on related local expenses.

Overall therefore, our analysis is still very tentative, especially compared to the similar study by Bernareggi (quot.) and needs to be supplemented by additional data from the complete GTT survey, census data and budget data from other local agencies and local public corporations managing public utilities.

5. Conclusions

This work analyses the influence of metropolitan development on central cities' finances. In particular, we tried to establish the extent to which the fiscal health of central cities was negatively impacted in the various phases of urban development and to identify potential analogies with the urban decline that typified the growth of some American cities.

Generally speaking, even though Turin does not seem to demonstrate symptoms of urban decline, it is experiencing the increasing financial stress common to big cities in Italy owing to the new system of local finance and central equalization transfers.

Little attention has been devoted to analyses of fiscal needs of big cities related to the impact of the non resident populations (Pommerehne and Krebs, 1991, Chernick and Tkacheva, 2002). The rough calculation provided here, although it is clearly underestimated, reveals that the impact on the central city's budget is indeed significant. Lacking a policy towards consolidation of the local governments concerned, new horizontal equalization transfer schemes from higher levels of government might be recommended.

Where excludable serices exist the most efficient solution is to apply user charges, such as *commuter charges* recently successfully used in London. From an institutional point of view this would require experimentation of new flexible forms of intergovernmental horizontal cooperation.

Appendix

1) *Calculation of the equivalency coefficients of the different categories of population*

To estimate the annual presence of the resident population we made use of the coeficient calculated by Bernareggi (2004b), equal to 0.947, assuming similar behaviour between the resident population of Milan and Turin. This coefficient allows absences for holidays and weekends to be taken into account so that comparison between the resident and the non resident population can be made homogeneously. The average annual presence indexes of the non resident population are therefore divided by this index.

A different method was used to measure the number of temporary residents. We used the actual figures declared by individuals in the 2001 ISTAT Family census broken down into three periods (90 to 180 days, 181 to 270 and 271 to 365). Periods under 90 days were excluded from the study. It may be useful to highlight that Bernareggi used a different method by means of indirect indicators such as daily water consumption and refuse production.

The median values of the first period (135 days), of the second (225 days) and of the third (318 days) were used as the index for the average annual presence for the five types of non resident populations residing in private lodgings. This is clearly a simplification which does calculate the exact periods of absence such as weekends, public holidays or vacation time and assumes instead that the median time spent by the non residents is evenly distributed over the entire declared period of residence. However, this method allowed to compare the non resident population with the resident population discounted by Bernareggi's coefficient. We thus use the coefficient of equivalence C representing the ratio between the coefficient of equivalence by type of population (c) – that is the per cent presence per year – and the overall coefficient of equivalence for the resident population.

$$C_i^j = \frac{c_i^j}{0.947}$$

where i= types of population and j = period of residence

This coefficient is used to estimate the equivalent population according to the criteria described below to calculate the expenses broken down by category in favour of the non resident population. Bernareggi's (2004b) coefficient was used in calculating cohabitation by category and daily population. However, we had the advantage of access to the preliminary data drawn from 2004 GTT survey on mobility in Turin. More detailed future analysis of the data may reveal significant differences in Milanese and Turinese commuters' habits, allowing us to make any appropriate adjustments to the coefficient of equivalence in Turin.

2) *Expenses for services used by all types of non residents and for those used only by certain subsets. Estimation of the share of expenses in favour of the different types of population*

Services used by all types of non residents

To calculate expenses in favour of non resident daily populations for the first group of services, those related to each individuals' physical presence in a city, we used the proportion of daily trips made by the non resident daily populations to the total as an indicator of their consumption of local public services according to the following criteria:

Municipal police and road maintenance: percent of total daily trips made by non resident population

Parking: percent of total daily car trips made by non resident population
Public Transport: percent of total daily trips on public transport made by non resident population
Public lighting: percent of total daily trips during operation of public lighting made by non resident population
Urban planning, environment, parks and public space design, emergency crews, refuse collection: proportion of temporary non resident population to the total population (resident and non resident).
(*) due to lack of data temporay residents were not take in to account in these calculations

Services used only by certain subsets of residents
To calculate expenses in favour of non resident daily populations for the second group of services, instead we used Bernareggi's coefficient to determine the ratio of the presence of commuters to the presence of permanent and temporary residents (the latter equal to 1 and therefore the former equal to. 4).
As for services used by only a subset of the population we calculated the ratio of daily commuters to the total number of commuters whose declared purpose can be directly linked to a particular service supplied by the municipality. The one exception was for the use of the courts. In this case we used the portion of daily population who declared "other" as their purpose for commuting. Services related to social sectors and migrant population and immigration have not been considered .
Estimates of the ratio of temporary equivalent resident population (excluding prison inmates and migrants) to the total population were used to calculate expenses in favour of particular subgroups of the population. The only exception were social services and tourism. For the former we used only the share of temporary residents to the total, and for the latter we used Hotel registration data reported in the 2001 Census. To calculate expenses on education related to temporary residents we applied the share of temporary residents who declared their presence for the purpose of study or work in the 2001 Census.
Whenever the purpose of non resident's presence cannot be attributed to a specific service because of lack of data the apportionment of the share of expenses was considered to be equal to their equivalent share of the total population (resident and non resident).

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