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Infrastructure and performance of the Italian economic system

by

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1. Introduction

This paper aims to analyse the consequences for the Italian economy of the recently started process of modernisation and extension of the infrastructure of the country. The planned measures aim to increase the competitiveness of Italian businesses and to improve the quality of citizens' life. Priorities include the defence of the ground, the transport system, the improvement of urban-planning, the water and energy distribution system and the information and telecommunications network.

The analysis has two main parts. Firstly we present (Sections 2 - 4) the causes of the lack of infrastructure in Italy, the new policy of public investment and the expected results in terms of reduction in the costs of transport, communications and supplies for businesses and the benefits for the citizens.

In the second part (Sections 5 and 6), we discuss how the building of new infrastructure involves all the productive sectors, chiefly the construction sector. This is a strategic sector for the Italian economy, because of the high level of employment in this field and the multiplier effects on other industries. An increase of production in the construction sector causes an increase of production in all the connected businesses which supply raw and building materials, electrical, gas and water supplies, fittings and services and leads to an increase in national employment.

The paper presents (Section 7) some estimates of the effects of the investment in construction on production and on value added, both on national and regional scale. The estimates are made using a set of 20 regional, 44-sector, input-output tables and a bi-regional model elaborated by I.R.P.E.T (the Regional Institute for Economic Planning of Tuscany).

2. The causes of the lack of infrastructure in Italy

Italy has a lower level of infrastructure than other European countries, and this causes serious problems for the competitiveness of its enterprises and the quality of life of its citizens.

This state of affairs is confirmed by an analysis of the data in Tables 1-2. Here we can see that Italy systematically invests a lower share of its GDP in civil engineering and public residential construction than other European States ([1]).

TABLE 1 - INVESTMENT IN PUBLIC RESIDENTIAL CONSTRUCTION AND CIVIL ENGINEERING

MILLIONS OF ECU (1996 PRICES) – (*) FORECAST

	1994	**1995**	**1996**	**1997(*)**	**1998(*)**
AUSTRIA	8,232	7,845	7,530	7,478	7,592
BELGIUM	5,066	4,989	5,100	5,278	5,370
DENMARK	4,338	4,671	4,947	5,025	5,025
FINLAND	3,078	2,959	3,150	3,254	3,468
FRANCE	27,702	26,580	24,465	23,252	23,710
GERMANY	48,741	47,739	45,100	44,802	44,941
IRELAND	1,464	1,618	1,824	2,044	2,239
ITALY	20,427	20,407	20,938	21,454	22,077
NORWAY	4,824	4,928	5,090	5,067	4,744
PORTUGAL	4,969	5,363	5,639	6,413	6,655
SPAIN	21,702	22,365	20,419	19,302	19,433
SWEDEN	8,911	9,145	8,620	8,726	9,021
SWITZERLAND	9,168	8,756	8,380	8,235	8,543
THE NETHERLANDS	8,140	8,287	8,410	8,228	8,410
UNITED KINGDOM	18,819	18,407	18,098	18,065	18,656
TOTAL	**195,581**	**194,059**	**187,710**	**186,623**	**189,884**

[1] Euroconstruct, The European Construction Outlook 1997/1998, The 43rd Euroconstruct Conference, Rome, Italy, 1997.

TABLE 2 - PERCENTAGE OF GDP INVESTED IN PUBLIC RESIDENTIAL CONSTRUCTION AND CIVIL ENGINEERING – (1996 PRICES) – (*) FORECAST

	1994	**1995**	**1996**	**1997(*)**	**1998(*)**
AUSTRIA	4.65%	4.35%	4.13%	4.05%	4.02%
BELGIUM	2.56%	2.47%	2.49%	2.52%	2.49%
DENMARK	3.85%	4.03%	4.18%	4.12%	4.02%
FINLAND	3.86%	3.56%	3.68%	3.62%	3.73%
FRANCE	2.36%	2.22%	2.02%	1.87%	1.86%
GERMANY	2.72%	2.61%	2.43%	2.36%	2.31%
IRELAND	3.27%	3.27%	3.43%	3.60%	3.73%
ITALY	2.44%	2.37%	2.41%	2.44%	2.46%
NORWAY	4.29%	4.25%	4.16%	3.99%	3.61%
PORTUGAL	6.25%	6.63%	6.75%	7.43%	7.45%
SPAIN	4.98%	5.00%	4.46%	4.10%	4.00%
SWEDEN	4.67%	4.63%	4.31%	4.27%	4.31%
SWITZERLAND	4.57%	4.33%	4.17%	4.07%	4.22%
THE NETHERLANDS	2.73%	2.72%	2.68%	2.55%	2.52%
UNITED KINGDOM	2.49%	2.38%	2.28%	2.21%	2.24%
TOTAL	**3.01%**	**2.92%**	**2.78%**	**2.70%**	**2.68%**

The lack of infrastructure is a problem both in industrialised northern Italy, where it hinders further growth, and in the South where it creates an obstacle to industrialisation and economic take-off.

The delay in the development of an adequate infrastructure has become increasingly problematic in recent years. The causes are many and varied, but we can identify three main reasons:

- lack of planning;
- lack of a regulatory framework;
- budgetary constraints.

As regards the lack of planning, investment in public works has for too long in Italy been above all anti-cyclical, that is, investment has been seen as a way to activate the multiplier mechanisms of production, employment and income, rather than structural,

that is with the long-term aim of increasing the availability of productive capital. Italy has not had an organic programme for the development of its infrastructure, and many public works have been carried out not because they were really useful but simply to create financial flow. Moreover many public works were started but never finished, because the flow of finance ceased when the cyclical crisis ended.

These considerations lead us to the conclusion that the situation of Italian infrastructure is even worse than that suggested by the data in the tables above. Not only has Italy invested a lower share of its resources in public works than the European average, but these resources have been badly used, thus further increasing the infrastructure gap**.**

To move on to the problem of the lack of a regulatory framework, it has to be admitted that Italian legislation on building and public works is complicated, and sometimes contradictory and inadequate. There is a law on public contracting but it is not yet fully applied. The system of control over which firms can take part in public tenders (membership of the national board of building firms) does not guarantee the choice of the most reliable firms and the only element considered is the price which is often too low and leads to the bankruptcy of the contractor and the suspension of works. Town planning regulations are also complicated and rules governing the renting of property also have a negative effect on the housing market. The general situation is made worse by the conflicts of powers which often arise between the central State administration and the local administrations (Regions, Provinces and Municipalities), particularly over environmental questions.

Finally, on the question of budgetary constraints, the most striking aspect is the fact that the Italian public debt is the highest in Europe, equal to 121.6% of the GDP. The State budget is almost completely absorbed by running costs and the payment of interest. Only investments in capital account can be postponed and it is here that the main cuts in public expenditure are to be found.

3. The balance of public finance in Italy as a requirement for the expansion of infrastructure

Since 1996, Italy has been working hard to improve the situation of its public finance and infrastructure. This operation has perhaps been made possible by the will of the Italian government and people to reach an ambitious and seemingly impossible goal, that of joining Europe’s single currency.

At the end of 1995, the parameters established by the treaty of Maastricht on 1st January 1993 seemed completely out of reach for Italy. They included:

- a public deficit not higher than 3% of the GDP;

- a public debt not more than 60% above the GDP, and in any case tending to decrease rapidly;

- a rate of inflation not more than 1.5% above that of the average of the three most virtuous countries ;

- a long-term interest rate not more than 2% above that of the average of these three countries;

- two years' participation in the EMS, without devaluation.

Table 3 shows how, at the end of 1995, Italy did not satisfy any of the parameters of Maastricht and was very far from the European average.

TABLE 3 - PARAMETERS OF THE TREATY OF MAASTRICHT

	DEFICIT/GDP		DEBT/GDP		INFLATION RATE		INTEREST RATE	
	1995	**1997**	**1995**	**1997**	**1995**	**1997**	**1995**	**1997**
AUSTRIA	5.5%	2.5%	68.0%	66.1%	2.4%	1.2%	7.3%	5.6%
BELGIUM	4.5%	2.1%	134.4%	122.2%	1.5%	1.5%	7.9%	5.7%
FINLAND	5.4%	0.9%	63.2%	55.8%	1.2%	1.2%	9.4%	5.9%
FRANCE	5.0%	3.0%	51.5%	58.0%	1.9%	1.3%	7.8%	5.5%
GERMANY	2.9%	2.7%	58.8%	61.3%	1.8%	1.5%	7.1%	5.6%
IRELAND	2.7%	-0.9%	85.9%	67.0%	2.5%	1.2%	8.5%	6.2%
ITALY	7.4%	2.7%	124.9%	121.6%	5.6%	1.9%	12.3%	6.7%
LUXEMBOURG	-0.4%	-1.7%	6.4%	6.7%	1.9%	1.4%	6.2%	5.6%
THE NETHERLANDS	3.1%	1.4%	78.4%	72.3%	1.6%	1.9%	7.2%	5.5%
PORTUGAL	5.4%	2.5%	70.5%	62.0%	4.2%	1.9%	11.7%	6.2%
SPAIN	5.9%	2.6%	64.8%	68.3%	4.9%	1.9%	11.5%	6.3%
DENMARK	2.0%	-0.7%	73.6%	64.1%	2.0%	2.0%	8.6%	6.2%
UNITED KINGDOM	5.1%	1.9%	52.5%	53.4%	2.9%	1.9%	8.4%	7.0%
GREECE	9.3%	4.0%	114.4%	108.7%	9.2%	5.4%	18.4%	10.2%
SWEDEN	7.0%	0.4%	81.4%	76.6%	2.8%	1.9%	10.7%	6.5%
GOAL	**3.0**%	**3.0**%	**60.0**%	**60.0**%	**2.9**%	**2.7**%	**10.2**%	**7.9**%

The policy of limiting public expenditure, a rigorous fiscal policy, a correct monetary policy and a responsible policy of wages has enabled Italy to improve its position spectacularly in two years, coming into line with the Maastricht parameters and earning the right to join the single European currency (see previous table, year 1997).

4. The new policy on infrastructure in Italy

Having identified the causes of the delay in developing adequate infrastructure (lack of planning, lack of a regulatory framework and budgetary constraints), the public authorities are working to remove these obstacles. The Ministry of Public Works is in the front line, having set up a programme to establish what infrastructure is necessary for the country and to bring up to date the regulatory framework. The aim of the programme is to provide the country with the infrastructure it needs rapidly, through the provision of a clear regulatory framework and to enable this work to be co-financed by private capital and European funds.

Certain sectors have been identified as having priority, and action strategies have been outlined.

- Protection of the ground. Progressive hydro-geological damage has been severe and is destined to get worse. The lack of preventive measures has created a drain on public finances from five to ten times that necessary for expenses related to safety measures. Natural disasters have cost an average of 7.000 billion lire a year over the last 30 years. It is necessary to exchange the pattern of extraordinary intervention following catastrophic events for criteria of maintenance and consolidation. In the plan for the protection of the ground there should be elements of flexibility to allow for situations where intervention would be too costly in relation to the benefits obtained or where the probability of a natural disaster is very low. In the first case it is more economical to pay for the movement of residential property, in the second case it is more economical to take out insurance contracts.

- Roads, ports, airports, railways. These are the infrastructure systems which have the greatest impact on transport costs for industry and on competitiveness in internal and international markets. In Italy there is a severe lack of the infrastructure needed for the movement of people and goods in the large urban areas and the connections between towns are congested. The overall picture shows that some infrastructure is underused (80% of the railways are underused), other is of poor quality (particularly in the South), yet other is congested. The main problem of the network of Italian transport is not that of creating new road and rail links, it is to better organise the existing system. The only new project of importance is the high speed rail system. All other projects are aimed at improving the integration between the different means of transport and rationalising the use of the system, also by the introduction of a more effective system of pricing.

- Towns. The Italian urban system has been central to the economic development of the country and the large towns are still extremely lively centres, although they have undergone some profound transformations in recent years. The advanced tertiary sector has taken over the central and residential areas of large towns, forcing the resident population to move to the outskirts, or out of town. At the same time, traditional industry has left the town to settle in the surrounding areas. This situation has given rise to a number of problems, which the local administrations are trying to solve. The first problem is transportation between towns and the surrounding areas: the number of commuters continues to increase, the lack of public services leads to the use of private means of transport, the existing road network is saturated and new settlements make it difficult to find the physical space for new roads. The second problem is that of disused areas in strategic positions in the towns, which must be converted into residential or green areas. A third problem is that of the degradation of urban suburbs, which must be made more welcoming both by the renovation of large residential complexes and the creation of social services and centres. Finally we must not forget that Italian cities are cities of art, with a wonderful artistic, historical and archeological patrimony which must be preserved, protected and shown to its best advantage.

- The water network. It is incredible that a civilised country such as Italy has a water system with such serious problems. Some areas do not have the necessary infrastructure to provide the basic services, such as the distribution of drinking water and drainage. Information about the demand and supply of water distribution is often not available. A large part of the water distribution system is out-dated and the loss of water is considerable. A recent law passed in Parliament aims to re-organise the whole sector. Various types of intervention are planned. Firstly it is necessary to guarantee the essential services of water distribution and the collection of sewage throughout the country. Secondly the management of the water system, which is at present run by a myriad of small municipal firms, has to be completely reviewed. It is necessary to concentrate the management in the hands of a few large companies, run according to economic criteria and with space for private initiative. It is also necessary to fix prices which will cover the cost of the service and repay investments, abandoning the old system of contributions from the State.

- The energy grid. The infrastructure for the provision, transport and distribution of energy is at present adequate for the needs of the country. The process of privatisation which is taking place at the moment has allowed the State to step back from the financial support of this sector and the firms which run the system are self-financing and run the system economically. The State has however important roles to play. The first is that of guaranteeing the working of the market, to avoid situations of monopoly with negative consequences for the consumer. The second is to provide a long-term energy policy to reduce Italy’s dependence on others for its energy supply. At present Italy imports more than 80% of its energy requirements. The new policy aims to diversify, both in terms of the supplying countries and in terms of the types of fuel supplied. Italy is at present

converting many plants from oil to methane. Finally the State has to provide incentives for research in the field of energy, above all into the use of renewable sources of energy.

- Information and telecommunication networks. It is vital for Italy to take an active part in the process of development and diffusion of information and telecommunication technologies, which are the basis not only for the economic but also for the social and cultural development of the country. It is necessary to create channels of communication which will be adequate for the increasing amount of information (text, images, sounds,….) which will circulate between individuals, businesses and institutions, both internally and externally, in the coming years. Italy, in particular, because of the specific nature of its economic system, based on a large number of small and medium-sized enterprises, needs a more highly developed communication network than other countries. Particular attention must be paid to technological evolution, to avoid the risk of obsolescence of the "architecture" even more than of the "product". The whole question of transport should be completely reviewed, putting the transport of people, things and information at the same level. At present the transport of people and goods via the road network is substantially free while the transport of information, with or without wires, is very expensive. State intervention should aim to create a balance in this situation and to control access to the infrastructure of the great information highways, in order to avoid the risk of creating dominant positions.

5. Infrastructure and the building sector

Creating infrastructure in a country means first of all providing services for businesses to allow them to reduce costs and for citizens to allow them to increase their well-being. In the long and medium term, infrastructure favours the offer. Businesses become more competitive, taking advantage of external economies of scale which result in lower costs for transport, communications and supplies. Citizens have access, at fixed prices or without charge, to services which are essential to civilised life, ranging from the supply of water and electricity to transport, social services and defence against natural disasters. From this point of view, infrastructure can be compared to investments made by businesses to increase their productivity, or by private citizens to buy durable consumer goods. The significant difference is that the development of infrastructure is usually the concern of the public sector, because of the high costs, the impact on the ground and on the social tissue of the country, and the problematic issue of returns on investment and profit.

From the short term point of view, investments form part of the aggregate demand and, as such, directly affect the levels of production and employment of the firms which are called upon to realise them, and indirectly, the levels of production and employment of connected firms.

The first sector involved is obviously the building trade, which is called upon to carry out the works which constitute the main part of the physical infrastructure. This is the direct and most immediate effect on the economic system, followed by a series of indirect effects which involve the enterprises which supply raw and building materials, electrical, gas and water supplies, fittings and services. To these direct and indirect effects we can add a further effect which closes the cycle: the induced effect. The newly employed people have income which can be spent on the purchase of consumer goods, leading to an increase of production and employment also in these sectors.

In recent years, the building trade in Italy has been through a period of profound crisis and is still going through a period of transformation. Table 4 shows data concerning the crisis and the expected recovery ([2]):

TABLE 4 - INVESTMENT IN CONSTRUCTION – % VARIATION ON THE PRECEDING YEAR CALCULATED ON CONSTANT VALUES – (*) FORECAST

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998***	**1999-2002***
NEW BUILDING	**2.1%**	**0.8%**	**0.7%**	**-7.5%**	**-7.0%**	**-0.5%**	**1.7%**	**-1.2%**	**-0.3%**	**1.0%**
RESIDENTIAL	2.9%	1.0%	3.5%	-0.7%	-6.0%	-3.9%	-3.3%	-4.3%	-1.9%	-0.1%
NON RESID. PRIVATE	7.4%	2.9%	-3.8%	-8.5%	-12.0%	5.8%	10.1%	1.1%	-1.6%	1.6%
NON RESID. PUBBLIC	-2.1%	-1.8%	-4.4%	-12.0%	-6.5%	4.4%	2.6%	1.5%	3.0%	2.0%
CIVIL ENGINEERING	-4.2%	-1.4%	1.9%	-20.0%	-2.9%	-1.0%	2.9%	1.9%	4.0%	2.0%
RENOVATION	**2.0%**	**2.0%**	**0.7%**	**-4.1%**	**0.8%**	**2.6%**	**2.1%**	**1.5%**	**6.4%**	**1.6%**
RESIDENTIAL	2.5%	2.7%	3.0%	-0.5%	2.3%	2.8%	1.1%	1.8%	10.3%	1.6%
NON RESID. PRIVATE	5.3%	2.2%	-3.2%	-6.5%	2.0%	3.5%	4.0%	0.8%	1.5%	2.0%
NON RESID. PUBBLIC	-7.8%	1.3%	-1.7%	-9.3%	-6.0%	4.0%	1.5%	-0.6%	2.5%	2.1%
CIVIL ENGINEERING	0.2%	0.2%	2.0%	-8.5%	-3.5%	-0.5%	2.7%	3.0%	3.0%	0.9%
TOTAL INVESTMENT	**2.1%**	**1.4%**	**0.7%**	**-5.9%**	**-3.4%**	**1.0%**	**1.9%**	**0.1%**	**3.0%**	**1.3%**
ORD. MAINTENANCE	3.1%	8.1%	2.0%	-3.6%	0.5%	1.4%	1.8%	2.5%	3.0%	1.6%

The building trade went through a period of rapid expansion in the years of post-war reconstruction and industrial development of the country. These were the years of the development of large areas of urban suburbs, resulting from the demographic growth in the population and the migratory flow towards the towns where industry was concentrated. The building firms controlled every stage of the construction, from the

[2] Cresme, Il mercato delle costruzioni 1998. Lo scenario di medio periodo 1997-2002, Rome, Italy, 1998.

purchase of the land with planning permission for building, to the planning, the assignment of sub-contracts, the stipulation of contracts for the supplies of raw materials, the technical construction of the work and the sale of the building. The building firms completely controlled the offer and were easily able to place their buildings on the market. From this point of view it can be said that the offer created its own demand. In cyclical adverse moments, private demand was replaced by public demand, which charged the big general building contractors with major building work such as roads and other infrastructure which the country needed.

In the last few years, the panorama has completely changed. The demand for new residential property has fallen off considerably and the new trend is towards single or two family units or small blocks of flats. At the same time the area of repair and maintenance has taken off and is progressively taking the place of new construction work. The final users have become more demanding, more attentive to the quality of work and more skilled in technical know-how. The range of firms able to satisfy the demand has increased to include not only construction companies but also specialised firms, project planners, firms producing power and water supplies and building material. The offer has divided into smaller sections and diversified and control of the market has passed to the demand. We can therefore now say that the demand creates its offer. Public demand has stopped acting on an anti-cyclical basis and, largely because of budgetary constraints, is now oriented towards the creation of infrastructure which is really of use to the country, particularly within the European context.

6. Project financing

The task of providing the country with the infrastructure it needs on one hand, and of containing public expenditure on the other hand, have led to a search for new forms of financing for the construction and management of works of national and local interest.

The method followed abroad and which Italy is struggling to follow is *project financing*, that is the involvement of private risk capital in the creation of public infrastructure.

It is as well to point out immediately that this is not a new formula invented by the State, or by local institutions, to borrow money from private citizens for public investment. The philosophy of project financing is different and the emphasis is not so much on the building itself and the ownership of the construction as on the services the construction can provide for the public.

Project financing is a technique whereby a project is financed on the basis of the flow of income which the operation can generate. The enterprise which carries out the work does not deliver it, on payment of an agreed sum, to the contracting body, but maintains ownership and looks after the maintenance and management for the time necessary to

recover the sum invested and to make an operating profit from the sums paid by users for the service provided or by the State according to pre-established rates.

We therefore see a new way of working and a new role for the building trade. No longer simple builders, the building firms are now called upon to carry out an active role in the planning stage, the financial organisation and in particular, in the new role of managers of related services.

The acronyms DBFO (design, build, finance, operate) and BOT (build, operate, transfer) summarise the roles building companies will take on in future, both in the fields of private and public building. The innovative construction company will be able to give an effective response to the requirements of the private and public market, both internal and external, and will have to amplify its sphere of action, acquiring and developing financial, management, planning and organisational abilities.

Project financing is certain to take on a decisive role in the development of public infrastructure. It has been estimated that in Europe, within the next five years, at least 35% of public works will be financed by private enterprise. The sectors most involved are those of energy and transport, but interest is also increasingly focusing on water, waste disposal and health. Great Britain, France, Germany, Spain and Portugal are among the countries most active in the field of project financing. In Great Britain, project financing, known as PFI (Private finance initiative) has enabled projects to the value of 25.000 billion lire to be set up. In Italy, the interest of companies in this new method of financing will become concrete when the general regulatory framework is fully approved.

7. The regional input-output model

This section details the results of a series of simulations carried out in order to assess the effects of investment in construction on the value added of the 20 Italian regions in the coming years (1998-2002).

We used 20 regional input-output tables, disaggregated into 44-sector, up-dated to 1994 and elaborated by I.R.P.E.T (the Regional Institute for Economic Planning of Tuscany) and 20 bi-regional models of the type: One region – The rest of Italy.

The structure of the model is as follows:

$$\mathbf{x} = \mathbf{T}(\mathbf{d} - \mathbf{m}_w) \qquad \mathbf{d} = \mathbf{Ax} + \mathbf{f} + \mathbf{e}_w$$

$$\mathbf{m}_w = \mathbf{M}(\mathbf{Ax} + \mathbf{f}) \qquad \mathbf{y} = \mathbf{Vx}$$

$$\mathbf{l} = \mathbf{Lx}$$

where:

r	=	number of regions (2)	*n*	=	number of sectors (44)
h	=	*rn*			
y	=	vector of value added	**l**	=	vector of employment
x	=	vector of production	$\mathbf{m_w}$	=	vector of foreign imports
f	=	vector of final demand	$\mathbf{e_w}$	=	vector of foreign exports

A = block-diagonal matrix (*hxh*) of technical coefficients;

V = diagonal matrix (*hxh*) of value added coefficients

L = diagonal matrix (*hxh*) of labour coefficients

M = diagonal matrix (*hxh*) of foreign import coefficients

T = traditional Chenery-Moses trade matrix (*hxh*) that allocates the total demand **d** between the two regions of origin.

The reduced form of the model is ([3]):

$$\mathbf{y} = \mathbf{V}\left[\mathbf{I} - \mathbf{T}\,(\mathbf{I} - \mathbf{M})\mathbf{A}\right]^{-1}\left[\mathbf{T}\,(\mathbf{I} - \mathbf{M})\mathbf{f} + \mathbf{e_W}\right].$$

This traditional structure of a bi-regional Chenery-Moses model can be extended to include some hypothesis on private consumption ([4]):

$$\mathbf{f} = \mathbf{c} + \mathbf{g} + \mathbf{i} \qquad \mathbf{c} = \mathbf{Hx} + \mathbf{k}$$

where:

c	=	total private consumption	**g**	=	public consumption
i	=	fixed investment	**k**	=	exogenous priv. consumption

H = block-diagonal matrix (*hxh*) of consumption coefficients

Including partial endogenous consumption, the model becomes:

$$\mathbf{y} = \mathbf{V}\left[\mathbf{I} - \mathbf{T}\,(\mathbf{I} - \mathbf{M})(\mathbf{A}+\mathbf{H})\right]^{-1}\left[\mathbf{T}\,(\mathbf{I} - \mathbf{M})(\mathbf{k} + \mathbf{g} + \mathbf{i}) + \mathbf{e_W}\right].$$

In the first case traditional leontievian multipliers are obtained, whereas in the second we obtain keynesian-leontievian multipliers.

The first simulation aimed to assess the effects on the value added of an investment in construction of 1000 lire in a particular region. Both the internal effect and the spillover effect were considered. Table 5 highlights two aspects:

[3] S. Casini Benvenuti, D. Martellato, C. Raffaelli. INTEREG: A Twenty-region Input-Output Model for Italy, Economic Systems Research, 1995.

[4] P. Costa - G. Marangoni, Economia delle Interdipendenze Produttive, Padova, Cedam, 1995.

TABLE 5 - KEYNESIAN-LEONTEVIAN MULTIPLIERS – VALUE ADDED PRODUCED BY AN INVESTMENT IN CONSTRUCTION OF 1000 LIRE IN A SINGLE REGION

	INTERNAL	SPILLOVER	TOTAL
PIEMONTE	1,209	223	1,432
VAL D'AOSTA	965	575	1,539
LOMBARDIA	1,203	241	1,443
TRENTINO A.A.	1,221	378	1,599
VENETO	1,245	238	1,483
FRIULI V.G.	1,235	222	1,457
LIGURIA	1,029	393	1,422
EMILIA R.	1,228	245	1,474
TOSCANA	1,155	295	1,450
UMBRIA	1,096	369	1,465
MARCHE	1,186	319	1,505
LAZIO	1,120	225	1,345
ABRUZZO	1,275	270	1,545
MOLISE	1,057	439	1,496
CAMPANIA	1,127	380	1,507
PUGLIA	1,238	311	1,550
BASILICATA	1,059	423	1,483
CALABRIA	1,047	578	1,625
SICILIA	1,137	424	1,561
SARDEGNA	1,173	423	1,596
ITALY	**1,177**	**305**	**1,482**

- the internal effect is greater in the rich northern regions than in the poorer southern regions, while the spillover effect is greater in the South. This means that the construction industries in the North of the country buy the majority of raw and building materials from industries in the same region and the income generated is mostly spent in this region. On the other hand, the southern regions are obliged to buy the raw materials and consumer goods they need from the more industrialised regions;

- the total effect is greater in the regions of the South than in the North. This is because there is a different propensity to consume in the different regions: the poorer southern regions tend towards a higher level of consumption, since they have to spend almost all their income on the purchase of consumer goods.

The direct effects on the construction sector and the indirect effects on other sectors are indicated in Table 6 which shows the percentage distribution of value added between construction sector and other sectors.

TABLE 6 - PERCENTAGE OF VALUE ADDED PRODUCED IN THE SINGLE SECTORS

	% ON TOTAL
AGRICULTURE	1.3%
ENERGY	1.7%
FERROUS AND NON FER. METALS	1.3%
NON METALLIC PRODUCTS	6.8%
CHEMICAL	1.2%
MACHINERY	4.1%
CARS AND TRUCKS	0.3%
FOOD	0.7%
FASHION	0.8%
PAPER AND PULP	0.8%
OTHER MANUFACTURING	1.9%
CONSTRUCTION	50.6%
TRADE	10.1%
TRANSPORT	5.7%
CREDIT AND INSURANCE	1.3%
OTHER MARKETABLE SERVICES	11%
NON MARKETABLE SERVICES	0.3%
TOTAL	**100**%

More than 50% of the value added is created by the construction sector and almost 27% by trade, non metallic products, transport and machinery.

The following tables 7, 8 and 9 show the effects of investment in construction on the value added of 20 Italian regions. For 1995-97 we used data from the national accounting, disaggregated by regions, and for 1998-2002 we used estimated data. For each region we calculated the internal effect (table 7), the received spillover effect (table 8) and the transmitted spillover effect (table 9).

Table 10 is a summary. The figures show the average for the years 1998-2002. The ‘spillover balance’ column shows how, as we have seen, most of the benefits of investment in construction affect the northern regions, which are in a position to satisfy the indirect demand from the North and from the South.

The last column of table 10 shows the value added produced by investment in construction as compared to the total regional value added. It is noteworthy that the highest values are to be found in the South, thus showing the importance of this sector for those regions.

TABLE 7 - EFFECTS OF INVESTMENT IN CONSTRUCTION IN TERMS OF VALUE ADDED

INTERNAL EFFECT (BILLIONS OF LIRE – 1990 PRICES)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
PIEMONTE	13090	13324	13437	13682	13933	14190	14452	14721
VAL D'AOSTA	964	982	990	1008	1027	1045	1065	1085
LOMBARDIA	27444	27933	28170	28685	29211	29749	30299	30862
TRENTINO A.A.	5829	5933	5984	6093	6205	6319	6436	6555
VENETO	16799	17098	17243	17558	17880	18209	18546	18891
FRIULI V.G.	4903	4990	5032	5124	5218	5314	5413	5513
LIGURIA	4705	4789	4829	4918	5008	5100	5195	5291
EMILIA R.	12133	12349	12454	12682	12914	13152	13395	13644
TOSCANA	8300	8448	8520	8675	8834	8997	9164	9334
UMBRIA	2158	2197	2215	2256	2297	2339	2383	2427
MARCHE	4481	4561	4600	4684	4770	4858	4947	5039
LAZIO	14701	14963	15090	15366	15648	15936	16231	16532
ABRUZZO	3817	3885	3918	3990	4063	4138	4214	4293
MOLISE	1389	1413	1425	1451	1478	1505	1533	1562
CAMPANIA	10192	10374	10462	10653	10848	11048	11252	11461
PUGLIA	7614	7749	7815	7958	8104	8253	8406	8562
BASILICATA	2291	2331	2351	2394	2438	2483	2529	2576
CALABRIA	4588	4670	4709	4795	4883	4973	5065	5159
SICILIA	10920	11114	11209	11413	11623	11837	12056	12280
SARDEGNA	5154	5246	5291	5387	5486	5587	5691	5796
ITALY	**163468**	**166346**	**167741**	**170771**	**173866**	**177033**	**180272**	**183586**

TABLE 8 - RECEIVED SPILLOVER EFFECT (BILLIONS OF LIRE – 1990 PRICES)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
PIEMONTE	1512	1539	1552	1581	1610	1639	1669	1701
VAL D'AOSTA	112	114	115	117	119	121	124	126
LOMBARDIA	5695	5797	5846	5953	6062	6174	6288	6405
TRENTINO A.A.	382	389	392	399	407	414	422	430
VENETO	1646	1675	1689	1720	1752	1784	1817	1851
FRIULI V.G.	401	409	412	420	427	435	443	451
LIGURIA	659	670	676	688	701	714	727	741
EMILIA R.	2162	2200	2219	2260	2301	2343	2387	2431
TOSCANA	2595	2641	2664	2712	2762	2813	2865	2918
UMBRIA	680	692	698	711	724	737	751	765
MARCHE	379	386	389	396	404	411	419	426
LAZIO	2241	2281	2300	2342	2385	2429	2474	2520
ABRUZZO	258	262	264	269	274	279	284	290
MOLISE	69	70	70	72	73	74	76	77
CAMPANIA	717	730	736	749	763	777	791	806
PUGLIA	1257	1279	1290	1314	1338	1363	1388	1414
BASILICATA	52	52	53	54	55	56	57	58
CALABRIA	222	226	228	233	237	241	246	250
SICILIA	825	840	847	863	879	895	911	928
SARDEGNA	289	294	297	302	308	313	319	325
ITALY	**24149**	**24545**	**24737**	**25153**	**25579**	**26014**	**26460**	**26915**

TABLE 9 - TRANSMITTED SPILLOVER EFFECT (BILLIONS OF LIRE – 1990 PRICES)

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
PIEMONTE	1476	1503	1515	1543	1571	1600	1630	1660
VAL D'AOSTA	272	277	279	284	289	295	300	306
LOMBARDIA	3233	3290	3318	3379	3441	3504	3569	3635
TRENTINO A.A.	783	797	804	819	834	849	865	881
VENETO	1596	1624	1638	1668	1698	1730	1762	1795
FRIULI V.G.	438	445	449	457	466	474	483	492
LIGURIA	771	785	792	806	821	836	851	867
EMILIA R.	1364	1388	1400	1425	1451	1478	1505	1533
TOSCANA	1203	1225	1235	1258	1281	1304	1329	1353
UMBRIA	403	410	413	421	429	437	445	453
MARCHE	534	543	548	558	568	578	589	600
LAZIO	1689	1719	1734	1765	1798	1831	1865	1899
ABRUZZO	432	440	443	451	460	468	477	486
MOLISE	270	275	277	282	287	292	298	303
CAMPANIA	1631	1660	1674	1704	1736	1768	1800	1834
PUGLIA	1040	1059	1068	1087	1107	1128	1149	1170
BASILICATA	476	485	489	498	507	516	526	536
CALABRIA	1286	1309	1320	1344	1369	1394	1420	1446
SICILIA	2182	2221	2240	2281	2323	2365	2409	2454
SARDEGNA	1076	1095	1104	1124	1145	1166	1188	1210
ITALY	**24149**	**24545**	**24737**	**25154**	**25579**	**26014**	**26460**	**26915**

TABLE 10 - TOTAL EFFECTS OF INVESTMENT IN CONSTRUCTION

(BILLIONS OF LIRE – 1990 PRICES)

	INTERNAL EFFECT	SPILLOVER RECEIVED	TOTAL EFFECT	SPILLOVER TRASM.	SPILLOVER BALANCE	REGIONAL V.A.	% SHARE ON V.A.
	(1)	(2)	(1+2)	(3)	(2-3)	(4)	(1+2)/4
PIEMONTE	14196	1640	15836	1601	39	146382	10.8%
VAL D'AOSTA	1046	121	1167	295	-173	4660	25.1%
LOMBARDIA	29761	6176	35938	3506	2671	354812	10.1%
TRENTINO A.A.	6322	414	6736	850	-435	32922	20.5%
VENETO	18217	1785	20002	1731	54	160351	12.5%
FRIULI V.G.	5316	435	5752	474	-39	43378	13.3%
LIGURIA	5102	714	5817	836	-122	58040	10.0%
EMILIA R.	13157	2344	15502	1478	866	152311	10.2%
TOSCANA	9001	2814	11815	1305	1509	117258	10.1%
UMBRIA	2340	738	3078	437	301	24435	12.6%
MARCHE	4860	411	5271	579	-167	45352	11.6%
LAZIO	15943	2430	18373	1832	598	183283	10.0%
ABRUZZO	4140	279	4419	468	-189	34437	12.8%
MOLISE	1506	74	1580	292	-218	7724	20.5%
CAMPANIA	11052	777	11830	1768	-991	117006	10.1%
PUGLIA	8257	1363	9620	1128	235	86281	11.1%
BASILICATA	2484	56	2540	517	-461	11993	21.2%
CALABRIA	4975	241	5216	1395	-1153	36776	14.2%
SICILIA	11842	895	12737	2366	-1471	102559	12.4%
SARDEGNA	5589	313	5903	1167	-853	37512	15.7%
ITALY	**177106**	**26024**	**203130**	**26024**	**0**	**1757470**	**11.6**%