

PART C

THE MAIN RESULTS OF ALPENCOR S

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1 - ECONOMY

1.1 - Introduction

The present chapter summarizes the main results obtained by the Department of Economics of Venice University "Ca' Foscari" and tries to place them in a broader account for the likely effects that can be expected from the realization of corridors, in general, and Corridor V, in particular. The results have been described in a number of internal documents (deliverables) released in 2003 and 2004 and they are downloadable from the restricted area of the project's website. The chapter also borrows some results obtained by Prometeia S.r.l. (Bologna) and presented at an AlpenCorS meeting in Milan (Oct. 2004).

The chapter is divided into two parts. The first is focused on some themes which are likely to be very important for the global economic context at least until 2015 (i.e. the time horizon of the project). The relation between trade and growth appears to be increasingly at the centre of the contemporary economic debate. The role of market integration and infrastructure investment also are central themes in the enlarged European Union. The second part is more focused on the internal aspects of Corridor V and, in particular, on its central stretch. The preliminary aspect is the logical shift from a mere multi-modal infrastructure connection to the surrounding area that has been dubbed AlpenCorS. The project has taken into consideration other aspects such as the growth forecast until 2015 (at national level) and the prospective analysis of the regional convergence/divergence properties. The results are of course very tentative. They reflect the shared perception that transport infrastructures are able to set in motion strong forces and they try to reconcile the need of empirical analysis with the complex nature of a process which unfolds in time and space, simultaneously.

1.2 - Features of the global economic context until 2015

1.2.1 Trade

1.2.1.1 Trade and competitiveness

The layman has trouble understanding why economists think free trade is good. Foreign competition seems to him to be an evil either if – as a worker – he loses his job – or if - as an entrepreneur or a manager - the company faces weaker demand. As a shopkeeper, the layman is angry because workers, entrepreneurs and managers

buy less at his shop. When domestic firms are less competitive they lose market penetration and the trade balance worsens. In these instances, the national currency should depreciate and the real wage rate become lower, but if this is impossible, foreign currencies are commonly felt as undervalued and foreign competition is said to be unfair. As producers, workers and shopkeepers begin to complain, some politicians ask for higher trade barriers and currency devaluation. The layman agrees.

Why, then, so many educated economists insist on positing that free trade is good for the layman? Free trade devotees argue that free trade is good because they have in their mind the concept of general equilibrium and perfect competitive markets. For them, when Chinese price competition hinders European producers, all European consumers take advantage from this fact. Secondly, the increased average Chinese wage translates into higher demand for some European goods, such as tourism to European cities. Things are, however, far more complicated as imperfect competition prevails in all product markets. This is why the Government is asked to intervene. But what should it do? Considering that trade barriers and competitive devaluations are banned and ineffective, the government could ask for reciprocity of trade. The Government could try to foster competitiveness in other ways, i.e. by adopting industrial policies able to help firms in the strategic sectors which are those that grow more, those which have higher margins or those where productivity grows more rapidly. Changing the product mix and shifting the labour force from sector to sector is not easy, particularly in rigid labour markets. What the Government should do is to encourage rather than opposing change, which means that it must provide mechanisms able to reduce the economic and social costs of layoffs and make them temporary. The government could also adopt demand and supply policies, such as building infrastructure, reforming institutions, forming human capital and increasing territorial competitiveness.

The concept of the competitiveness of a territory is commonplace but it remains more controversial than that of company competitiveness. Nevertheless, economists no longer believe that the relation between trade and economic growth merely encompasses a demand relation. The mercantilist approach to economic growth is no longer respected by economists. They are more interested in the supply side of the economy and are keen to see in a territory a competitive factor. However, it remains true that even when trade flows are balanced, so that by increasing trade no extra demand is available to domestic producers, trade is beneficial. It is the deeper specialization and integration, rather than the trade surplus, that is beneficial. Specialization and trade integration imply shifts of labour and capital among sectors,

which lifts the average labour productivity. A further positive supply effect may be reaped from larger market size, stronger competition and faster innovation. All this has a bearing on the rate of growth of average labour productivity.

Such ideas can be summarized by arguing that trade liberalization inside Europe is expected to increase efficiency and benefit all EU members countries of the EU. The idea that the creation of a single and very large market in which goods, capital, people and knowledge are free to move could deliver higher and more equitable growth is still a credo in Europe, but faces increasing difficulties. The ongoing enlargement puts together countries which are different not only in terms of their productive specialization, average labour cost, average productivity and comparative advantages, but also in terms of regulation in goods and factor markets, fiscal regime and welfare state. The enlarged EU is a free trade area, i.e. an area in which tariffs are non-existent. But EU is, at the same time, a customs union, i.e. a uniform system of customs tariffs and non-tariff barriers vis-à-vis other countries. The economic and political forces aiming at slowing, or even halting, the enlargement of the free area and, at the same time, increasing the protection of customs union have gained vigour of late.

1.2.1.2 Europe and World trade

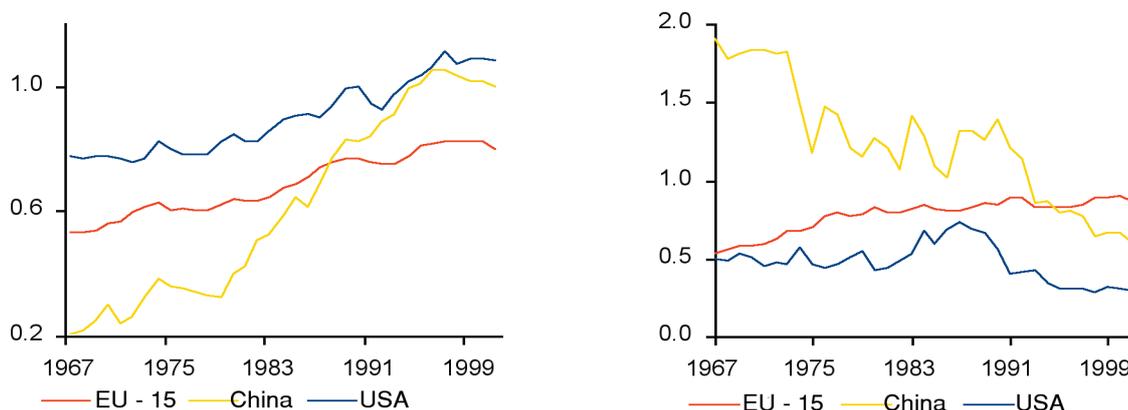
Prometeia has offered an analysis of the comparative growth performance of Europe, seen as a global participant, i.e. vis-à-vis other macro areas, in the last three decades and has proposed an assessment of its future prospects; this section is partially based on their report (Prometeia, 2004 mimeo). As far as the determinants of long run growth, i.e. factor inputs and their productivity, are concerned, Prometeia observes that the initial conditions seem more favourable to emerging regions - notably the countries of East Asia -- and partly to the

United States than they are to Europe. In considering the role of real exchange rates in international competition, Prometeia predicts that in the next ten years, i.e. until 2014, the dollar, and the Asian currencies that can remain pegged to it, will not be allowed to appreciate against the euro. This, of course, represents a factor which could severely weaken the European competitive position.

The issue of exchange rates is always a hot and critical one in an open trade environment and it is always difficult to envisage really credible scenarios. It can be said the whole global system of flexible exchange rates is likely to exhibit high volatility when regional blocks are large and, consequently, when few currencies float. The argument advanced by Prometeia is based on the fact that the dollar-yen-renminbi multiple peg is a system that could last until at least 2015. This implies that the putative dollar-yen-renminbi block can eagerly absorb internal trade imbalances in the same way as the EU digests its own imbalances. This seems unlikely. Indeed, while integration in Europe is increasing, and high in the capital market, albeit lower than the one found inside the US, the same is not true for the dollar-yen-renminbi block. Integration inside the putative dollar-yen-renminbi block is very weak and asymmetrical, in that one country is allowed to inflate the liquidity of the others in exchange for goods and services.

As regards competitiveness, however, it is well known that this depends on many factors. A factor which is often mentioned -the real exchange rate- is probably not the most important. The exchange rate is easy to quantify while the other factors defy our ability to measure them statistically. Prometeia has, nevertheless, tried to indirectly assess their relevance. It has used the gravity model and has correctly argued that a country must be a competitive one if its exports increase more than would be possible to predict on the basis of the model,

Figure 20. Reactivity to growth of partners and Reactivity to distance from partners



Source: University of Venice – Department of economic sciences’ elaborations

i.e. considering demand in the partner countries and distances from them. The Figure below shows that in the period 1967-2001 the EU-15 was not able to outperform China and the US.

Looking ten years ahead, Prometeia has focused on various aspects regarding medium-term growth in Europe. Prometeia has firstly considered activity rates. An equilibrium through migration has to be struck between the negative impact of the reduction in the activity rates in the EU-15 and the positive impact that comes from the increase that should take place in the Central and Eastern Europe, but, on average, Europe will not find support for growth on the demographic side. Population greying, however, should deliver a higher average savings rate, which is positive. A further positive factor will come from the increase in competition in the markets for products and factors and from the deregulation which is expected to be a side-effect of the single market and the monetary union per se. It can be added, of course, that the realization of the corridors and, in general, the improvement of the trans-European networks is another boosting factor for the European economy.

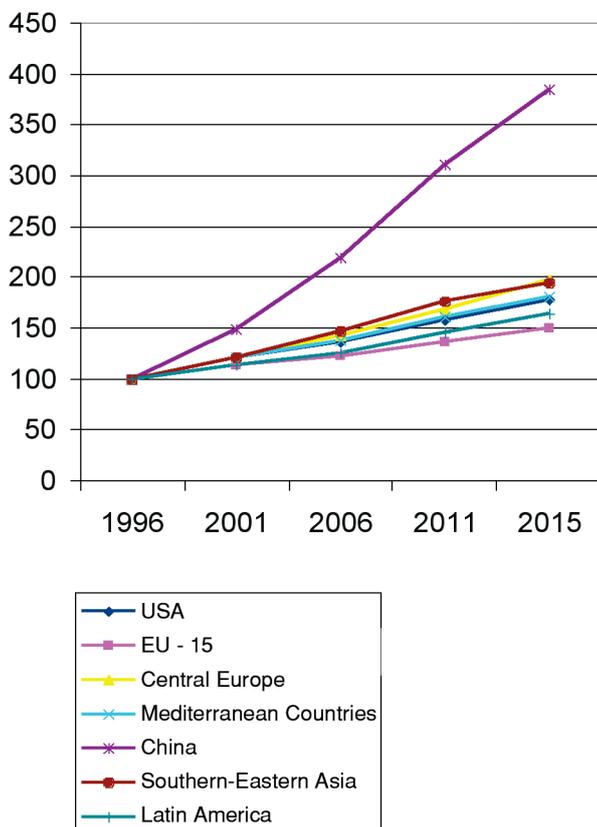
The last factor considered by Prometeia is enlargement. The recent accession of the eight Central and Eastern

countries and the prospective admission of Romania, Bulgaria and Croatia, not to mention Turkey and even Ukraine, is bringing low cost labour in the single market, is expanding the market itself, is increasing the average growth rate of the population and favouring the immigration of labour. As all those countries are more or less rapidly catching up in the technology domain, the average rate of increase in productivity is also heightened. The size of the eight countries is limited but not negligible. At least for a while, the average growth rate should increase not only in the countries mentioned but also in the EU-25. It can be argued, however, that the interaction effect of enlargement could make the effective growth rate in the EU higher than the mere statistical average of the individual growth rates and also that the extra growth dividend is not a guaranteed outcome. The interaction effect will be positive only if the EU will be able to manage the integration process properly.

Prometeia has given a growth scenario for the large macro areas on the basis of certain assumptions regarding the global economic cycle (e.g. the oil price and the US dollar) and the economic conditions internal to the macro areas (viz. bilateral trade flows)

Interestingly enough, real GDP growth is predicted to speed up everywhere but not in China and Southern and Eastern Asia, notwithstanding the yen-renminbi pegging. Growth is predicted to speed up in the EU-15 from 1.6% (2001-05) to 2.5% (2011-2015) a little more than what is found for Central Europe (from 3.2% to 4.0%) and for Mediterranean countries (from 1.6% to 3%).

Figure 21. Real GDP growth in macroareas



Source: University of Venice
Department of economic sciences' elaborations

1.2.2 European integration

1.2.2.1 Integrating financial and labour markets

Market integration is probably a significant force shaping the economy of contemporary Europe. Besides the goods and services markets (and notably the transport services) the EU is trying to integrate other key markets. The creation of European monetary union with a single currency is the most important achievement in this respect. The euro and the system of exchange rate pegs between the euro and the currencies of the countries that are EU members without being in the euro zone are obviously delivering integration in the broad European monetary market. This has had profound effects on the conduct of monetary and fiscal policies and exchange rates vis-à-vis third countries. Short-term interest rates are equal and remarkably stable in the EU-15 and converging in the other member countries. Despite this, differences in real long-term interest rates remain, even inside the euro zone, although they are lower than in the past. The integrated monetary market is yielding convergence and stability through the reduction of

spreads and thus of average long-term interest rates.

Capital and labour markets are also integrating. The freeing of capital movement takes various forms. The freedom of establishment means that companies may set up businesses anywhere in order to reduce costs and serve a larger or emerging market. To attract new business initiatives in peripheral areas and in industrial wastelands, national and regional governments are promoting local competitiveness through fiscal incentives and in other ways. Besides freeing direct investment abroad, Europe is aiming at integrating the capital markets themselves. Integrating national credit markets means increasing competition and this is expected to deliver benefits both to investors (through a higher average return) and to borrowers (through a lower risk premium). As financial centres operate with increasing returns to scale, small and medium size centres are less efficient than a large size financial centre. This explains why the European authorities are trying to build a single market for the government debt as well as a single global stock exchange. Overall, the total amount of available financing and investment should increase and unit costs should diminish.

Other forms of integration regard the large sector of business and consumer services and the labour market. Here progress appears more difficult. The creation of trans-European networks and corridors is merely intended to accelerate the process of integration and the subsequent transformation. It can be underlined here that all forms of integration in Europe yield changes in the structure of the economy and in society. The benefits of such an endeavour can be seen from a purely macroeconomic angle, i.e. in terms of national aggregates such as GDP growth rate, unemployment rate, per capita income and so forth. When the founder countries of EU started the ambitious effort they clearly thought that the removal of historical, political and economic barriers is good not only per se, but also because integration is able to deliver a measurable macroeconomic return. A different perspective for assessing the impact of the integration process is that focusing on the effects that integration is able to exert on the locations of activities, on the location of households, the spatial mobility of workers, the productive specialization and other structural aspects of the European economic system.

1.2.2.2 Structural change in AlpenCorS

All economies undergo a process of continuous transformation of their structure. Employment, for instance, shifts between sectors and between locations. Powerful forces, such as the changes in technology and demand, lie behind the transformation. Like technologies and products, territories also change in a way that resembles a life cycle.

Cities have changed their function, as production and population have moved inside the urban system. The typical pattern of urban evolution obviously predicts urbanisation. Later on, suburbanisation emerges as the population and jobs move from urban cores to peripheries. Mobility increases, life style and shopping habits change drastically. As the tendency proceeds, disurbanisation sets in as jobs and population migrate from large to medium and small size cities. This pattern of change is clearly affected by transport infrastructure and turns out to be relevant in a corridor such as AlpenCorS. In analyzing these aspects we have focused on three cases: Italy, Slovenia and Hungary.

The larger cities of Northern Italy (more than 500 thousand inhabitants) lost population from 1961 to 2001 while smaller urban centres (less than 50 thousand inhabitants) gained from 1971 on. The medium size urban centres (those between 50 and 500 thousands) were almost in equilibrium. The following figures show the increase in the average density of urban centres, i.e. polarization, along the main axes in the Po valley. The effect of disurbanisation is seen in the flattening of the density profile inside the corridors.

Slovenia and Hungary conform to the pattern of change found in Italy and elsewhere in western Europe, i.e. first urbanisation, then suburbanisation and disurbanisation, followed by reurbanisation. Hungary, in particular, let the population increase more in the larger urban centres from 1960 to 1980. During the following twenty years disurbanisation favoured the small and medium size centres. The following figures focus on the location pattern in the core and periphery of each NUT3 territorial unit, in Hungary. They clearly show the cycle in the location. In summary, urbanisation and suburbanisation prevail in the first two decades, while disurbanisation and reurbanisation prevail in the last two decades, both in Italy and Hungary, but the same is true for Slovenia and seemingly for the other countries in AlpenCorS.

When different countries integrate their markets, peg exchange rates or adopt the same currency, the forces pushing for change strengthen. Foreign direct investment and migration act as vehicles of structural change. Shocks affecting single countries and regions are more difficult to face in a union. Production factors therefore must be sufficiently mobile in order to avoid the economic distress caused by shocks. This is an added factor of change. In a monetary union, in other words, integration and idiosyncratic shocks reinforce the need for structural change. In considering the recent admission of the eight Central and Eastern European countries, one could argue that the push to mobility is compounded by the existing geographical differences in employment, wage rates and social security systems as well. It is obvious that existing differences in language and cul-

ture, legal restrictions and other frictions limit mobility, but the differences mentioned are there and they push hard. Structural change is clearly an issue in the European Union and the realization of cross-border networks and corridors deliberately reduces geographical barriers to mobility.

Economics textbooks explain that higher spatial mobility of capital and labour can be traded off with lower levels of employment and per capita income. Indeed, if mobility is insufficient, employment and income suffer in a monetary union. The trade-off relation is exacerbated in the enlarged EU where some countries are still converging and where income disparities are large. The lower the mobility, the higher the role to be played by the basic economic mechanism of adjustment which operates through unemployment, wage rates, prices and income. At the highest geographical scale, the sector composition of production necessarily reflects the composition of demand while the sector composition of employment reflects the composition of demand and also relative productivities. At a lower than global geographical scale, i.e. at national and regional tiers, the level and composition of employment necessarily reflect relative or comparative costs. Inside a large economic space, such as the European Union, where differences are large and integration is deliberately pursued, production tends to be located where it costs less. This means that the existing distribution of employment must change when it is not in line with efficiency. Equity

and cohesion can temper the mechanism but, if the market is large, market competition pushes harder for higher efficiency.

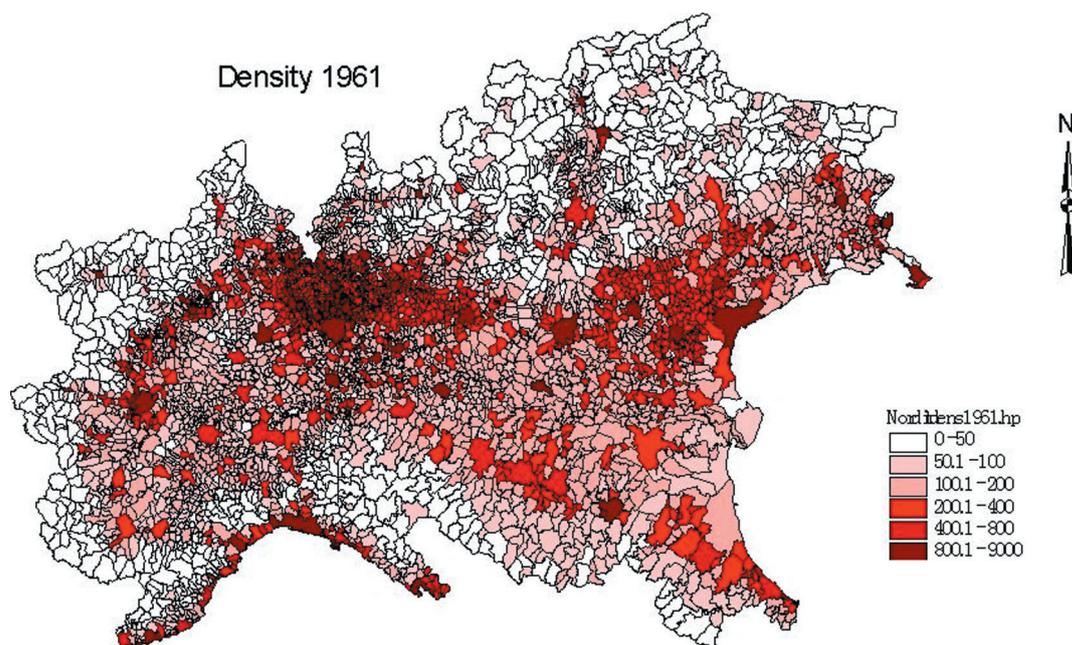
1.2.3 European transport networks

1.2.3.1 Infrastructure and growth

The common European transport policy was set up to liberalize the markets of transport services per se but also to provide physical infrastructure able to reduce geographical peripherality and increase cohesion in the enlarging single market. The goal of market liberalization is to increase size in the markets for transport services and to strengthen internal competition in those markets.

The final effects of infrastructure building on economic growth depend on the degree of competition in the markets for goods and services different from those of transport. Competition can be looked upon in two ways. From one point of view, when the market broadens, each producer faces more competitors or, if he is a monopolist, more contenders. Not less important is the point of view of the reactions of the single producers. In many instances, a producer accepts the enlarged market boundaries and tries to exploit it by outperforming competitors, i.e. by catching a greater share of the enlarged demand via lower costs and prices. In some other instances, he can try to alter the existing market boundaries by finding a niche for a specialized good or service

Figure 22. Northern Italy Population Density in 1961

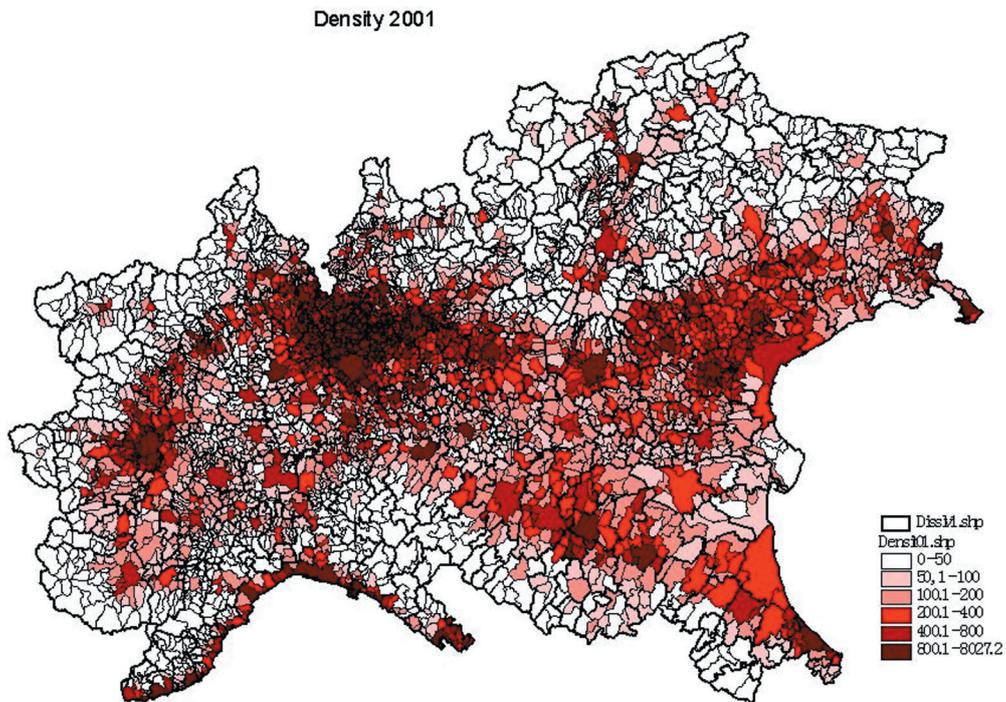


Source: University of Venice – Department of economic sciences' elaborations

or by creating and exploiting a new market and a new demand. In both cases, increased market size helps him. Niche production can be profitable only in a large market and the investment necessary to create a new market is sustainable only if there are sufficient potential

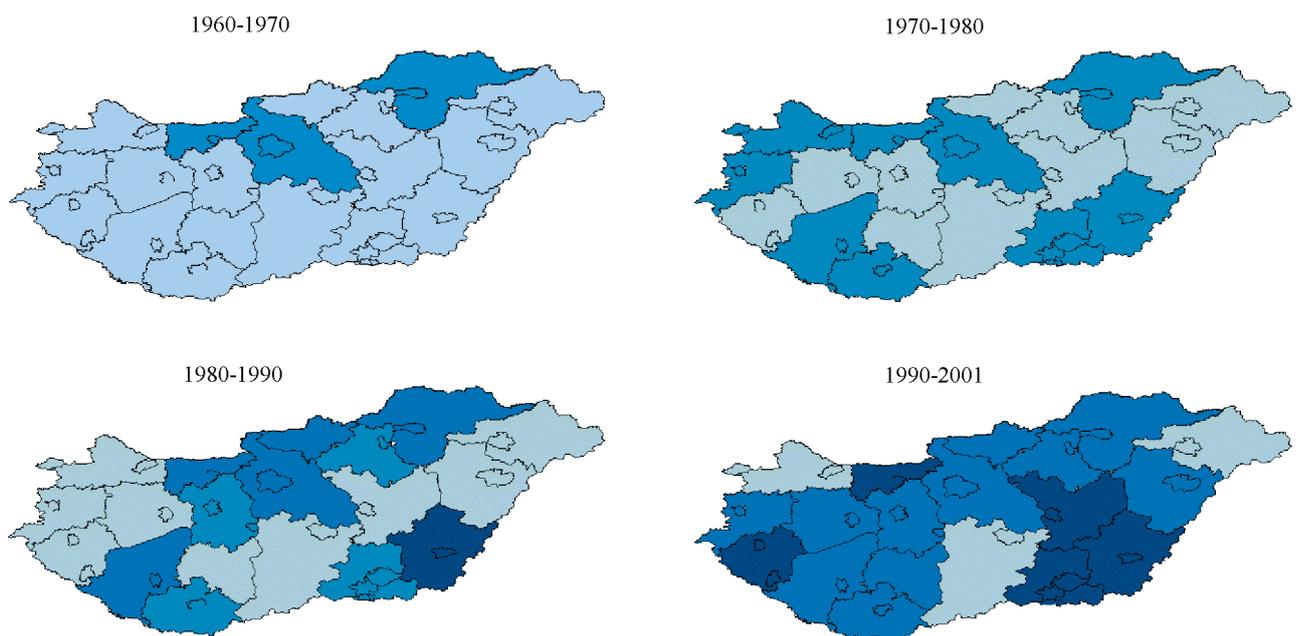
customers. In this case, new goods and services are offered to producers and consumers thus allowing the range of available intermediate and final products. Therefore, to understand the real effects of physical infrastructure on economic growth, one should first look

Figure 23. Northern Italy Population Density in 2001



Source: University of Venice – Department of economic sciences’ elaborations

Figure 24. Hungary, urban development stages by NUTS 3, 1960-2001



Source: University of Venice – Department of economic sciences’ elaborations

at the impact that the new physical infrastructure exerts on the local producers and consumers and, secondly, at the effects of the change in the competitiveness of the producers located in the different regions on trade and growth patterns. The effects that cost reductions exert on trade, growth and economic disparities are not easy to decipher and are, in some instances, counter-intuitive. Modern economic theory has shown that economic divergence, rather than convergence, can be the outcome.

The most practical and efficient way of grasping these effects is to consider how trade and transport flows are generated between different urban centres, territories or regions. We were particularly interested at the effects of distances on the accessibility of different locations. As it is obvious that the first effect of infrastructure investment is the reduction of distances and travel time on the different road and train connections, it is easy to argue that the connectedness of each urban centre is directly related to the size of the centres around it and indirectly related to separating distances. Connectedness or accessibility is measured by the potential number of flows arriving to and departing from it and it is a proxy of attractiveness. It has been measured in various ways, i.e. at various geographical scales and with different variables. The following maps show some results.

1.2.3.2 Competing corridors

The realization of each Helsinki corridor will affect the economy of the regions crossed in one way or another. Before corridors can deliver their final effects on trade, specialization and growth, however, they must deliver their impact on mobility, congestion and on the balance between the existing transport modes. The cohesion effects are difficult to predict as each region will get some positive effects, but will also face some negative effects. This is particularly true for weaker and peripheral regions.

So far, demand for transport has outpaced economic growth everywhere. There is an equation between growth and transport demand according to which growth in the transport of goods and passengers is a multiple of growth in mere real GDP. If growth is to continue, the equation poses an obvious problem of sustainability in transport. The EU is well aware of the problem but the reduction of the order in the multiple is not in sight: it is difficult, therefore, to conceive of medium or long-run growth without an increase in the capacity of the transport system, despite the increase in its efficiency. This is particularly obvious in the enlarged European Union where the creation of the internal market is synonymous with deeper trade integration and higher mobility between the different countries and regions.

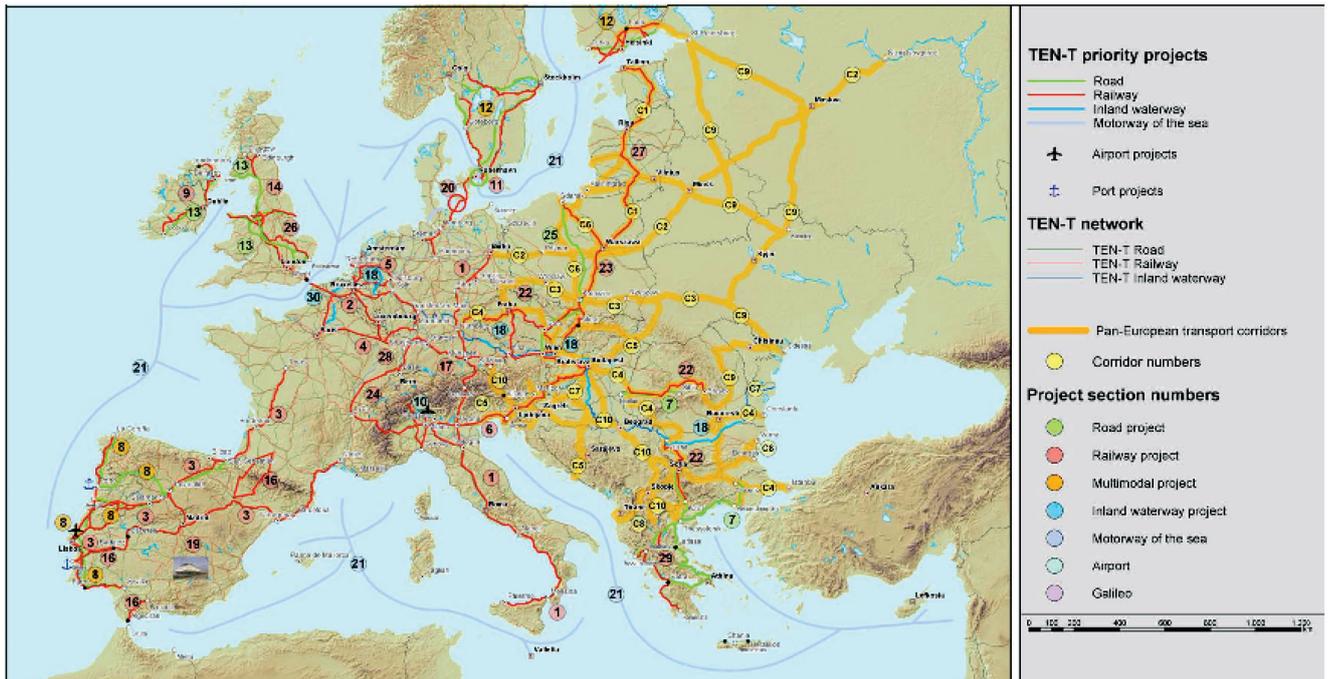
The competition between corridors depends on the fact that transport infrastructure is a major investment. Community funding may help some countries, some modes, some projects, but not all countries, modes and projects simultaneously. The EU co-financing of the trans-European transport network was approved with the Maastricht Treaty but was also estimated in the order of several hundreds of billions of euro. The cost of the priority infrastructure in the new EU member countries, alone, was estimated to be nearly €100 billion in Agenda 2000. As is obvious, the budget constraint holds also at the national level.

The idea of fixing a strategy based on priorities and targeted investments in the European transport networks, which gained momentum with the Treaty of Maastricht and was repeatedly sanctioned later on (i.e. at the Essen Council, 1994 and the Helsinki Conference, 1997), is a way of reconciling needs with the budget constraint. The enlargement of the Union has made the need for a balance between competitiveness and cohesion more compelling, thus putting more emphasis on the aim of improving the links between the outlying or peripheral regions and the central part of the EU, but, at the same time, ever-increasing global competition requires that European transport policy focus at fostering European competitiveness.

Ultimately, different transport modes, regions and corridors compete for funding. The EU strategy aims at rebalancing the different transport modes in order to make the growth of transport sustainable. At the same time, disparate goals such as the elimination of bottlenecks, the completion of Essen 14 major infrastructure projects, internal cohesion and integration are at odds with the limited possibility of Community and national public funding and private co-funding.

Each corridor contributes to the overall performance but, at the same time, need funding, thus competing with others. Network infrastructure forms the backbone of the transport industry and firms in the trade automatically react to the improvement in the network. The enterprises forming the transport system typically have decreasing average costs if they locate along the better corridors in order to exploit a larger market size. The regions privileged by corridors getting priority will, therefore, inevitably enjoy a lead, i.e. an advantage over the others. A multimodal corridor getting priority above others will act as a transport hub for the large area around it, if not for the Community at large. Around this hub, growth tends to be self-reinforcing. Indeed, it usually happens that the initial location incentive for transport firms and other firms with increasing returns to scale becomes a location incentive for other firms seeking agglomeration economies, rather than scale economies.

Figure 25. Trans European Network



Source: EuroGeographics 2001 for the administrative boundaries cartography; DG TREN, 23/06/2004

1.3 - Growth inside the AlpenCorS corridor

1.3.1 Corridor definition

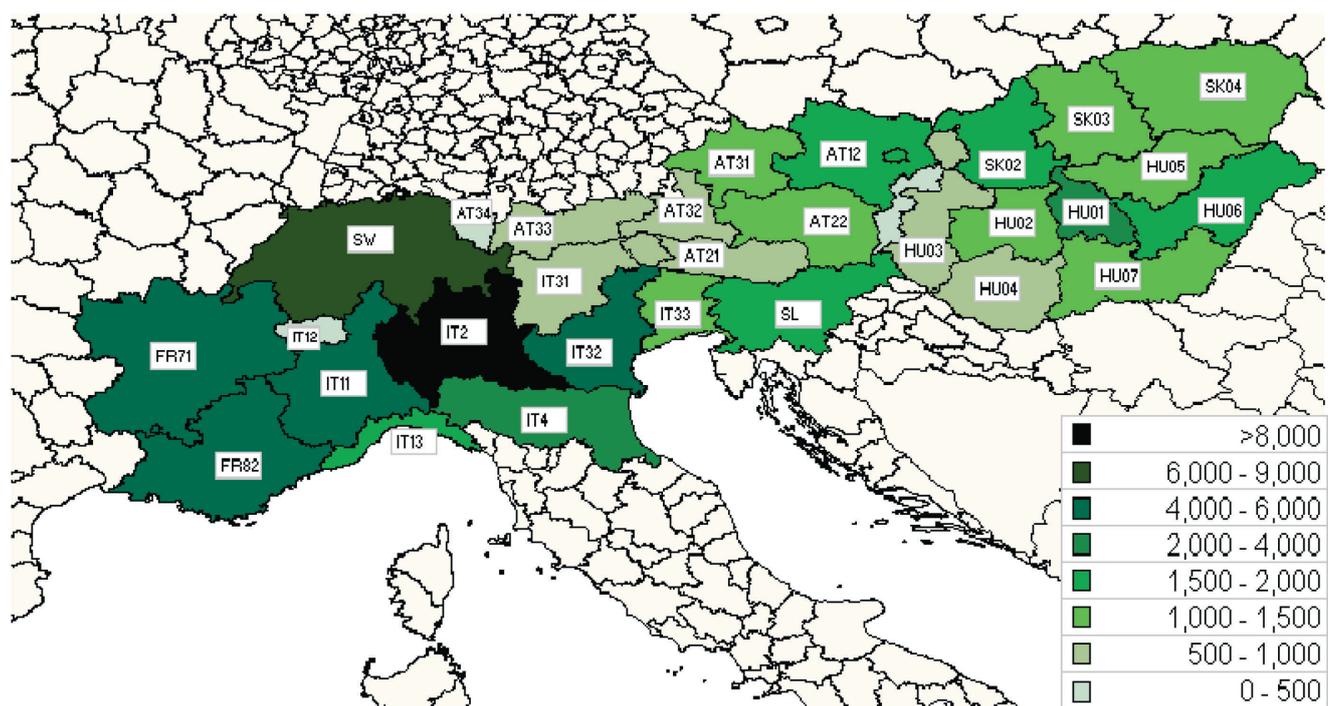
The concept of territory we adhere to is inspired by a simple understanding that economic space is shaped by transport infrastructure. Transport infrastructure shapes economic space by changing the intensity and direction of forces that pull and push the locations and movements of people and activities. An economic space is thus a space shaped by human activity and infrastructure. When asked to define economic spaces or economic regions, theorists long ago focused on the existence of economic forces emanating from human activity. Esteemed theorists such as Francois Perroux and August Lösch in 1939 respectively wrote *“Economic space is a field of forces, some centripetal and some other centrifugal”* and *“Economic regions are the result of economic forces, some working toward concentration and others toward dispersion”*. What was implied in these definitions is that such forces are primarily those exerted by human activity and transport infrastructure. The layman may think of corridors (AlpenCorS included) as mere geographic spaces or mere multimodal connections. This vision is, from one side, justified by the fact that the trans-European networks and the Helsinki corridors are real projects, but, from the other, that vision is flawed. It would lead us to ignore the powerful economic forces that are put at work in networks by human

activities and infrastructures. The European initiative was precisely aimed at increasing average accessibility and integration, i.e. the principal features of economic spaces and corridors. It would be a complete surprise if the European initiative was not able to reshape the economic spaces and the landscape of Europe, given that the infrastructure was conceived as a basic premise for the creation of the single and enlarged market.

Infrastructure is basically a dynamic factor as it lowers transport costs, thus changing the location decisions of agents. New infrastructure could attract other factors of production, particularly if agglomeration and scale externalities are increased, thus reinforcing an initial competitive advantage. By attracting warehousing and logistic activities, it could, in particular, turn a territory into a transport hub for the surrounding area. This is the basic economic mechanism set in motion by infrastructure investment; however, subtle push and pull forces make the behaviour of different territories in space and time counter-intuitive.

The corridor, therefore, is the result of the interplay of such push and pull forces. The corridor comes into existence gradually as it involves relocation and further investment. It actually appears when investment and activities have strengthened the internal relationships to the point of giving to the surrounding area characteristics which are recognizable and measurable. As different corridors cooperate and compete, the process regarding one corridor interferes with that of other corridors. The

Figure 26. AlpenCorS, Population by Region (thousand inhabitants, 2001)



Source: University of Venice – Department of economic sciences’ elaborations

process therefore implies the slow co-evolution of different corridors. It would be wrong, therefore, to think of AlpenCorS as a corridor already shaped. What was sensible to do in our work was to consider a tentative definition of the corridor as the large area formed by the regions close to or crossed by the Helsinki Corridor V. According to the nature of the data used, we have considered as the relevant units of analysis sometimes the single countries, some other times single regions or single NUTS3 zones. We do not consider the geography of AlpenCorS as fixed. Being aware that urban and regional development is path dependent, i.e. forged by decisions that are very much influenced by the inherited location patterns, we consider the initial definition to be purely tentative. AlpenCorS, in other words, is considered as an area subject to a gradual process of development in which interdependency, specialization, size and hierarchy change in relation to infrastructure building.

1.3.2 Growth forecast in the AlpenCorS countries

1.3.2.1 Trends and shocks

A common understanding is that shocks continuously affect any economy. In the global economy the search for ever-higher levels of productivity, the change in relative prices, demand changes, regulation and institutional reforms exert powerful shocks to the national economies. Increasing trade integration is the most powerful factor behind such phenomena and the changes in economic performance of the different economies. The example of the recently enlarged European Union is a case in point.

While earlier growth theories posited that growth is constant in the long run, modern theories emphasize the role of knowledge and human capital accumulation and allow the possibility of permanent increases in the growth rate. Particular events, such as technological change, trade integration and institutional reforms could affect the rate of knowledge accumulation in a country and permanently alter its macroeconomic performance. There is, therefore, the possibility that the growth performance in different countries becomes un-predictable, or that besides a predictable growth component there is a non-predictable one reflecting the non-transitory nature of various types of shocks. From the point of view of the forecaster, this is a problem because the trend becomes variable and its variability cannot be correctly forecast on the basis of history alone.

In preparing growth scenarios for the countries included in AlpenCorS we used both a deterministic and a stochastic approach. By assuming that a constant growth rate exists, a deterministic trend growth has been fitted and then extrapolated from 2004 to 2015. The procedure, which retains the permanent component observed

in the reference period (1990-2003) and deletes the cyclical component, has yielded the results shown in the first column of following table.

Table 3. Real GDP annual growth rate in AlpenCorS countries in the period 2004-2015 (percentage values)

	Growth rate forecast[1]	Growth rate forecast [2]
Austria (*)	1.89	2.24
France (*)	1.59	1.5
Italy (*)	1.3	1.48
Switzerland(*)	0.8	0.75
Croatia (°)	2.68	2.49
Hungary (°)	2.79	2.51
Slovakia (°)	3.62	4.24
Slovenia (°)	3.46	4

(*) 1990-2003, (°) 1992-2003

Source: University of Venice – Department of economic sciences' elaborations

A completely different approach is to assume that shocks are able to permanently affect trend growth. The distinctive and practical feature of this approach is the recognition that new shocks alter the existing trend, thus forcing the analysis to continuously redo their forecasts. The last available exercise is given in the second column of above table. It shows not only a wider range of growth rates (the interval broadens from 0.8%-3.6% to 0.75%-4.2%) but also that some countries undergo large changes. Austria, in particular, but also Slovakia and Slovenia are predicted to grow at a higher rate than in the previous exercise.

It is interesting to consider the effect on the gaps in per capita GDP between the eight countries included in AlpenCorS in our growth scenario. This can be done by calculating the number of years necessary to catch up if reported growth rates and population were to remain constant from 2004 on everywhere. The supposedly constant growth rate tends to be lower in the countries where per capita income is higher and vice versa. This suggests something akin to convergence. Considering that the richest of the eight countries (Switzerland) is also the slowest in growth, we could calculate the number the years needed by the others to catch up with the slowest and richest forerunner solely in view of the detected differences the growth trend. The results are reported in following table.

The following figure is useful in order to visualize the dynamic process. The highest profile (the low rate makes it almost a straight line) represents real long-run trend growth in the per capita GDP of Switzerland, from 2004 on. In 2003 Austria appeared to be very close to catching up with Switzerland. The event is due

Table 4. Years for catching up (*)

	Growth rate forecast [1]	Years for catching-up under [1]	Growth rate forecast[2]	Years for catching-up under [2]	Growth rate 2004	Consensus forecast 2005
Austria (*)	1.89	6	2.24	4	2.1	2
France (*)	1.59	14	1.5	15	2.4	1.9
Italy (*)	1.3	37	1.48	25	0.8	0.5
Switzerland(*)	0.8		0.75		1.2	1.2
Croatia (°)	2.68	54	2.49	58		
Hungary (°)	2.79	38	2.51	38	4	3.7
Slovakia (°)	3.62	31	4.24	32	5.5	4.8
Slovenia (°)	3.46	17	4	17	4.4	4

(*) 1990-2003, (°) 1992-2003

Source: University of Venice – Department of economic sciences' elaborations

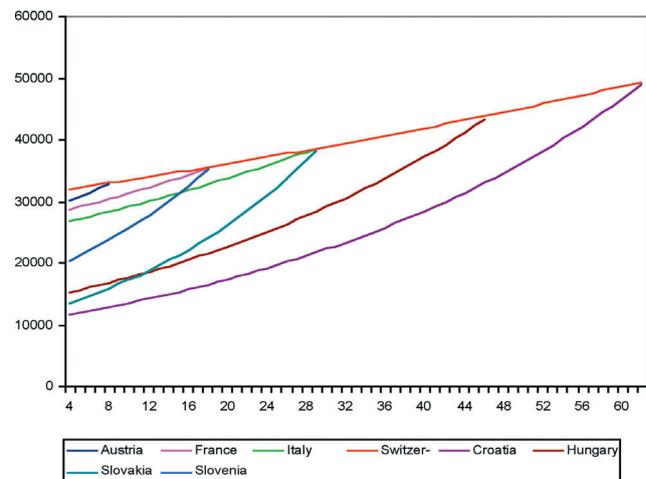
in 2008. France and Slovenia will catch up in 2018, i.e. three years after the time horizon of the growth scenario (2015). Italy and Slovakia will reach Switzerland only eleven years later (i.e. 2029). Hungary will catch up in 2046 and Croatia will do the same in forty years (2058). The projection is, of course, conditional on a number of assumptions. First of all, population is assumed to be constant everywhere. Secondly and more important, the growth scenario assumes that the growth rate extracted from the reference period (1990-2003 for Austria, France, Italy and Switzerland and 1992-2003 for the remaining four countries) is a correct forecast for future growth, even as far ahead as the end year of 2015. This is unlikely, as future shocks could permanently alter the growth trend extracted from the past. The figures included in the last two columns of the same table are there to show how events after the date of the forecast immediately cast a doubt on (or may be falsify) the forecast as values go out of the widest interval range.

We should note that we are not considering differences in the speed of convergence either towards some ideal steady state, or towards the simple cross-economy average. We are simply comparing historical average growth rates when extrapolated from the initial national levels (2003) of real GDP. As the growth rate is affected by shocks, the rates are not stable, but we deal them as if they were so from 2003 on, at country level. At this stage, we can say nothing about the implied convergence between the different regions, as often some regions react differently from the countries to which they belong. The convergence issue will be analyzed in

the following pages after having accommodated into the model the predictable effects of infrastructure investment in AlpenCorS.

The completion of the plan of TENs and Helsinki corridors is a big effort for the Enlarged EU. It will certainly represent a powerful stimulus to the different economies. The

Figure 27. Trend growth per capita GDP AlpenCorS countries



Source: University of Venice – Department of economic sciences' elaborations

completion of the road and rail links and the creation of logistic centres around them will, in particular, speed up the rate of change in the different regions and countries. These are shocks no less important than other obvious

examples such as technological innovation, relative price changes, immigration, institutional changes, etc.. It is easy then to predict a big impact here and there, strong competition between the different corridors and the different territories, but it is also easy to foresee an unequal advantage for them. It is the economic space dynamics that affects the regions differently. Forces shaping and twisting economic space are not balanced and the final objective of our analysis is to foreshadow the convergence or divergence tendency for the AlpenCorS regions.

1.3.2.2 Savings, infrastructure and growth

In the growth scenario sketched in the preceding section values for the rates of change of the stocks in the economy – notably human and fixed capital, infrastructure included are implicit. It follows that, to be sustainable, even from the mere economic point of view, a growth path should always imply an accumulation process able to keep stocks at the level required by the process itself. This concept is easy to understand but difficult to apply in practice because the required level of stocks clearly depends on technologies used in production and because technologies are not fixed, particularly in the modern economic environment. To be sure, economic growth requires stocks of private capital, public infrastructure, human capital and knowledge able to fit the available technology. The stocks have been accumulated over time and must continue to accumulate at the required speed if the growth process is to be sustained.

Let us consider fixed capital only. To attain a higher level of per capita income, economic theory prescribes a precise value for the ratio between output and capital stock. The ratio depends on the elasticity of output with respect to capital stock - a parameter which seems not to be constant. It is higher when new technologies are embodied in new capital goods. To reach and maintain high productivity growth in the present context, the rate of investment must be high because capital depreciates rapidly. The control parameter of the process is the rate of accumulation, which reflects profitability and, ultimately, the savings rate. It is difficult to manage the economy in order to set the accumulation process at the right regime. What can be observed empirically is that savings and investment cycle together are correlated across countries: a high investment rate means a high savings rate and vice versa. Only in a completely abstract global world economy, national savings would be completely detached, within a country, from local investment. In an economic union such as the EU, the creation of an integrated market could, in theory, favour this kind of savings and investment decoupling. It is a matter of fact that in the fifteen countries of EU-15 the flows are not far from balanced. When savings exceed investment, the country has a trade surplus. This is typically the case of South East Asia and China. These countries invest

more than the average and save even more. The US is in the opposite position: they invest less in relative terms and save even less. They consequently borrow savings from abroad. Also the Central Eastern European countries face a savings gap, but they invest more than the EU-15 and the US, in relative terms.

Our findings show that the higher the rate of increase of savings, the higher the rate of GDP growth. If this were not the case, the country concerned could face macroeconomic imbalance and a low savings rate would make capital expensive. This could also attract foreign savings, thus impairing the balance of trade. Private savings are also critical for a country's capacity to fund social security. The European countries which are facing a rapid ageing of their population and aim to invest heavily in network infrastructure cannot sustain a declining savings rate.

1.3.3 Potentials, accessibility and transport inside AlpenCorS

It is commonplace to speak of accessibility of a particular location or city centre and accessibility is the name of the potential number of contacts or interactions perceived in one centre in relation to all other centres connected to it by the transport network. Since interaction decreases with distance, the number of potential contacts in a centre is a measure of the ease of interaction and, at the same time, of the attraction of the potential destinations around it. The number of actual contacts and interactions can be different from the potential number, but any improvement in transport infrastructure affects distances, travel time and the ease of interaction thus making space for an increase in the number of actual interactions.

An efficient, albeit partial, way of assessing the impact of transport infrastructure is to consider its effects on the ease of interaction and thus on accessibility. This is a practical way of assessing the effects of infrastructure investment as it is related to potential rather than actual interaction. The most important aspect among those omitted here is the possibility that the change in distances and thus accessibility sets in motion a change in the pattern of agglomeration and the scale of production thus altering the size of masses. Actual interaction and masses co-evolve and accessibility can capture this evolution only partially.

As explained in the literature and, in particular, in the various deliverables produced in AlpenCorS, there are various ways of considering the impedance effect produced by distance, various ways of measuring distances and different variables that can be used to quantify the number of potential contacts. The most often-used variables are population, employment and production. There is also the possibility to use as many systems of

spatial units as are the political, economic and physical ways of articulating space. A final possibility is to directly relate accessibility and flows in order to obtain a gravitation model. The latter procedure has been applied to traffic data in order to generate a matrix of traffic flows in car-equivalent units (which was needed elsewhere in the AlpenCorS project). Long-range interaction was also considered.

We have used more than one way of sub-dividing space because we used different variables and also because we faced the problem of heterogeneity of spatial definitions of western countries (France, Switzerland, Italy and Austria) and Central Eastern countries (Slovenia, Croatia, Hungary, Slovakia).

Income potentials and population potentials have been obtained for NUTs 3 regions (cantons in Switzerland). The following figures show the results in four countries when per capita income is used and short distance interaction considered.

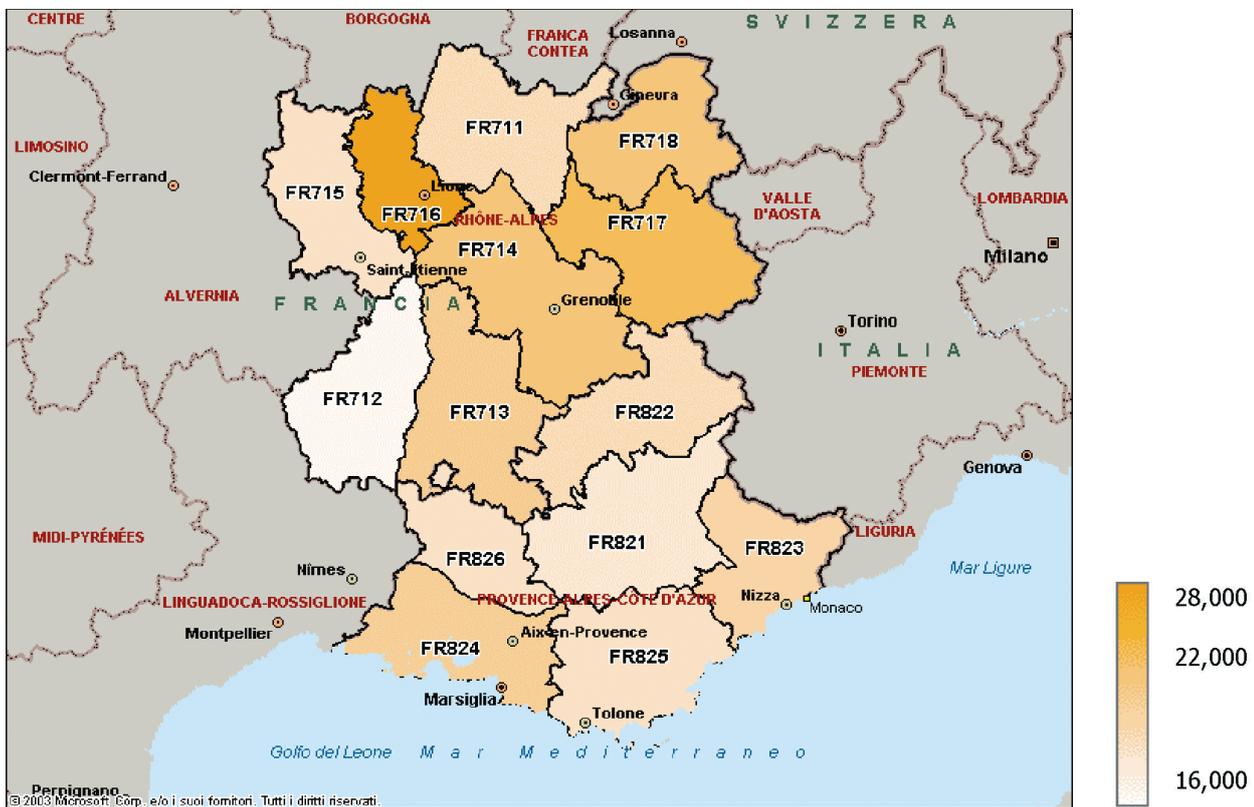
A further set of accessibility levels has been provided in order to carefully assess the predictable effects of infrastructure investment in Corridor V. NUTs 2 regions (instead of NUTs 3), population figures, GDP and time distances (instead of kilometres) were used in the exercise. The results shown below map the effects on

regional GDP in millions of US\$ at purchasing power parity, from 2000 to 2015. The effects consist in a robust increase in accessibility almost everywhere but in moderate differential effects at regional level.

1.3.4 Growth in the AlpenCorS regions

In this section we concentrate on the forecasts of regional economic growth within the AlpenCorS, in the production of which a particular emphasis has been put on the influence played by changes in transport infrastructure. The third Report on Economic and Social Cohesion of the European Commission underlines the need for a set of conditions to be met, both at the national and at a regional level, in order to achieve regional development. Among these, great emphasis is placed on the provision of a suitable endowment of basic infrastructure and, in particular, of an efficient transport network. However, modifications of a network of transport infrastructure, altering travel times and economic distances between different places, affect the accessibility and the economic potential of different locations in an asymmetric fashion, increasing relative accessibility and economic potential of some regions to the detriment of others. Consequently, the spatial

Figure 28. Income Per Capita Potential, France, NUTS3 (2000)



Source: University of Venice – Department of economic sciences' elaborations

Figure 31. Income Per Capita Potential, Hungary, NUTS3 (2000)



Source: University of Venice – Department of economic sciences' elaborations

impact of transport infrastructure changes is fundamental in order to produce forecasts of regional development.

Based on this line of reasoning, particular attention has to be paid to changes in regional accessibility and economic potential brought in by planned modifications of the existing transport network while producing the forecasts of regional economic growth. The first step of the forecasting procedure is therefore represented by a set of estimates of regional economic potential given the existing transport infrastructure network. Similarly, we estimate the economic potential in 2015, taking into account regional population projections and the change in travel distances brought in by the completion of the Pan-European corridors.

Secondly, we estimate a linear model of regional growth that includes, among other things, a measure of regional economic potential (in order to capture the impact of the transport network) and the level of national GDP (to allow for the correlation between national and regional economic performance) among the explicative variables. In particular, due to problems of non-stationarity in the

variables, we resort to a first difference specification where the dependent variable is represented by the annual variation of regional real GDP while the main explicative variables are the first difference of national real GDP, the annual variation of regional economic potential and the initial level of regional real GDP.

Finally, the forecasts of real GDP for the AlpenCorS regions are obtained by combining these regression estimates on one side and the forecasts on national real GDP and on economic potential in 2015 on the other. The following figures then illustrate the outcome of the forecasting procedure. In particular, the first presents the level of real GDP of AlpenCorS region in 2000, showing a clear East-West dichotomy within the corridor with richer regions concentrated along the Western section. The second, instead presents the regional forecasts of real GDP in 2015, based on a 'low national growth scenario', i.e. on the assumption that each country grows at the lowest of its forecast rates. The message that this set of regional forecasts conveys is moderately optimistic as the dispersion in regional GDP within the AlpenCorS area is somewhat reduced. This result is due to some of

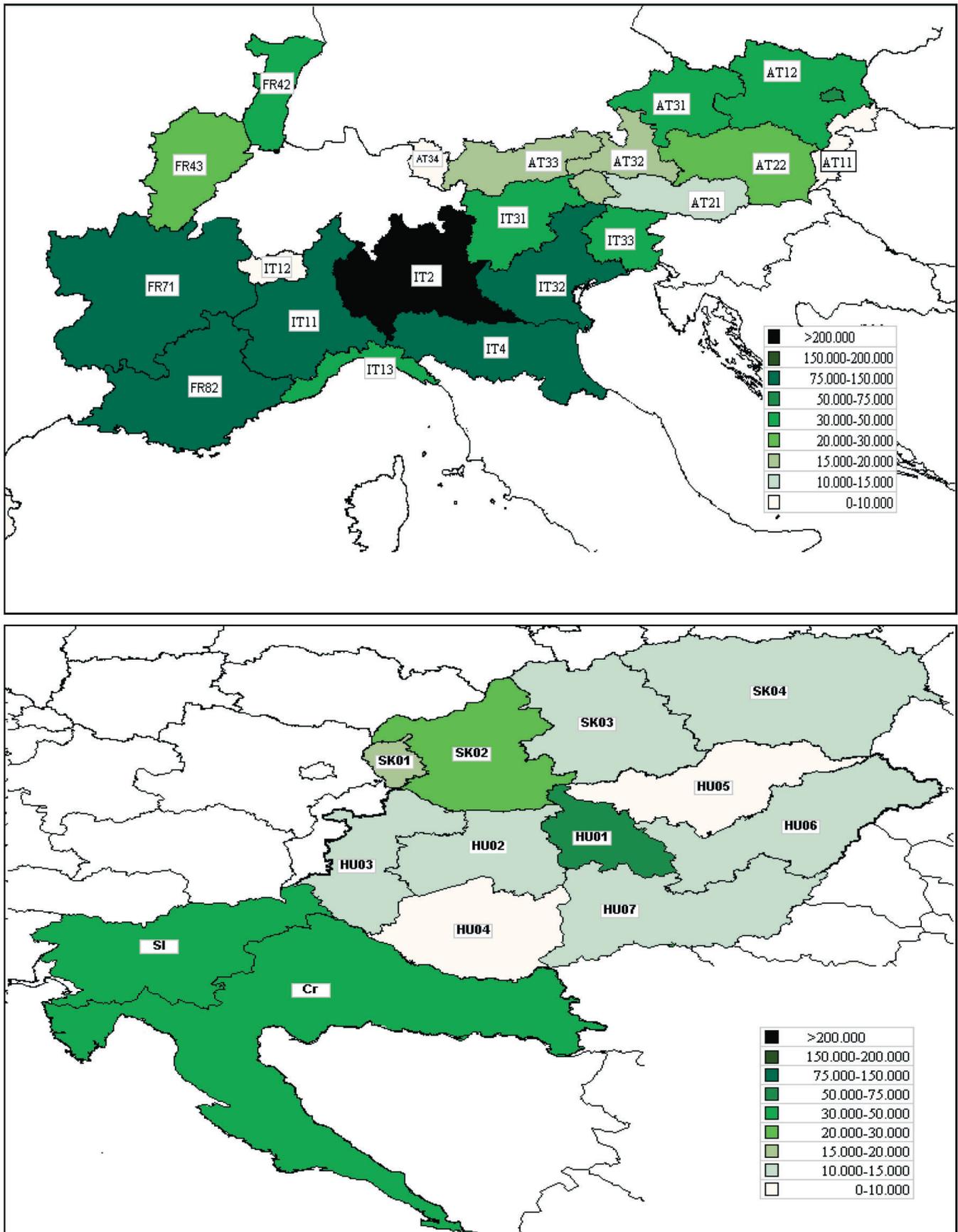
the initially less affluent regions in the western section of the corridor manifesting an above average economic performance in the considered years and, simultaneously, to some Eastern regions showing a tendency to catch up with Western regions. In particular, Slovakia and the Northern regions of Hungary appear to gain the most.

1.3.5 Convergence among AlpenCorS regions

The aim of the present section is twofold. First of all, it uncovers the convergence dynamics that have characterised the recent experience of the regions belonging to the corridor. Secondly, making use of two sets of regional growth forecasts for the period 2005-2015, it evaluates how the completion of the corridor infrastructure might have an impact on patterns of economic convergence or divergence among the AlpenCorS regions.

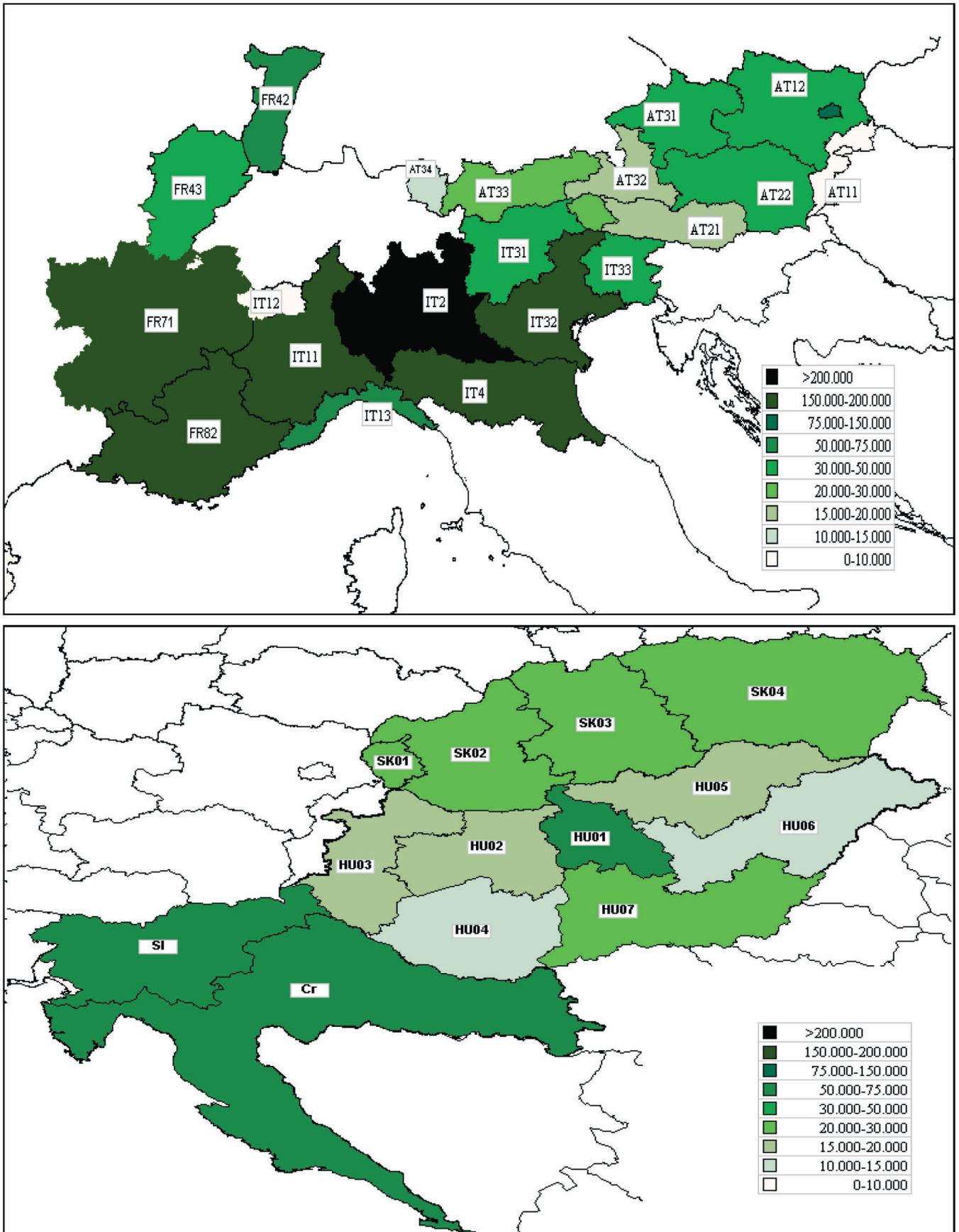
In general, two broad threads of analysis on economic convergence can be identified. Within the first thread, the 'regression approach', a variety of methods has been developed. These methods, however, suffer from substantial drawbacks, the most important of which relate to their informative content. Most applications of this approach in fact concentrate on the behaviour of a 'representative' economy and are thus not only silent as to the cross-sectional distribution dynamics but can also be misleading as to the identification of the determinants of economic growth. A viable alternative is represented by the 'distributional approach' to convergence. To describe the evolution of cross-sectional distributions of per capita income, this approach makes use of 'stochastic kernels', giving the probability density function of regional per capita GDP (relative to the average of the group of regions under analysis) at the end of the analysed period conditional on regional per capita GDP (again relative to the average) at the beginning of the period. Within this approach, convergence among regional economies is thus studied by analysing directly the shape of a three-dimensional plot of the stochastic kernel. In graphs such as these the main diagonal highlights persistence properties: when most of the graph is concentrated along this diagonal, then elements in the cross-sectional distribution remain where they started. In contrast, a 90 degree counter-clockwise rotation from the main diagonal would indicate that substantial overtaking occurs, thereby suggesting that poor and rich economies periodically exchange their relative positions over the time horizon under analysis. A tendency towards convergence to equality in the cross-sectional distribution of per capita income would be signalled by a concentration of most of the graph around the 1-value of the final year axis and parallel to the initial year axis. Finally, the formation of separate modes would be a signal of a tendency toward polarization in regional incomes.

Figure 32. Regional GDP (Million 1999 US\$. PPP) Year 2000



Source: University of Venice – Department of economic sciences' elaborations

Figure 33. Regional GDP (Million 1999 US\$. PPP) Year 2015



Source: University of Venice – Department of economic sciences' elaborations

1.3.5.1 The distribution dynamics between 1995 and 2000

Before analysing regional convergence during the second part of the 1990s through the distribution dynamics approach, we should have a first look at the disparities. The figure below plots the kernel-smoothed density estimates of the cross-sectional distributions of per capita GDP (relative to the average in the Corridor) for the years 1995 and 2000. The cross-sectional distribution estimates, depicted in the figure, are clearly bimodal in both years, thus emphasising the profound heterogeneity of per capita income levels characterising the corridor. Moreover, the direct comparison of the two

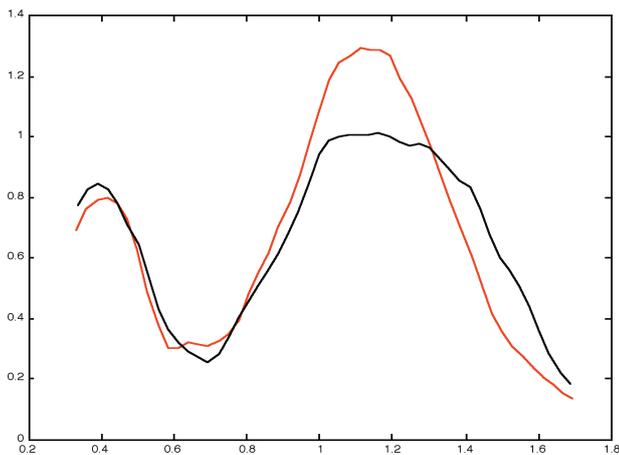
kernel-smoothed density estimates suggests that a (weak) convergence process took place during the second part of the 1990s as the left peak of the distribution tends to become somewhat lower in 2000 while the right peak becomes more pronounced.

To get further insights into this feature, we can then turn to the study of intra-distribution dynamics following the 'distributional approach'. The figure below thus shows the nonparametric estimate of the three-dimensional kernel for the transition dynamics across the regions of Corridor V and, in the lower part, the corresponding two-dimensional contour plot. In particular, these two plots describe how the cross-sectional distribution of (relative) per capita GDP has evolved over the 1995-2000 period. As is evident from the figure, the fact that most of the conditional probability mass is concentrated along the 45-degree diagonal indicates that persistence is the most evident feature over the 1995-2000 period. However, the slight counter-clockwise rotation for high (relative) income regions points to some degree of convergence among these regions, as suggested above.

To sum up, the analysis of economic convergence between 1995 and 2000 among the AlpenCorS regions shows that:

- Persistence in relative per capita income differentials is the most evident feature over the period;
- Simultaneously, some degree of convergence has occurred among high (relative) income regions.

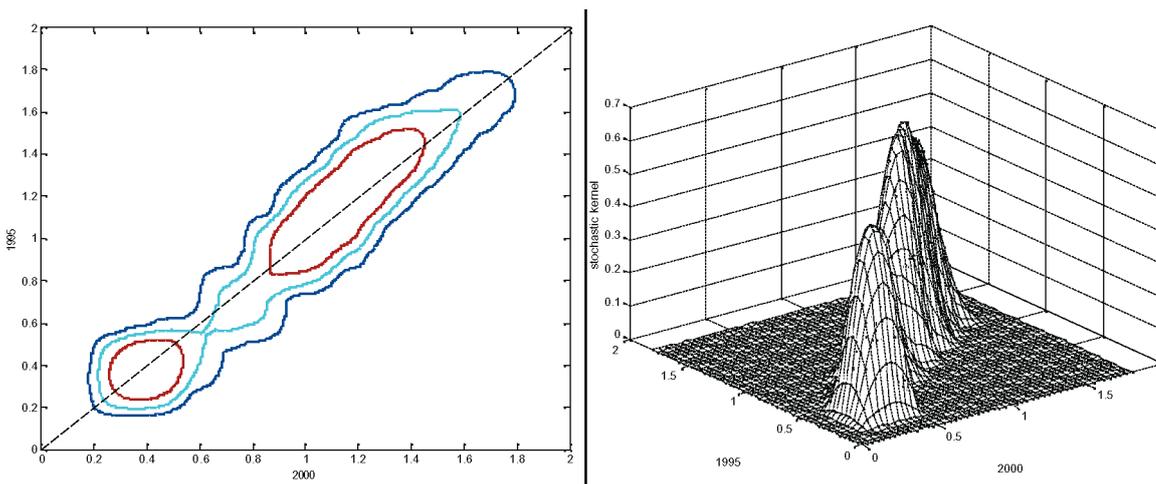
Figure 34. Distributions of regional (relative) per capita GDP (1995 and 2000)



Notes: Non-parametric Epanechnikov kernel estimates of per capita GDP 1995: continuous (black) line; 2000: dashed (red) line

Source: University of Venice – Department of economic sciences' elaborations

Figure 35. Relative (per capita) GDP dynamics (1995-2000)



Notes: Epanechnikov kernel; contour plot at levels 0.05, 0.15, 0.3

Source: University of Venice – Department of economic sciences' elaborations

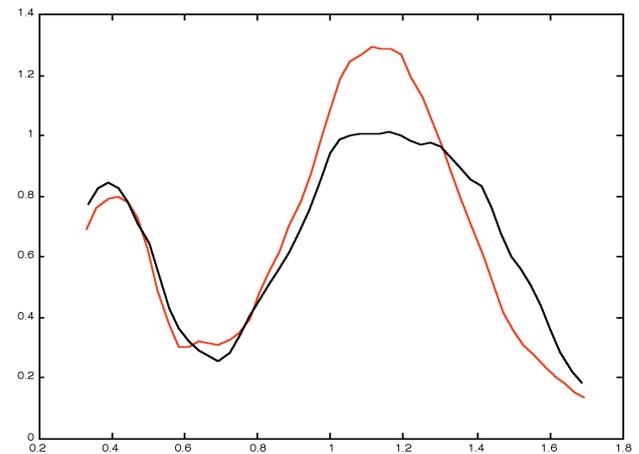
1.3.5.2 The distribution dynamics between 2000 and 2015

Could the completion of the corridor infrastructure have an impact on convergence dynamics over the period 2000-2015? To answer this question we can make use of the regional forecasts of real per capita GDP within the 'distribution approach'. In particular, two sets of regional forecasts of real per capita GDP are employed in this analysis; in turn, these sets of forecasts correspond to two extreme scenarios of national growth: the first scenario assumes that each country grows at the highest rate among the forecast rates; the second scenario instead assumes that each country grows at the lowest forecast rate. Since these two sets of regional estimates yield similar results, we can concentrate on the analysis that makes use of the former.

As before, it is interesting to look at the morphology and shape characteristics of the cross-sectional distributions of (relative) per capita income through their kernel-smoothed density estimates. The figure below thus compares the kernel-smoothed density estimate for year 2000 (the continuous line) with the corresponding estimate obtained from the 'high national growth' forecasts of regional per capita GDP in 2015 (the dashed line). The comparison between the two estimates reveals that, based on the regional growth forecasts, at least two important processes might take place between 2000 and 2015. First, while the kernel-smoothed density estimate for 2000 presents two quite distinct peaks, a third peak shows up in the right tail of the distribution in the corresponding estimate for 2015. In other words, based on the regional growth forecasts, a restricted group of rich regions shows a tendency to grow away from all the others. Second, the distance between the two peaks that existed in 2000 appears to have decreased by 2015 as a combination of both the low-income peak moving to the right and the high-income peak moving to the left. In other words, based on our forecasts, the period 2000-2015 might be characterised by a process of convergence among regions with low and medium (relative) levels of per capita income; however, since the two peaks get closer but do not merge, this process of convergence does not entirely overtake the forces leading towards polarization.

These impressions can be further clarified through the study of the three-dimensional stochastic kernel (and the corresponding contour plot) for the transitions in (relative) per capita GDP between 2000 and 2015 shown in following figure. In this case, the rightmost part of the conditional probability mass shows a clear tendency to shift in a counter-clockwise manner, parallel to the 2000 axis and in correspondence with a value of 1.6 on the 2015 axis. At the same time, the conditional probability mass corresponding to the central peak

Figure 36. Distributions of regional (relative) per capita GDP (2000 and 2015) Scenario



Notes: Non-parametric Epanechnikov kernel estimates of per capita GDP 2000: continuous (black) line; 2015(scenario1): dashed (red) line

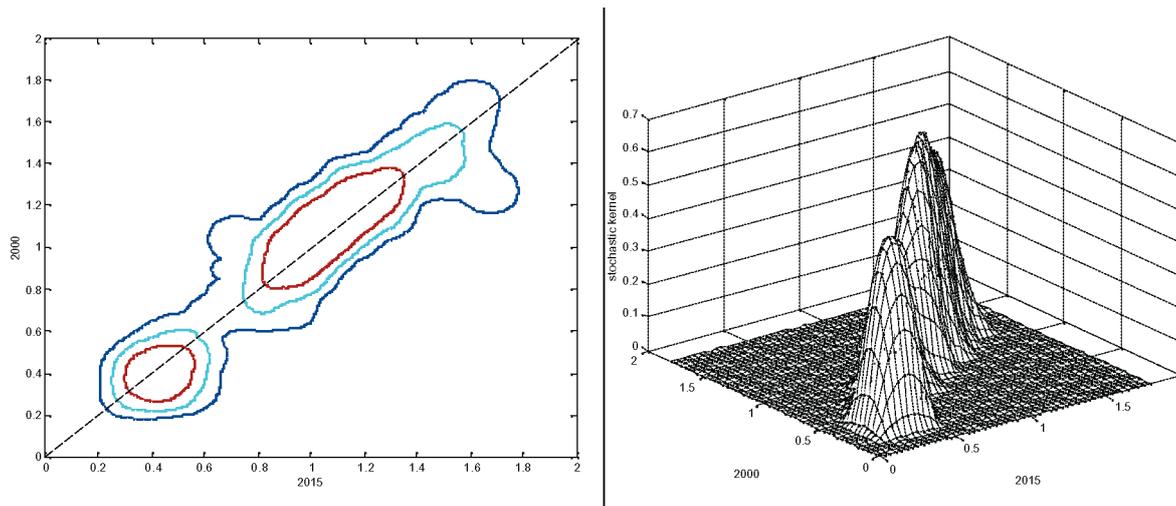
Source: University of Venice – Department of economic sciences' elaborations

shows a tendency to expand above the 45-degree diagonal while the mass corresponding to the leftmost peak shows a slight tendency to expand below the diagonal. These changes suggest that both the reduction in the distance between the peaks and the formation of a new peak by 2015 noted above could be essentially due to medium and high (relative) income regions shifting towards the lower part of the distribution.

To sum up, within both the 'high national growth' scenario and the 'low national growth' one, there is evidence that some of the medium-high (relative) income regions move towards lower (relative) income regions. More specifically, this implies that:

- A small group of high (relative) income regions grow away from all the others;
- There is some degree of convergence between medium (relative) income regions and low (relative) income ones.

Figure 37. Relative (per capita) GDP dynamics (2000-2015) Scenario 1



Notes: Epanechnikov kernel; contour plot at levels 0.05, 0.15, 0.3

Source: University of Venice – Department of economic sciences' elaborations