Sustainability of Urban Sprawl: Environmental-Economic Indicators for the Analysis of Mobility Impact in Italy

Chiara M. Travisi and Roberto Camagni

NOTA DI LAVORO 102.2005

SEPTEMBER 2005

KTHC - Knowledge, Technology, Human Capital

Chiara M. Travisi and Roberto Camagni, *DIG, Politecnico di Milano*

Sustainability of Urban Sprawl: Environmental-Economic Indicators for the Analysis of Mobility Impact in Italy

Summary

Sound empirical and quantitative analysis on the relationship between different patterns of urban expansion and environmental or social costs of mobility are still very rare in Europe and the few studies available provide only a qualitative discussion on this. Recently, Camagni et al. (2002) have performed an empirical analysis on the metropolitan area of Milan, aimed at establishing whether different patterns of urban expansion generate different levels of land consumption and heterogeneous impacts of urban mobility. Results confirm the expectation that higher environmental impact of mobility is associated with more extensive and sprawling urban development, more recent urbanisation processes and residential specialisation. The present paper enlarges further the empirical analysis to seven Italian metropolitan areas (namely, Bari, Florence, Naples, Padua, Perugia, Potenza and Turin) to corroborate previous results for the Italian context. The novelty of the present paper is threefold. Firstly, we are interested in exploring the changes occurred to the intensity of the mobility impact across a ten-year period, from 1981 to 1991, corresponding to the Italian economic boom years. Secondly, using an econometric analysis in cross-section, we consider several metropolitan areas at once, being therefore able to explore whether there are significant differences in the way the model explains variations in the mobility impact across various Italian urban areas. Finally, we propose a conceptual interpretation of the causal chain in the explanation of the mobility impact intensity and we test it using Causal Path Analysis.

Keywords: Urban mobility, Sprawl, Environmental sustainability, Collective costs

JEL Classification: Q56, R14, R41

Address for correspondence:

Chiara M. Travisi
DIG, Politecnico di Milano
Via G. Colombo, 40
20123 Milano
Italy
E-mail: chiara.travisi@polimi.it

5.1 Introduction

Among recent phenomena of urban transformation in the European context, urban sprawl is one of the most debated and controversial (EC, 2004). The term *sprawl* has been coined in the North America during the second half of the 60's, when features, determinants and effects of this peculiar phenomenon of urban development and conversion captured the interest of both researchers and the governments and started to be formally analysed (e.g. Real Estate Research Corporation, 1974; Altshuler, 1977; Windsor, 1979). Although many definitions of *sprawl* has been given, a central component of most definitions -and of most tentative translations of this term[1]- is the uncontrolled spreading out of a given city, and its suburbs, over more and more rural or semi-rural land at the periphery of an urban area. This involves, in the short-run, the conversion of open space into built-up, developed land and, in the medium-run, a prospective exacerbation of some detrimental environmental externalities, which typically portray cities.

Differently from traditional urban expansion, this pattern of development is not followed by an increase of the overall population of the city. Migration here is no more directed from rural toward urban areas but, instead, from the core – more densely populated - towards the periphery of urban settlements, and further[2]. If one looks at Europe, towns and cities are expanding outwards into rural areas at a faster rate than their population is growing: a 20 percent expansion in the last 20 years with only a 6 percent increase in population over the same period (CEC, 2004). Besides, at the same time that cities are expanding outwards, many contain large amount of derelict, unused lands, and a high number of empty properties.

Another extremely significant trait of sprawl is that the process of expansion is typically disordered, unplanned, this leading to often inefficient and unsustainable urban expansion patterns. With special regard to Europe, indeed, there is a widely shared consensus on the fact that urban dispersion is, at least in part, the result of a long-lasting normative lack or, more in general, of inadequate or scarcely farsighted urban planning policies, which have not been able to interpret the direction of the '*push* and *pull*' tendencies of European towns and cities over the last twenty years (for a discussion see Camagni et al , 1998, 2002a). Of course, the factors that have assisted the success of disperse city in Europe are numerous (for a

[1] Among the others: *périurbanisation, ville éclatée, desserrement urbain, città diffusa, dispersione urbana*.

[2] To some extent, this is one of the motives why some commentators have defined the phenomenon of sprawl has an 'escape' from concentration and from the drawbacks of living in more compact and densely populated areas.

complete discussion see Gibelli, 1999). For what concerns residential preferences, one can enumerates: the overall worsening of the quality of life in urban areas (high cost of habitations, congestion, air pollution, noise, deterioration of public spaces, etc.); the evolution of individual preferences and taste in favour of single-household dwellings (following the US archetype); the placing out from central locations of residential in favour of service activities; the higher costs of real estate re-qualification in central areas compared to extra-urban locations; and, often, less stringent city planning and institutional constraints in the periphery. The same goes for economic activities: increase diffusion of back-office activities irrespective of accessibility economies; scarce accessibility of central areas by motorised private transport modes; increasing fiscal and administrative fragmentation are all contingent elements that have contributed to the success of sprawling patterns of urban expansions.

Today, the European Commission recognizes urban sprawl as the most urgent of the urban design issues as it leads to green space consumption, high cost of infrastructure and energy, increase social segregation and land use functional divisions, reinforce the need to travel and sharpen dependence upon private motorised transport model, leading in turn to increased traffic congestion, energy consumption and polluting emissions (OECD, 2000; CEC, 2004).

The favoured vision of high density, mixed use settlements with refuse of brownfields land and empty property, and planned expansions of urban areas rather than ad hoc urban sprawl, has been reinforced in each EC policy document on urban development starting from the "Green Paper on the Urban Environment" (CEC, 1990)[3]. Since that, a number of community initiatives on urban design has been implemented[4]. Nevertheless, additional efforts are needed to achieve

[3] The EU Expert Group o the Urban Environment was established in 1991; the Sustainable Cities Project was launched in 1993 with the aim of promoting new ideas on sustainability in European urban settings, fostering exchange of experience, disseminating good practices on sustainability at the urban level and formulating recommendation for the EU institutions. In 1996 the EU expert Group produced a major report on "European Sustainable Cities" in support to the local Agenda 21 process. In 1997 the Communication "Towards an Urban Agenda in the European Union" (CEC, 1997)opened the efforts towards a thematic strategy on urban environment and in 1998 the Communication on "Sustainable Urban Development in the European Union: a Framework for Action" (CEC, 1998) for the first time took a real sustainable development approach with four main interdependent policy objectives: i) strengthening economic prosperity and employment in towns and cities; ii) promoting equality, social inclusion and regeneration in urban areas; iii) protecting and improving the urban environment towards local and global sustainability; iv) contributing towards good governance and local empowerment. In 2001, the EU Expert Group produced the report "Towards more sustainable urban land use: advice to the European Commission for policy and action". On a wider level, Article 6 of the Treaty places sustainable development at the very core of the EU policies and actions, as stated in the 2001 Communication "A Sustainable Strategy for a Better World: A European Strategy for Sustainable Development" (CEC, 2001).

[4] The European Spatial Development Perspective (ESDP, 1999), which addressed explicitly the question of how to control the physical expansion of towns and cities, has been adopted on a voluntary basis by all of the member states in 1999. After that, a number of actions has been implemented. To mention some: the European Spatial Observatory Network (ESPON) programme implements and co-ordinates research in spatial planning, putting in place a framework to collecting and analysing spatial data; the URBAN II initiative supports mixed use and environmentally friendly brown-field redevelopment, involving reduced pressures on green-field development and urban sprawl. INTERREG has offered similar opportunities. In addiction, the Community supports different

widespread sustainable urban design able to fulfil such shared objectives, and concrete initiatives at national level ought to follow the current acknowledgement of the 'dark side' of urban sprawl. In these direction, the emphasis of the debate is on the need to ensure the adoption of a long-term strategic land use planning systems, with environmental impacts identified and minimised, able to reverse the tendency that, in the previous decade, have seen often urban development as un unplanned process leading to unsustainable expansion. The focus of the proposed solutions should be specific to the case. In fact, as each town and city is unique, it is not for this purpose to set standard system for making land use decisions, neither to define the "ideal" settlement pattern. However, the Commission is exploring the possibility of identifying guidelines on "high density" and "mixed used" new developments, the integration of green space, retrofitting urban areas to improve their sustainability, or on the continuity of the urban fabric.

Research, exchange of experience and promotion of best practice on urban land issues is therefore of particular importance and highly recommended to attain insights for policy actions. In particular, a starting point should be the identification of the actual state of sprawl-driven negative externalities in towns and cities, and their costs. Next, the identification of the cause-effects relationships that have favoured over time the phenomenon of urban sprawl should follows. We are facing in fact a phenomenon that is driven by a number of heterogeneous components – historical, cultural, social, economic, structural - which interact in the space playing different roles depending on local conditions.

The possibility to monitor the impacts generated by urban sprawl over time and space, as well as to make clearer which are its major determinants is, therefore, an important prerequisite to prepare a solid background for the definition of effective national, regional and/or local urban environment strategies. This is particularly true for Europe, compared to North America, not only because of an indisputable scientific delay of about ten-years, but also because Europe presents a very much scattered puzzle of territorial conditions, which vary from country to country, region to region and, even, city to city.

Major research challenges can be summarised as follows:

i) to qualify and quantify collective costs imputable to diffuse and scattered patterns of urban development over time and space, with the intent of drawing attention on contingent trends and tendencies, as well as on likenesses among different cities from which to share experiences;

---

research projects related to the revitalization of city centres and neighbourhoods, the restoration and re-use of contaminated and brownfields sites, sustainable retrofitting of urban areas such as large housing estates and on strategies to reduce urban sprawl based on the integration of land use and transport planning.

ii) to achieve a comprehensive assessment of the determinants of urban sprawl with the aim of setting priority requirements and, thus, a ranking of priority management actions;

iii) to analyse the effects of past urban planning policies to enhance feed-back processes and the definition of good-practice for sustainable urban planning.

The focus of the present chapter is on points i) and ii), with particular emphasis on the connections among sprawl and the impacts of urban mobility . In respect to this, even though, as we said, the debate on urban development and its consequences on environmental and social issues has started to be tackled in the European spatial policy, sound empirical and quantitative results on the collective costs of sprawl are still partial. It is indeed not straightforward to measure the environmental externalities related to the phenomenon of sprawl, especially due to the difficulties of finding sound and reliable performance indicators[5]. Even more challenging is the analysis of the determinants of urban sprawl, especially if one starts from the stance that more perspicacious analyses ought to focus on a local territorial level.
Among the bunch of studies available on the European context[6], a qualitative comparative analysis of pros and cons of different urban growth patterns by Breheny et al. (1993) presents suggestions and recommendations for urban planning actions, set at various administrative levels, but lacks relevant results on the preferable urban growth mode. Camagni et al. (2002b) performs an empirical quantitative analysis on the metropolitan area of Milan, aimed at establishing whether different patterns of urban expansion generate different level of land consumption and heterogeneous impacts of urban mobility. In particular, the study provides first insights on whether there is any significant correlation between variables describing the form of urban expansion and the impact of urban mobility, as an indicator of the pressure on the quality of day-life in metropolitan areas and on the urban environment, with the aim of providing a basis for orienting future planning policies. A mobility impact based on commuting data referring to 1991 is used to capture the level of environmental impact of mobility on commune level, estimated on the basis of trip time and modal choice. The intensity of mobility

[5] At a local level, the European Commission has recently provided a set of urban environmental indicators, useful to provide focus for establishing initial policy and action plans, as well as for communicating locally to citizens and to raise the general level of awareness on key urban environmental indicators, which can be used on a voluntary basis (European Common Indicators, ECI www.sustainable-cities.org/indicators/index.htm). Although this includes interesting parameters –such as local mobility and passenger transportation, or the availability of local public open areas and services - the level of detail employed is nevertheless insufficient to cover extensively all of the issues related to sprawl.

[6] It is not the purpose of this paper to provide an extensive analysis of the North America experience, which expresses incomparable administrative, institutional, territorial and suburbanization features in respect to the European scenery. Nevertheless, it worth to notice that the great majority of empirical studies on the collective costs of mobility nowadays available relate mostly to North America. Yet, results show a significant correlation between different forms of urban development and collective costs, which appear to be higher for less dense.

impact is then explained by some variables controlling for geographical, socio-economic, morphology and transport efficiency factors. The results of the analysis confirm the expectation that a higher environmental impact of mobility is associated with more extensive and sprawling urban development, more recent urbanisation processes and residential specialisation. The same procedure is used in two subsequent studies on the urban areas of Brescia (Camagni et al. 2002) and Bologna (Musolino and Guerzoni, 2003), both referring to the year 1991.

More recently, Salatino (2004) follows the methodology by Ewing et al. (2002) and provides a static analysis, for the Italian regions, of the univariate correlation between an aggregate indicator of spatial dispersion and a number of parameters that capture some costs imputable to sprawl, with special focus on the private costs of mobility (e.g.: household petrol consumption, household transport expenditures, and so forth). Salatino (2005) proposes a similar static analysis at national level for 11 EU countries, including Italy, and a Path Analysis exercise to find causal relationships among the variables analysed. Both analyses show positive and significant correlation among parameters controlling for urban dispersion and transport costs, overall providing further indications of the fact that more dense urban forms are accompanied with higher costs of mobility.

In the analysis proposed in the present Chapter, a local level focus is adopted and an empirical quantitative procedure similar to the one employed by Camagni et al. (2002b) is enlarged to other seven Italian urban areas, namely: Bari, Florence, Naples, Padua, Perugia, Potenza and Turin[7].

In respect to the previous papers, the novelty of the present study is threefold. Firstly, the analysis is dynamic and explores the changes occurred to the intensity of the mobility impact across a ten year period, from 1981 to 1991. This is a relevant decade to focus on with the intent to study the Italian context for a number of reasons: it corresponded to an overall 'deregulation' period that is thought to have promoted, indirectly, an unprecedented success of diffuse urban development patterns; it corresponded to an important economic boom, which led to new practice of private mobility.

Secondly, using multivariate cross-section regression analyses, we consider several urban areas at once, being therefore able to explore whether there are significant differences in the way the model explains variations in the mobility impact across various "prototypes" of Italian urban areas. Cities are selected, in fact, to provide a representative picture of metropolitan and polycentric Italian urban agglomerations, either located in the North, Centre or South of Italy (see Figure 1).

---

[7] Each urban area is a province (from the administrative point of view), and it includes in its territorial borders a number of communes. Overall, more than 700 communes are analysed (see Figure 1).

The paper tries, on one hand, to find empirical evidence of the increasing collective impact of urban mobility and, on the other hand, to figure out whether factors expected to influence the intensity of mobility impact do vary as the city of concern varies or, instead, if results are valid and sound for all the Italian cities analysed. This is a very important point for future research, which can help to give an indication on which ought to be the level of analysis to be preferred for studying the negative effects of urban sprawl on mobility, and their rousing factors. Available studies, in fact, propose either national, regional or local level analyses, often disregarding whether the impacts of sprawl are actually traceable and measurable at higher levels than the local one. In particular, the urban scale to which empirical analyses and case studies should apply remain uncertain.

Finally, we propose a conceptual interpretation of the causal chain in the explanation of the mobility impact intensity and we test it using Causal Path Analysis (CPA) (see a previous version of this study in Travisi and Camagni, 2004). Differently from Salatino (2005), which uses path analysis as an exploratory tool through which to highlight, with an inductive process, incidental correlations among variables, path analysis here is used to test an *a priori* defined conceptual causal model on the impacts of mobility.

The reminding of the paper is organized as follows. In Section 2 we present the conceptual underpinnings of the development of the mobility impact model and describe our hypotheses as to the reasons for heterogeneities in the intensity of mobility across cities. In Section 3 we present results of the dynamic analysis of the intensity of the mobility impact across 1981-1991; while Section 4 presents and discusses the main findings of our empirical multivariate cross-section regression analyses. In Section 5 a conceptual interpretation of the causal chain in explaining the impact of mobility is proposed and empirically tested. Finally, Section 6 provides conclusions and recommendations for future research.

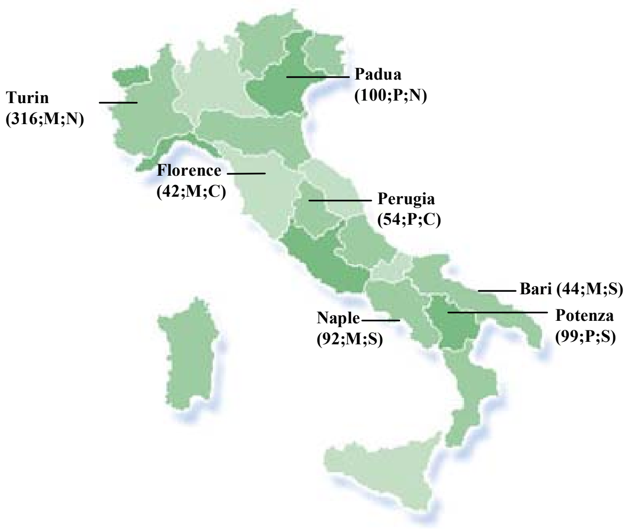


Figure 1: Geographical location and a taxonomy of the urban areas of concern. In brackets is reported: the number of communes in each area, the type of urban settlement (M: Metropolitan; P: Polycentric) and their geographical location (N: North; C: Centre; S: South). Note that polycentrism is measures as the ratio between the population of the chief town of a given urban area (province) and the sum of the population of the ten biggest cities belonging to the province. A given urban area is defined as Metropolitan and Polycentric, respectively, whenever this ratio is bigger or lower than 0.5.

2.1 Explaining the impact of mobility in Italy

2.1.1 Creating a mobility impact index

Many studies on urban sustainability show that the demand for mobility is an important component of the environmental impact of urban growth but, so far, empirical evidences and a systematic quantification of the intensity of this phenomenon are still lacking in the European context and still partial at the Italian level. The first research question addressed in this paper is, therefore, to measure the intensity of urban mobility at local level, for a group of seven Italian urban areas representative of metropolitan and polycentric urban agglomeration either located in the North, Centre or South of Italy. Previous results by Camagni et al. (2002a, 2002b) Musolino and Guerzoni (2003), Salatino (2004) show, for the Italian context, that urban settlements characterised by sprawling patterns of development are associated with a higher demand of urban mobility and higher environmental impacts than more compact ones.

An additional question concerns the dynamic of the demand of urban mobility and the related collective costs for the Italian context. In particular, as we move from 1981 to 1991 commuting data, we expect to observe an overall increase in the intensity of the impact of urban mobility, caused by the progressive replacement of diffuse in place of more dense urban development patterns, and by a change in individual preferences for alternative transport modes towards private mobility.

How to capture urban mobility? For Italy, the lack of reliable mobility data entails a methodological and operational problem. As far as mobility is concerned, we use the only reliable data available at the local (commune) level, i.e., the journey-to-work data recordered in the 1981 and 1991 Census for each active resident. These are disaggregated by mode into 6 categories[8] and, within each mode, by the time taken: up to 30, 31-60, over 60 minutes.

As trip length is not recorded in the Census, a drawback of this approach is that it is not possible to link trip duration and length and, therefore, it is not possible to distinguish between the effect of distance and the effect of vehicle speed and traffic conditions. Another limitation concern the nature of available data, which account only for one segment of urban mobility (commuting), disregarding all the non-systematic aspects of mobility. Being aware of the existing data limits, we employ –as in Camagni et al. (2002b)- journey-to-work data to develop a so called *mobility impact index*.

From the data on travel modes and the time length of commuter trips (direction outside or within each municipality), an indicator of the environmental cost of mobility is created. As the environmental pressure of mobility is strictly related to mode and time length, a weighted index of pressure is therefore defined for 18 different combinations of mode and time, according to the structure of available data.

The matrix of weights for time and mode, applied to each commuting trip to capture its level of environmental pressure is described in Table 1, and it is based on two main assumptions:

- For any given mode, the impact of a trip per unit of time decreases with the trip length, according to a number of simple, but not trivial, evidences: gas emissions and pollution generated by vehicles are higher at the beginning of the trip; traffic fluidity increases outside urban areas; trains stops decrease on longer journeys, etc.
- Set conventionally at 1.00 per passenger per minute the weight of the trip by car, the weight of the various modes for a given duration is, respectively: 1/3 for motorcycle and bus; 1/5 for rail trips and transported passengers; zero for pedestrians or bicycle trips and passengers (this is justified by considering that the possible lengthening of a journey due to the presence of the passenger is already absorbed by the length of the journey travelled by the driver).

Using the values in Table 1, the commuters recorded in the Census are transformed into 'Equivalent Impact Commuters' (EIC). Given the municipality kth, the intensity of the mobility impact, I_k, can be estimated as the ratio between the EIC and the actual commuters (at commune level) as follows:

[8] The categories considered are: walking or other soft means; car driver; motorcycle; car passenger; train, tram or metro.

$$I_k = \frac{\sum_{ij} m_{ij} w_{ij}}{\sum_{ij} m_{ij}} \quad \text{Eq- 1}$$

where: m_{ij} is the number of commuters moving within the *k*th municipality plus the number of commuters going outside the *k*th municipality for the *i*th travel mode and the *j*th trip time class; and w_{ij} is the weight assigned to the *i*th travel mode and the *j*th trip time class (see Table 1).

A drawback of this approach relates to the definition of the weight matrix that, as it is now, it is not linked to any physical impact dimension and, thus, provides a relative rather than an absolute measurement of the urban mobility impact. On the other hand, a big advantage of this methodology compared to others more direct indicators of environmental impacts is that it refers directly to the demand of urban mobility generated in each municipality as a consequence of its settlement pattern, rather than referring to some other mobility effects, which can often originate from other municipalities[9].

The subsequent sections discuss the dynamic of the mobility impact index in the Italian context during the decade 1981-1991, and provide a multivariate analysis of factors explaining the intensity of mobility impact across Italy, relating 1991.

Table 1: Weights by travel time and travel mode.

	Classes of travel modes (*i*th)	Weights for modes	Time (min)		
Classes of trip time (*j*th)			*0-30 min*	*31-60 min*	*>60 min*
Average trip time			15 min	45 min	75 min
Weight per time unit			1.20	1.00	0.80
Equivalent trip time			18 min	45 min	60 min
	Walking or other soft means	0.00	0.00	0.00	0.00
	Bus	0.33	0.13	0.33	0.44
Travel mode	*Private car (driver)*	1.00	0.40	1.00	1.33
	Motorcycle	0.33	0.13	0.33	0.44
	Private car (passenger)	0.00	0.00	0.00	0.00
	Train, tram, underground	0.20	0.20	0.20	0.27

[9] To improve the methodology, we are now trying to re-define the weight matrix on the basis of gas emission factors related to travel mean and trip time.

2.1.2 Dynamic of mobility impact during 1981-1991

Before exploring the determinants of the intensity of mobility, we analyze the distribution of the mobility impact index across the seven urban areas (province) of concern and its variation during the period from 1981 to 1991. As we said, during this decade Italy experienced the so called 'deregulation' period and an intense economic growth, two factors that have certainly significantly contributed to the diffusion of sprawl in this country, traditionally scattered by densely populated and well-structured cities. It is therefore interesting to follow the dynamic of the demand of urban mobility during such period, in consideration of this process of development and modernization, and the consequent increase in income level and change in mobility individual habits and behaviours.

This analysis is here performed at different levels, so that we look at: i) the average impact within each province; ii) the average impact of the main city within each province (i.e. the chief town); iii) the average impact related to minor towns located within each province. This allows to take into account the fact that, within a given province, the dynamics of both socio-economic and territorial conditions during the period 1981-1991 can be significantly different if we consider main or minor towns.

Figure 2 and Figure 3 show, respectively, the distribution of mobility impact and box-plots reporting median, percentiles and minimum and maximum values for subgroups (based on province, geographical location and level of polycentricism) for 1981 and 1991. Table 2 provides descriptive statistics of the mobility impact index for 1981 and 1991 at the province level, whereas Table 3 shows the average values and the percentage rate of increase of the impact for provinces, chief towns and minor towns.

If we look at absolute values in Table 2, a first result is that the impact of urban mobility decreases as one moves from northern to southern Italian regions, as one would expect given the higher income level of northern Italian area, which normally favours the diffusion of motorised private travel means. The higher impact values refers to Turin, and this is not surprising as this is the 'land' of the main Italian car producer, Fiat. Nevertheless, the positive trend in the intensity of the mobility impact over the decade 1981-91 characterises all the urban settlements considered, and it is higher for those areas located in the southern Italian regions, Bari and Potenza. The increment ranges from a minimum of 14.8 percent for Turin, to a maximum of the 37.3 percent for Potenza (Table 3). Interestingly, with the exception of Turin and Padua, minor towns experienced an higher percentage increase in the impact of mobility than chief cities.

A second result is, therefore, that urban mobility has increased noticeably across the whole Italian peninsula for reasons that are beyond the increase of the Italian population, which on average has not exceeded the 5.3 percent points. A thorough analysis of the reasons for such an increase lies outside the scientific aim of this paper and would require an investigation on how the socio-economic features of a given urban settlement has varied during this time lag (e.g. household income, transport networks and infrastructures, changes in production factors and job markets, etc.). Without entering into the detail of this discussion, it suffices to say that among the main drivers of such tendency the literature indicates, for Italy, the increasing demand of urban mobility, together with a shift of individual preferences towards private mobility motivated, to some extent, by the higher income level that made car market accessible to wider portions of citizens, as well as by the lower competitiveness of public compared to private travel means (Giordano et al., 2001; Lattarulo, 2003).

The change in individual preferences towards private travel mode is confirmed by the results showed in Table 4. Table 4 indicates that, during the decade 1981-1991, the distribution of commuters by travel modes has changed in favour of private travel means, with a particularly relevant increase in the use of private car. Such increment ranges from a minimum of 9 percent for Naples, to a maximum of 14 percent for Turin and Padua. At the same time, other private soft means have been abandoned and the incidence of the use of public transport has also decreased, especially for what concerns the use of public bus. As the weight matrix use to compute the mobility impact index assigns higher impacts to private transport means (especially car), we observe higher impact values for 1991[10].

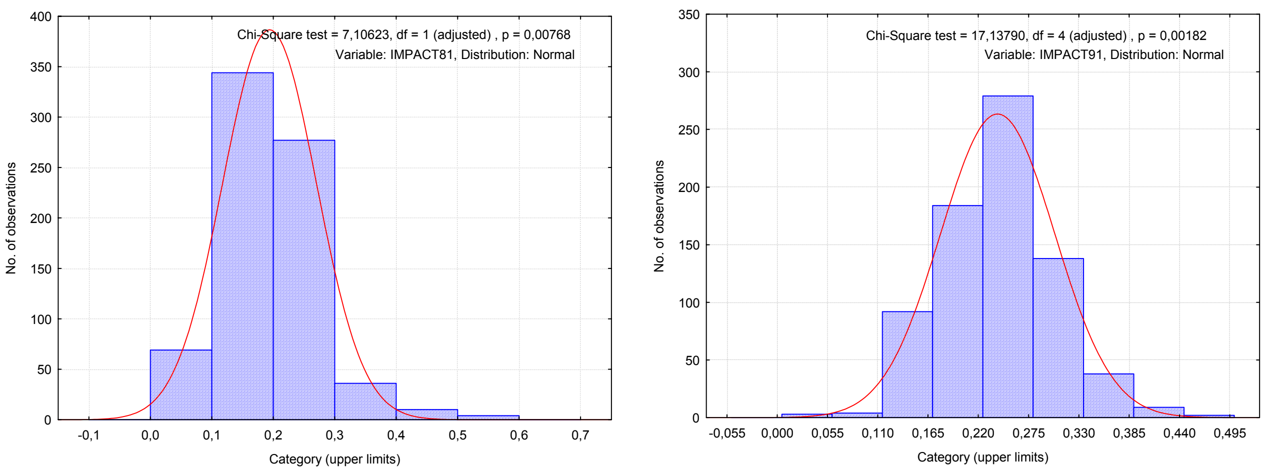


Figure 2: Distribution of mobility impact index for 1981 and 1991.

[10] This paper does not investigate the reasons why individual preferences for alternative travel modes has changed.

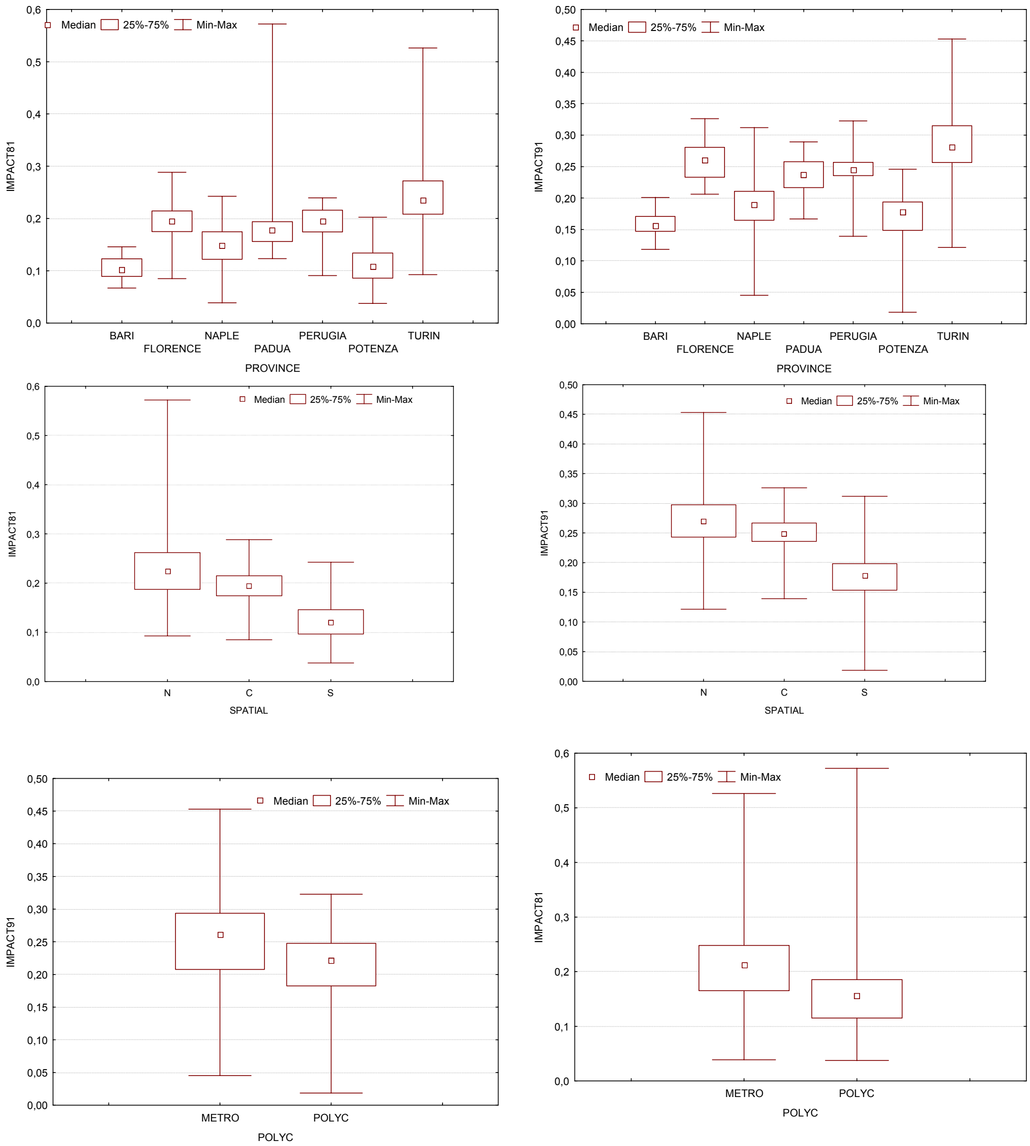


Figure 3: Box-plots reporting median, percentiles, minimum and maximum values of the mobility impact index for 1981 and 1991, according to the province, their geographical location and their level of polycentrism.

Table 2: Descriptive statistics of mobility impact index for 1981 and 1991.

Variable	*Nobs*	*Mean*	*Median*	*Minimum*	*Maximum*	*Std. dev*
IMPACT81						
Bari	44	0,105	0,102	0,067	0,146	0,021
Florence	42	0,195	0,194	0,085	0,288	0,037
Naples	91	0,151	0,149	0,039	0,242	0,043
Padua	100	0,198	0,178	0,123	0,572	0,089
Perugia	48	0,189	0,195	0,091	0,240	0,032
Potenza	99	0,109	0,108	0,038	0,202	0,032
Turin	315	0,245	0,235	0,093	0,526	0,059
IMPACT91						
Bari	44	0,159	0,156	0,119	0,201	0,019
Florence	42	0,260	0,261	0,206	0,326	0,028
Naples	91	0,189	0,190	0,045	0,312	0,042
Padua	100	0,237	0,238	0,167	0,289	0,028
Perugia	48	0,244	0,245	0,139	0,323	0,030
Potenza	99	0,174	0,178	0,019	0,246	0,036
Turin	315	0,287	0,282	0,121	0,453	0,049

Table 3: Mean value and rate of increase of the mobility impact index per urban area and time period.

	1981			1991			Increase rate 1981-91 (%)		
	(a) Province	(b) Chief town	(c) Other	(a) Province	(b) Chief town	(c) Other	(a)	(b)	(c)
Bari	0,105	0,142	0,115	0,159	0,181	0,155	33,9	21,9	26,0
Florence	0,195	0,184	0,195	0,260	0,206	0,262	25,2	10,8	25,5
Naple	0,151	0,195	0,150	0,189	0,203	0,189	20,4	3,9	20,6
Padua	0,198	0,174	0,198	0,237	0,221	0,237	16,3	21,3	16,3
Perugia	0,189	0,199	0,189	0,244	0,240	0,244	22,7	17,0	22,6
Potenza	0,109	0,148	0,109	0,174	0,199	0,174	37,3	25,7	37,5
Turin	0,245	0,192	0,245	0,287	0,241	0,287	14,8	20,2	14,8

Notes:
(a) mean impact value for each urban area (province)
(b) impact value for the chief town of a given province
(c) mean impact value referring to the minor towns of a given province

Table 4: Percent distribution of commuters by travel mean during 1981 and 1991.

		Naples	**Turin**	**Bari**	**Florence**	**Padua**	**Perugia**	**Potenza**
Walking or other soft means	*1981*	44%	29%	56%	30%	37%	28%	58%
	1991	41%	22%	45%	23%	26%	21%	41%
Bus	*1981*	24%	25%	13%	23%	17%	24%	17%
	1991	17%	18%	10%	15%	15%	17%	19%
Private car (driver)	*1981*	15%	28%	17%	27%	25%	32%	16%
	1991	24%	42%	28%	37%	39%	45%	29%
Motorcycle	*1981*	1%	2%	2%	8%	12%	6%	1%
	1991	2%	1%	2%	11%	7%	3%	1%
Private car (passenger)	*1981*	4%	7%	6%	6%	7%	7%	6%
	1991	7%	9%	10%	8%	10%	11%	9%
Train,tram,metro	*1981*	11%	10%	6%	6%	2%	3%	3%
	1991	10%	8%	6%	6%	3%	2%	2%

2.1.3 Determinants of mobility impact: an exploratory univariate analysis

The hypothesis underpinning this paper is that, within a relatively homogeneous area (in terms of income level and main socio-economic conditions), such as each of the seven Italian urban areas of concern here, the local differences in the mobility patterns can be explained, at least to a certain extent, by the typology of urban development occurred in such areas. Thus, the form in which urban growth has occurred and, as well, its dynamic is expected to influence the intensity of the mobility impact at a local level and its spatial distribution. In particular, the economic literature on this issue suggests that a number of factors might have a role in explaining why urban mobility changes its intensity across various countries and urban areas. In particular, we expect that four types of variables might influence the intensity of mobility impact at a local level: geographical, socio-economic, morphology variables, and variables measuring the accessibility and efficiency of private versus public transport.

The spatial distribution of the indices of impact intensity is examined using an econometric analysis to ascertain whether there are significant correlation with any of the selected independent variables describing the characteristics of a given urban settlement. All regression variants refer to 1991 and the mobility impact index is used as the dependent variable and captures, at commune level, the intensity of the collective impacts associated with the demand of urban mobility. Few variables controlling for structural and socio-economic differences across urban areas are used as explanatory variables. The relationship is established using least squares estimators. Three classes of explanatory variables are included in the econometric analysis: i) spatial, ii) structural socio-economic, and iii) variables relating to the demand and supply of urban mobility.

Spatial variables include factors that contribute to describe the structural and spatial configuration of a given municipality located within a certain urban area. Among the number of possible parameters, indicators and proxies that can be used to capture the spatial structure of a given towns, we consider a variable that accounts for the distance of a given municipality from the chief town of the urban area to which it belongs (DISTANCE), a variable estimating the incidence of rural landscape within a given municipality (RURAL), and the overall city dimension (POPTOT). In order to describe urban areas according to their sprawling behaviour, we use -as a proxy- the gross density of the urban settlement (DENSITY). Among the socio-economic variables we consider the dynamic of urban growth in the decade under analysis (GROWTH), and a variable explaining the 'functional mix' a given municipality (MIXITE). Finally, the third class of factors includes three variables, which control, respectively, for the accessibility and efficiency of public transport in a given municipality, and for its self-containment capacity (SHAREPUB, COMPUB, SELFCONT). Detailed description and descriptive statistics of explanatory variables are provided in Table 5 and Table 6.

In respect to the abovementioned discussion, our main expectations can be summarised briefly as follows. Population density is expected to have mainly an indirect negative effect on the mobility impact, through its influence on the average trip time of public transport and, hence, on the modal spilt of commuter trips in favour of public transport[11]. For what concerns the city dimension, we expect to notice an overall increase in the intensity of mobility moving from smaller to bigger towns, due to the fact that the number of motorised vehicle circulating increases, as well as trip time, and this favours traffic intensity and congestion. Nevertheless, the effect of city dimension might be compensated by the travel modal choice, whether oriented towards more environmental friendly and public ones, and also by the city density, whether high.
Demographic growth rate is expected to show a positive relationship with the intensity of mobility impact. The impact index is expected to increase with the urban dynamisms of the commune of concern: in fact, a high population growth rate is generally also associated with the existence of areas of recent expansion, typically scattered all around the older urban conurbation. The literature also gives considerable importance to the residential *versus* productive attitude of a municipality, in connection with the demand of mobility as well as with sprawl. Sprawl is in fact both a cause and an effect of land use functional divisions, which reinforces the need to commute and increases dependence on private transport modes. This relationship can be conveniently interpreted as an indicator of the level of functional diversification-integration-segregation, i.e. sort of a 'functional mix' of each municipality. In particular, we expect to find a negative relationship with the mobility impact indicating that urban mobility becomes more intense as the proportion of employment decreases whereas the residential vocation of the area increases. The relationship between the impact of urban mobility and the efficiency and competitiveness of public transport is also relevant. In respect to this, Camagni et al. (2002b) find empirical evidence that, at least for the metropolitan area of Milan, the mobility impact index is inversely correlated to the share and competitiveness of public transport. Another potentially relevant source of variation concerns the direction of commuters during home-to-work daily trips. In this case, we focus on whether commuters move within the city borders, or whether they are directed outside their own residential town, in connection with the "functional mix" variable. Therefore, we experiment whether what we indicates as the "self containment" capacity of a given town can help to explain variations in the intensity of the mobility impact. As the literature does not suggest which direction one should expect, our analysis will provide original insights on this concern.

We analyse first univariate relationships between dependent and independent variables using pooled and categorised data, after proceeding with the normality test of the independent variables. Figure 4a provides scatter plots, which give preliminary

[11] We are aware though that, over a certain level and under specific local conditions, high urbanisation density can contribute to the phenomenon of congestion and increase the overall impact of mobility. Nevertheless, the present paper is not addressing this issue.

information on the direction of each univariate relationship. Figure 4a shows that spatial factors (i.e. RURAL, DENSITY, DISTANCE, POPTOT) are all negatively correlated with the impact of mobility, and that such correlations are statistically significant. Differently, the city dimension (POPTOT) deserves a thorough discussion. The related scatter plot shows that the mobility intensity decreases as the city dimension rises. This contradicts our expectation to find a positive and significant univariate relationship between these variables but, on the other hand, the scatter plot between city density and its dimension shows that, on average in our sample, bigger cities are also those more densely built and therefore, in principle, less affected by sprawl.

Middle graphs refer to socio-economic factors (Figure 4b). As expected, GROWTH is positively correlated with IMPACT; while, in contrast with our expectations, the relationship with the log of MIXITE is also positive. Nevertheless, if one draws scatter plots categorised on the basis of the spatial position of the urban areas (i.e., located in the north, centre or south of Italy), one can observe negative and significant correlations between the impact of mobility and the functional mix variable.

Bottom graphs refer to the relationship between the intensity of mobility impact SELFCONT, SHAREPUB and COMPUB and show, in all of the cases, a negative and significant correlation (Figure 4c) with the impact of mobility. If one moves to categorical scatter-plots though, the direction of these relationships changes according to the geographical position of cities and towns, and this will need to be address in the regression analyses.

In sum, the exploratory univariate analysis of the factors determining the impact of urban mobility indicates that our a priori expectations are generally confirmed. Interestingly, some of the univariate relationships that are difficult to capture using pooled data (for instance, the functional mix variable), emerge clearly once we use sub-samples based on the spatial position of urban areas, this suggesting that simple univariate correlations can hardly be captured at national level, or that they might lead to misleading results (see Salatino, 2005). In the reminder of the paper, we move from univariate to multivariate relationships and provide results of different variants of cross-section regression analysis, all referring to 1991.

Table 5: Variables list and description.

Type of variable	*Abbreviation*	*Definition*
Dependent:	IMPACT91	Average intensity of the impact of urban mobility at commune level. The impact of mobility is calculated as the ratio between the EIC and the number of commuters recorded in the Census
Spatial	DISTANCE	Distance [Km] between the centroid of a commune and the centroid of the capital of the province
	RURAL	The incidence of rural areas is calculated as the rural area [Km^2] over the total land area [Km^2]
	DENSITY	Gross density of the commune, calculated as the number of residents over the whole land area [Km^2]
	POPTOT	Total number of residents
	SUPTOT	Total land area [Km^2]
	NORTH	Takes value 1 if the city is located in the North of Italy
	CENTRE	Takes value 1 if the city is located in the Centre of Italy
	SOUTH	Takes value 1 if the city is located in the South of Italy
Structural	MIXITE	Ratio between the number of employments and residents of a commune
	GROWTH	Growth rate of the population between 1981 and 1991
	METRO	Takes value 1 if the urban area is metropolitan
	POLYC	Takes value 1 if the urban area is polycentric
Mobility	COMPUB	Relative competitiveness of public transport, calculated as the ratio between the average time taken for trips made with private transport and the average time taken for trips made with public vehicles (the ratio is multiplied for 100 for computational reasons).
	SHAREPUB	Market share of public transport calculated as the percentage of all trips made by public transport
	SELFCONT	The degree of containment of urban mobility within a given urban settlement (at commune level), measured as the ratio between the number of commuters moving out of the commune, and the number of commuters moving within and going outside the commune

Table 6: Descriptive statistics of independent variables, referring to 1991.

Variable	*Mean*	*Minimum*	*Maximum*	*Std.dev*
DISTANCE	71,78	1,00	157,00	30,91
DENSITY	5,10	0,46	9,48	1,56
RURAL	48,99	1,77	175,15	24,23
GROWTH	2,25	- 55,30	69,90	10,34
MIXITE	0,48	-	2,34	0,29
SELFCONT	0,36	0,01	1,00	0,16
COMPUB	35,21	3,71	174,57	18,65

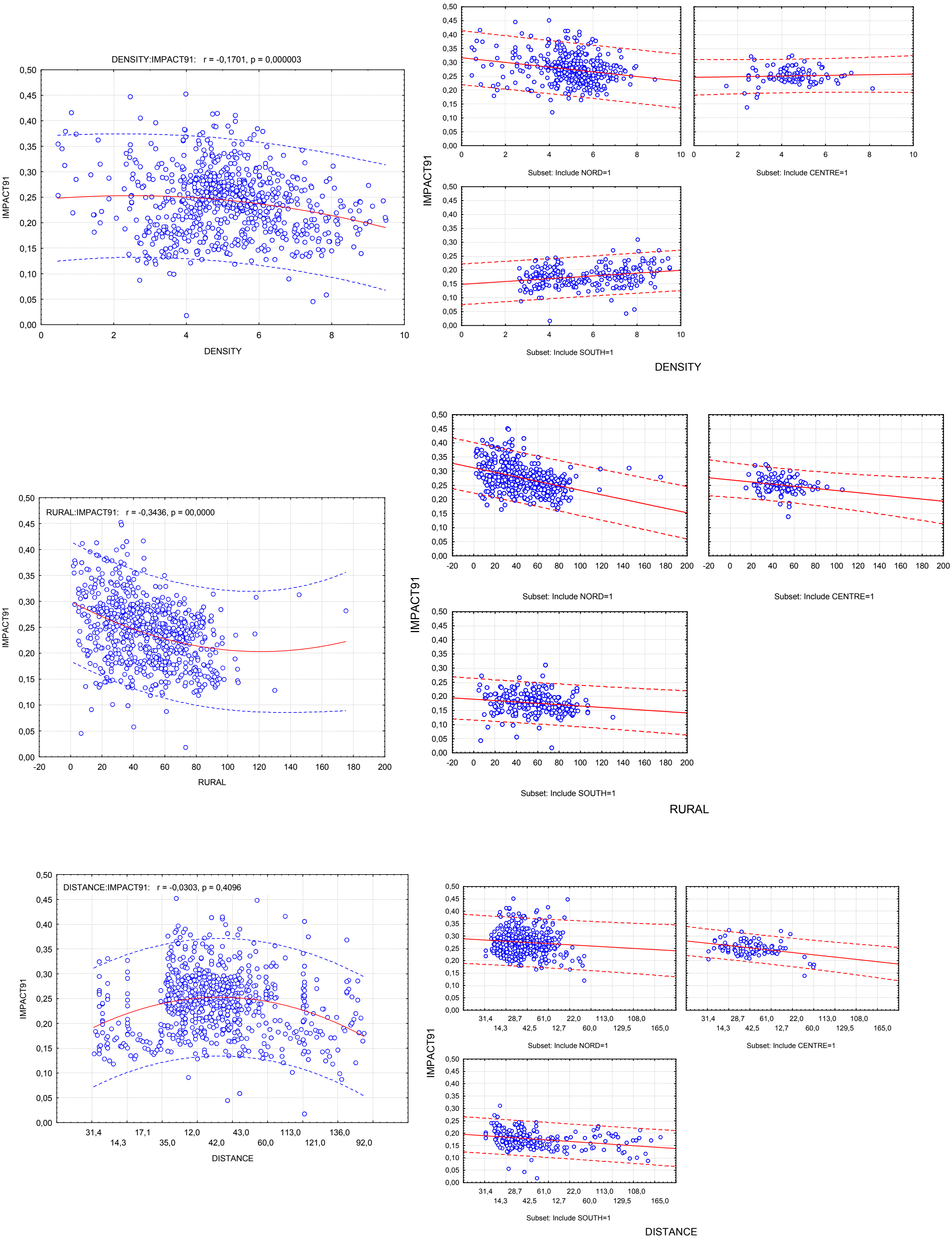
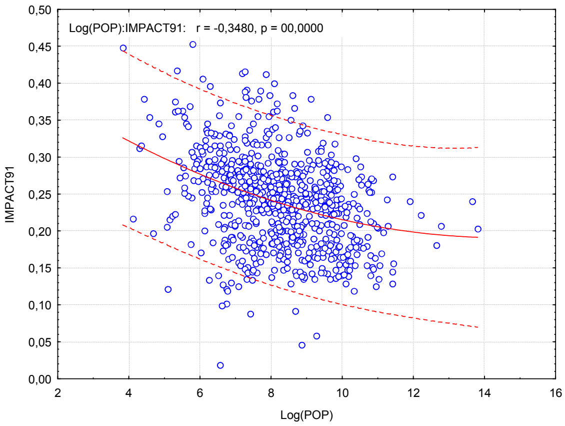
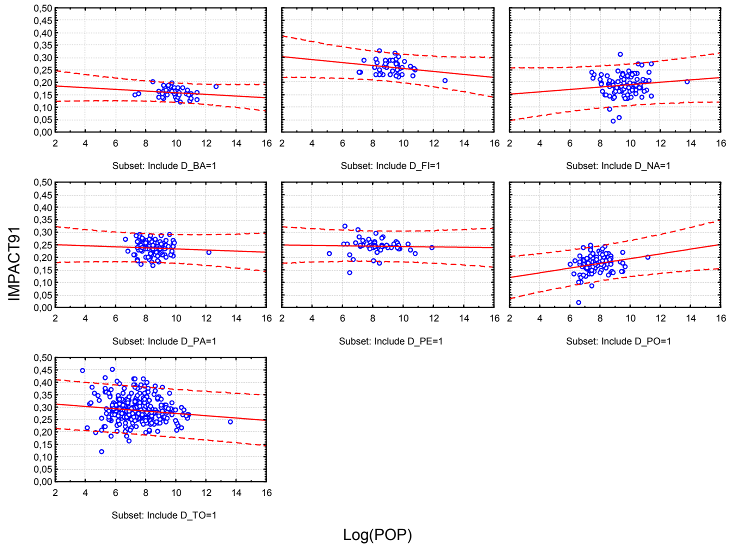
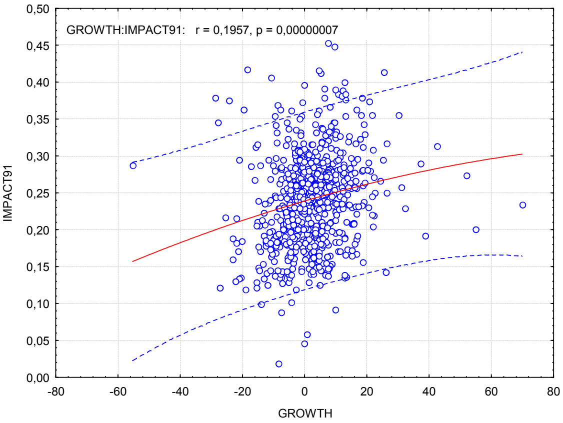


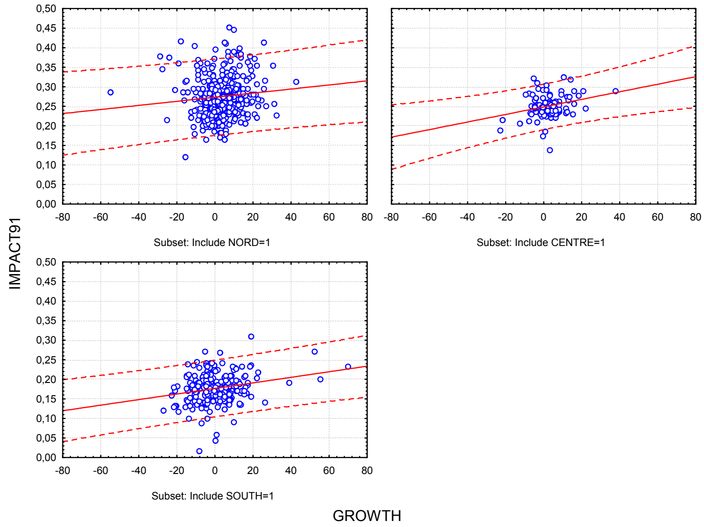
Figure 4a: scatter plots of ‘spatial’ explanatory variables, with polynomial and linear fitting and regression bands at 95 percent prediction level.

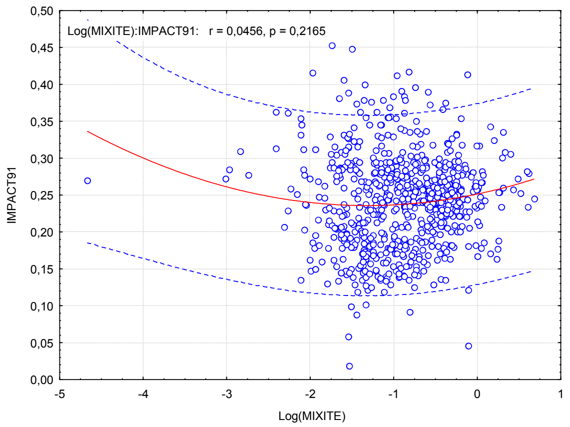
Figure 4b: Scatter plots of ‘socio-economic’ explanatory variables with polynomial and linear fitting and regression bands at 95 percent prediction level.

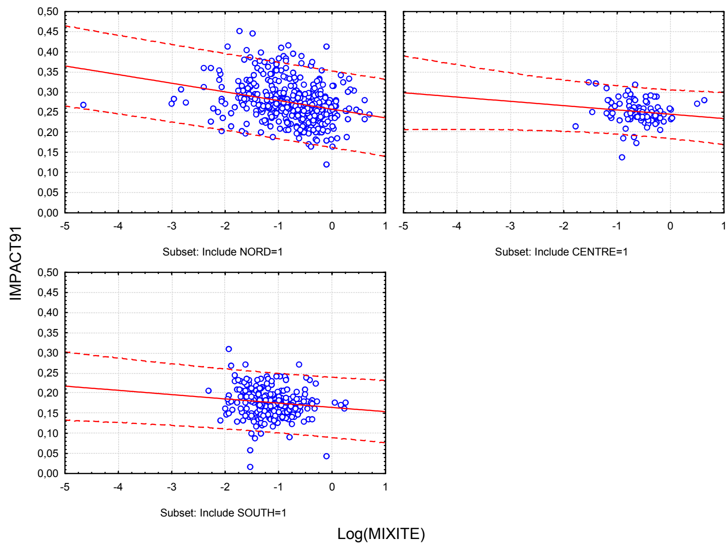


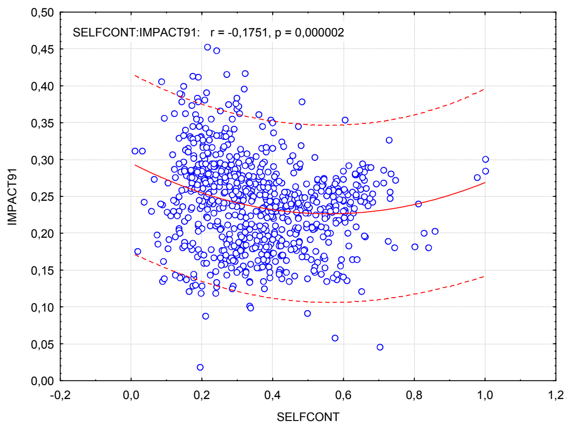



GROWTH:IMPACT91: r = 0,1957, p = 0,00000007
IMPACT91
GROWTH


IMPACT91
Subset: Include NORD=1
Subset: Include CENTRE=1
Subset: Include SOUTH=1
GROWTH


Log(MIXITE):IMPACT91: r = 0,0456, p = 0,2165
IMPACT91
Log(MIXITE)


IMPACT91
Subset: Include NORD=1
Subset: Include CENTRE=1
Subset: Include SOUTH=1
Log(MIXITE)


SELFCONT:IMPACT91: r = -0,1751, p = 0,000002
IMPACT91
SELFCONT

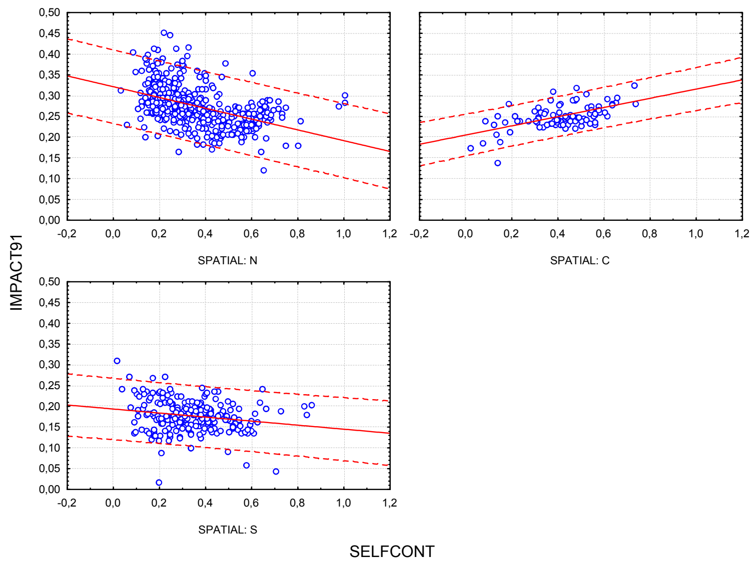
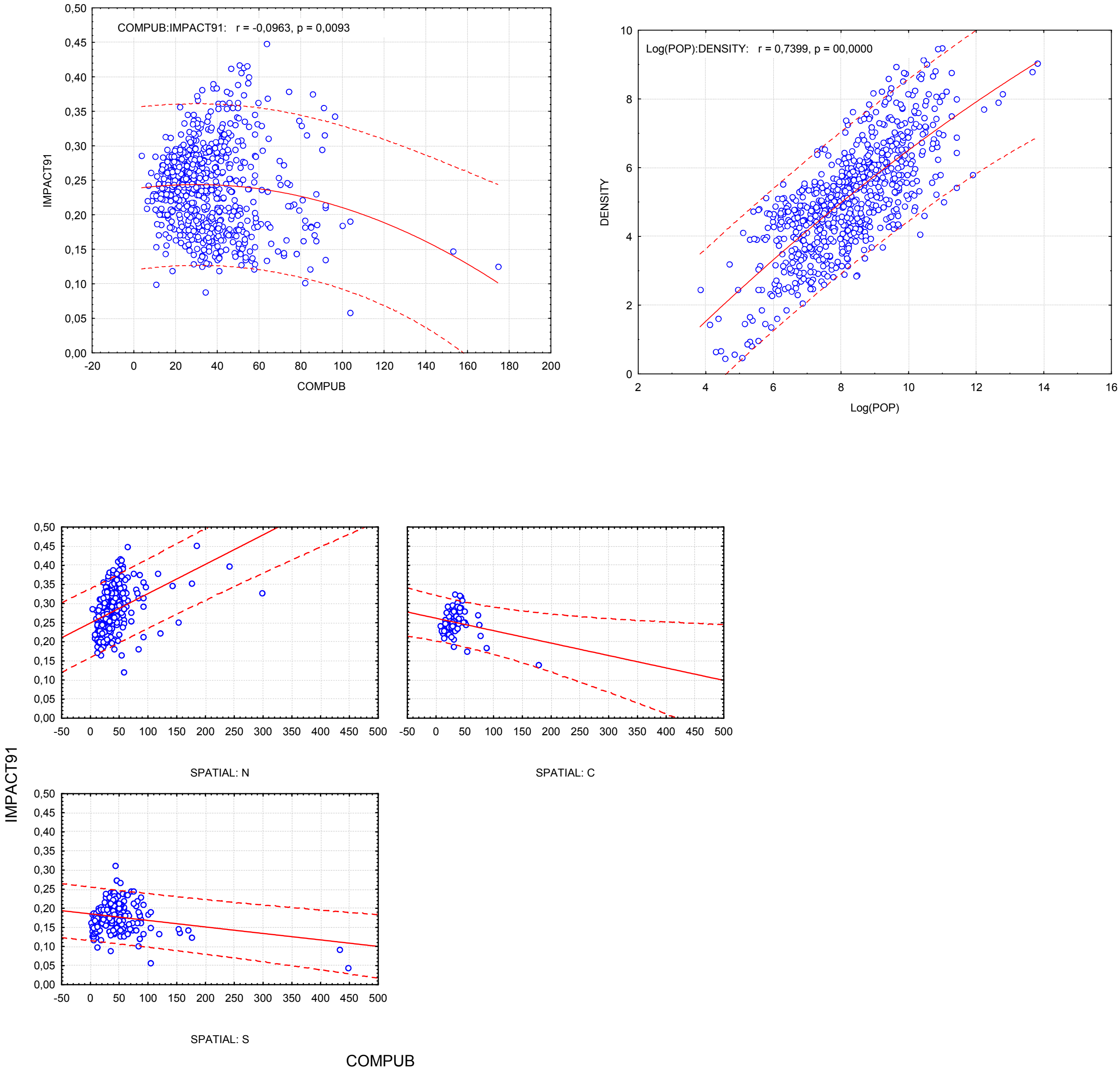
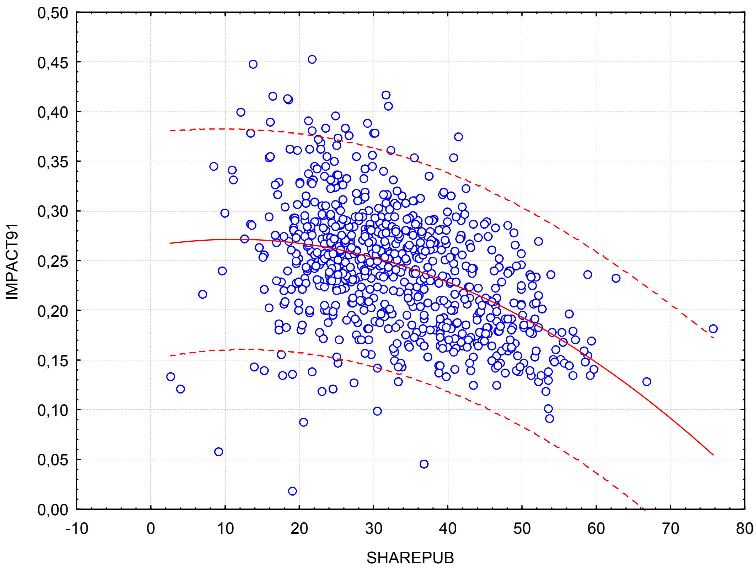
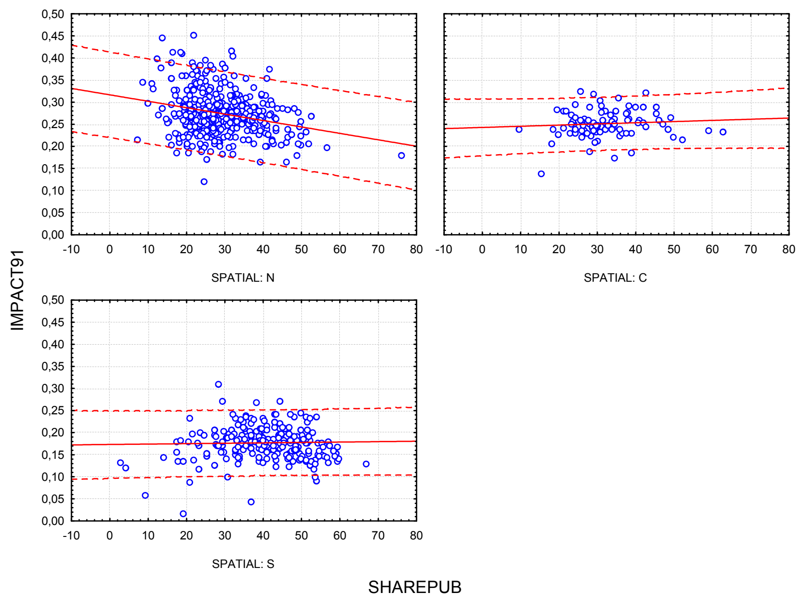

IMPACT91
SPATIAL: N
SPATIAL: C
SPATIAL: S
SELFCONT

Figure 4c: Scatter plots of ‘mobility’ variables, referring to 1991, with polynomial fitting and regression bands at the 95 percent prediction level.

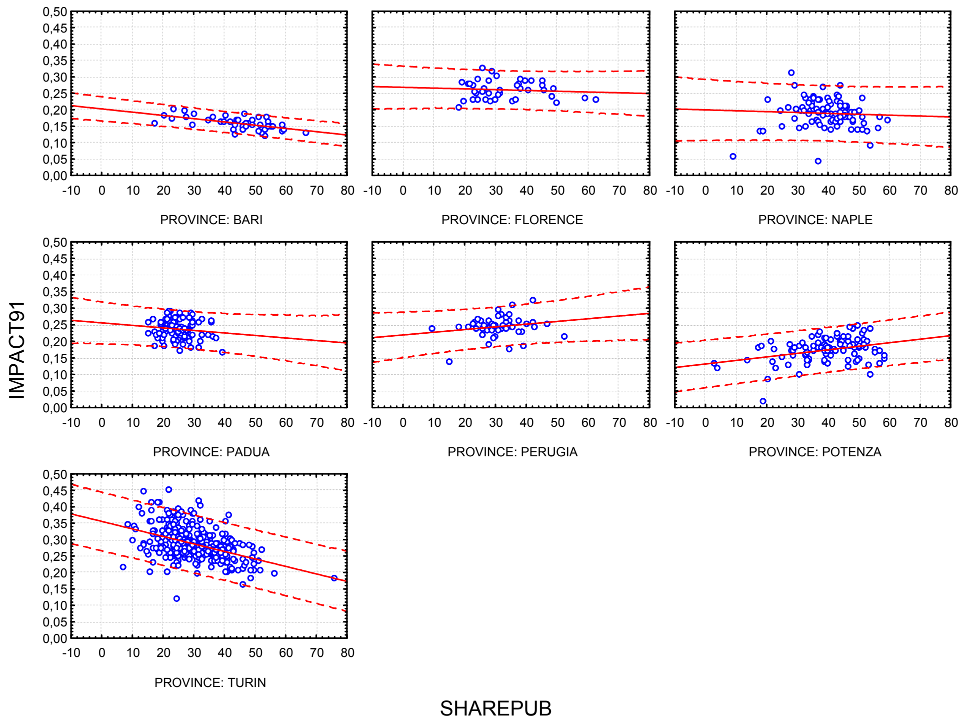




IMPACT91
SHAREPUB



IMPACT91
SPATIAL: N
SPATIAL: C
SPATIAL: S
SHAREPUB


IMPACT91
SHAREPUB
PROVINCE: BARI
PROVINCE: FLORENCE
PROVINCE: NAPLE
PROVINCE: PADUA
PROVINCE: PERUGIA
PROVINCE: POTENZA
PROVINCE: TURIN

2.1.4 Multiple Regression Variants and Estimation Results

The initial step of our analysis is to assess the average effect of explanatory variables, irrespectively of potential heterogeneities across different urban areas. We start therefore running multivariate regressions using pooled data. Preliminarily to this, we check for multicollinearity among independent variables and find no significant redundancy among them.

In the attempt to control for geographical differences, the model include the distance from the chief town of the related urban area (DISTANCE), and its rural ratio (RURAL). Among the number of socio-economic factors that might have a role in determining the degree of mobility intensity we focus on the dynamic of urban growth (GROWTH) and the residential versus productive vocation (log MIXITE) of a given settlement. We use the density of the urban development (DENSITY) as a proxy of sprawling behaviour[12]. The model also includes a variable that estimates to which degree urban mobility is (at commune level) contained within the city borders or, instead, it spreads towards outside of the city (SELFCONT). We can interpret this as the capacity of a given urban area to contain mobility within its borders, a sort of mobility self-containment capacity, which is expected to be positively related to its productive attitude. In fact, to some extent, the higher is the productive attitude of an urban settlement, the higher its capacity to contain commuting within its borders[13]. Coming back to our main line of reasoning, we expect SELFCONT to be negatively correlated to the level of mobility impact for two reasons: on one side, the average trip times increase whenever moving direction outside the city; second, commuters moving out of their city usually prefer less environmental friendly travel means, especially their own car. We have a confirmation of this in Table 9, which reports the results of a comparison between the mobility impact indexes calculated, on one side, considering both commuters travelling within the town and those going out of it (sort of gross mobility) and, on the other side, indexes calculated considering only the net movements outside of the town. As expected, the intensity of the mobility impact is higher whenever considering the net movements towards outside of the city, up to the 51.3 percent for Potenza.

---

[12] We are aware of the limits of such procedure, whereas previous researches have proposed other, more accurate, indicators of urban sprawl (for a discussion see Camagni et al. 2002a). To have a better understanding of the spatial distribution of urban settlement within a given area and about their sprawling attitude, we are at the moment working on the development of graphical indicators of sprawl, based on the methodology proposed by Salvetti (1982).

[13] A regression model of SELFCONT shows that the coefficient of MIXITE is positive and strongly statistically significant for all the cities of concern, with the exception of Potenza and Turin. This suggests that, ceteris paribus, residential cities can contribute to generate traffic and congestion more than urban areas with a higher level of 'functional mix'.

Besides, an important research issue here is to understand which role accessibility and efficiency of public transport can have in curbing the proliferation of urban traffic and congestion. On this perspective we expect that, as the overall competitiveness of public transport increases, commuters' preferences will move towards public transport means contributing to reduce traffic congestion and the intensity of mobility impact. To capture these dimensions we estimate the accessibility (market share) and the efficiency of public transport calculated as, respectively, the percentage of all trips made with public vehicles (SHAREPUB), and the ratio between the average trip times taken with private vehicles over the average times taken travelling with public ones (COMPUB).

We begin analysing the pooled data sample with a simple specification in which the dependent variable IMPACT91 is modelled as a linear additive function of the usual constant term, the spatial variables (DISTANCE, DENSITY, RURAL), the log of MIXITE, GROWTH, the variables controlling for the direction of urban mobility (SELFCONT), and three dummies controlling for the geographical position of the urban areas (NORTH and SOUTH) and whether they are metropolitan or polycentric ones (METRO). In Table 7 Model A shows that results are consistent with the outcomes of the univariate analyses. All coefficients have the expected sign and are highly statistically significant. Interestingly, SELFCONT contributes to reduce the mobility impact. We use F-test to assess how much heterogeneity among provinces need to be taken into account using a weighted least squares (WLS) estimator. The pooled regression model can be affected by heteroscedasticity because mobility impacts refers to different provinces with differing numbers of observations (i.e., different number of communes in each province, see Figure 1). We therefore use the number of observations of the underlying province as a proxy to account for the differing sample sizes available for each of the seven urban areas (see also Dalhuisen et al., 2003). The sample size of the different provinces ranges between 42 and 316 observations. Table 7 shows that OLS and WLS models provide significant and robust results consistent with our a priory expectations. Finally, Model C includes the variable measuring the quote of trips with public vehicles (SHAREPUB) and a proxy for the efficiency of private versus public transport (COMPUB). The model has a slightly higher explanatory power and it shows that both regressors are negatively and significantly correlated with the impact of urban mobility. Nevertheless, given the type of data available for the computation of the mobility index, which do not link trip duration with trip length, we are aware that these results might be biased by such underlying omission. The WLS model is omitted as it does not improve the performance of the analysis.

Table 7: Least squares regression analysis of the Mobility Impact index 1991 using pooled data.

	OLS Model A	WLS Model B	OLS Model C
Dependent variable:	IMPACT91	IMPACT91	IMPACT91
Independent variables:			
Intercept β	0.31*** (0.01)	0.29*** (0.68^{-02})	0.33*** (0.89^{-02})
DISTANCE	-0.43^{-03}*** (0.66^{-04})	-0.31^{-03}*** (0.58^{-04})	-0.44^{-03}*** (0.65^{-04})
DENSITY	-0.39^{-05}** (0.13^{-05})-	-0.21^{-05}* (0.11^{-05})-	-0.40^{-05}*** (0.13^{-05})-
RURAL	-0.51^{-03}*** (0.65^{-04})	-0.48^{-03}*** (0.60^{-04})	-0.46^{-03}*** (0.64^{-04})
GROWTH	0.34^{-03}** (0.15^{-03})	0.45^{-03}** (0.15^{-03})	0.23^{-03}*** (0.15^{-03})
Log(MIXITE)	-0.011*** (0.002)	-0.011*** (0.002)	-0.010*** (0.002)
SELFCONT	-0.07*** (0.01)	-0.03*** (0.01)	-0.08*** (0.01)
METRO	0.01*** (0.3^{-02})	0.01*** (0.3^{-02})	0.01*** (0.3^{-02})
NORTH	0.01** (0.44^{-024})	0.01** (0.33^{-024})	0.01** (0.43^{-024})
SOUTH	-0.07*** (0.52^{-02})	-0.08*** (0.37^{-02})	-0.07*** (0.53^{-02})
SHAREPUBB	--	--	-0.65^{-03}*** (0.15^{-03})
COMPUBB	--	--	-0.93^{-04}*** (0.43^{-30})
Nobs	734	734	729
R^2-adj	0.64	0.65	0.66
F-test	147.52***	154.34***	130.11***

Note: the weights are determined as the number of observations related to each of the seven underlying urban areas. Standard errors are given in parentheses, and significance is indicated by ***, ** and * for the 1, 5, and 10 percent level, respectively.

Previous results show that the proposed model performs well in explaining the factors driving heterogeneities in the impact that mobility has in different cities. Starting from this, we proceed running multiple regressions in cross-section in order to explore the existence of significant differences: i) across single urban areas; ii) across cities located in the north, centre or south of Italy and; iii) between metropolitan and polycentric urban areas. We use Wald-test on combined restrictions on model parameters and intercepts across such aggregate samples.

We start with the analysis of single urban areas. Table 8 reports the results of reduced and full specification OLS and WLS models (A, B, C). Similarly to the pooled model, the dependent variable IMPACT91 is modelled as a linear additive function of spatial, structural and mobility variables, with intercepts specific to each province.
Overall, the results presented in Table 8 confirm the outcomes of the pooled models (Table 7), even though the significance of coefficients is reduced due to the limited number of observations available for sub-sample based on provinces. The F-test results point to preference for the weighted over the un-weighted model. A Wald-test on combined restrictions on the parameters across the different provinces, resulting in

seven aggregate samples, shows that the restrictions can be rejected and, therefore, that parameters are statistically different for cities belonging to diverse provinces (urban areas). As well, intercepts province specific are also statistically unequal.
In particular, major variations relate to the effects that the self-containment capacity and the quote of agricultural land have in explaining the IMPACT91 variance in different provinces. For such parameters, in fact, coefficients get either positive and negative sign. For instance, for SELFCONT, Naples and Turin have negative and significant coefficients whereas, instead, Perugia, Potenza, Florence and Bari have positive and highly significant coefficients in contrast with our expectation. Another contradictory result is that the quote of agricultural land favours higher mobility impact in Naples. Differently from the pooled model, the coefficient of SHAREPUB takes on negative and significant values only for the province of Florence and Turin. For Perugia and Potenza, the overall effect of higher rates of commuters travelling with public transport contributes to increase the intensity of the impact of mobility, probably due to longer average trip duration.
The main outcomes from these models can be summarised as follows (Table 8). The coefficients of the variable measuring the distance of a given town from the chief city (DISTANCE) are all negative and small in terms of absolute values. For the urban areas of Naples, Padua, Perugia, Potenza and Turin, coefficients are statistically significant and they remain stable across the two models. This suggests that going towards the most external part of the province, municipalities become more autonomous and they behave as sort of self-contained 'district' that contribute less to urban traffic. An inverse relationship is found between IMPACT91 and the gross population density (DENSITY). Coefficients are small in terms of absolute values and they are statistically different from zero for Florence and Turin.
An inverse relationship also exists with the variable RURAL, but for the case of Naples. Coefficients are statistically significant for Naple, Perugia, Potenza and Turin, though they are small in absolute values. We can interpret this as an effect of the smaller demand of mobility in areas with higher agricultural land rates. The log MIXITE variable captures the effect of the functional mix of the city on the intensity of the urban mobility impact. In our models, coefficients take on negative values but insignificant values for Bari, Florence, Naples, Padua, Perugia, Potenza, Turin. GROWTH, whenever significant, is positively related to the mobility impact.

It is however difficult to interpret results on the basis of single urban areas. We move, therefore, to a broader level of analysis and we run cross-section analysis on the basis of the geographical location and the level of polycentrism of urban areas (Table 10, Table 11), using the reduced and usual full model specification.

In Table 10 we can observe that the reduced and the full model on geographic location perform well in terms of explanatory power and significance of coefficients. Wald-test on combined restrictions on the parameters across North, Centre and South aggregate samples shows that null hypothesis of equality of regressors and intercepts coefficients across the three sub-samples can be rejected. In this case, the WLS model is not to be preferred to the OLS one and it is omitted in the table. We can argue from these results that the usual specifications can explain the variation in the intensity of the mobility impact at a broader spatial level than the local one. In fact, whenever significant, regressors take on the expected sign for each of the three sub samples, with the sole exception of the SELFCONT variable. SELFCONT coefficients are significant and negative for northern and southern cities, while the coefficient for central cities is positive. Regarding the effect of the rate of trips with public means, the coefficient is negative and significant only for Northern cities, according to the results of the univariate analysis.

Table 11 reports results obtained with aggregations on the basis of the level of polycentrism. Once more, Wald-test on combined restrictions on the parameters across polycentric and metropolitan aggregate cities samples shows that null hypothesis of equality of regressors and intercepts coefficients can be rejected. The WLS model is not to be preferred to the OLS one and it is omitted. Similarly to before, whenever significant, regressors take on the expected sign for each sub sample. There are however some differences in the elasticity of some explanatory variables. In particular, the effect of functional mix, growth rate and density is stronger for towns and cities belonging to a polycentric urban agglomeration whereas, instead, the effect of DISTANCE and RURAL is stronger for metropolitan ones.

Table 8: Least squares regression analyses of the mobility impact index 1991.

	Model A OLS	Model B WLS	Model C WLS
INDMOB91			
β_{Bari}	0.08 (0.06)	0.08*** (0.03)	0.10** (0.04)
$\beta_{Florence}$	0.27*** (0.05)	0.27*** (0.02)	0.30*** (0.03)
β_{Naples}	0.25*** (0.02)	0.25*** (0.01)	0.24*** (0.02)
β_{Padua}	0.21*** (0.04)	0.21*** (0.03)	0.18*** (0.03)
$\beta_{Perugia}$	0.26*** (0.04)	0.26*** (0.02)	0.23*** (0.02)
$\beta_{Potenza}$	0.18*** (0.03)	0.18*** (0.02)	0.15*** (0.02)
β_{Turin}	0.38*** (0.01)	0.38*** (0.01)	0.41*** (0.01)
DISTANCE			
Bari	0.10^{-03} (0.32^{-03})	0.10^{-03} (0.16^{-03})	0.12^{-03} (0.16^{-03})
Florence	-0.65^{-03} (0.53^{-03})	-0.65^{-03} (0.27^{-03})	-0.56^{-03} (0.52^{-03})
Naples	-0.10^{-02}*** (0.41^{-03})	-0.10^{-02}*** (0.30^{-03})	-0.11^{-02}** (0.31^{-03})
Padua	-0.10^{-02}*** (0.41^{-03})	-0.11^{-02}** (0.33^{-03})	-0.11^{-02}*** (0.32^{-03})
Perugia	-0.42^{-03} (0.29^{-03})	-0.42^{-03}*** (0.16^{-03})	-0.58^{-03}*** (0.17^{-03})
Potenza	-0.18^{-03}* (0.96^{-04})	-0.18^{-03}*** (0.75^{-04})	-0.14^{-03}** (0.73^{-04})
Turin	-0.96^{-03}*** (0.12^{-03})	-0.95^{-03}*** (0.17^{-03})	-0.78^{-03}*** (0.17^{-03})
DENSITY			

	Model A OLS	Model B WLS	Model C WLS
Bari	0.68^{-05} (0.16^{-04})	0.68^{-05} (0.83^{-05})	0.48^{-05} (0.81^{-05})
Florence	-0.20^{-04} (0.15^{-04})	-0.21^{-04}*** (0.76^{-05})	-0.24^{-04}*** (0.76^{-05})
Naples	0.97^{-06} (0.19^{-05})	0.97^{-06} (0.14^{-05})	0.77^{-06} (0.14^{-05})
Padua	-0.17^{-04} (0.16^{-04})	-0.17^{-04} (0.12^{-04})	-0.16^{-04} (0.14^{-04})
Perugia	-0.75^{-05} (0.66^{-04})	-0.75^{-05} (-0.38^{-04})	-0.47^{-05} (-0.37^{-04})
Potenza	-0.19^{-04} (0.11^{-03})	-0.19^{-04} (0.93^{-04})	-0.21^{-04} (0.90^{-05})
Turin	-0.17^{-04}*** (0.43^{-05})	-0.17^{-04}*** (0.59^{-05})	-0.15^{-04}** (0.58^{-05})
RURAL			
Bari	0.31^{-03} (0.53^{-03})	0.31^{-03} (0.28^{-03})	0.32^{-03} (0.27^{-03})
Florence	-0.23^{-04} (0.41^{-03})	-0.23^{-04} (0.20^{-03})	-0.17^{-03} (0.21^{-03})
Naples	0.37^{-03}* (0.19^{-03})	0.37^{-03}** (0.14^{-03})	0.39^{-03}*** (0.14^{-03})
Padua	-0.15^{-04} (0.28^{-03})	-0.15^{-04} (0.22^{-03})	-0.11^{-04} (0.22^{-03})
Perugia	-0.33^{-03} (0.33^{-03})	-0.33^{-03}* (0.19^{-03})	-0.20^{-03} (0.20^{-03})
Potenza	-0.46^{-03}** (0.21^{-03})	-0.46^{-03}** (0.17^{-03})	-0.41^{-03}* (0.16^{-03})
Turin	-0.60^{-03}*** (0.83^{-04})	-0.60^{-03}*** (0.12^{-03})	-0.50^{-03}*** (0.11^{-03})
GROWTH			
Bari	0.45^{-03} (0.69^{-03})	0.45^{-03} (0.36^{-03})	0.35^{-03} (0.35^{-03})
Florence	0.70^{-03} (0.63_{-03})	0.70^{-03}** (0.31^{-03})	0.69^{-03} (0.30^{-03})
Naples	0.21^{-03} (0.31^{-03})	0.21^{-03} (0.23^{-03})	0.26^{-03} (0.23^{-03})
Padua	-0.33^{-03} (0.50^{-03})	-0.33^{-03} (0.40^{-03})	-0.21^{-03} (0.40^{-03})
Perugia	-0.62^{-03} (0.89^{-03})	-0.62^{-03} (0.51^{-03})	-0.51^{-03} (0.50^{-03})
Potenza	0.61^{-03} (0.60^{-03})	0.61^{-03} (0.47^{-03})	0.60^{-03} (0.45^{-03})
Turin	0.60^{-04} (0.21^{-03})	0.59^{-04} (0.29^{-03})	0.35^{-04} (0.20^{-03})
Log MIXITE			
Bari	0.04 (0.04)	0.03* (0.02)	0.03 (0.02)
Florence	-0.01 (0.01)	-0.01 (0.01)	-0.02* (0.9^{-02})
Naples	-0.31^{-02} (0.02)	-0.32^{-02} (0.02)	-0.30^{-02} (0.01)
Padua	-0.01 (0.8^{-02})	-0.01* (0.7^{-02})	-0.01 (0.7^{-02})
Perugia	-0.02 (0.03)	-0.02 (0.08)	-0.02 (0.17)
Potenza	0.01 (0.02)	0.96^{-02} (0.02)	0.64^{-02} (0.01)
Turin	-0.68^{-03} (0.8^{-02})	-0.68^{-03} (0.1^{-02})	-0.26^{-03} (0.11^{-02})
SELFCONT			
Bari	0.07 (0.05)	0.07*** (0.03)	0.06 **(0.03)
Florence	0.04 (0.06)	0.04 (0.03)	0.03 (0.03)
Naples	-0.15*** (0.02)	-0.15*** (0.02)	-0.14*** (0.02)
Padua	0.13*** (0.03)	0.13*** (0.03)	0.14*** (0.03)
Perugia	0.09** (0.04)	0.09*** (0.02)	0.08*** (0.02)
Potenza	0.12*** (0.04)	0.12*** (0.03)	0.11*** (0.03)
Turin	-0.08*** (0.01)	-0.08*** (0.02)	-0.08*** (0.02)
SHAREPUBB			
Bari			-0.42^{-0} (0.31^{-03})
Florence			-0.54^{-03} (0.32^{-03})
Naples			0.30^{-03} (0.32^{-03})
Padua			0.67^{-03} (0.61^{-03})
Perugia			0.13^{-02}** (0.46^{-03})
Potenza			0.75^{-03}*** (0.23^{-03})
Turin			-0.15^{-02}*** (0.29^{-03})
N° obs.	734	734	732
R^2 adj	0.72	0.77	0.79
F-test	39.21***	52.04***	49.72***
Wald-test on restrictions	p<0.00***	p<0.00***	p<0.00***

Note: the weights are determined as the number of observations related to each of the seven underlying urban areas. Standard errors are given in parentheses, and significance is indicated by ***, ** and * for the 1, 5, and 10 percent level, respectively.

Table 9: Descriptive statistics of the mobility impact index per metropolitan area.

	Mobility Impact Index										
	Mean		Median		Std. dev		Minimum		Maximum		Increase rate
	a	*b*	*a*	*b*	*a*	*b*	*a*	*b*	*a*	*b*	*(a-b)*
Naple	0.189	0.269	0.189	0.270	0.042	0.056	0.045	0.042	0.312	0.400	29.7%
Turin	0.287	0.362	0.287	0.350	0.049	0.064	0.121	0.219	0.453	0.789	20.6%
Bari	0.159	0.296	0.159	0.294	0.019	0.036	0.119	0.245	0.201	0.415	46.5%
Florence	0.260	0.371	0.260	0.354	0.028	0.056	0.206	0.294	0.326	0.556	29.8%
Padua	0.237	0.340	0.237	0.337	0.028	0.032	0.167	0.284	0.289	0.427	30.4%
Perugia	0.244	0.370	0.244	0.361	0.030	0.050	0.139	0.293	0.323	0.544	33.9%
Potenza	0.174	0.357	0.174	0.350	0.036	0.082	0.019	0.048	0.246	0.577	51.3%

Note:

(a) Mobility impact index calculated considering both commuters going outside and moving within a given commune:

(b) Mobility impact index calculated considering only those commuters going outside a given commune.

Table 10: Cross-section analysis of the Mobility Impact Index 1991 on the basis of the geographical position of towns and cities.

	OLS (Model A)	OLS (Model B)
Dependent variable:	IMPACT91	IMPACT91
Independent variables:		
Intercept β_{North}	0.37*** (0.01)	0.39*** (0.94^{-02})
β_{Centre}	0.25*** (0.02)	0.25*** (0.03)
β_{South}	0.21*** (0.01)	0.20*** (0.02)
DISTANCE		
North	-0.88^{-03}***(0.12^{-03})	-0.74^{-03}***(0.12^{-03})
Centre	-0.43^{-03}* (0.25^{-03})	-0.44^{-03}* (0.25^{-03})
South	-0.24^{-03}*** (0.83^{-30})	-0.23^{-03}*** (0.82^{-30})
DENSITY		
North	-0.18^{-04}*** (0.43^{-05})	-0.15^{-04}*** (0.43^{-05})
Centre	-0.17^{-04}* (0.11^{-04})	-0.16^{-04} (0.11^{-04})
South	0.16^{-05} (0.15^{-05})	0.16^{-05} (0.15^{-05})
RURAL		
North	-0.72^{-03}*** (0.79^{-04})	-0.68^{-03}*** (0.78^{-04})
Centre	-0.30^{-03} (0.23^{-03})	-0.27^{-03} (0.25^{-03})
South	-0.18^{-03} (0.11^{-03})	-0.19^{-03}* (0.11^{-03})
GROWTH		
North	0.47^{-04} (0.20^{-03})	0.67^{-05} (0.20^{-03})
Centre	0.21^{-03} (0.52^{-03})	0.19^{-03} (0.51^{-03})
South	0.46^{-03}* (0.24^{-03})	0.48^{-03}** (0.23^{-03})
Log(MIXITE)		
North	-0.01*** (0.24^{-02})	-0.73^{-02}*** (0.24^{-02})
Centre	-0.01 (0.01)	-0.01 (0.01)
South	-0.92^{-02}* (0.54^{-02})	-0.94^{-02}* (0.53^{-02})
SELFCONT		
North	-0.09*** (0.11^{-03})	-0.10*** (0.01)
Centre	0.07** (0.03)	0.07** (0.03)
South	-0.07*** (0.02)	-0.07*** (0.02)
SHAREPUBB		
North		-0.98^{-03}*** (0.21^{-03})
Centre		0.12^{-03} (0.49^{-03})
South		0.17^{-03} (0.22^{-03})
Nobs	734	732
R^2-adjusted	0.66	0.68
F-test	73.84***	68.16***
Wald-test on restrictions	197.74***	572.49***

Note: the weights are determined as the number of observations related to each of the seven underlying urban areas. Standard errors are given in parentheses, and significance is indicated by ***, ** and * for the 1, 5, and 10 percent level, respectively.

Table 11: Cross-section analysis of the Mobility Impact Index 1991 on the basis of the level of polycentrism of towns and cities.

	OLS (Model A)	OLS (Model B)
Dependent variable:	IMPACT91	IMPACT91
Independent variables:		
Intercept β_{Polyc}	0.22*** (0.02)	0.22*** (0.21)
β_{Metro}	0.39*** (0.88^{-02})	0.43*** (0.01)
DISTANCE		
Polycentric	-0.33^{-03}*** (0.11^{-03})	-0.33^{-03}*** (0.10^{-03})
Metropolitan	-0.79^{-03}*** (0.13^{-03})	-0.45^{-03}*** (0.12^{-03})
DENSITY		
Polycentric	-0.23^{-04} (0.15^{-04})	-0.23^{-04} (0.13^{-03})
Metropolitan	-0.18^{-04}*** (0.15^{-05})	-0.13^{-04}*** (0.15^{-03})
RURAL		
Polycentric	-0.56^{-03}*** (0.18^{-03})	-0.56^{-03}*** (0.17^{-03})
Metropolitan	-0.97^{-03}*** (0.85^{-04})	-0.70^{-03}*** (0.81^{-04})
GROWTH		
Polycentric	0.77^{-03}* (0.43^{-03})	0.77^{-03}* (0.39^{-03})
Metropolitan	0.51^{-04} (0.21^{-02})	0.14^{-05} (0.19^{-03})
Log(MIXITE)		
Polycentric	0.99^{-03} (0.72^{-02})	0.99^{-03} (0.66^{-02})
Metropolitan	0.2^{-03} (0.29^{-02})	0.53^{-03} (0.26^{-02})
SELFCONT		
Polycentric	-0.13*** (0.23)	0.13*** (0.02)
Metropolitan	-0.14*** (0.13)	-0.13*** (0.01)
SHAREPUBB		
Polycentric		-0.22^{-02} ***(0.02)
Metropolitan		0.57^{-05} (0.30)
Nobs	734	732
R^2-adj	0.45	0.55
F-test	47.69***	60.61***
Wald-test on restrictions	151.97***	169.27***

Note: the weights are determined as the number of observations related to each of the seven underlying urban areas. Standard errors are given in parentheses, and significance is indicated by ***, ** and * for the 1, 5, and 10 percent level, respectively.

2.1.5 A conceptual interpretation of mobility impact

The conceptual model

Moving further from the results presented in the previous paragraph, we try now to enrich our analysis envisaging a conceptual causal chain in the explanation of the mobility impact intensity, in which the mobility impact is the results of the influence of three main territorial dimensions: structural economic and social, as shown in Figure 5. In our model, the causal chain origins from the structural features of the urban settlement that we interpret as drivers of all other elements in the conceptual chain. In particular, we focus on the self-containment capacity of a given city, as a result of urban form and urban functional mix. The structural dimension of our conceptual model, here represented by the self-containment capacity, is therefore supposed to influence the intensity of the mobility impact through the economic and the social dimension. The economic element is represented by the competitiveness of public vs private transport (in terms of time efficiency), which is a results of the structural features of the urban settlement (e.g. urban density, functional diversification, etc). The social element is represented by the modal choice of the city inhabitants, depending on the competitiveness of the public vs private transport that, on its turn, is related to the urban settlement features.

Stigmatising the previous discussion, we have that settlement of relatively compact structure and good functional mix will be characterised by higher self-containment capacity. This will generate more favourable conditions for public transport competitiveness (in terms of journey-to-work time) that, on its turn, will move people preferences towards public travel means and, consequently, lower impacts of urban mobility.

From this conceptual interpretation we try now to move to the econometric analysis to find some empirical evidence of it. Before presenting our results, however, it is necessary to notice that our causal interpretation of the mobility index derives from a priori knowledge on the phenomenon and it can not be derived straight from the statistical estimation process.

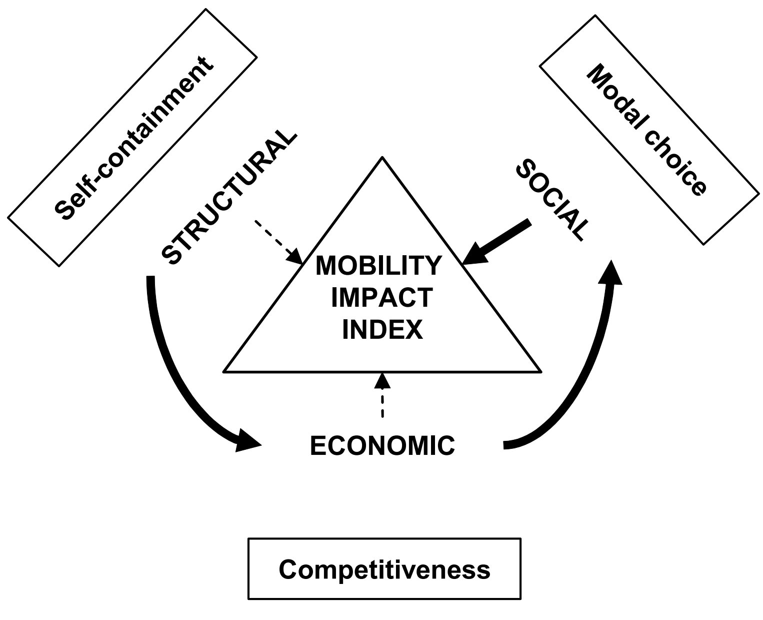


Figure 5: Causal chains in the explanation of mobility impact.

The Causal Path Analysis

In order to test the hypothesis on the causal chain in the explanation of mobility impact, we employ a methodology based on Causal Path Analysis (CPA) an in-depth description see e.g. Bollen, 1989). This type of analysis formulates the model as a path diagram, in which arrows connecting variables define the structure of the conceptual framework and allow the estimation of reaction parameters, i.e., essentially the regression coefficients. The arrow diagram of Figure 6 contains the structure of the causal path that we want to test, which comes from the conceptual model presented in Figure 5. On the right hand side we have the *endogenous* variable (dependent), i.e. the variable that in the end has to be explained by all other variables in the model. The remaining variable in the scheme are *exogenous* and *intermediate* variables, where the former are independent (in the sense that their variation is taken for granted in the model), while the latter can be influenced by variation in the exogenous variables.

Among various statistical methods, we use the Generalised Least-Square (GLS) method to run the path analysis. GLS allows us to construct a model of linear equations, in which a given variable can behaves both as independent variable (in one equation) and as dependent variable in a subsequent equations. We can therefore estimate regression coefficients in simultaneous regression model. Under the assumption that each variable has been standardised to unit variance and mean zero, the value assumed by individual parameters represents the order of magnitude of each independent variable in explaining the following dependent variable. The statistical significance of each parameter is given by the values of T-students run in parallel to the coefficient estimation analysis.

In the framework of our analysis three latent variables are chosen, one for each territorial dimension included in the conceptual model, plus three exogenous variables that capture the structural pattern of any given city. MIXITE, DENSITY and RURAL are chosen as exogenous variables and they describes, respectively, the functional mix and the urban sprawl attitude of a given urban area. SELFCONT is chosen to represent the structural dimension; COMPUBB is the economic element of the model, while SHAREPUB estimates individual preferences for public travel means, i.e. the social element. Impact of urban mobility is estimated by our Mobility Impact Index. The causal direction of the chain is given by arrows in

Figure 7. Results are presented in

Figure 7 with coefficients and T-values in brackets. From this it is easy to see that our conceptual model appears to be confirmed. All parameters are highly statistically significant and have the expected sign. The level of self-containment depends on some structural elements here represented by, in particular, residential density, functional mix and incidence of rural land. In this respect it is interesting to notice that, as the productive vocation of the settlement increases (MIXITE), the level of mobility self-containment increases too. The same goes for urban density and ratio of agricultural land. From the results presented in

Figure 7, we also have a confirmation of the causal link between self-containment and competitiveness of public transport. The SELFCONT coefficient is positive and highly statistically significant, meaning that as self-containment capacity goes up, competitiveness of public transport increases, as expected. Besides, the relationship between modal choice (SHAREPUBB) and competitiveness of public transport (COMPUBB) is also confirmed to be positive and highly statistically significant. As expected, a greater efficiency of public transport contributes to move individual choices towards public travel means and, therefore, to reduces the overall impact of urban mobility. The last link of our chain is indeed negative meaning that, as expected, all else being the same, if individual preferences move towards public travel means, we can expect a reduction of urban mobility impact.

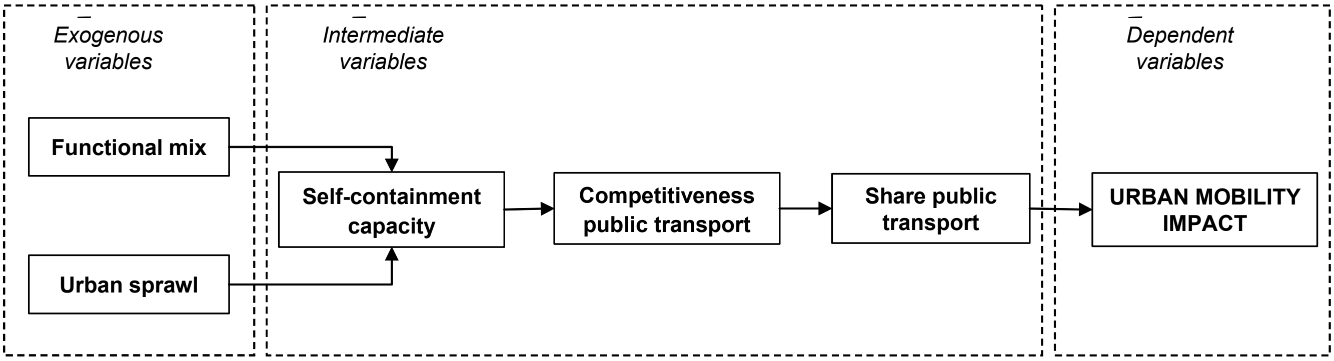


Figure 6: A general model for urban mobility impact estimates.

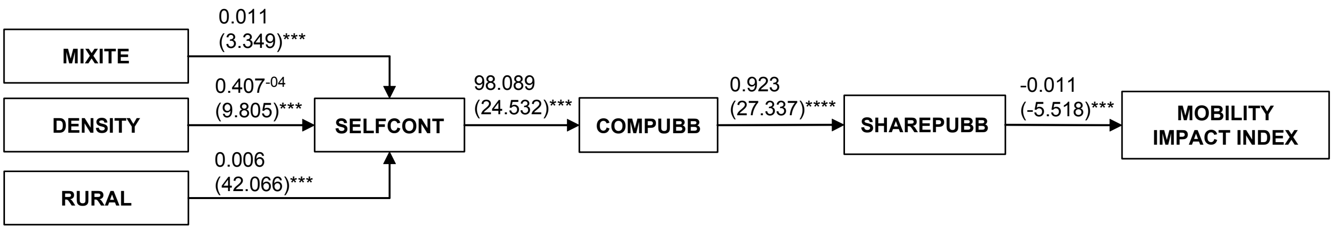


Figure 7: Estimated path analysis model for Italy. T-statistics are provided in brackets. Significance is indicated by ***, ** and * for the 1, 5, and 10 percent level, respectively.

2.2 Conclusions

In Europe, the debate on collective costs associated with sprawling urban patterns is recent and it advocates for empirical evidence of their dimensions as, so far, sound empirical and quantitative analysis is still rare. It is indeed a hard task to measure such externalities and, even more, to provide an econometric analysis of the link between the way in which an urban area develops and its effects in terms of collective costs. In this respect, we focus on urban mobility and provide a broad empirical analysis on both the dynamic of urban mobility during the decade 1981-1991 and the factors determining the intensity of mobility pressure in Italy.

We select seven Italian urban areas, located in the north, centre and south of Italy, and use journey-to-work data to compute a mobility impact index at commune level, for the years 1981 and 1991. The mobility index is based on a weight matrix that associates less environmental friendly mobility behaviours with higher impact scores (Camagni et al, 2002b).
A first result is that –as expected- during such decade, the impact of urban mobility has increased noticeably in the whole peninsula, up to the 37.3 percent. A regression model shows that the higher rate of use of private car is one of the main determinants of such an increase.
Subsequently, we describe our hypothesis as to the reasons to explain heterogeneities in intensity of mobility impact and use cross-section regression framework to test them empirically. Models refer to 1991 data and include variables controlling for structural and socio-economic features of the urban settlement, with a special focus on sprawling attitude and competitiveness and efficiency of public versus private transport. Among the structural factors, whenever statistically significant, urban density, functional mix (economic-residential balance) and rural ratio are negatively correlated to the mobility impact index, while demographic growth rate is positively correlated. Higher impacts are associated with diffused, sprawling development, residential specialisation and more recent urbanisation processes.
Finally, we try to enrich our analysis envisaging a conceptual causal chain in the explanation of the mobility impact intensity, which relies on three main components: structural, economic, and social. The three components are represented, respectively, by: self-containment capacity of a given urban area, competitiveness of public *vs* private transport (in terms of time efficiency), modal choice. In our conceptual model, structural factors are drivers of competitiveness of public transport, which, on its turns, influences peoples' preferences on alternative modal travel means. We test such causal relationship using CPA we find substantial confirmation of this, as all coefficients have the expected sign and they are highly statically significant. Results show that the level of self-containment depends on the structural form of urban development, and in particular on its residential density, functional mix and incidence of farmland. Results also show a positive correlation between the self-containment indicator and the public transport competitiveness; and between public transport competitiveness and travel means preferences. Finally, CPA shows a negative and statistically significant correlation between an increase in the use of public transport and the intensity of urban mobility.

1. REFERENCES

Altshuler, A., 1997. Review of the cost of sprawl, JAIP 43, April, 207-209.

Burchell, R.W. et al., 1992. Impact Assessment of the New Jersey Interim State Development and Redevelopement Paln, Report II: Research Findings, Trenton, NJ: Report Prepared for New Jersey Office of State Planning, February.

Breheny, M.J., Gent, T., Lock, D., 1993. Alternative Development Patterns: New Settlements. HMSO, London.

Bollen, K.A., 1989, *Structural equation with latent variables*, John Wiley and Sons, New York.

Camagni, R., Capello, R., Nijkamp, P., 1998. "Toward sustainable city policy: an economiy-environment-technology nexus", *Ecological Economics*, 24, 103-118.

Camagni, R., Gibelli, M.C. (Eds.), 1997. Développement urbain durable: quatre métropoles européennes à l'épreuve, Parigi, DATAR/Editions de l'Aube.

Camagni, R., Lombardo, S., 1999. La città metropolitana: strategie per il governo e la pianificazione, Alinea, Firenze.

Gibelli, M.C. (1999). Dal modello gerarchico alla governance: nuovi approcci alla pianificazione e gestione delle aree metropolitane, in Camagni, R., Lombardo Eds., S., 1999.

Camagni, R., Gibelli, M.C., Rigamonti, P. (Eds.), 2002a. *I costi collettivi della città dispersa*. Alinea, Firenze.

Camagni R., Gibelli, M.C., Rigamonti, P., 2002b. "Urban mobility and urban form: the social and environmental costs of different patterns of urban expansion", *Ecological Economics*, 40: 199-216.

CEC, Commission of the European Communities, 2004. "Towards a Thematic Strategy on the Urban Environment", COM(2004)60 final, Bruxell.

CEC, Commission of the European Communities, 1999. "Green Paper on the Urban Environment", COM(1999)218 final, Bruxell.

CEC, Commission of the European Communities, 1997. "Towards a Urban Agenda in the European Union", COM(1997)197 final, Bruxell.

CEC, Commission of the European Communities, 1998. "Sustainable Urban Development in the European Union: a Framework for Action", COM(1998) final, Bruxell.

CEC, Commission of the European Communities, 2001."A Sustainable Strategy for a Better World: a European Strategy for Sustainable Development", COM(2001) 264 final, Bruxell.

ESDP, 1999. *Towards Balanced and Sustainable Development of the Territory of the European Union*, European Communities, Luxembourg, May 1999

Fouchier, V., 2000. "Intervenir sur les densités urbaines pour limiter l'usage de l'automobile", in CERTU (Eds), *La forme des villes: caractériser l'étament urbain et réfléchir à des nouvelles modalités d'action*, Collections du CERTU, Lyon.

Frank, J.E., 1989. The Costs of Alternative Development Patterns: A Review if the Literature, Urban Land Institute, Washington DC.

Lattarulo, P., 2003. *I costi ambientali e sociali della mobilità*, IRPET, FrancoAngeli, Milano.

Marletto, G., 2002. "Costi esterni e politiche dei trasporti: un commento", *Economia Pubblica*, n. 2.

Nijkamp, P., 1994. "Roads toward environmentally sustainable transport", *Transportation Research*, 28, 261-271.

OECD, 1995. Reconciling transportation, energy and environmental issues. The role of public transport, OECD, Paris.

OECD, 2000. *Managing Urban Growth*, DT/Tdpc, Paris.

Real Estate Research Corporation, 1974. The Costs of Sprawl: Environmental and Economic Costs of Alternative Residential Development Patterns at the Urban Fringe, US Government Printing Office, Washington DC.

Musolino, D., Guerzoni, M., 2003. "Città dispersa e costi collettivi: il caso di Bologna", *Scienze Regionali*, n.1/2003, 107-112.

Salvetti, A. (1982). "I gradi di dispersione della popolazione (x) e di compattezza degli insediamenti (P)", in Astengo G., *Rapporto sullo stato dell'urbanistica in Italia e sulle politiche urbanistiche e territoriali per gli anni '80*, ricerca Mip-Iuav, Venezia.

Simmons M., 1999. “The Revival of Regional Planning. Government Intentions: Local Reality?”, *Town Planning Review*, 70.

TCRP, 1998. The Cost of Sprawl-Revisited, Transportation Research Board, National Research Council, National Academy Press, Washingtoon, DC.

World Health Organisation, 2002. Health impact assessment of air pollution in the eight major Italian cities, WHO, London.

Windsor, D., 1979. A critique of the costs of sprawl, JAPA 45(3), 209-212.

European Common Indicators, ECI , www.sustainable-cities.org/indicators/index.htm

Salatino M., 2004. “Dispersione urbana e costi collettivi del trasporto privato nelle regioni Italiane”, Atti della XXV Conferenza AiSre, Novara, Ottobre 2004.

Salatino M., 2005. “La correlazione tra forma urbana e mobilità nei paesi UE: un’analisi statistica”, forthcoming on Scienze Regionali.

Ewing R., Pendall R., Chen D., 2002. *Measuring Sprawl and its Impact,*Smart Growth America, Washington D.C.

NOTE DI LAVORO DELLA FONDAZIONE ENI ENRICO MATTEI

Fondazione Eni Enrico Mattei Working Paper Series

Our Note di Lavoro are available on the Internet at the following addresses:
http://www.feem.it/Feem/Pub/Publications/WPapers/default.html
http://www.ssrn.com/link/feem.html
http://www.repec.org

NOTE DI LAVORO PUBLISHED IN 2004

IEM	1.2004	*Anil MARKANDYA, Suzette PEDROSO and Alexander GOLUB*: Empirical Analysis of National Income and So2 Emissions in Selected European Countries
ETA	2.2004	*Masahisa FUJITA and Shlomo WEBER:* Strategic Immigration Policies and Welfare in Heterogeneous Countries
PRA	3.2004	*Adolfo DI CARLUCCIO, Giovanni FERRI, Cecilia FRALE and Ottavio RICCHI:* Do Privatizations Boost Household Shareholding? Evidence from Italy
ETA	4.2004	*Victor GINSBURGH and Shlomo WEBER:* Languages Disenfranchisement in the European Union
ETA	5.2004	*Romano PIRAS:* Growth, Congestion of Public Goods, and Second-Best Optimal Policy
CCMP	6.2004	*Herman R.J. VOLLEBERGH:* Lessons from the Polder: Is Dutch CO2-Taxation Optimal
PRA	7.2004	*Sandro BRUSCO, Giuseppe LOPOMO and S. VISWANATHAN* (lxv): Merger Mechanisms
PRA	8.2004	*Wolfgang AUSSENEGG, Pegaret PICHLER and Alex STOMPER* (lxv): IPO Pricing with Bookbuilding, and a When-Issued Market
PRA	9.2004	*Pegaret PICHLER and Alex STOMPER* (lxv): Primary Market Design: Direct Mechanisms and Markets
PRA	10.2004	*Florian ENGLMAIER, Pablo GUILLEN, Loreto LLORENTE, Sander ONDERSTAL and Rupert SAUSGRUBER* (lxv): The Chopstick Auction: A Study of the Exposure Problem in Multi-Unit Auctions
PRA	11.2004	*Bjarne BRENDSTRUP and Harry J. PAARSCH* (lxv): Nonparametric Identification and Estimation of Multi-Unit, Sequential, Oral, Ascending-Price Auctions With Asymmetric Bidders
PRA	12.2004	*Ohad KADAN* (lxv): Equilibrium in the Two Player, k-Double Auction with Affiliated Private Values
PRA	13.2004	*Maarten C.W. JANSSEN* (lxv): Auctions as Coordination Devices
PRA	14.2004	*Gadi FIBICH, Arieh GAVIOUS and Aner SELA* (lxv): All-Pay Auctions with Weakly Risk-Averse Buyers
PRA	15.2004	*Orly SADE, Charles SCHNITZLEIN and Jaime F. ZENDER* (lxv): Competition and Cooperation in Divisible Good Auctions: An Experimental Examination
PRA	16.2004	*Marta STRYSZOWSKA* (lxv): Late and Multiple Bidding in Competing Second Price Internet Auctions
CCMP	17.2004	*Slim Ben YOUSSEF:* R&D in Cleaner Technology and International Trade
NRM	18.2004	*Angelo ANTOCI, Simone BORGHESI and Paolo RUSSU* (lxvi): Biodiversity and Economic Growth: Stabilization Versus Preservation of the Ecological Dynamics
SIEV	19.2004	*Anna ALBERINI, Paolo ROSATO, Alberto LONGO and Valentina ZANATTA:* Information and Willingness to Pay in a Contingent Valuation Study: The Value of S. Erasmo in the Lagoon of Venice
NRM	20.2004	*Guido CANDELA and Roberto CELLINI* (lxvii): Investment in Tourism Market: A Dynamic Model of Differentiated Oligopoly
NRM	21.2004	*Jacqueline M. HAMILTON* (lxvii): Climate and the Destination Choice of German Tourists
NRM	22.2004	*Javier Rey-MAQUIEIRA PALMER, Javier LOZANO IBÁÑEZ and Carlos Mario GÓMEZ GÓMEZ* (lxvii): Land, Environmental Externalities and Tourism Development
NRM	23.2004	*Pius ODUNGA and Henk FOLMER* (lxvii): Profiling Tourists for Balanced Utilization of Tourism-Based Resources in Kenya
NRM	24.2004	*Jean-Jacques NOWAK, Mondher SAHLI and Pasquale M. SGRO* (lxvii):Tourism, Trade and Domestic Welfare
NRM	25.2004	*Riaz SHAREEF* (lxvii): Country Risk Ratings of Small Island Tourism Economies
NRM	26.2004	*Juan Luis EUGENIO-MARTÍN, Noelia MARTÍN MORALES and Riccardo SCARPA* (lxvii): Tourism and Economic Growth in Latin American Countries: A Panel Data Approach
NRM	27.2004	*Raúl Hernández MARTÍN* (lxvii): Impact of Tourism Consumption on GDP. The Role of Imports
CSRM	28.2004	*Nicoletta FERRO:* Cross-Country Ethical Dilemmas in Business: A Descriptive Framework
NRM	29.2004	*Marian WEBER* (lxvi): Assessing the Effectiveness of Tradable Landuse Rights for Biodiversity Conservation: an Application to Canada's Boreal Mixedwood Forest
NRM	30.2004	*Trond BJORNDAL, Phoebe KOUNDOURI and Sean PASCOE* (lxvi): Output Substitution in Multi-Species Trawl Fisheries: Implications for Quota Setting
CCMP	31.2004	*Marzio GALEOTTI, Alessandra GORIA, Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part I: Sectoral Analysis of Climate Impacts in Italy
CCMP	32.2004	*Marzio GALEOTTI, Alessandra GORIA ,Paolo MOMBRINI and Evi SPANTIDAKI:* Weather Impacts on Natural, Social and Economic Systems (WISE) Part II: Individual Perception of Climate Extremes in Italy
CTN	33.2004	*Wilson PEREZ:* Divide and Conquer: Noisy Communication in Networks, Power, and Wealth Distribution
KTHC	34.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI* (lxviii): The Economic Value of Cultural Diversity: Evidence from US Cities
KTHC	35.2004	*Linda CHAIB* (lxviii): Immigration and Local Urban Participatory Democracy: A Boston-Paris Comparison

KTHC	36.2004	*Franca ECKERT COEN and Claudio ROSSI* (lxviii): Foreigners, Immigrants, Host Cities: The Policies of Multi-Ethnicity in Rome. Reading Governance in a Local Context
KTHC	37.2004	*Kristine CRANE* (lxviii): Governing Migration: Immigrant Groups' Strategies in Three Italian Cities – Rome, Naples and Bari
KTHC	38.2004	*Kiflemariam HAMDE* (lxviii): Mind in Africa, Body in Europe: The Struggle for Maintaining and Transforming Cultural Identity - A Note from the Experience of Eritrean Immigrants in Stockholm
ETA	39.2004	*Alberto CAVALIERE:* Price Competition with Information Disparities in a Vertically Differentiated Duopoly
PRA	40.2004	*Andrea BIGANO and Stef PROOST:* The Opening of the European Electricity Market and Environmental Policy: Does the Degree of Competition Matter?
CCMP	41.2004	*Micheal FINUS* (lxix): International Cooperation to Resolve International Pollution Problems
KTHC	42.2004	*Francesco CRESPI:* Notes on the Determinants of Innovation: A Multi-Perspective Analysis
CTN	43.2004	*Sergio CURRARINI and Marco MARINI:* Coalition Formation in Games without Synergies
CTN	44.2004	*Marc ESCRIHUELA-VILLAR:* Cartel Sustainability and Cartel Stability
NRM	45.2004	*Sebastian BERVOETS and Nicolas GRAVEL* (lxvi): Appraising Diversity with an Ordinal Notion of Similarity: An Axiomatic Approach
NRM	46.2004	*Signe ANTHON and Bo JELLESMARK THORSEN* (lxvi): Optimal Afforestation Contracts with Asymmetric Information on Private Environmental Benefits
NRM	47.2004	*John MBURU* (lxvi)*:* Wildlife Conservation and Management in Kenya: Towards a Co-management Approach
NRM	48.2004	*Ekin BIROL, Ágnes GYOVAI and Melinda SMALE* (lxvi)*:* Using a Choice Experiment to Value Agricultural Biodiversity on Hungarian Small Farms: Agri-Environmental Policies in a Transition al Economy
CCMP	49.2004	*Gernot KLEPPER and Sonja PETERSON:* The EU Emissions Trading Scheme. Allowance Prices, Trade Flows, Competitiveness Effects
GG	50.2004	*Scott BARRETT and Michael HOEL:* Optimal Disease Eradication
CTN	51.2004	*Dinko DIMITROV, Peter BORM, Ruud HENDRICKX and Shao CHIN SUNG:* Simple Priorities and Core Stability in Hedonic Games
SIEV	52.2004	*Francesco RICCI*: Channels of Transmission of Environmental Policy to Economic Growth: A Survey of the Theory
SIEV	53.2004	*Anna ALBERINI, Maureen CROPPER, Alan KRUPNICK and Nathalie B. SIMON:* Willingness to Pay for Mortality Risk Reductions: Does Latency Matter?
NRM	54.2004	*Ingo BRÄUER and Rainer MARGGRAF* (lxvi): Valuation of Ecosystem Services Provided by Biodiversity Conservation: An Integrated Hydrological and Economic Model to Value the Enhanced Nitrogen Retention in Renaturated Streams
NRM	55.2004	*Timo GOESCHL and Tun LIN* (lxvi): Biodiversity Conservation on Private Lands: Information Problems and Regulatory Choices
NRM	56.2004	*Tom DEDEURWAERDERE* (lxvi): Bioprospection: From the Economics of Contracts to Reflexive Governance
CCMP	57.2004	*Katrin REHDANZ and David MADDISON:* The Amenity Value of Climate to German Households
CCMP	58.2004	*Koen SMEKENS and Bob VAN DER ZWAAN:* Environmental Externalities of Geological Carbon Sequestration Effects on Energy Scenarios
NRM	59.2004	*Valentina BOSETTI, Mariaester CASSINELLI and Alessandro LANZA* (lxvii): Using Data Envelopment Analysis to Evaluate Environmentally Conscious Tourism Management
NRM	60.2004	*Timo GOESCHL and Danilo CAMARGO IGLIORI* (lxvi):Property Rights Conservation and Development: An Analysis of Extractive Reserves in the Brazilian Amazon
CCMP	61.2004	*Barbara BUCHNER and Carlo CARRARO*: Economic and Environmental Effectiveness of a Technology-based Climate Protocol
NRM	62.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Resource-Abundance and Economic Growth in the U.S.
NRM	63.2004	*Györgyi BELA, György PATAKI, Melinda SMALE and Mariann HAJDÚ* (lxvi): Conserving Crop Genetic Resources on Smallholder Farms in Hungary: Institutional Analysis
NRM	64.2004	*E.C.M. RUIJGROK and E.E.M. NILLESEN* (lxvi): The Socio-Economic Value of Natural Riverbanks in the Netherlands
NRM	65.2004	*E.C.M. RUIJGROK* (lxvi): Reducing Acidification: The Benefits of Increased Nature Quality. Investigating the Possibilities of the Contingent Valuation Method
ETA	66.2004	*Giannis VARDAS and Anastasios XEPAPADEAS*: Uncertainty Aversion, Robust Control and Asset Holdings
GG	67.2004	*Anastasios XEPAPADEAS and Constadina PASSA*: Participation in and Compliance with Public Voluntary Environmental Programs: An Evolutionary Approach
GG	68.2004	*Michael FINUS*: Modesty Pays: Sometimes!
NRM	69.2004	*Trond BJØRNDAL and Ana BRASÃO*: The Northern Atlantic Bluefin Tuna Fisheries: Management and Policy Implications
CTN	70.2004	*Alejandro CAPARRÓS, Abdelhakim HAMMOUDI and Tarik TAZDAÏT*: On Coalition Formation with Heterogeneous Agents
IEM	71.2004	*Massimo GIOVANNINI, Margherita GRASSO, Alessandro LANZA and Matteo MANERA*: Conditional Correlations in the Returns on Oil Companies Stock Prices and Their Determinants
IEM	72.2004	*Alessandro LANZA, Matteo MANERA and Michael MCALEER*: Modelling Dynamic Conditional Correlations in WTI Oil Forward and Futures Returns
SIEV	73.2004	*Margarita GENIUS and Elisabetta STRAZZERA*: The Copula Approach to Sample Selection Modelling: An Application to the Recreational Value of Forests

CCMP	74.2004	*Rob DELLINK and Ekko van IERLAND*: Pollution Abatement in the Netherlands: A Dynamic Applied General Equilibrium Assessment
ETA	75.2004	*Rosella LEVAGGI and Michele MORETTO*: Investment in Hospital Care Technology under Different Purchasing Rules: A Real Option Approach
CTN	76.2004	*Salvador BARBERÀ and Matthew O. JACKSON* (lxx): On the Weights of Nations: Assigning Voting Weights in a Heterogeneous Union
CTN	77.2004	*Àlex ARENAS, Antonio CABRALES, Albert DÍAZ-GUILERA, Roger GUIMERÀ and Fernando VEGA-REDONDO* (lxx): Optimal Information Transmission in Organizations: Search and Congestion
CTN	78.2004	*Francis BLOCH and Armando GOMES* (lxx): Contracting with Externalities and Outside Options
CTN	79.2004	*Rabah AMIR, Effrosyni DIAMANTOUDI and Licun XUE* (lxx): Merger Performance under Uncertain Efficiency Gains
CTN	80.2004	*Francis BLOCH and Matthew O. JACKSON* (lxx): The Formation of Networks with Transfers among Players
CTN	81.2004	*Daniel DIERMEIER, Hülya ERASLAN and Antonio MERLO* (lxx): Bicameralism and Government Formation
CTN	82.2004	*Rod GARRATT, James E. PARCO, Cheng-ZHONG QIN and Amnon RAPOPORT* (lxx): Potential Maximization and Coalition Government Formation
CTN	83.2004	*Kfir ELIAZ, Debraj RAY and Ronny RAZIN* (lxx): Group Decision-Making in the Shadow of Disagreement
CTN	84.2004	*Sanjeev GOYAL, Marco van der LEIJ and José Luis MORAGA-GONZÁLEZ* (lxx): Economics: An Emerging Small World?
CTN	85.2004	*Edward CARTWRIGHT* (lxx): Learning to Play Approximate Nash Equilibria in Games with Many Players
IEM	86.2004	*Finn R. FØRSUND and Michael HOEL*: Properties of a Non-Competitive Electricity Market Dominated by Hydroelectric Power
KTHC	87.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Investment and Long-Term Income
CCMP	88.2004	*Marzio GALEOTTI and Claudia KEMFERT*: Interactions between Climate and Trade Policies: A Survey
IEM	89.2004	*A. MARKANDYA, S. PEDROSO and D. STREIMIKIENE*: Energy Efficiency in Transition Economies: Is There Convergence Towards the EU Average?
GG	90.2004	*Rolf GOLOMBEK and Michael HOEL* : Climate Agreements and Technology Policy
PRA	91.2004	*Sergei IZMALKOV* (lxv): Multi-Unit Open Ascending Price Efficient Auction
KTHC	92.2004	*Gianmarco I.P. OTTAVIANO and Giovanni PERI*: Cities and Cultures
KTHC	93.2004	*Massimo DEL GATTO*: Agglomeration, Integration, and Territorial Authority Scale in a System of Trading Cities. Centralisation versus devolution
CCMP	94.2004	*Pierre-André JOUVET, Philippe MICHEL and Gilles ROTILLON*: Equilibrium with a Market of Permits
CCMP	95.2004	*Bob van der ZWAAN and Reyer GERLAGH*: Climate Uncertainty and the Necessity to Transform Global Energy Supply
CCMP	96.2004	*Francesco BOSELLO, Marco LAZZARIN, Roberto ROSON and Richard S.J. TOL*: Economy-Wide Estimates of the Implications of Climate Change: Sea Level Rise
CTN	97.2004	*Gustavo BERGANTIÑOS and Juan J. VIDAL-PUGA*: Defining Rules in Cost Spanning Tree Problems Through the Canonical Form
CTN	98.2004	*Siddhartha BANDYOPADHYAY and Mandar OAK*: Party Formation and Coalitional Bargaining in a Model of Proportional Representation
GG	99.2004	*Hans-Peter WEIKARD, Michael FINUS and Juan-Carlos ALTAMIRANO-CABRERA*: The Impact of Surplus Sharing on the Stability of International Climate Agreements
SIEV	100.2004	*Chiara M. TRAVISI and Peter NIJKAMP*: Willingness to Pay for Agricultural Environmental Safety: Evidence from a Survey of Milan, Italy, Residents
SIEV	101.2004	*Chiara M. TRAVISI, Raymond J. G. M. FLORAX and Peter NIJKAMP*: A Meta-Analysis of the Willingness to Pay for Reductions in Pesticide Risk Exposure
NRM	102.2004	*Valentina BOSETTI and David TOMBERLIN:* Real Options Analysis of Fishing Fleet Dynamics: A Test
CCMP	103.2004	*Alessandra GORIA e Gretel GAMBARELLI:* Economic Evaluation of Climate Change Impacts and Adaptability in Italy
PRA	104.2004	*Massimo FLORIO and Mara GRASSENI*: The Missing Shock: The Macroeconomic Impact of British Privatisation
PRA	105.2004	*John BENNETT, Saul ESTRIN, James MAW and Giovanni URGA*: Privatisation Methods and Economic Growth in Transition Economies
PRA	106.2004	*Kira BÖRNER*: The Political Economy of Privatization: Why Do Governments Want Reforms?
PRA	107.2004	*Pehr-Johan NORBÄCK and Lars PERSSON*: Privatization and Restructuring in Concentrated Markets
SIEV	108.2004	*Angela GRANZOTTO, Fabio PRANOVI, Simone LIBRALATO, Patrizia TORRICELLI and Danilo MAINARDI*: Comparison between Artisanal Fishery and Manila Clam Harvesting in the Venice Lagoon by Using Ecosystem Indicators: An Ecological Economics Perspective
CTN	109.2004	*Somdeb LAHIRI*: The Cooperative Theory of Two Sided Matching Problems: A Re-examination of Some Results
NRM	110.2004	*Giuseppe DI VITA*: Natural Resources Dynamics: Another Look
SIEV	111.2004	*Anna ALBERINI, Alistair HUNT and Anil MARKANDYA*: Willingness to Pay to Reduce Mortality Risks: Evidence from a Three-Country Contingent Valuation Study
KTHC	112.2004	*Valeria PAPPONETTI and Dino PINELLI*: Scientific Advice to Public Policy-Making
SIEV	113.2004	*Paulo A.L.D. NUNES and Laura ONOFRI*: The Economics of Warm Glow: A Note on Consumer's Behavior and Public Policy Implications
IEM	114.2004	*Patrick CAYRADE*: Investments in Gas Pipelines and Liquefied Natural Gas Infrastructure What is the Impact on the Security of Supply?
IEM	115.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Oil Security. Short- and Long-Term Policies

IEM	116.2004	*Valeria COSTANTINI and Francesco GRACCEVA:* Social Costs of Energy Disruptions
IEM	117.2004	*Christian EGENHOFER, Kyriakos GIALOGLOU, Giacomo LUCIANI, Maroeska BOOTS, Martin SCHEEPERS, Valeria COSTANTINI, Francesco GRACCEVA, Anil MARKANDYA and Giorgio VICINI*: Market-Based Options for Security of Energy Supply
IEM	118.2004	*David FISK*: Transport Energy Security. The Unseen Risk?
IEM	119.2004	*Giacomo LUCIANI*: Security of Supply for Natural Gas Markets. What is it and What is it not?
IEM	120.2004	*L.J. de VRIES and R.A. HAKVOORT*: The Question of Generation Adequacy in Liberalised Electricity Markets
KTHC	121.2004	*Alberto PETRUCCI*: Asset Accumulation, Fertility Choice and Nondegenerate Dynamics in a Small Open Economy
NRM	122.2004	*Carlo GIUPPONI, Jaroslaw MYSIAK and Anita FASSIO*: An Integrated Assessment Framework for Water Resources Management: A DSS Tool and a Pilot Study Application
NRM	123.2004	*Margaretha BREIL, Anita FASSIO, Carlo GIUPPONI and Paolo ROSATO*: Evaluation of Urban Improvement on the Islands of the Venice Lagoon: A Spatially-Distributed Hedonic-Hierarchical Approach
ETA	124.2004	*Paul MENSINK*: Instant Efficient Pollution Abatement Under Non-Linear Taxation and Asymmetric Information: The Differential Tax Revisited
NRM	125.2004	*Mauro FABIANO, Gabriella CAMARSA, Rosanna DURSI, Roberta IVALDI, Valentina MARIN and Francesca PALMISANI*: Integrated Environmental Study for Beach Management:A Methodological Approach
PRA	126.2004	*Irena GROSFELD and Iraj HASHI*: The Emergence of Large Shareholders in Mass Privatized Firms: Evidence from Poland and the Czech Republic
CCMP	127.2004	*Maria BERRITTELLA, Andrea BIGANO, Roberto ROSON and Richard S.J. TOL*: A General Equilibrium Analysis of Climate Change Impacts on Tourism
CCMP	128.2004	*Reyer GERLAGH*: A Climate-Change Policy Induced Shift from Innovations in Energy Production to Energy Savings
NRM	129.2004	*Elissaios PAPYRAKIS and Reyer GERLAGH*: Natural Resources, Innovation, and Growth
PRA	130.2004	*Bernardo BORTOLOTTI and Mara FACCIO*: Reluctant Privatization
SIEV	131.2004	*Riccardo SCARPA and Mara THIENE*: Destination Choice Models for Rock Climbing in the Northeast Alps: A Latent-Class Approach Based on Intensity of Participation
SIEV	132.2004	*Riccardo SCARPA Kenneth G. WILLIS and Melinda ACUTT*: Comparing Individual-Specific Benefit Estimates for Public Goods: Finite Versus Continuous Mixing in Logit Models
IEM	133.2004	*Santiago J. RUBIO*: On Capturing Oil Rents with a National Excise Tax Revisited
ETA	134.2004	*Ascensión ANDINA DÍAZ*: Political Competition when Media Create Candidates' Charisma
SIEV	135.2004	*Anna ALBERINI*: Robustness of VSL Values from Contingent Valuation Surveys
CCMP	136.2004	*Gernot KLEPPER and Sonja PETERSON*: Marginal Abatement Cost Curves in General Equilibrium: The Influence of World Energy Prices
ETA	137.2004	*Herbert DAWID, Christophe DEISSENBERG and Pavel ŠEVČIK*: Cheap Talk, Gullibility, and Welfare in an Environmental Taxation Game
CCMP	138.2004	*ZhongXiang ZHANG*: The World Bank's Prototype Carbon Fund and China
CCMP	139.2004	*Reyer GERLAGH and Marjan W. HOFKES*: Time Profile of Climate Change Stabilization Policy
NRM	140.2004	*Chiara D'ALPAOS and Michele MORETTO*: The Value of Flexibility in the Italian Water Service Sector: A Real Option Analysis
PRA	141.2004	*Patrick BAJARI, Stephanie HOUGHTON and Steven TADELIS* (lxxi): Bidding for Incompete Contracts
PRA	142.2004	*Susan ATHEY, Jonathan LEVIN and Enrique SEIRA* (lxxi): Comparing Open and Sealed Bid Auctions: Theory and Evidence from Timber Auctions
PRA	143.2004	*David GOLDREICH* (lxxi): Behavioral Biases of Dealers in U.S. Treasury Auctions
PRA	144.2004	*Roberto BURGUET* (lxxi): Optimal Procurement Auction for a Buyer with Downward Sloping Demand: More Simple Economics
PRA	145.2004	*Ali HORTACSU and Samita SAREEN* (lxxi): Order Flow and the Formation of Dealer Bids: An Analysis of Information and Strategic Behavior in the Government of Canada Securities Auctions
PRA	146.2004	*Victor GINSBURGH, Patrick LEGROS and Nicolas SAHUGUET* (lxxi): How to Win Twice at an Auction. On the Incidence of Commissions in Auction Markets
PRA	147.2004	*Claudio MEZZETTI, Aleksandar PEKEČ and Ilia TSETLIN* (lxxi): Sequential vs. Single-Round Uniform-Price Auctions
PRA	148.2004	*John ASKER and Estelle CANTILLON* (lxxi): Equilibrium of Scoring Auctions
PRA	149.2004	*Philip A. HAILE, Han HONG and Matthew SHUM* (lxxi): Nonparametric Tests for Common Values in First-Price Sealed-Bid Auctions
PRA	150.2004	*François DEGEORGE, François DERRIEN and Kent L. WOMACK* (lxxi): Quid Pro Quo in IPOs: Why Bookbuilding is Dominating Auctions
CCMP	151.2004	*Barbara BUCHNER and Silvia DALL'OLIO*: Russia: The Long Road to Ratification. Internal Institution and Pressure Groups in the Kyoto Protocol's Adoption Process
CCMP	152.2004	*Carlo CARRARO and Marzio GALEOTTI*: Does Endogenous Technical Change Make a Difference in Climate Policy Analysis? A Robustness Exercise with the FEEM-RICE Model
PRA	153.2004	*Alejandro M. MANELLI and Daniel R. VINCENT* (lxxi): Multidimensional Mechanism Design: Revenue Maximization and the Multiple-Good Monopoly
ETA	154.2004	*Nicola ACOCELLA, Giovanni Di BARTOLOMEO and Wilfried PAUWELS*: Is there any Scope for Corporatism in Stabilization Policies?
CTN	155.2004	*Johan EYCKMANS and Michael FINUS*: An Almost Ideal Sharing Scheme for Coalition Games with Externalities
CCMP	156.2004	*Cesare DOSI and Michele MORETTO*: Environmental Innovation, War of Attrition and Investment Grants

CCMP	157.2004	*Valentina BOSETTI, Marzio GALEOTTI and Alessandro LANZA*: How Consistent are Alternative Short-Term Climate Policies with Long-Term Goals?
ETA	158.2004	*Y. Hossein FARZIN and Ken-Ichi AKAO*: Non-pecuniary Value of Employment and Individual Labor Supply
ETA	159.2004	*William BROCK and Anastasios XEPAPADEAS*: Spatial Analysis: Development of Descriptive and Normative Methods with Applications to Economic-Ecological Modelling
KTHC	160.2004	*Alberto PETRUCCI*: On the Incidence of a Tax on PureRent with Infinite Horizons
IEM	161.2004	*Xavier LABANDEIRA, José M. LABEAGA and Miguel RODRÍGUEZ*: Microsimulating the Effects of Household Energy Price Changes in Spain

NOTE DI LAVORO PUBLISHED IN 2005

CCMP	1.2005	*Stéphane HALLEGATTE*: Accounting for Extreme Events in the Economic Assessment of Climate Change
CCMP	2.2005	*Qiang WU and Paulo Augusto NUNES*: Application of Technological Control Measures on Vehicle Pollution: A Cost-Benefit Analysis in China
CCMP	3.2005	*Andrea BIGANO, Jacqueline M. HAMILTON, Maren LAU, Richard S.J. TOL and Yuan ZHOU*: A Global Database of Domestic and International Tourist Numbers at National and Subnational Level
CCMP	4.2005	*Andrea BIGANO, Jacqueline M. HAMILTON and Richard S.J. TOL*: The Impact of Climate on Holiday Destination Choice
ETA	5.2005	*Hubert KEMPF*: Is Inequality Harmful for the Environment in a Growing Economy?
CCMP	6.2005	*Valentina BOSETTI, Carlo CARRARO and Marzio GALEOTTI*: The Dynamics of Carbon and Energy Intensity in a Model of Endogenous Technical Change
IEM	7.2005	*David CALEF and Robert GOBLE*: The Allure of Technology: How France and California Promoted Electric Vehicles to Reduce Urban Air Pollution
ETA	8.2005	*Lorenzo PELLEGRINI and Reyer GERLAGH*: An Empirical Contribution to the Debate on Corruption Democracy and Environmental Policy
CCMP	9.2005	*Angelo ANTOCI*: Environmental Resources Depletion and Interplay Between Negative and Positive Externalities in a Growth Model
CTN	10.2005	*Frédéric DEROIAN*: Cost-Reducing Alliances and Local Spillovers
NRM	11.2005	*Francesco SINDICO*: The GMO Dispute before the WTO: Legal Implications for the Trade and Environment Debate
KTHC	12.2005	*Carla MASSIDDA*: Estimating the New Keynesian Phillips Curve for Italian Manufacturing Sectors
KTHC	13.2005	*Michele MORETTO and Gianpaolo ROSSINI*: Start-up Entry Strategies: Employer vs. Nonemployer firms
PRCG	14.2005	*Clara GRAZIANO and Annalisa LUPORINI*: Ownership Concentration, Monitoring and Optimal Board Structure
CSRM	15.2005	*Parashar KULKARNI*: Use of Ecolabels in Promoting Exports from Developing Countries to Developed Countries: Lessons from the Indian LeatherFootwear Industry
KTHC	16.2005	*Adriana DI LIBERTO, Roberto MURA and Francesco PIGLIARU*: How to Measure the Unobservable: A Panel Technique for the Analysis of TFP Convergence
KTHC	17.2005	*Alireza NAGHAVI*: Asymmetric Labor Markets, Southern Wages, and the Location of Firms
KTHC	18.2005	*Alireza NAGHAVI*: Strategic Intellectual Property Rights Policy and North-South Technology Transfer
KTHC	19.2005	*Mombert HOPPE*: Technology Transfer Through Trade
PRCG	20.2005	*Roberto ROSON*: Platform Competition with Endogenous Multihoming
CCMP	21.2005	*Barbara BUCHNER and Carlo CARRARO*: Regional and Sub-Global Climate Blocs. A Game Theoretic Perspective on Bottom-up Climate Regimes
IEM	22.2005	*Fausto CAVALLARO*: An Integrated Multi-Criteria System to Assess Sustainable Energy Options: An Application of the Promethee Method
CTN	23.2005	*Michael FINUS, Pierre v. MOUCHE and Bianca RUNDSHAGEN*: Uniqueness of Coalitional Equilibria
IEM	24.2005	*Wietze LISE*: Decomposition of CO2 Emissions over 1980–2003 in Turkey
CTN	25.2005	*Somdeb LAHIRI*: The Core of Directed Network Problems with Quotas
SIEV	26.2005	*Susanne MENZEL and Riccardo SCARPA*: Protection Motivation Theory and Contingent Valuation: Perceived Realism, Threat and WTP Estimates for Biodiversity Protection
NRM	27.2005	*Massimiliano MAZZANTI and Anna MONTINI*: The Determinants of Residential Water Demand Empirical Evidence for a Panel of Italian Municipalities
CCMP	28.2005	*Laurent GILOTTE and Michel de LARA*: Precautionary Effect and Variations of the Value of Information
NRM	29.2005	*Paul SARFO-MENSAH*: Exportation of Timber in Ghana: The Menace of Illegal Logging Operations
CCMP	30.2005	*Andrea BIGANO, Alessandra GORIA, Jacqueline HAMILTON and Richard S.J. TOL*: The Effect of Climate Change and Extreme Weather Events on Tourism
NRM	31.2005	*Maria Angeles GARCIA-VALIÑAS*: Decentralization and Environment: An Application to Water Policies
NRM	32.2005	*Chiara D'ALPAOS, Cesare DOSI and Michele MORETTO*: Concession Length and Investment Timing Flexibility
CCMP	33.2005	*Joseph HUBER*: Key Environmental Innovations
CTN	34.2005	*Antoni CALVÓ-ARMENGOL and Rahmi İLKILIÇ* (lxxii): Pairwise-Stability and Nash Equilibria in Network Formation
CTN	35.2005	*Francesco FERI* (lxxii): Network Formation with Endogenous Decay
CTN	36.2005	*Frank H. PAGE, Jr. and Myrna H. WOODERS* (lxxii): Strategic Basins of Attraction, the Farsighted Core, and Network Formation Games

CTN	37.2005	*Alessandra CASELLA and Nobuyuki HANAKI* (lxxii): Information Channels in Labor Markets. On the Resilience of Referral Hiring
CTN	38.2005	*Matthew O. JACKSON and Alison WATTS* (lxxii): Social Games: Matching and the Play of Finitely Repeated Games
CTN	39.2005	*Anna BOGOMOLNAIA, Michel LE BRETON, Alexei SAVVATEEV and Shlomo WEBER* (lxxii): The Egalitarian Sharing Rule in Provision of Public Projects
CTN	40.2005	*Francesco FERI*: Stochastic Stability in Network with Decay
CTN	41.2005	*Aart de ZEEUW* (lxxii): Dynamic Effects on the Stability of International Environmental Agreements
NRM	42.2005	*C. Martijn van der HEIDE, Jeroen C.J.M. van den BERGH, Ekko C. van IERLAND and Paulo A.L.D. NUNES*: Measuring the Economic Value of Two Habitat Defragmentation Policy Scenarios for the Veluwe, The Netherlands
PRCG	43.2005	*Carla VIEIRA and Ana Paula SERRA*: Abnormal Returns in Privatization Public Offerings: The Case of Portuguese Firms
SIEV	44.2005	*Anna ALBERINI, Valentina ZANATTA and Paolo ROSATO*: Combining Actual and Contingent Behavior to Estimate the Value of Sports Fishing in the Lagoon of Venice
CTN	45.2005	*Michael FINUS and Bianca RUNDSHAGEN:* Participation in International Environmental Agreements: The Role of Timing and Regulation
CCMP	46.2005	*Lorenzo PELLEGRINI and Reyer GERLAGH*: Are EU Environmental Policies Too Demanding for New Members States?
IEM	47.2005	*Matteo MANERA*: Modeling Factor Demands with SEM and VAR: An Empirical Comparison
CTN	48.2005	*Olivier TERCIEUX and Vincent VANNETELBOSCH* (lxx): A Characterization of Stochastically Stable Networks
CTN	49.2005	*Ana MAULEON, José SEMPERE-MONERRIS and Vincent J. VANNETELBOSCH* (lxxii): R&D Networks Among Unionized Firms
CTN	50.2005	*Carlo CARRARO, Johan EYCKMANS and Michael FINUS*: Optimal Transfers and Participation Decisions in International Environmental Agreements
KTHC	51.2005	*Valeria GATTAI*: From the Theory of the Firm to FDI and Internalisation:A Survey
CCMP	52.2005	*Alireza NAGHAVI*: Multilateral Environmental Agreements and Trade Obligations: A Theoretical Analysis of the Doha Proposal
SIEV	53.2005	*Margaretha BREIL, Gretel GAMBARELLI and Paulo A.L.D. NUNES*: Economic Valuation of On Site Material Damages of High Water on Economic Activities based in the City of Venice: Results from a Dose-Response-Expert-Based Valuation Approach
ETA	54.2005	*Alessandra del BOCA, Marzio GALEOTTI, Charles P. HIMMELBERG and Paola ROTA*: Investment and Time to Plan: A Comparison of Structures vs. Equipment in a Panel of Italian Firms
CCMP	55.2005	*Gernot KLEPPER and Sonja PETERSON*: Emissions Trading, CDM, JI, and More – The Climate Strategy of the EU
ETA	56.2005	*Maia DAVID and Bernard SINCLAIR-DESGAGNÉ*: Environmental Regulation and the Eco-Industry
ETA	57.2005	*Alain-Désiré NIMUBONA and Bernard SINCLAIR-DESGAGNÉ*: The Pigouvian Tax Rule in the Presence of an Eco-Industry
NRM	58.2005	*Helmut KARL, Antje MÖLLER, Ximena MATUS, Edgar GRANDE and Robert KAISER*: Environmental Innovations: Institutional Impacts on Co-operations for Sustainable Development
SIEV	59.2005	*Dimitra VOUVAKI and Anastasios XEPAPADEAS* (lxxiii): Criteria for Assessing Sustainable Development: Theoretical Issues and Empirical Evidence for the Case of Greece
CCMP	60.2005	*Andreas LÖSCHEL and Dirk T.G. RÜBBELKE*: Impure Public Goods and Technological Interdependencies
PRCG	61.2005	*Christoph A. SCHALTEGGER and Benno TORGLER*: Trust and Fiscal Performance: A Panel Analysis with Swiss Data
ETA	62.2005	*Irene VALSECCHI*: A Role for Instructions
NRM	63.2005	*Valentina BOSETTI and Gianni LOCATELLI*: A Data Envelopment Analysis Approach to the Assessment of Natural Parks' Economic Efficiency and Sustainability. The Case of Italian National Parks
SIEV	64.2005	*Arianne T. de BLAEIJ, Paulo A.L.D. NUNES and Jeroen C.J.M. van den BERGH*: Modeling 'No-choice' Responses in Attribute Based Valuation Surveys
CTN	65.2005	*Carlo CARRARO, Carmen MARCHIORI and Alessandra SGOBBI*: Applications of Negotiation Theory to Water Issues
CTN	66.2005	*Carlo CARRARO, Carmen MARCHIORI and Alessandra SGOBBI*: Advances in Negotiation Theory: Bargaining, Coalitions and Fairness
KTHC	67.2005	*Sandra WALLMAN* (lxxiv): Network Capital and Social Trust: Pre-Conditions for 'Good' Diversity?
KTHC	68.2005	*Asimina CHRISTOFOROU* (lxxiv): On the Determinants of Social Capital in Greece Compared to Countries of the European Union
KTHC	69.2005	*Eric M. USLANER* (lxxiv): Varieties of Trust
KTHC	70.2005	*Thomas P. LYON* (lxxiv): Making Capitalism Work: Social Capital and Economic Growth in Italy, 1970-1995
KTHC	71.2005	*Graziella BERTOCCHI and Chiara STROZZI* (lxxv): Citizenship Laws and International Migration in Historical Perspective
KTHC	72.2005	*Elsbeth van HYLCKAMA VLIEG* (lxxv): Accommodating Differences
KTHC	73.2005	*Renato SANSA and Ercole SORI* (lxxv): Governance of Diversity Between Social Dynamics and Conflicts in Multicultural Cities. A Selected Survey on Historical Bibliography
IEM	74.2005	*Alberto LONGO and Anil MARKANDYA*: Identification of Options and Policy Instruments for the Internalisation of External Costs of Electricity Generation. Dissemination of External Costs of Electricity Supply Making Electricity External Costs Known to Policy-Makers MAXIMA

IEM	75.2005	*Margherita GRASSO and Matteo MANERA*: Asymmetric Error Correction Models for the Oil-Gasoline Price Relationship
ETA	76.2005	*Umberto CHERUBINI and Matteo MANERA*: Hunting the Living Dead A "Peso Problem" in Corporate Liabilities Data
CTN	77.2005	*Hans-Peter WEIKARD*: Cartel Stability under an Optimal Sharing Rule
ETA	78.2005	*Joëlle NOAILLY, Jeroen C.J.M. van den BERGH and Cees A. WITHAGEN* (lxxvi): Local and Global Interactions in an Evolutionary Resource Game
ETA	79.2005	*Joëlle NOAILLY, Cees A. WITHAGEN and Jeroen C.J.M. van den BERGH* (lxxvi): Spatial Evolution of Social Norms in a Common-Pool Resource Game
CCMP	80.2005	*Massimiliano MAZZANTI and Roberto ZOBOLI*: Economic Instruments and Induced Innovation: The Case of End-of-Life Vehicles European Policies
NRM	81.2005	*Anna LASUT*: Creative Thinking and Modelling for the Decision Support in Water Management
CCMP	82.2005	*Valentina BOSETTI and Barbara BUCHNER*: Using Data Envelopment Analysis to Assess the Relative Efficiency of Different Climate Policy Portfolios
ETA	83.2005	*Ignazio MUSU*: Intellectual Property Rights and Biotechnology: How to Improve the Present Patent System
KTHC	84.2005	*Giulio CAINELLI, Susanna MANCINELLI and Massimiliano MAZZANTI*: Social Capital, R&D and Industrial Districts
ETA	85.2005	*Rosella LEVAGGI, Michele MORETTO and Vincenzo REBBA*: Quality and Investment Decisions in Hospital Care when Physicians are Devoted Workers
CCMP	86.2005	*Valentina BOSETTI and Laurent GILOTTE*: Carbon Capture and Sequestration: How Much Does this Uncertain Option Affect Near-Term Policy Choices?
CSRM	87.2005	*Nicoletta FERRO*: Value Through Diversity: Microfinance and Islamic Finance and Global Banking
ETA	88.2005	*A. MARKANDYA and S. PEDROSO*: How Substitutable is Natural Capital?
IEM	89.2005	*Anil MARKANDYA, Valeria COSTANTINI, Francesco GRACCEVA and Giorgio VICINI*: Security of Energy Supply: Comparing Scenarios From a European Perspective
CCMP	90.2005	*Vincent M. OTTO, Andreas LÖSCHEL and Rob DELLINK*: Energy Biased Technical Change: A CGE Analysis
PRCG	91.2005	*Carlo CAPUANO*: *Abuse of Competitive Fringe*
PRCG	92.2005	*Ulrich BINDSEIL, Kjell G. NYBORG and Ilya A. STREBULAEV* (lxv): Bidding and Performance in Repo Auctions: Evidence from ECB Open Market Operations
CCMP	93.2005	*Sabrina AUCI and Leonardo BECCHETTI*: The Stability of the Adjusted and Unadjusted Environmental Kuznets Curve
CCMP	94.2005	*Francesco BOSELLO and Jian ZHANG*: Assessing Climate Change Impacts: Agriculture
CTN	95.2005	*Alejandro CAPARRÓS, Jean-Christophe PEREAU and Tarik TAZDAÏT*: Bargaining with Non-Monolithic Players
ETA	96.2005	*William BROCK and Anastasios XEPAPADEAS* (lxxvi): Optimal Control and Spatial Heterogeneity: Pattern Formation in Economic-Ecological Models
CCMP	97.2005	*Francesco BOSELLO, Roberto ROSON and Richard S.J. TOL* (lxxvii): Economy-Wide Estimates of the Implications of Climate Change: Human Health
CCMP	98.2005	*Rob DELLINK, Michael FINUS and Niels OLIEMAN*: Coalition Formation under Uncertainty: The Stability Likelihood of an International Climate Agreement
CTN	99.2005	*Valeria COSTANTINI, Riccardo CRESCENZI, Fabrizio De FILIPPIS, and Luca SALVATICI*: Bargaining Coalitions in the Agricultural Negotiations of the Doha Round: Similarity of Interests or Strategic Choices? An Empirical Assessment
IEM	100.2005	*Giliola FREY and Matteo MANERA*: Econometric Models of Asymmetric Price Transmission
IEM	101.2005	*Alessandro COLOGNI and Matteo MANERA*: Oil Prices, Inflation and Interest Rates in a Structural Cointegrated VAR Model for the G-7 Countries
KTHC	102.2005	*Chiara M. TRAVISI and Roberto CAMAGNI*: Sustainability of Urban Sprawl: Environmental-Economic Indicators for the Analysis of Mobility Impact in Italy

(lxv) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications" organised by Fondazione Eni Enrico Mattei and sponsored by the EU, Milan, September 25-27, 2003

(lxvi) This paper has been presented at the 4th BioEcon Workshop on "Economic Analysis of Policies for Biodiversity Conservation" organised on behalf of the BIOECON Network by Fondazione Eni Enrico Mattei, Venice International University (VIU) and University College London (UCL) , Venice, August 28-29, 2003

(lxvii) This paper has been presented at the international conference on "Tourism and Sustainable Economic Development – Macro and Micro Economic Issues" jointly organised by CRENoS (Università di Cagliari e Sassari, Italy) and Fondazione Eni Enrico Mattei, and supported by the World Bank, Sardinia, September 19-20, 2003

(lxviii) This paper was presented at the ENGIME Workshop on "Governance and Policies in Multicultural Cities", Rome, June 5-6, 2003

(lxix) This paper was presented at the Fourth EEP Plenary Workshop and EEP Conference "The Future of Climate Policy", Cagliari, Italy, 27-28 March 2003

(lxx) This paper was presented at the 9th Coalition Theory Workshop on "Collective Decisions and Institutional Design" organised by the Universitat Autònoma de Barcelona and held in Barcelona, Spain, January 30-31, 2004

(lxxi) This paper was presented at the EuroConference on "Auctions and Market Design: Theory, Evidence and Applications", organised by Fondazione Eni Enrico Mattei and Consip and sponsored by the EU, Rome, September 23-25, 2004

(lxxii) This paper was presented at the 10th Coalition Theory Network Workshop held in Paris, France on 28-29 January 2005 and organised by EUREQua.

(lxxiii) This paper was presented at the 2nd Workshop on "Inclusive Wealth and Accounting Prices" held in Trieste, Italy on 13-15 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics

(lxxiv) This paper was presented at the ENGIME Workshop on "Trust and social capital in multicultural cities" Athens, January 19-20, 2004

(lxxv) This paper was presented at the ENGIME Workshop on "Diversity as a source of growth" Rome November 18-19, 2004

(lxxvi) This paper was presented at the 3rd Workshop on Spatial-Dynamic Models of Economics and Ecosystems held in Trieste on 11-13 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics

(lxxvii) This paper was presented at the Workshop on Infectious Diseases: Ecological and Economic Approaches held in Trieste on 13-15 April 2005 and organised by the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics.

2004 SERIES

CCMP	*Climate Change Modelling and Policy* (Editor: Marzio Galeotti)
GG	*Global Governance* (Editor: Carlo Carraro)
SIEV	*Sustainability Indicators and Environmental Valuation* (Editor: Anna Alberini)
NRM	*Natural Resources Management* (Editor: Carlo Giupponi)
KTHC	*Knowledge, Technology, Human Capital* (Editor: Gianmarco Ottaviano)
IEM	*International Energy Markets* (Editor: Anil Markandya)
CSRM	*Corporate Social Responsibility and Sustainable Management* (Editor: Sabina Ratti)
PRA	*Privatisation, Regulation, Antitrust* (Editor: Bernardo Bortolotti)
ETA	*Economic Theory and Applications* (Editor: Carlo Carraro)
CTN	*Coalition Theory Network*

2005 SERIES

CCMP	*Climate Change Modelling and Policy* (Editor: Marzio Galeotti)
SIEV	*Sustainability Indicators and Environmental Valuation* (Editor: Anna Alberini)
NRM	*Natural Resources Management* (Editor: Carlo Giupponi)
KTHC	*Knowledge, Technology, Human Capital* (Editor: Gianmarco Ottaviano)
IEM	*International Energy Markets* (Editor: Anil Markandya)
CSRM	*Corporate Social Responsibility and Sustainable Management* (Editor: Sabina Ratti)
PRCG	*Privatisation Regulation Corporate Governance* (Editor: Bernardo Bortolotti)
ETA	*Economic Theory and Applications* (Editor: Carlo Carraro)
CTN	*Coalition Theory Network*