

**Institut für Höhere Studien (IHS), Wien  
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**No. 50**

**Cohesion in the EU and Accession of Slovenia:  
Comparisons with Selected Smaller EU  
Countries**

**Pavle Sicherl**

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## **Abstract**

Comparing Slovenia with selected smaller EU countries (Austria Ireland, Portugal and Greece) in two dimensions (in percentage difference around 1995, and in time distance) showed that for this selection of indicators Slovenia could be considered to belong broadly to the group of the less developed EU countries. Slovenia was in 1995 in 13 cases behind and in 13 cases ahead of Ireland, Portugal and Greece. When behind, time lag of Slovenia never exceeded 10 years. For GDP per capita the effect of accession of Slovenia on cohesion would be insignificant, for other indicators the relative position is even more favourable.

## **Keywords**

Time distance, S-distance, cohesion, Slovenia, Austria, Portugal, Greece

## **JEL-Classifications**

O10, O52

**Comments**

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## 1. Introduction

The scope and speed of the enlargement of the European Union is an important policy issue. In the final instance the decision about integration of Central and Eastern European countries into EU will be political. However, a meaningful question before that is how similar or dissimilar are these countries, with respect to EU countries and among themselves. Namely, international comparisons are an important ingredient for analysis and formulation of development strategy and of the approach to the process of accession of Slovenia. Such analysis is particularly useful in discussing the effect that the accession of Central and Eastern European (CEE) countries would have on the cohesion in the EU.

This question has been addressed from two points of view: methodological and empirical. The novel methodology for comparisons in time and space as the first part of this project has been presented in Sicherl (1997a). It offers a new perspective to the problem, an additional statistical measure, and a presentation tool for policy analysis and debate that is readily understood by policy makers, media and general public. In this study, as an empirical example of possible application of this methodology, the comparison of Slovenia with some smaller EU countries for selected indicators has been undertaken within the given limitations of time and resources.

In the final instance the decision about Slovenia's integration into EU will be political. Assuming that the outcome of a referendum on this topic in Slovenia would be positive, decision of the EU would depend on two elements:

- i) Slovenia's readiness to fulfill the usual conditions for the entry;
- ii) Political will and budgetary condition in the EU which have nothing to do with the fulfillment of the objective conditions necessary for the entry by Slovenia.

In actual negotiation there are many issues, sectors and details to be dealt with. However, what is needed first is a strategic overview of Slovenia's position in Europe, both West and East, in terms of economic, social and institutional development. Such an overall picture is then a synthesizing framework through all stages of the process, from initial diagnoses and establishment of priorities, to continuous monitoring of progress and necessary corrections, to preparing official briefings and submissions at various stages.

Such an analytical and policy making framework is very much needed for public relations issues with the international community, both EU and international business community in general. However, it is even much more important for building up and properly adjusting in time the country's own strategy and policy decisions. This study is thus not a cost/benefit analysis of accession of Slovenia, either from the point of view of Slovenia or of the EU. One major point to be documented within the limited scope of this project and brought to the

attention of the international community is that the overall picture regarding Slovenia's position relative to the EU countries is much more favourable than one would conclude from comparisons of the per capita product alone.

Section 2 offers an overview of the position of Slovenia at the beginning of transition with respect to twelve EU countries and four CEE countries in 1990 for four indicators. In Section 3 the fall in GDP in transition will be discussed and compared with similar experiences in the developed countries during the "Great Depression" in 1930's and the World War II. Section 4 presents the empirical findings of the static disparities and disparities in time between Slovenia and the analysed smaller EU countries for the selected set of indicators, showing similarities and dissimilarities in time and space for these indicators. A brief illustration of the position of the countries across many indicators will be provided in Section 5. Section 6 outlines some possible other applications of this methodology, e.g. empirical analysis of comparative positions of other potential member countries of the EU, analysis of cohesion within and among the present EU members and regions, and suggestions for further work and more detailed analysis of the position of Slovenia. Section 7 provides a summary and draws conclusions.

## 2. Situation at the beginning of transition

Empirical analysis will deal first with the static disparity and the time dimension of disparity between four Central and Eastern European countries (Czechoslovakia, Hungary, Poland and Slovenia) and twelve EU countries around 1990 with respect to four representative indicators. It will show that the degree of disparity between the analysed countries has been very different for different economic and social fields of concern. Even though we analyse in this section only four selected indicators, a number of substantive questions are raised that could be later verified with a broader selection of economic, social, environmental and institutional indicators using the same dynamic conceptual and analytical framework.

The conventional analysis of disparity is mainly developed for the evaluation of the degree of disparity at a given point in time. The method used in this study enables two-dimensional analysis of disparity: disparity in the level (for a given point in time) and disparity in time (for a given level of the indicator). In general, time distance measures, for a given level of the indicator, the difference in time that separates the two compared units or situations. From this idea of the multidimensional notion of disparity it follows that the overall degree of disparity is conceived here as a weighted combination of the static and dynamic (temporal) dimensions of disparity (Sicherl, 1992). The degree of disparity between the two compared units can thus be expressed simultaneously in at least two dimensions: *a static measure* (e.g. that per capita product in region A was in 1993 50 per cent higher than in region B) *and the time distance* (e.g. that the time lag amounted to 10 years, as the current 1993 level of the per

capita income of region B was achieved in region A already in 1983). Either cannot in itself describe the complex notion of the overall degree of disparity (Sicherl, 1996c).

Time distance in general means the difference in time when two events occurred. We define a special category of time distance, which is related to the level of the analysed indicator. The suggested statistical measure **S-distance** measures the distance (proximity) in time between the points in time when the two series compared reach a specified level of the indicator X.<sup>1</sup> The observed distance in time (the number of years, quarters, months, days, minutes, etc.) is used as a dynamic (temporal) measure of disparity between the two series in the same way that the observed difference (absolute or relative) at a given point in time is used as a static measure of disparity.

Table 1 and Table 2 present the information on the two analysed dimensions of disparity among the 16 countries in the year 1990: Slovenia is the base country from which distance in time and percentage differences are calculated for the selected indicators. The greatest degree of disparity is found for GDP per capita (which is calculated at purchasing power parity). In international comparisons the accuracy and comparability of data present a major problem. For this reason a sensitivity analysis is undertaken by utilising three sources of GDP data. GDPpc1 is GDP per capita at purchasing power parity based on two sources. The level of GDP per capita in 1990 is based on the study of the Austrian Statistical Office (OSZA, 1997), while the time distances are estimated by utilising OECD data on dynamic movement of GDP per capita in constant prices and in constant exchange rates of 1990 (OECD, 1997). GDPpc2 is based on Maddison (1995) and is expressed in 1990 Geary-Khamis dollars. GDPpc3 is based on Summers and Heston (1991) Penn World Tables (Mark 5.5), in international dollars of 1985.

Obviously the results depend on the source used. For the eight developed countries of EU12 the basic conclusion is similar for all three sources of data. GDP per capita was in 1990 in all these countries at least 70 per cent higher than in Slovenia, and the time distances were between 20 and 30 years. For the less developed countries of EU12 and the three CEE countries analysed the numerical estimates from different sources show greater variation. This is especially true for the relative position of Portugal and Greece in relation to Slovenia and other countries. Eurostat estimates for Portugal and especially Greece have increased substantially from their values published by the same source earlier due to 'methodological reasons'. According to earlier estimates Slovenia was ahead of Portugal and Greece, after this revision of data by Eurostat it has been placed behind them. GDPpc1 estimates by Austrian Statistical Office (OSZA, 1997) Eurostat and OECD, as well as GDPpc2 estimates by Maddison (1995), contain these revisions, while Penn World Tables (Mark 5.5) did not use these revisions and is shown here as an example how the conclusions based on different sources can vary. One should not be surprised if there will be sudden changes in the position of certain countries or regions in future estimates.

Table 2 shows the static differences in per cent for 1990 and does not need any further methodological explanation. The methodology for calculation of time distances in Table 1 is provided in Sicherl (1997a) in greater detail<sup>2</sup>. The explanation here should provide the minimum information needed for understanding of the results of the analysis. The procedure for calculating time distances for GDPpc1 contains two steps. First the ratio of the value of GDP per capita for 1990 for Slovenia and the respective compared country is calculated on the basis of data in OSZA (1997). For instance, the value for Slovenia for 1990 is 0.567 of the respective value for Italy. The second step uses the OECD data on GDP per capita in constant prices and constant exchange rates of 1990 for the period 1960–1995 (OECD, 1997). For each country, in this case Italy, the value for 1990 is taken as the basis and the time series back to 1960 is calculated. This time series shows that Italy had the value of 0.567 (1990=1) in the year 1969. Slovenia's GDP per capita at purchasing power parity was in 1990 0.567 of the value for Italy in 1990. From this comparison we can deduce that Italy attained the level for Slovenia in 1990 in 1969. The time distance between Italy and Slovenia (for the level of GDP per capita for Slovenia in 1990) is calculated as the difference between 1969 and 1990, i. e. 21 years of lead for Italy.

The results of the time distance calculation for the three alternative series for GDP per capita are plotted in Figures 1a, 1b and 1c. One should not attach great significance to small differences in the numerical values of distance (proximity) in time. The overall impression is clear. The eight developed EU member countries were in 1990 20-30 years ahead of Slovenia. Portugal and Greece were approximately at the same level as Slovenia according to Eurostat/OECD data, slightly ahead of Slovenia according to Maddison, and substantially behind Slovenia according to Mark 5.5 version of Penn World Tables. Czechoslovakia, Hungary and Poland in 1990 were lagging behind Slovenia 10-20 years, although the estimates for CEE countries are much less reliable. Obviously the new dimension in comparative analysis leads to additional insights important for an evaluation of similarities or dissimilarities among compared countries that are very useful for better understanding of the situation and policy discussions.

Figures 2, 3 and 4 show the values of S-distance between the analysed fifteen countries and Slovenia for the three other selected indicators. The values for life expectancy (female) as an important non-monetary indicator showed a significantly smaller lag. Except for four countries, the time distance of Slovenia behind EU countries was less than 10 years. Even better performance was shown in the infant survival rate, where Slovenia was on the same level as Belgium, Italy and Great Britain, better than all countries of European periphery except Ireland and practically at the median level of OECD countries. Also the time lag of Slovenia behind the leading EU countries for the indicator cars per capita was at least 10 years less than in GDP per capita. This means that the overall picture regarding Slovenia's position relative to EU countries was much more favourable than one would conclude from comparisons of per capita product alone.

Table 1 and Table 2. Time distances and static differences for 16 countries (1990)

Table 1. S-distance from Slovenia (years, - time lead, + time lag)						
	GDPpc1	GDPpc2	GDPpc3	LEXPF	INFSR	CARSpc
LUX	-30		-30	-5	-4.5	-19.4
DEU	-22	-26.7	-26.9	-6	-3	-12.8
FRA	-25	-24.9	-26	-14.7	-6.1	-15.3
DNK	-27	-28.2	-28.6	-10	-10	-5.6
BEL	-22	-21.9	-22.9	-8	-1	-13.3
ITA	-21	-21.1	-21	-11.3	0	-13.6
NLD	-24	-25.7	-25.6	-16	-7	-12.6
GBR	-26	-26.4	-26	-6.5	0	-8
ESP	-8	-14.1	-16.5	-11.2	1.2	-1.4
IRL	-3	-2.6	-3.5	0	-3.5	9
PRT	-1	-3.1	16.5	-3.8	4.4	9.1
GRC	1	-5.6	16.4	-6	3.3	12.5
SLO	0	0	0	0	0	0
CSK	10	12	16.8	7	4.2	10.2
HUN	18	19	19.6	14	10.4	12.5
POL	20	22	20.3	7	11.7	15.8

Table 2. Static difference in per cent for 1990 (Slovenia=0)						
	GDPpc1	GDPpc2	GDPpc3	LEXPF	INFSR	CARSpc
LUX	149		126	2	0	67
DEU	73	100	99	3	0	34
FRA	88	91	92	5	0	44
DNK	79	93	90	1	0	7
BEL	77	80	87	3	0	34
ITA	76	71	73	4	0	65
NLD	73	78	77	4	0	27
GBR	72	75	80	1	0	29
ESP	28	31	33	3	0	7
IRL	22	19	25	0	0	-21
PRT	2	15	-10	1	0	-10
GRC	-1	8	-8	3	0	-41
SLO	0	0	0	0	0	0
CSK	-9	-38	-15	-3	0	-30
HUN	-33	-32	-26	-4	-1	-36
POL	-54	-45	-47	-3	-1	-52

GDPpc1=GDP per capita, source Eurostat/OECD  
 GDPpc2=GDP per capita, source Maddison(1995)  
 GDPpc3=GDP per capita, source Penn World Tables

LEXPF=life expectancy (female)  
 INFSR=infant survival rate  
 CARSpc=cars per 1000 inhabitants

Figure 1a

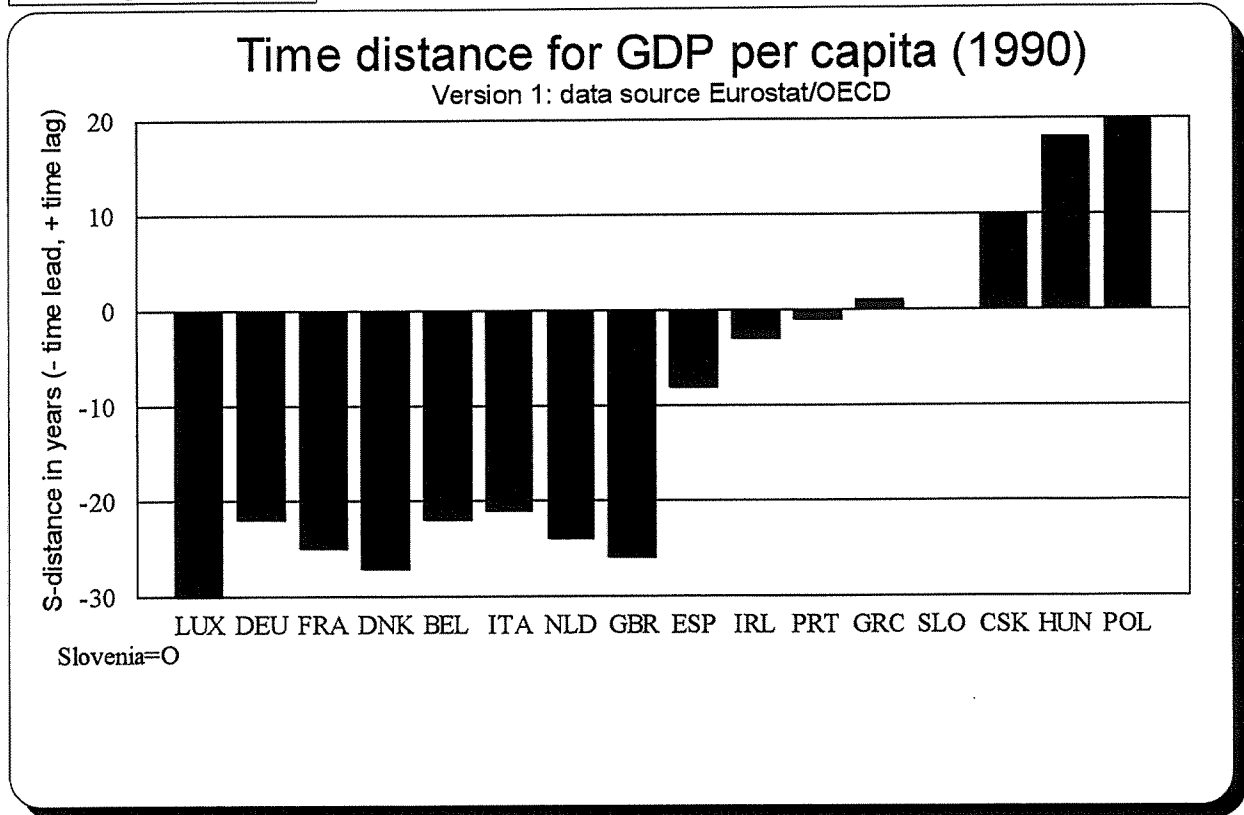


Figure 1b

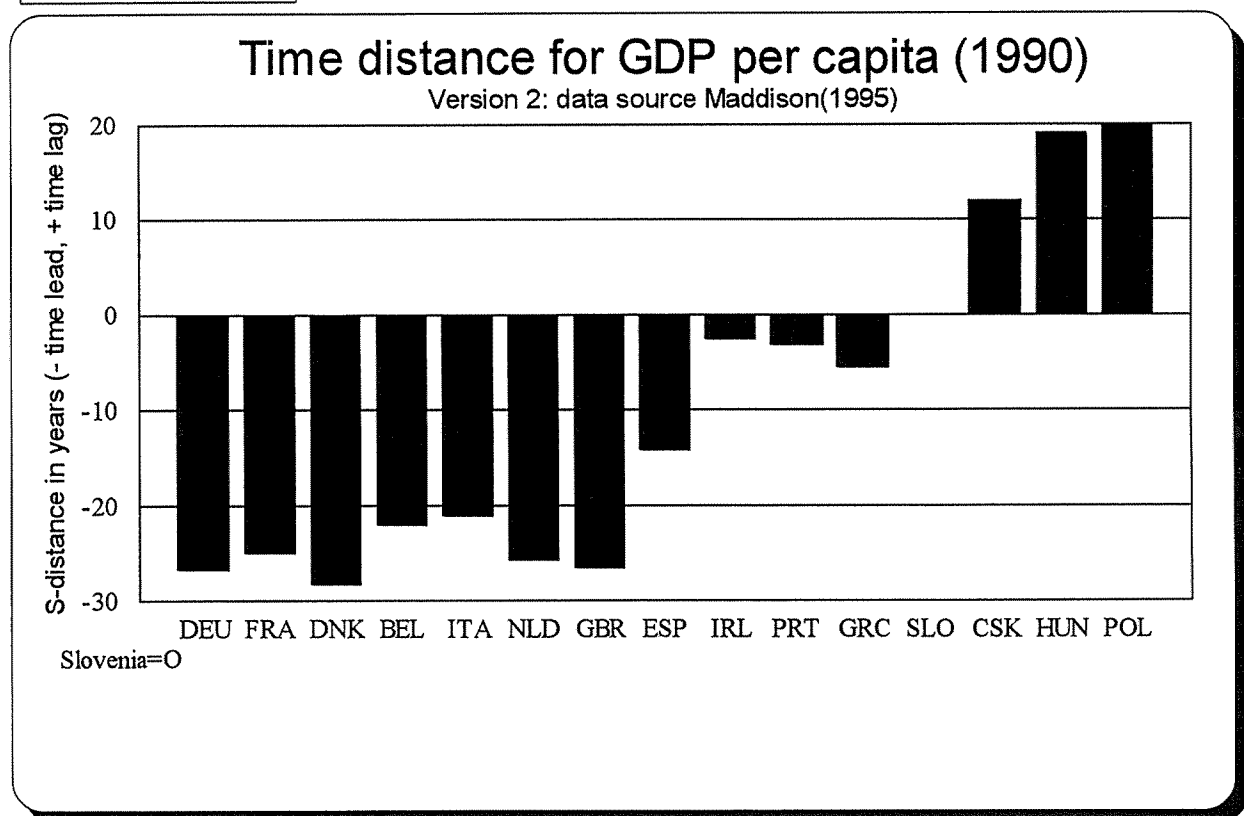


Figure 1c

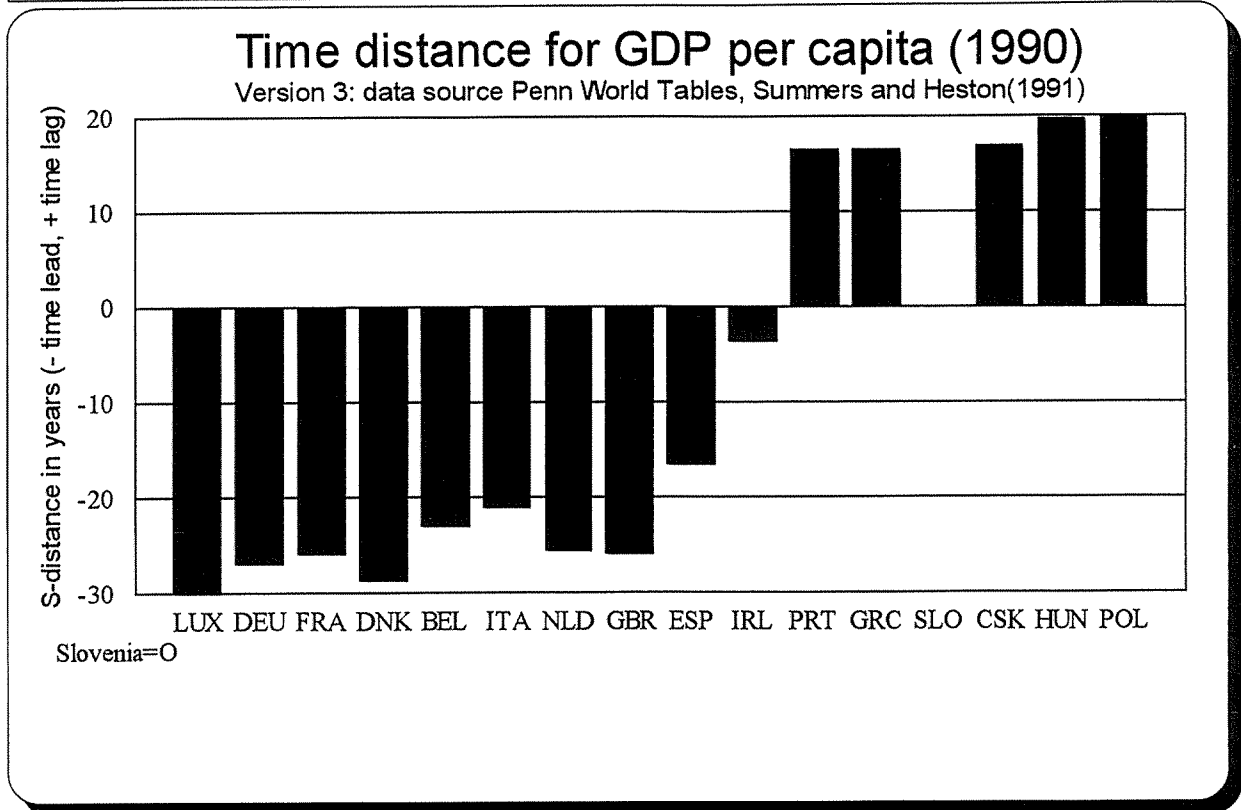


Figure 2

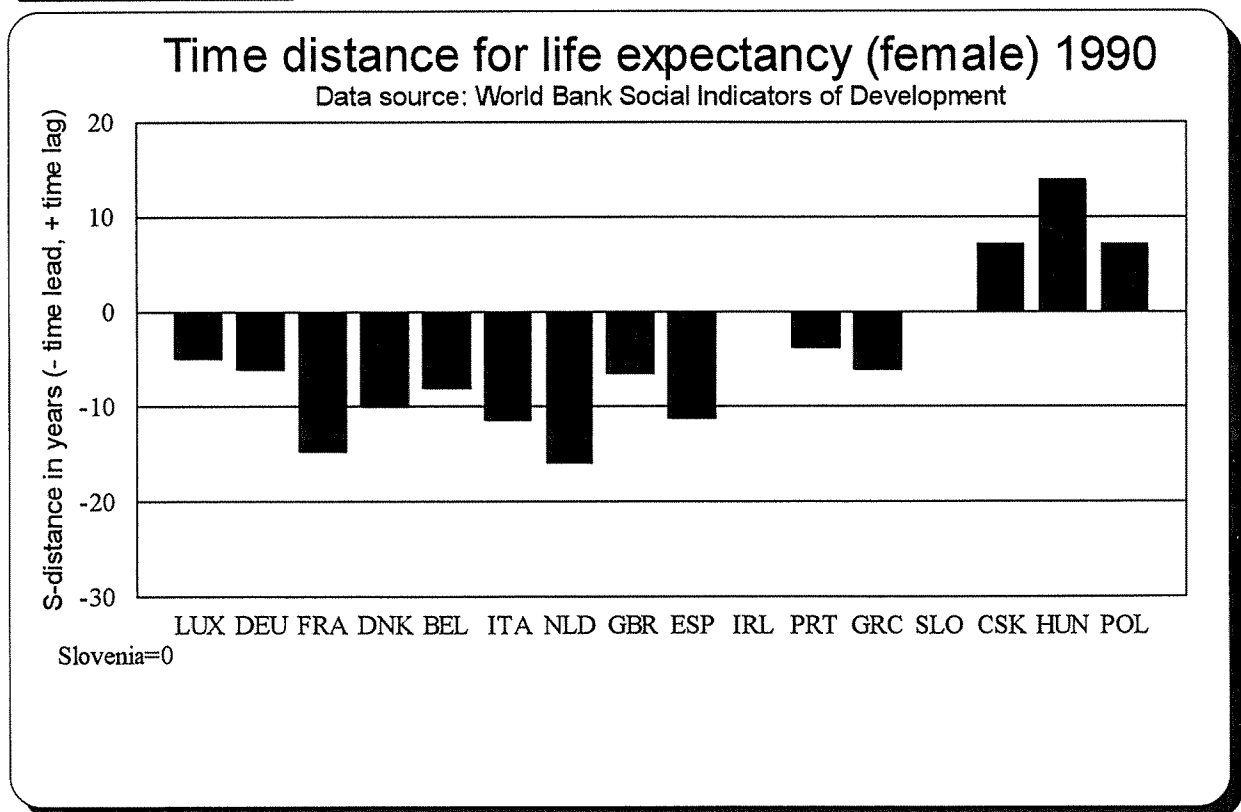


Figure 3

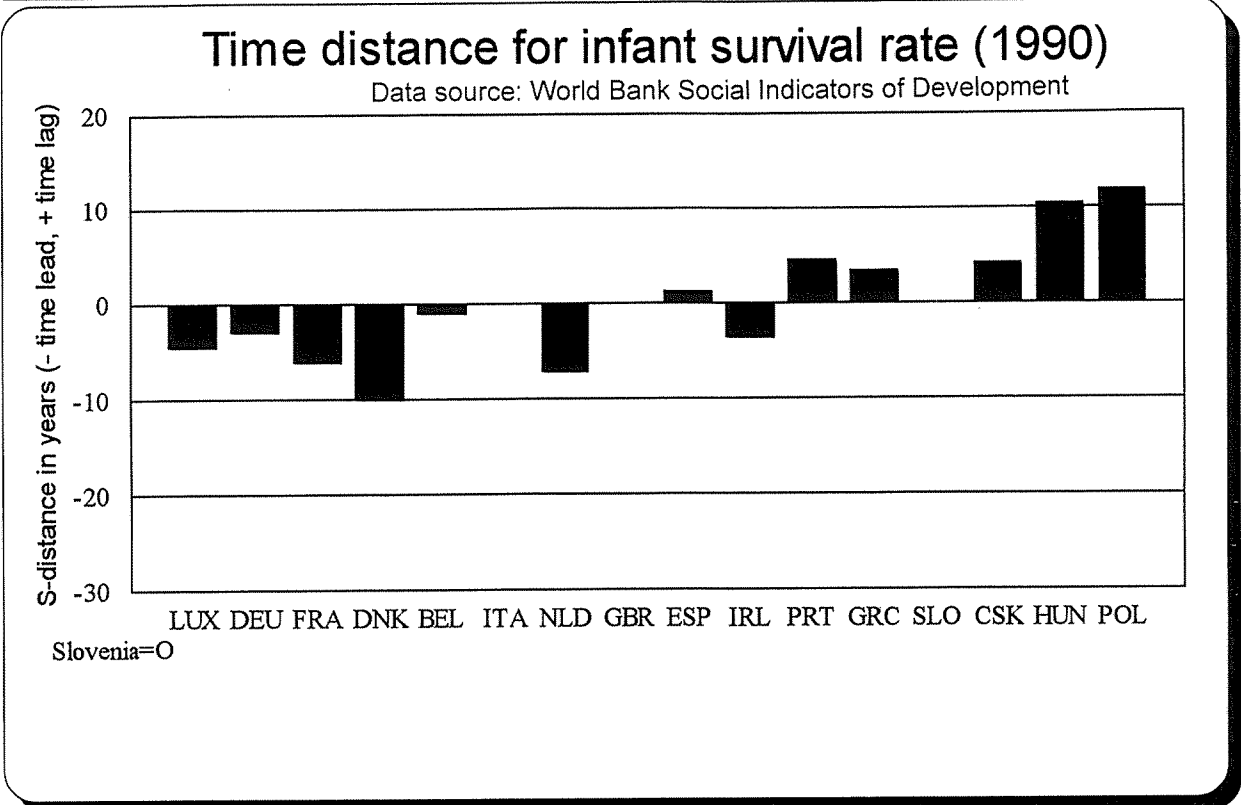
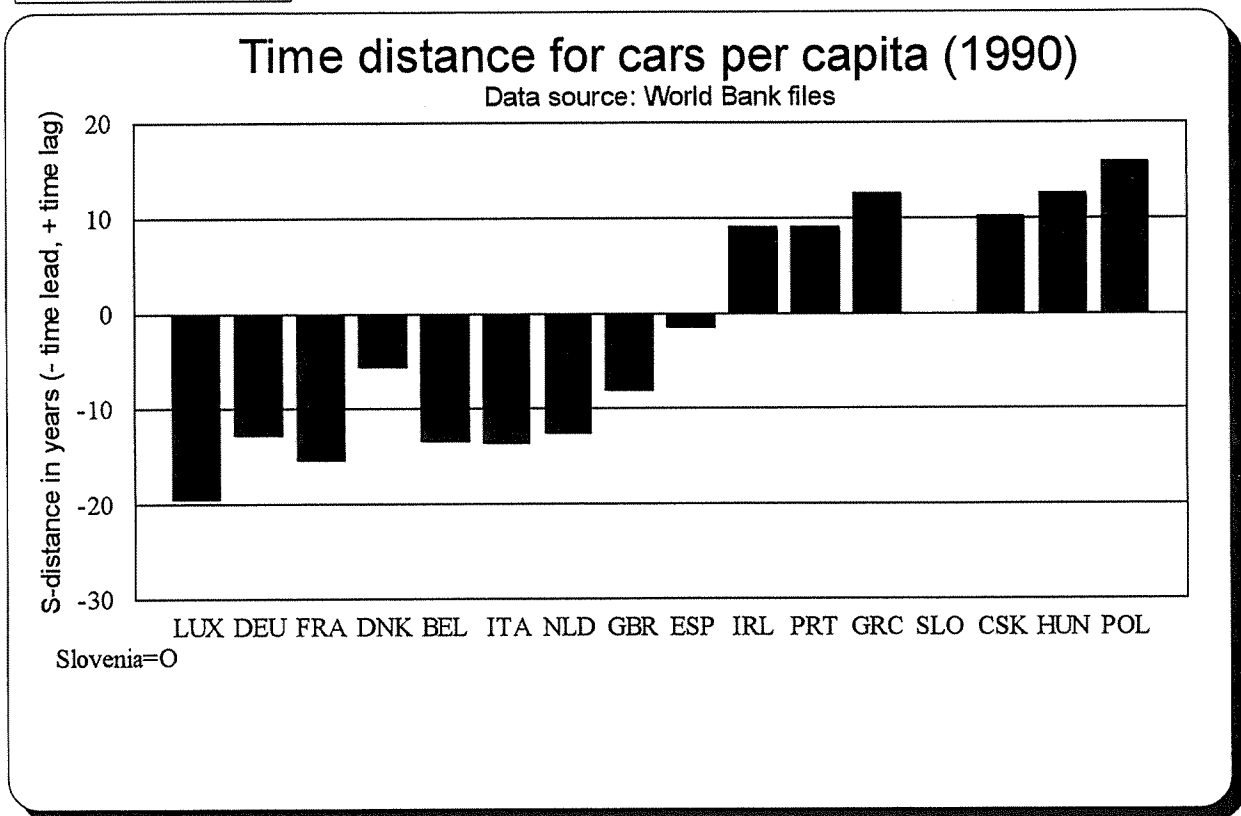


Figure 4



A similar conclusion can be reached for the other analysed Central and Eastern European countries when compared with EU countries. While the time distances between these countries and EU countries were in general greater than those for Slovenia, one can also for other countries in this group conclude that the similarity with EU countries was considerably greater in other indicators than in per capita product. The same conclusion can also be reached by comparing static differences around 1990 for these indicators. In this case the differences between indicators are even larger, since the static differences are very small for life expectancy (only up to 5 per cent), and negligible in percentage terms for infant survival rate. With respect to Central and Eastern European countries, Slovenia is together with Czech Republic leading this group of countries. For instance, time distance results show that at the beginning of transition Slovenia was more than 10 years ahead of Hungary and Poland in GDP per capita, infant survival rate and cars per capita.

Comparisons across indicators and over time have led to an important policy conclusion, on the one hand, and to an empirical verification of the theoretical postulate that the conventional static measures of disparity have to be complemented by time distances to provide a better picture of reality, on the other. The above conclusion that the disparity for other analysed indicators is considerably smaller (in both dimensions, percentage difference at a given point in time and time distance) than the disparity in GDP per capita (at purchasing power) can be demonstrated for Central and Eastern European countries for a larger number of economic and social indicators. Due to lack of space we shall in this study use the case of Slovenia as an example of how this methodology could be used to analyse the position of other transition economies in relation to EU countries, or among themselves, as well as for comparisons between EU countries.

Its level of development can classify Slovenia into a group of countries, which Maddison labels countries of European periphery. Four EU members in that group are Ireland, Spain, Portugal and Greece. We shall in the Section 4 in more detail compare Slovenia with the most relevant selection of smaller EU countries: Austria as Slovenia's neighbour, Greece and Portugal as more recent and less developed members, and Ireland as a very interesting small country with very impressive results in the last decade.

### **3. The “Second Great Depression”**

In the transition period in all Central and Eastern European countries production levels plummeted and their position relative to the countries of the EU deteriorated drastically. The cumulative fall in GDP in the period 1989-92 in Slovenia, Czechoslovakia, Hungary and Poland amounted to around 20 per cent, and the fall in the industrial production was still larger (see e.g. Hunya, Vidovic et al. 1994).

This fall in economic activity and employment in the first years of transition can be compared with the decline in the great depression sixty years ago. For instance, the decline in GDP at that time amounted to 28 per cent in the USA, to 16 per cent in Germany, and to 21 per cent in Austria. Even a larger decline in output was recorded after the World War II when GDP fell between 1944 and 1946 by 20 per cent in the USA, 60 per cent in Germany, 45 per cent in Japan, and 51 per cent in Austria (data source: Maddison 1991). While the economic, social and political conditions of the earlier depressions were not the same as in the current transition in Central and Eastern European countries, it is of interest to see how the developed countries fared after these great declines in their attempts to catch up with the previously achieved production levels.

One way of analysing such situations is also application of time distance methodology to the specific case of calculating S-distance between the values of the series on itself. For instance, in the USA the value of GDP at the lowest level of depression in year 1932 was achieved already in year 1922, in Austria the level of GDP in 1933 was similarly achieved already in 1922. In Germany and Austria the lowest level of GDP in 1946 was achieved thirty years ago. For the present situation it is of interest to see how long did it take for these countries to reach the level of economic activity that was already attained before these downturns. In the USA the level of production of 1929 was reached in 1939, in Germany in 1935, in Austria in 1935, i. e. that is it took about 10 years. After the World War II these countries have needed about 9 years to reach the level of GDP of 1944: USA and Japan 8 years, Germany and Austria 9 years. The rate of growth of GDP in the recovery was about 6 per cent in 1930's, and about 10 per cent in Germany, Austria and Japan after 1946.

The fall in production in Slovenia in the period 1989-1992 was about 20 per cent which means that this level was achieved already about 15 years earlier. Relative disparity and time distance between Slovenia and the compared EU countries for the indicator GDP per capita increased substantially as compared with the position at the end of 1980's. Time distance between Slovenia and Italy in 1991 increased to 30 years, the corresponding time distances were 19 years for Spain, 13 years for Ireland, 6 years for Portugal, while Slovenia remained one year ahead of Greece in this indicator according to the Penn World Tables (Mark 5.5).

The fact that Slovenia in the past already enjoyed a higher level of per capita income and was therefore better equipped with durable consumer goods and communication facilities, together with the importance of informal economy, contributed to the situation that the fall of standard of living has not been as drastic as the fall in production. Also, without going into details here, some earlier discussed social indicators have continued to improve in sharp contrast with the fall in GDP per capita. As earlier in comparing levels of development, GDP per capita does not tell the whole story also when the direction and speed of change are concerned.

## 4. Comparing Slovenia with some smaller EU countries for selected indicators

The position of Slovenia in 1995 (or the closest available year) is compared with the four selected smaller EU countries (Austria, Ireland, Portugal and Greece) for a set of economic and social indicators. As mentioned before, the accuracy and comparability of international data leaves a lot to be desired. For estimation of time distances (proximity in time) one needs also data over a longer period of time which poses additional problems. In most cases such time series were available, but in some cases approximations had to be used. The similarity or dissimilarity among countries is investigated in two dimensions: the conventionally measured disparity in the indicators space at a given point in time (expressed in per cent of Slovenia's level) and disparity in time (time distance calculated for the current level of Slovenia and expressed in years).

The time distance approach is useful at least in two domains: (1) it offers a new view of data that is exceptionally easy to understand and communicate, and (2) it may allow for developing and exploring new hypotheses and perspectives that cannot be adequately dealt with without the new concept. This permits perceiving and measuring disparities also in time and an integration of static and intertemporal comparisons for a better understanding of the situation to policy makers and general public.

### 4.1 Disparities in GDP per capita

The latest information by Eurostat on GDP per capita at purchasing power parity for EU countries and Associated Member Countries for 1995 is Eurostat (1997a). These results are presented in Table 3. Slovenia reached in 1995 59 per cent of the average value of EU15. According to this data source the level for Austria was higher for 89 per cent, for Ireland 57 per cent, for Portugal 14 per cent and for Greece 11 per cent. We shall use this data source in further analysis, but one should be aware that different sources lead to different conclusions. For instance, World Bank Atlas method puts Slovenia in 1995 on equal level as Greece (8200 US\$ and 8210 US\$, respectively). Also Cesen (1997) puts Slovenia in 1995 on the same level as Greece. It is quite possible that future revisions of data for CEE countries could bring about substantial changes as were produced by Eurostat revisions for Portugal and Greece in the past. Havlik (1997) reports that the Czech Republic and Poland are in the process of revision of their GDP estimates. In this study we shall, nevertheless, use the present Eurostat estimates, as they will be the official bases for discussions in the process of accession of Slovenia to the EU.

According to these estimates and the dynamics of GDP per capita in the compared countries in the past as provided by OECD (1997), the time distance analysis shows that the present level of Slovenia's GDP per capita (ppp) was attained in Austria 28 years ago, and in the

other three countries between 6 and 8 years ago. These are ex post time distances, which by no means should be interpreted as the distance in time between these countries in the future (ex ante time distance). Ex post time distances incorporate the past performance of the comparator country, the ex ante time distances will be mostly influenced by the future performance of the base country (in our case Slovenia). A vivid example of this association with the past performance of the comparator country is the case of Ireland and Greece in comparison with Slovenia in 1995. The GDP per capita for Ireland was 57 per cent higher, and that of Greece 11 per cent higher than in Slovenia, but the time distance was in both cases about 8 years (time lead for Ireland was  $-7.9$  and for Greece  $-7.7$  years ahead of Slovenia). If ex post time distances would be used for discussing future scenarios for Slovenia, in the next 8 years Slovenia would have to repeat the very successful performance of Ireland in the last 8 years to reach the 1995 level of GDP per capita for Ireland. To reach 1995 level of GDP per capita for Greece in 8 years it would have to repeat only the rather poor performance of Greece in the past.

It is possible to make various projections about future rates of growth of GDP per capita in the selected countries. EC (1997) presents medium term projections for 1997-2001 and IMAD (1997) has prepared projections for Slovenia. The past performance in Table 4 shows that after 1993 the rate of growth of GDP in Slovenia is higher than in all compared countries, with the exception of Ireland. Scenarios of economic development of Slovenia include reducing the gap with EU also for GDP per capita. The starting position of Slovenia in 1996 is about 60 per cent of the EU15 average. Havlik (1997) projects that Slovenia will in the year 2000 reach 63 per cent of EU average, and that it will by 2005 catch up with Portugal and surpass Greece a few years earlier. EC (1997) projects rather optimistic rates of growths for the analysed countries (6.3 per cent for Ireland, 3.4 per cent for Portugal and Greece, for the period 1995-2001) which are considerably higher than the past performance shown in Table 4, with the exception of Ireland. Even if these growth rates would prevail, it is projected by IMAD that Slovenia will grow faster (with the exception of Ireland). This means that Slovenia will probably reduce the gap in GDP per capita with EU average and Austria, Portugal and Greece, but probably not with Ireland.

Table 3. GDP per capita (ppp), current prices

	AUT	IRL	PRT	GRC	SLO
1993	17774	13139	10565	10225	8559
1994	18832	14709	11161	10801	9386
1995	19321	16024	11621	11324	10199

Source: Eurostat(1997a)

Table 5 presents gross domestic fixed investments as per cent of GDP. During the first three years of transition investment ratio in Slovenia dropped to the levels of Ireland and Greece. From 1993 it shows distinctly higher values than these two countries and in 1996 it reached 22.5 per cent. Such a value is still lower than that of Austria and Portugal, but substantially higher than for Ireland and Greece. Continuous increase in investment ratio for Slovenia is a good sign of acceleration of investment activity, which may be helpful in closing the gap also with Ireland.

	AUT	IRL	PRT	GRC	SLO
1990	4.3	7.8	4.3	-2.5	
1991	2.9	2.2	2.1	5.1	-8.9
1992	2.0	3.9	1.1	-0.2	-5.5
1993	0.3	3.1	-1.2	-1.2	2.8
1994	3.1	6.7	0.8	2.1	5.3
1995	1.8	7.8	2.4	2.0	4.1

Source: WB Development Indicators 1997, IMAD

	AUT	IRL	PRT	GRC	SLO
1990	24.6	18.2	27.3	19.6	18.0
1991	25.4	16.7	26.7	18.4	18.9
1992	25.1	16.0	26.7	18.2	17.6
1993	24.3	14.9	25.1	17.4	18.7
1994	24.8	15.1	25.7	16.9	19.6
1995	25.1	15.1	26.7	17.5	21.1

Source: WB Development Indicators 1997

## 4.2 Sectoral structure and investment ratio

Tables 6 and 7 show relative importance of agriculture in these economies, the share of this sector in GDP and in civilian employment. As far as the share of agriculture in GDP is concerned, Slovenia has a considerably lower share of this sector than Ireland and especially Greece. The share of employment in agriculture is lower than in Slovenia only in Austria. In terms of this broad structural characteristic Slovenia can be considered as being ahead of all three analysed less developed EU countries. Its substantial lead in this indicator with respect to Greece can be an indication that the estimate of the overall GDP per capita by Eurostat might overestimate the position of Greece in relation to Slovenia.

Table 6. Share of agriculture (% of GDP)

	AUT	IRL	PRT	GRC	SLO
1990	3.1	7.3		12.7	5.0
1991	2.8	6.8		14.1	5.2
1992	2.4	7.2		12.5	5.2
1993	2.2	6.8	3.7	11.8	4.5
1994	2.2			12.7	4.7
1995					4.4

Source: OECD(1996), IMAD

Table 7. Employment in agriculture (% of civilian employment)

	AUT	IRL	PRT	GRC	SLO
1990	7.9	15.0	17.9	23.9	
1991	7.4	13.8	13.2	22.2	13.8
1992	7.1	13.7	11.3	21.9	
1993	7.0	12.7	11.3	21.3	10.7
1994	7.2	12.0	11.5	20.8	11.5
1995					10.4

Source: OECD(1996), SORS

### 4.3 Life expectancy and infant survival rate

The relative position of Slovenia in relation to the analysed EU countries for these two social indicators is much more favourable than for GDP per capita. The difference in life expectancy, expressed in percentage terms, is negligible; 1 to 4 per cent. However, the time distances are not negligible, Portugal leads Slovenia in this indicator for 2 years, and Greece leads for 10 years. This example is another indication that the time distance measure and the two-dimensional notion of the disparity in time and in indicator space provides a broader and more realistic representation of reality. Infant survival rate (1000 – infant mortality rate) in Table 9 puts Slovenia together with Austria at the head of the compared countries. Slovenia in this indicator reaches also the EU15 average. Such a position is not only an indication that one can expect improvements in the life expectancy, but also of a comparably good health sector and social conditions.

Table 8. Life expectancy at birth, female (years)

	AUT	IRL	PRT	GRC	SLO
1990	78.9	77.4	77.3	79.5	77.2
1991	79.1	77.7	77.3	79.8	77.4
1992	79.2	79.0	77.5	80.2	77.3
1993	79.4		77.8	79.9	77.3
1994	79.7		78.2		77.4
1995	80.1	79.0	78.6	80.6	77.8

Source: WB Development Indicators 1997, SORS (1996), OSZA (1996)

Table 9. Infant mortality rate (per 1000 live births)

	AUT	IRL	PRT	GRC	SLO
1990	7.8	8.2	10.9	9.7	8.4
1991	7.5	8.2	10.8	9.0	8.3
1992	7.4	5.0	9.2	8.4	8.9
1993	6.5	6.0	8.6	8.5	6.6
1994	6.3	5.9	7.9	7.9	6.5
1995	5.4	5.6	7.4	7.5	5.5

Source: WB Development Indicators 1997, SORS (1996), OSZA (1996)

#### 4.4 Foreign trade

Slovenia as a small country is very much oriented to foreign markets. This orientation was strongly emphasized in the first years of transition and after disintegration of Yugoslavia, when the reorientation to foreign markets was a question of survival in the conditions of fall of output and loss of the Yugoslav market. In 1995 the share of exports of goods and services, and import of goods and services, in GDP is in Slovenia at a level at about 56 per cent. Ireland is the only country from those countries analysed in Tables 10 and 11 that has a higher share of exports of goods and services in GDP than Slovenia. Also in this respect, Ireland can be a good example for Slovenia to follow.

Slovenia has a similar trade orientation with respect to the EU than other compared countries, only Portugal is exporting to EU a substantially higher percentage of total exports. In 1994 the percentage of trade with EU countries was on the export side 80 per cent for Portugal, 74 per cent Ireland, 66 per cent Slovenia, 65 per cent Austria, and 57 per cent Greece. The respective values on the import side are: 74 per cent Portugal, 69 per cent Slovenia, 68 per cent Austria and Greece and 65 per cent Ireland. From this point of view, Slovenia is already now in line with other smaller EU countries.

The situation is different when one looks at the value of exports and imports per capita, which are shown in Tables 12 and 13. Austria, which had a lower share of exports and imports of goods and services in GDP, has a higher value of exports and imports per capita. Slovenia is ahead of Portugal and Greece in exports and imports per capita, but is lagging Ireland and Austria and should try to come closer to their export performance.

Table 10. Exports of goods and services (% of GDP)

	AUT	IRL	PRT	GRC	SLO
1990	40.4	59.3	32.7	21.6	85.6
1991	40.2	59.8	28.8	22.5	93.0
1992	38.7	62.8	25.5	23.2	63.7
1993	37.0	67.9	25.8	22.1	58.5
1994	36.9	72.0	28.5	23.1	59.0
1995	38.1	75.5	28.3	22.4	55.7

Source: WB Development Indicators 1997

Table 11. Imports of goods and services (% of GDP)

	AUT	IRL	PRT	GRC	SLO
1990	39.1	53.4	40.8	32.7	69.9
1991	39.3	53.3	37.4	33.0	80.8
1992	37.7	52.8	34.8	33.0	54.5
1993	36.4	54.8	34.6	32.3	57.9
1994	37.2	58.4	37.0	32.4	56.7
1995	38.9	60.9	37.5	34.2	56.9

Source: WB Development Indicators 1997

Table 12. Exports per capita (ECU)

	AUT	IRL	PRT	GRC	SLO
1991	4273	5538	1337	692	1561
1992	4347	6151	1440	739	2575
1993	4308	6882	1338	696	2610
1994	4714	8017	1527	758	
1995					3350

Source: Eurostat(1995), SORS

	AUT	IRL	PRT	GRC	SLO
1991	5265	4771	2157	1719	1664
1992	5300	4740	2373	1790	2367
1993	5212	5084	2098	1827	2790
1994					
1995					3800

Source: Eurostat(1995), SORS

#### 4.5 Transport and communications

Cars per capita are another indicator where Slovenia shows a high level of development in relation to the compared smaller EU countries. In time distance measure, Slovenia is 10 years behind Austria, approximately at the same level as Portugal, 8 years ahead of Ireland and 16 years ahead of Greece.

Telephone mainlines per 1000 people in Table 15 indicate the history of substantial differences in development of infrastructure and availability of telephones in western European countries and earlier socialist economies. Slovenia was in 1995 in terms of availability of telephones still lagging behind all four compared countries, though the situation has substantially improved in the recent years. Since the rate of growth of telephones is high, the time distances are not very large. Austria is ahead of Slovenia for 14 years, Greece for 10 years, Ireland for 4 years and Portugal for 2 years.

In addition to telephone mainlines there is a strong expansion of mobile phones. Slovenia was in 1995 lagging behind others also in mobile phones per 1000 people, but the time distances were much smaller than for telephone mainlines. The time lead for Austria was about 4 years, for Ireland 2-3 years, and for Portugal and Greece the lead was about 1 year.

Substantial improvement in the telecommunication sector is under way and great attention is given to the need of catching up with the development of telecommunications in developed countries. It is planned that the number of telephone mainlines per 1000 people will increase to 400 by the year 2000. In addition to that a high rate of growth of mobile telephones is under way. In March 1996 Slovenia was already connected with the ISDN network of 17 European countries and has been planning to extend these connections to other networks rapidly.

The price for international calls was in 1995 in Slovenia considerably higher than in other four compared countries, as it is indicated in Table 17 where the average price for 3 minutes call to the USA is presented. Very recently there has been a change in the price structure which made the international calls relatively cheaper and domestic calls relatively more expensive.

The lower level of available infrastructure is in Slovenia partly compensated by a higher utilisation for international calls of available capacity. Despite much higher costs of international calls in Slovenia the international outgoing traffic (minutes per subscriber) is in Slovenia considerably higher than in Greece or Portugal. Ireland and Austria are leading in this indicator (see Table 22).

Table 14. Cars (per 1,000 people)

	AUT	IRL	PRT	GRC	SLO
1990	388	227	260	171	289
1991	396	238	283	173	297
1992	412	242	310	178	304
1993	424	250	315	189	318
1994	440	265	359	199	330

Source: Eurostat, Environment statistics 1996

Table 15. Telephone mainlines (per 1,000 people)

	AUT	IRL	PRT	GRC	SLO
1992	440	314	306	437	248
1993	451	328	311	457	259
1994	465	350	350	478	287
1995	465	365	361	493	309

Source: WB Development Indicators 1997

Table 16. Mobile phones (per 1,000 people)

	AUT	IRL	PRT	GRC	SLO
1992	21.9	12.4	3.8	0.0	1.8
1993	27.8	17.1	9.7	4.6	3.3
1994	35.1	24.8	17.6	16.0	8.4
1995	47.6	44.1	34.3	26.1	13.6

Source: WB Development Indicators 1997

Table 17. International telecom, average price call to USA (US\$ per 3 min)

	AUT	IRL	PRT	GRC	SLO
1993	4.64	4.92	4.59	3.94	6.55
1994	3.68	3.09	4.14	3.73	5.84
1995	3.77	3.32	4.6	3.82	6.35

Source: WB Development Indicators 1997

## 4.6 Information age

The very fast changes in the information technology and software mean that the information of the development in these fields is outdated practically immediately its publication. Therefore, the indicators presented in Tables 18-22 can only show a general impression based on the 1995 data, which should suffice for comparison with indicators in other fields of concern. It will no doubt serve as a methodological example of how the time distance approach can add an important dimension of the reality which is quite distinct from the impression about the degree of the disparity among the compared countries based on static measures of disparity. With additional time and resources more detailed and current information could be obtained. It is expected that the qualitative conclusions would not change.

In personal computers per capita is Slovenia in 1995 lagging behind Austria and Ireland, and about 1 year behind Portugal, and leading Greece for about 4 years. However, as far as more sophisticated utilisation of computers in Slovenia is concerned, Slovenia is clearly ahead of Portugal and Greece and very close to Ireland. In internet users per capita Greece is only at about 25 per cent, and Portugal at about 40 per cent of the Slovenia's level in 1995. Since the number of internet users is growing very fast, time distance measure shows a different picture. By using time distance measures, if Slovenia would follow the speed of development in these indicators for Austria and Ireland, it would reach the corresponding levels of the indicators for internet users and internet hosts per capita for Austria in 1.3 and 2.9 years, and for Ireland in 0.4 and 0.8 years, respectively. Similarly, the considerable advantage for Slovenia against Portugal and Greece in percentage terms can be eliminated in about 1 year for Portugal and in less than 2 years for Greece, if these countries would follow the rate of growth of internet users per capita for Slovenia (for internet hosts per capita an assumed rate of growth of 50 per cent per year was used in calculating time distances).

Table 21 shows the situation with respect to television sets per capita. Data for this indicator are rather unreliable since in some countries the number of television sets is estimated, while some other countries use the number of TV licenses. The numbers for Greece provided by the World Bank are an obvious example of inconsistency in this time series. The general impression is that Slovenia is approximately at the level of Ireland and ahead of Portugal and behind Austria. The relative position with respect to Greece is not clear. Further inquires into the spread of cable television would be of interest, also because its importance as one possible channel for data and multimedia transfer. One can conclude that Slovenia is with respect to indicators of information technology use considerably more developed than the present density of the telephone network would indicate.

Table 18. Personal computers (per 1,000 people)

	AUT	IRL	PRT	GRC	SLO
1992	81.8	121.2	30.2	22.3	35.1
1993	93.5	128.6	37.2	25.5	37.7
1994	107.4	138.3	49.8	28.8	40.1
1995	124.2	145.0	60.4	33.4	47.7

Source: WB Development Indicators 1997

Table 19. Internet users (per 10,000 people)

	AUT	IRL	PRT	GRC	SLO
1992	11.1	3.1	1.8	0.5	..
1993	19.1	6.5	3.4	1.7	3.2
1994	34.5	15.5	5.1	3.4	8.9
1995	66.2	37.5	11.9	7.4	29.5

Table 20. Internet hosts (per 10,000 people)

	AUT	IRL	PRT	GRC	SLO
1994	39.5	13.4	6.1	3.8	9.1

Source: Table 19 WB World Development Indicators 1997, Table 20 ITU (1995)

Table 21. Television sets (per 1,000 people)

	AUT	IRL	PRT	GRC	SLO
1992	474	310	203	204	288
1993	475	322	231	212	296
1994	480	367	325	444	369
1995	497	382	332	442	374

Source: WB Development Indicators 1997

Table 22. International telecom, outgoing traffic (minutes per subscriber)

	AUT	IRL	PRT	GRC	SLO
1992	206	266	72	66	93
1993	214	270	71	71	120
1994	220	261	76	85	157
1995	240	311	84	90	164

Source: WB Development Indicators 1997

## 5. Comparisons across many indicators

In Section 4 data about 20 indicators were presented and analysed. For a thorough analysis of position of Slovenia with respect to the compared smaller EU countries a larger number of indicators and more fields of concern should be analysed. This would require a much larger project over a longer period of time and cooperation with other institutions rather than the short-term fellowship on which this analysis is based. However, the presentation of two-dimensional analysis of disparity in percentage terms and in time distances for 9 indicators in this section can satisfy two purposes. First, the methodology presented and applied provides a guideline for such a larger project, as well as for applying and testing the results of this methodology in other cases that are mentioned in Section 6. Second, some of the empirical results are important for policy consideration and may hold also in the case if more indicators and a greater number of economic and social fields of concern would be included. In this section the results on the relative position of Slovenia with each of the four compared smaller EU countries will be summarised (see Tables 23 and 24).

Table 23. Time distance (in years) for Slovenia's level at around 1995 (Slovenia=0)

Indicator	Austria	Ireland	Portugal	Greece
1. GDP per capita (ppp)	-28	-7.9	-6.3	-7.7
2. Life expectancy (female)	-8.8	-3.9	-2	-9.7
3. Cars per capita	-10	8	-0.6	16.6
4. Infant survival rate	0	0	2.4	2.4
5. Share of empl. In agriculture	-14	1	1	18
6. Telephones per capita	-14	-4.3	-2.4	-10
7. Internet users per capita	-1.3	-0.4	0.9	1.5
8. International calls per subscriber	-4.4	-9	4	3.1
9. Internet hosts per capita	-2.9	-0.8	0.8	1.8

Table 24. Static percentage differences around 1995 (Slovenia=0)

Indicator	Austria	Ireland	Portugal	Greece
1. GDP per capita (ppp)	89	57	14	11
2. Life expectancy (female)	3	2	1	4
3. Cars per capita	33	-20	9	-40
4. Infant survival rate	0	0	-1	-1
5. Share of empl. in agriculture	3.2	-1	-1	-9
6. Telephones per capita	50	18	17	60
7. Internet users per capita	124	27	-60	-75
8. International calls per subscriber	64	90	-49	-45
9. Internet hosts per capita	334	47	-33	-58

## 5.1 Comparison with Austria

The static differences and time distances between Austria and Slovenia for 9 selected indicators around 1995 are visually presented in Figure 5. Figure 5 represents a simultaneous two-dimensional visual presentation of disparities in time and space, characteristic for this approach (i.e. simultaneous presentations of a static measure and of the time dimension of disparities) across many indicators. Such a graph allows for a quick comparative overview with regard to four diverse types of information in the same picture: over space (Austria-Slovenia), time (past history), growth rates (the ray from 0.0 to the indicator position) and a number of selected indicators. The average growth rate associated with a given estimate of the time distance is observed in the graph as a slope of the ray from the center (0.0) to the indicator point. One can observe that the indicators 2, 4 and 5 are growing slowly, as distinct from indicators 7, 8 and 9, which are growing very fast. Such graphs for different units or different periods can, apart from their descriptive value in summarizing the situation over more dimensions, raise policy questions about priorities assigned to different fields in strategies followed by the compared countries in the past and in scenarios for the future.

Austria is ahead of Slovenia in all of 9 presented indicators. The only exception is infant survival rate for which Slovenia is on the same level as Austria. The greatest time distance observed is 28 years for GDP per capita, for the share of employment in agriculture and telephones per capita the time distance is about 14 years, for other indicators it does not exceed 10 years. The static differences for the indicators related to the internet use are substantial, but the time distance is only between 1 and 3 years. Austria is an example of a country, which is in general more developed than the EU average. This means that in general, but not necessarily for all indicators, the time lag of Slovenia behind the EU average will be smaller than the respective time distances behind Austria.

## 5.2 Comparison with Ireland

Ireland has been in the recent past one of the success stories in the EU. In many ways it could be a very proper example for Slovenia as far as the strategy of opening the economy and facing the challenges of international competition and globalisation. The ex post time distance between Ireland and Slovenia is for the analysed indicators never more than 10 years. The range of time distances is between 9 years for international calls per subscriber and 8 years for GDP per capita, where Ireland is leading Slovenia, and 8 years for cars per capita, in this indicator Slovenia is ahead of Ireland. For telephones per capita and life expectancy (female) Ireland is 4 years ahead of Slovenia, for four other indicators Slovenia and Ireland are separated by less than 1 year.

Figure 5 (AUT)

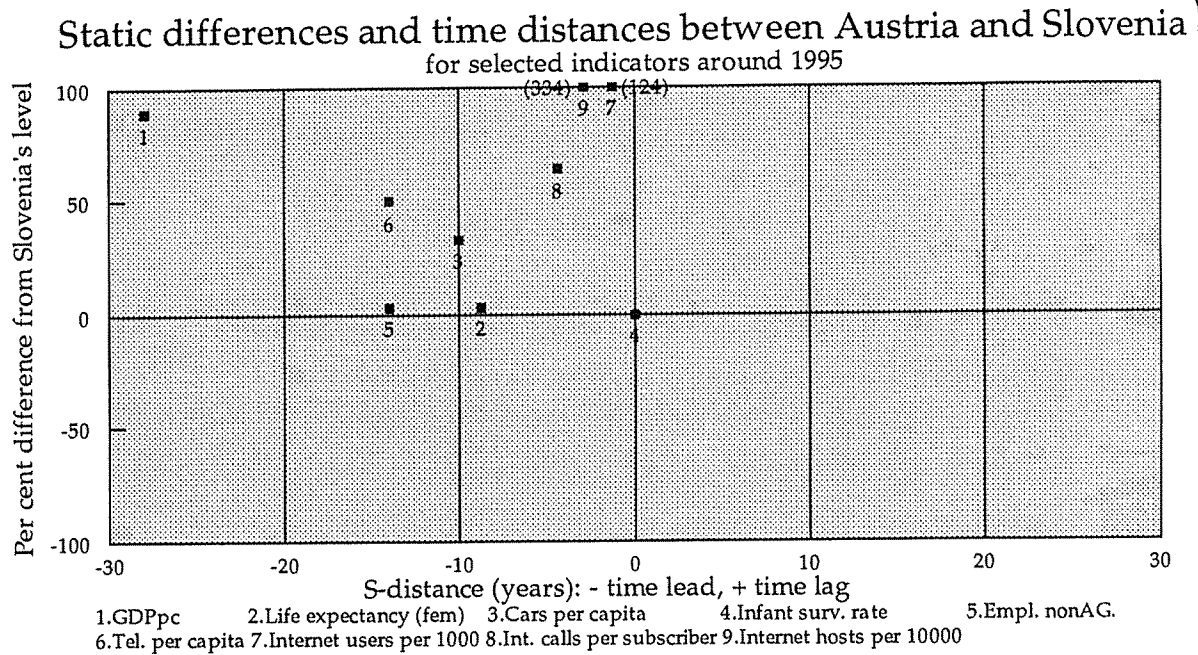
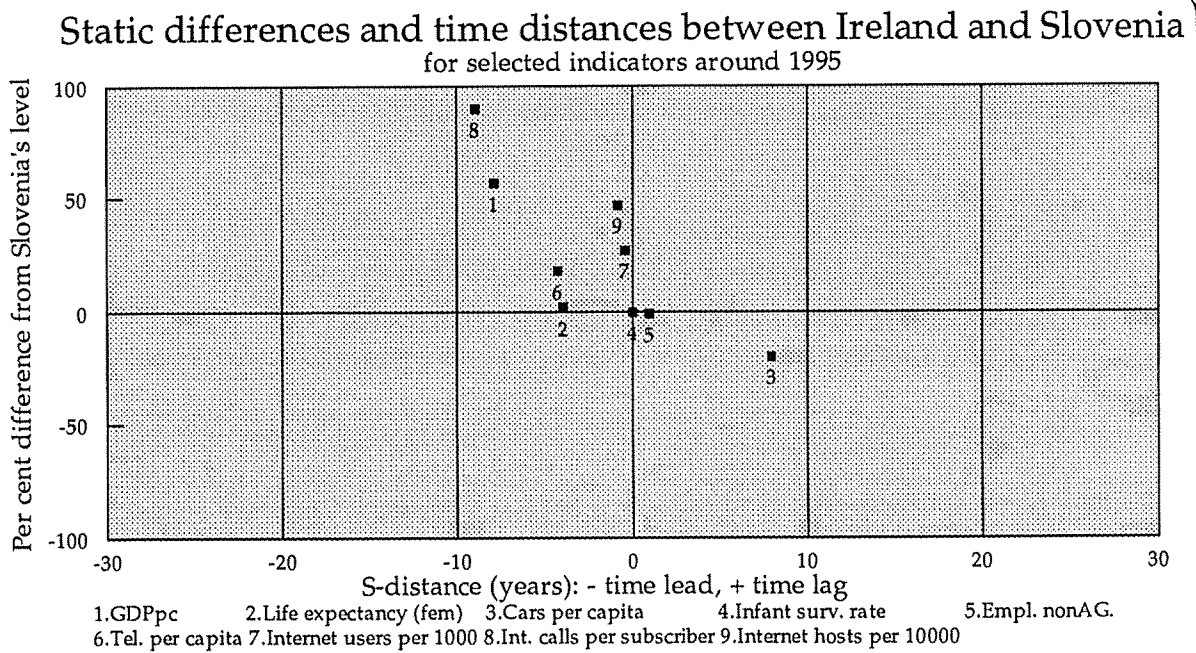


Figure 6 (IRL)



The share of agriculture in Ireland is slightly higher than in Slovenia. However, one should understand that when the comparator country is Ireland with its high rate of growth, time distance of 8 years means that Slovenia would have to repeat such a good performance just to stay at the same time distance behind Ireland.

### **5.3 Comparison with Portugal**

Slovenia and Portugal are very close in terms of the selected 9 indicators. For 7 of them the time distance in either direction is less than 3 years. The only exception is GDP per capita, where Portugal is ahead of Slovenia for about 6 years and international calls per subscriber where Slovenia is ahead of Portugal for 4 years.

In percentage terms, the advantage of Slovenia is more evident. While for GDP per capita and for telephones per capita Portugal is about 15 per cent higher than Slovenia, for internet hosts per capita and internet users per capita Portugal is from 33 to 60 per cent below the level of Slovenia. Figure 7 displays the situation. For this selection of indicators, in overall terms it seems that Slovenia is slightly ahead of Portugal.

### **5.4 Comparison with Greece**

In comparison with Greece Slovenia seems to be at a higher level for 6 indicators and lagging in 3 indicators. Greece is ahead of Slovenia for about 10 years for telephones per capita and life expectancy, and for less than 8 years for GDP per capita. For all other analysed indicators Greece is behind Slovenia, most for share of employment in agriculture and in cars per capita where it is about 17 years behind Slovenia.

When the differences between Slovenia and Greece are measured in per cent, the relative position of Slovenia looks even more favourable. The only one large advantage for Greece is the indicator telephones per capita for which the level is 60 per cent higher than in Slovenia. However, in cars per capita and in the three indicators of information technology use, Greece is at levels that are 40 to 75 per cent lower than those of Slovenia. Also, the time lead of 8 years for GDP per capita is by no means of the same importance than the 8 years of lead of Ireland ahead of Slovenia. When Greece is the comparator country, the backward looking time distance of 8 years represents the past performance of Greece in this period. This performance was not exceptional as in the case of Ireland, so that Slovenia should have no difficulty to improve on that performance.

Figure 7 (PRT)

Static differences and time distances between Portugal and Slovenia  
for selected indicators around 1995

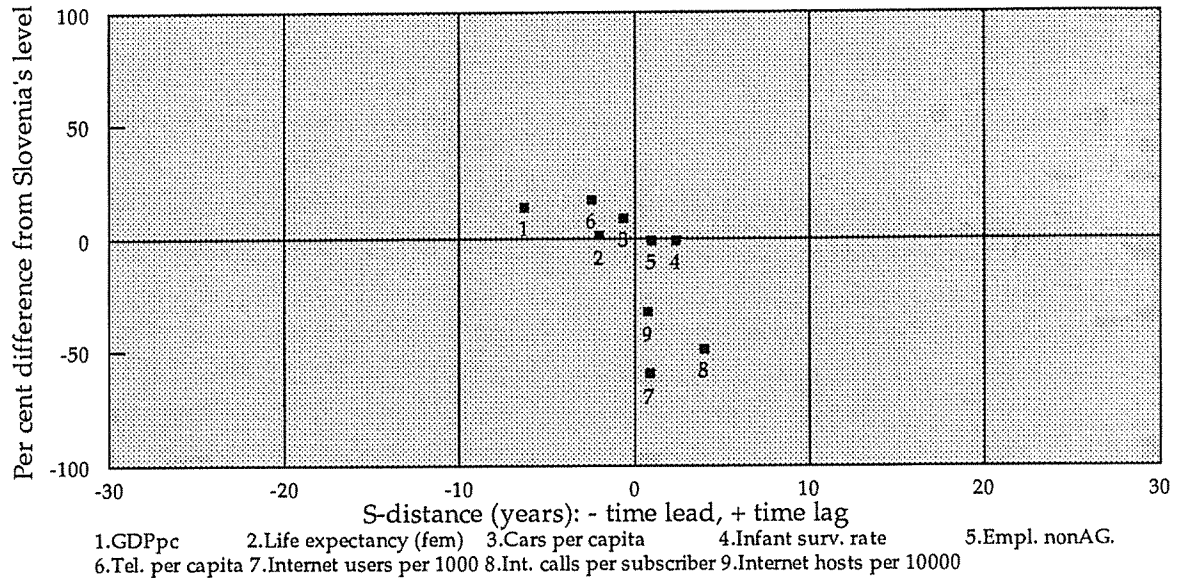
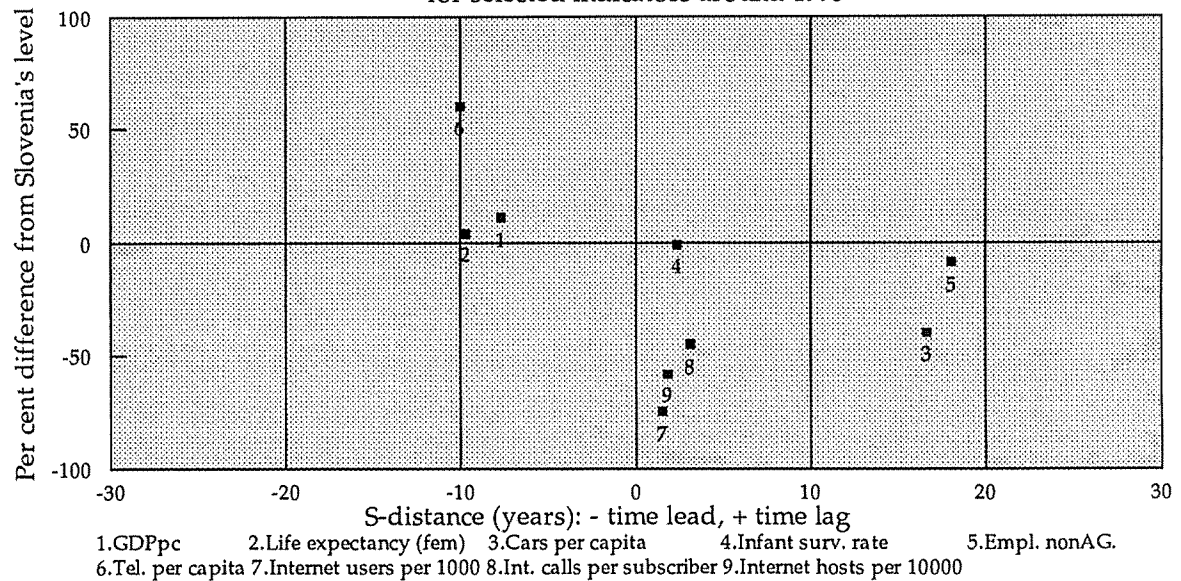


Figure 8 (GRC)

Static differences and time distances between Greece and Slovenia  
for selected indicators around 1995



## 6. Possible other applications and suggestions for further work

The empirical example of application of the novel methodology of comparisons over time and space, as outlined in the first part of the project (Sicherl, 1997a), to the evaluation of the relative position of Slovenia with respect to the four selected smaller EU countries cannot adequately present the potential for other applications of this methodology for two reasons. On the one hand, time distance is a generic concept that can provide an additional dimension to a wide range of problems. The comparison of economic and social indicators between countries and regions is just one field of application. On the other hand, the scope of empirical comparisons of Slovenia and the analysed smaller EU countries in this study was limited by the time and resources available from the short Phare ACE Fellowship. A brief outline of some possible applications follows.

First, at the general level Sicherl (1997) provides also several empirical examples from the second major group of applications (comparisons between two states of a given series): discrepancy between actual and estimated values in time series regressions and models, business cycle analysis, forecasting and monitoring plans, budgets, projections and scenarios in economic and business applications. Sicherl (1994 and 1996a) give a more detailed example of application to business cycle analysis in the case of USA, Japan and Germany, and an example of the third major group of applications (calculation of S-distance for a given time series on itself), which is by now the least developed of the three groups of applications mentioned. In general one can say that time distance analysis can be applicable with respect to the time horizon to analysis over long-term, medium-term, short-term and very short-term, and with respect to the field of analysis to economics, politics, business and statistics. Since it is a novel approach complementing conventional analysis it will be necessary to test it in concrete applications and develop further operational adjustments to the specific field of application. This should be done in cooperation with experts in specific substantive areas.

Second, an obvious suggestion for further work is an expansion of the present empirical comparison of Slovenia with the selected smaller EU countries. For reasons explained above, the presentation of about twenty indicators and a more detailed analysis for nine economic and social indicators in terms of both static differences and time distances does by no means cover all interesting fields of concern. It more than satisfies the requirements of a concrete empirical example as a methodological presentation in two ways, i.e. of how the conventional static measures of disparity can be integrated with the time distance approach, and of the relevance of such a broader approach for understanding the situation and policy conclusions. However, a wider selection of fields of concern and greater number of indicators could change some of the conclusions about the relative position of these countries.

Third, the first kind of expansion of comparison of Slovenia with the selected EU countries in a framework of a larger research project would be the addition of fields like environment, human capital, labour market, energy, in the case of 'hard' statistical indicators, and of various possibilities of institutional benchmarking, in the case of 'soft' indicators. A similar, but distinct, category of such 'soft' qualitative and in many cases also subjective indicators is the international business environment rankings used by the Economist Intelligence Unit (Kekic, 1997). In this group also the usual macroeconomic, monetary and fiscal indicators should be included. A distinction would have to be made about the type of indicators that represents a longer term direction of development and are thus a more lasting element of the relative position of a country, region or industry, and of indicators of a short term nature with higher volatility and the possibility of quick changes in both directions.

Fourth, another line of expansion of comparison of Slovenia with the selected EU countries in a framework of a larger research project would be a more detailed study of selected sectors or branches, on one hand, or regions, on the other. Namely, Slovenia is a small country and can be fruitfully compared also with selected regions in the EU countries (even if Slovenia would not be broken down for purpose of such analysis into a few regions), both in terms of its size, structure, level of development and policy instruments used at the regional level in the compared EU countries. Regions in neighbouring EU countries and selected regions (or countries like Ireland) by the type of development and resource endowment would be the most promising cases. Another possible expansion would be comparing more or all EU countries in certain selection of fields to see the possible effect of accession in more aspects.

Fifth, this broadened analytical framework can be applied to studies of the relative position of other potential member countries. They could be compared with selected EU countries as it has been done in a limited scope for Slovenia in this study, on the one hand, or among themselves, on the other. Both types of comparisons should be of interest. In the project design the priorities in terms of selected fields of concerns and indicators representing them should be specified and institutional cooperation secured.

Sixth, analysis of cohesion within and among present EU states and regions could benefit from this methodology. Especially in dealing with a wider set of fields of concern and a greater number of indicators the additional view of the problem provided may be important for a more realistic evaluation of the situation, for improved semantics of discussing the policy issues, and for monitoring of progress. By analogy this methodology could be applied to numerous similar problems in business at the micro and corporate levels, and in the analysis of relative position and competitiveness of Europe in the global economy.

## 7. Summary and conclusions

1. The novel methodology used offers a new perspective to the problem, an additional statistical measure, and a presentation tool for policy analysis and debate that is readily understood by policy makers, media and general public. The results should encourage further use of this methodology to include a number of additional indicators and fields of concern.
2. Empirical analysis of sixteen countries in the beginning of transition in 1990 (twelve countries of EU12 and four CEE countries - Czechoslovakia, Hungary, Poland and Slovenia) shows that the similarity of the analysed transition economies with EU countries is considerably greater in other indicators than in GDP per capita. Especially in the transition economies with great variations in output growth and with large structural changes economic data alone are not enough for a complex evaluation of their relative position.
3. The fall in GDP in the first years of transition is compared with similar experiences in the developed countries during the "Great Depression" in 1930' s and the World War II. The rate of recovery was greater in these situations than the rate of recovery from the lowest point in CEE countries in transition.
4. For an evaluation of the possible effects of accession of Slovenia on the cohesion in the EU it is important to realise that the degree of disparity between EU countries and Slovenia is in general much smaller in other analysed indicators than in GDP per capita. Also, even in cases when Slovenia showed a lower level of an indicator than the three of the compared EU countries, for all 9 selected indicators the time lag of Slovenia behind Ireland, Portugal and Greece in 1995 never exceeded 10 years. In fact, for these three EU countries for the analysed selection of indicators Slovenia was in 1995 in 13 cases behind and in 13 cases ahead of them.
5. Even today Slovenia could be considered to belong broadly in the same group of the four EU countries which are by Maddison (1994) categorised into the group of 'South European Countries'. When compared across a number of indicators (see also Tables 23 and 24), Ireland and Spain are in a greater number of indicators ahead than behind Slovenia, while Slovenia is in a greater number of indicators ahead than behind Portugal and Greece.
6. Ireland, Portugal and Greece are in three indicators (GDP per capita, life expectancy, and telephones per capita) all ahead of Slovenia. On the other hand, in three indicators (share of GDP in agriculture or share of employment in agriculture in total GDP or in total civilian employment, cars per capita and infant survival rate) Slovenia is practically ahead of all

these three countries. In the other three indicators (internet users per capita, internet hosts per capita, and international calls per subscriber) Ireland is ahead of Slovenia, while Slovenia is in terms of information technology use clearly ahead of Portugal and Greece. Austria is ahead of Slovenia for all analysed indicators.

7. Economic and social development is by its nature a multidimensional and long-term phenomenon. Comparative analysis of disparities in attributes of development has to deal with these two characteristics in a meaningful and consistent way. The conventional approach in comparative analysis does not take into account the fact that, in addition to the disparity at a given point in time, there exists a similar theoretically equally universal disparity (distance) in time for a given level of the indicator.
8. Cohesion in a community or in a society is first and foremost a question of the state of mind. Yet the perceptions formed and the decisions, behavior and actions undertaken are also influenced by the quantitative indicators and measures used in the semantics of discussing the issue, in setting the targets and in following their implementation. This methodological approach emphasises the multidimensional and dynamic nature of development by taking into account a number of economical and social indicators, on the one hand, and introducing the notion of proximity in time in addition to the conventional approach of measuring cohesion by proximity in the indicator space alone, on the other.
9. The contribution of this novel dynamic conceptual and analytical approach to the analysis of the cohesion in the present EU and of the impact of EU enlargement on the cohesion is twofold. First a broader viewpoint to the problem is introduced. This is not a question of a greater precision in empirical analysis. It is first of all a question of the perception of disparities and the policy consequences which arise from using a dynamic analytical framework that is closer to the way in which people perceive disparities and react to them. Second, the novel concept of time distance and the associated statistical measure *S*-distance (expressed in standardised units – time) permit perceiving and measuring disparities also in time and an integration of static and intertemporal comparisons to deliver better understanding of the situation to policy makers and general public.
10. The larger are the differences in the magnitudes of growth rates for different indicators, the higher the probability that the assessment of the degree of disparity in these indicators based on static measures will be different from the results based on time distance as a dynamic (temporal) measure of disparity. Depending on the magnitudes of the growth rate, indicators that show a high degree of disparity in static comparison may at the same time show a rather small distance in time, and vice versa. This was confirmed in the empirical analysis. For instance, the percentage differences among the four analysed countries for the indicators internet users per capita and internet hosts per capita were the largest of all 9 indicators. Yet the time lead of Austria and Ireland or the time lag of Portugal and Greece in relation to Slovenia did not exceed 3 years. The example in the

opposite direction is the indicator life expectancy (female) where Slovenia was only 1-4 per cent lower than compared countries, but the time distance ranged from 2 to 10 years.

11. The time distances approach adds a dimension of analysis that complements the conventional analysis. The conclusions based on both dimensions of the disparity can be quite different than the conclusions based on conventional measures alone. The time distance concept is useful at least in two domains: (1) it offers a new view of data that is exceptionally easy to understand and communicate, and (2) it may allow for developing and exploring new hypotheses and perspectives that cannot be adequately dealt with without the new concept. The fact that the novel statistical measures S-distance is expressed in time as one of the most commonly used comparators makes it not only a transparent analytical measure but also an excellent presentation and communication device. This is of great importance for its practical application and use. As such it should have a considerable influence on public opinion in forming the perception about the degree of disparity and cohesion.
12. If this theory is right in suggesting that people take into account also time distance as one element of their subjective evaluation of the (overall) degree of disparity, a whole new set of hypotheses with important economic, social and political consequences follows. One of them is the need for more flexible and varied semantics in discussing convergence and divergence. It should be discussed in two dimensions: closer (or more apart) in static measures(s) and closer (or more apart) in time. This leads to a very important policy conclusion. In this framework for the analysis of convergence and the degree of cohesion in the EU it is important also how fast and not only how much faster will the less developed countries (regions) and the potential member countries grow in the future.
13. Some other interesting questions for growth and welfare theory, and the related policy issues can be raised. A high rate of growth is also an instrument for reducing disparities at least in the time distance dimension. Efficiency without adverse distribution effects is in this framework important also for the degree of cohesion, and inefficiency has negative economic and political consequences also in this respect. Lower growth rates should signal to politicians that an increase in the degree of disparity may be felt and that social tension may be increasing and cohesion decreasing. Such issues have come forward in the analysis of regional disparity in Austria and in the evaluation of the disparity at the regional level in the former Yugoslavia.
14. The time distance framework is more general and practical than the usual projections of the period needed to catch up with a given country under certain assumptions. For some potential member states and some regions in the EU the full equalisation with e.g. the EU average is a possibility that can occur only in a rather distant future. Time distance analysis allows a continuous monitoring whether the given country or region has increased or decreased the proximity in time with a selected benchmark. In this way it is

possible to evaluate the time dimension aspect of cohesion at any point in time which is more important for formulation of policy and monitoring of its results than full equalisation in a distant future.

15. Time distance is a generic concept. As such it is capable of universal application across different units and levels of comparison as well as across different indicators. This is not a methodology oriented towards a specific substantive problem but an additional view to many problems and applications. Three groups of possible applications include: 1) comparison of economic and social indicators among countries, regions, industries, firms, households, etc., 2) discrepancy between actual and estimated values in time series regressions and models, business cycle analysis, forecasting and monitoring, and 3) fields of very fast changes like financial markets. In this study the novel analytical framework is presented as a suggestion to the European Commission, international and national organisations, and researchers to incorporate this additional dimension in their analysis of disparities in economic and social indicators and to provide the decision makers and general public with a broader description of the situation.
16. As far as the conventional analysis of disparities and cohesion is concerned, a suggestion is made that the currently used standard deviation around the EU average value as a summary measure of the cohesion (see e.g. Commission of European Communities, 1991) is replaced with mean deviation. The component elements of mean deviation as well as the value of the summary measure mean deviation have a clear substantive meaning, depending on the percentage difference from the average and the population weight. Different measures could lead to different conclusions. For the 76 regions of the EU15 for GDP per capita (ppp) the standard deviation fell from 25.31 in 1993 to 25.16 in 1994, while the mean deviation increased from 19.17 in 1993 to 19.5 in 1994 (based on Eurostat 1996a and 1997b).
17. The effect of the accession of Slovenia on the cohesion in the EU, measured in GDP per capita (ppp), would be insignificant with respect to both relevant components: the highest level of the indicator among the potential CEE countries and the small population weight. It would have the same order of effect on cohesion as e.g. Mecklenburg-Vorpommern. In most discussions concerning the relative position of transition economies the conclusions are based predominantly, if not exclusively, on this indicator, thus overemphasising the differences and overlooking the similarities. The time distance for other indicators would in general for Slovenia be substantially less than in GDP per capita.

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## NOTES

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<sup>1</sup> For a given level of  $X_L$ ,  $X_L = X_i(t_i) = X_j(t_j)$ , and the S-distance, the time span separating unit (i) and unit (j) for the level  $X_L$ , will be written as

$$S_{ij}(X_L) = \Delta T(X_L) = T_i(X_L) - T_j(X_L) \quad (1)$$

where T is determined by  $X_L$ . In special cases T can be a function of the level of the indicator  $X_L$ , while in general it can be expected to take more values when the same level is attained at more points in time, i.e. it is a vector which can in addition to the level  $X_L$  be related to time. Three subscripts are needed to indicate the specific value of S-distance: (1 and 2) between which two units is the time distance measured and (3) for which level of the indicator (in the same way as the time subscript is used to identify the static measures). In the general case also the fourth subscript would be necessary to indicate to which point in time it is related ( $T_1, T_2, \dots, T_n$ ).

The sign of the time distance comparing two units is important to distinguish whether it is a time lead (-) or time lag (+) (in a statistical sense and not as a functional relationship)

$$S_{ij}(X_L) = -S_{ji}(X_L) . \quad (2)$$

<sup>2</sup> Backward looking (*ex post*) and forward looking (*ex ante*) time distances relate to different periods, past and future. This is an important distinction. Backward looking time distance belongs to the domain of statistical measures based on known facts, and there is no need to relate it to any static measure or growth rate. The second, the forward looking time distance, is important for describing the time distance outcomes of alternative assumptions about future developments or of alternative policy scenarios for the future.

There are at least four ways in which one can read off or estimate the values of S-distance for the past. The first one simply compares data in a table, then for a given value (level of the indicator) finds the two time values indicating when such indicator value was achieved in the two compared units, and subtracts the time values to arrive at the value of S-distance. This is simply a statistical fact and one does not need to bring into the picture any assumption about the respective rates of growth or catching-up hypothesis. It is an additional way of looking at the situation, which in no way discards or replaces other measures. The second method is similar, one can from a figure of trends of the compared series select a given level of the indicator, read off from the figure the respective times and calculate the corresponding time distances.

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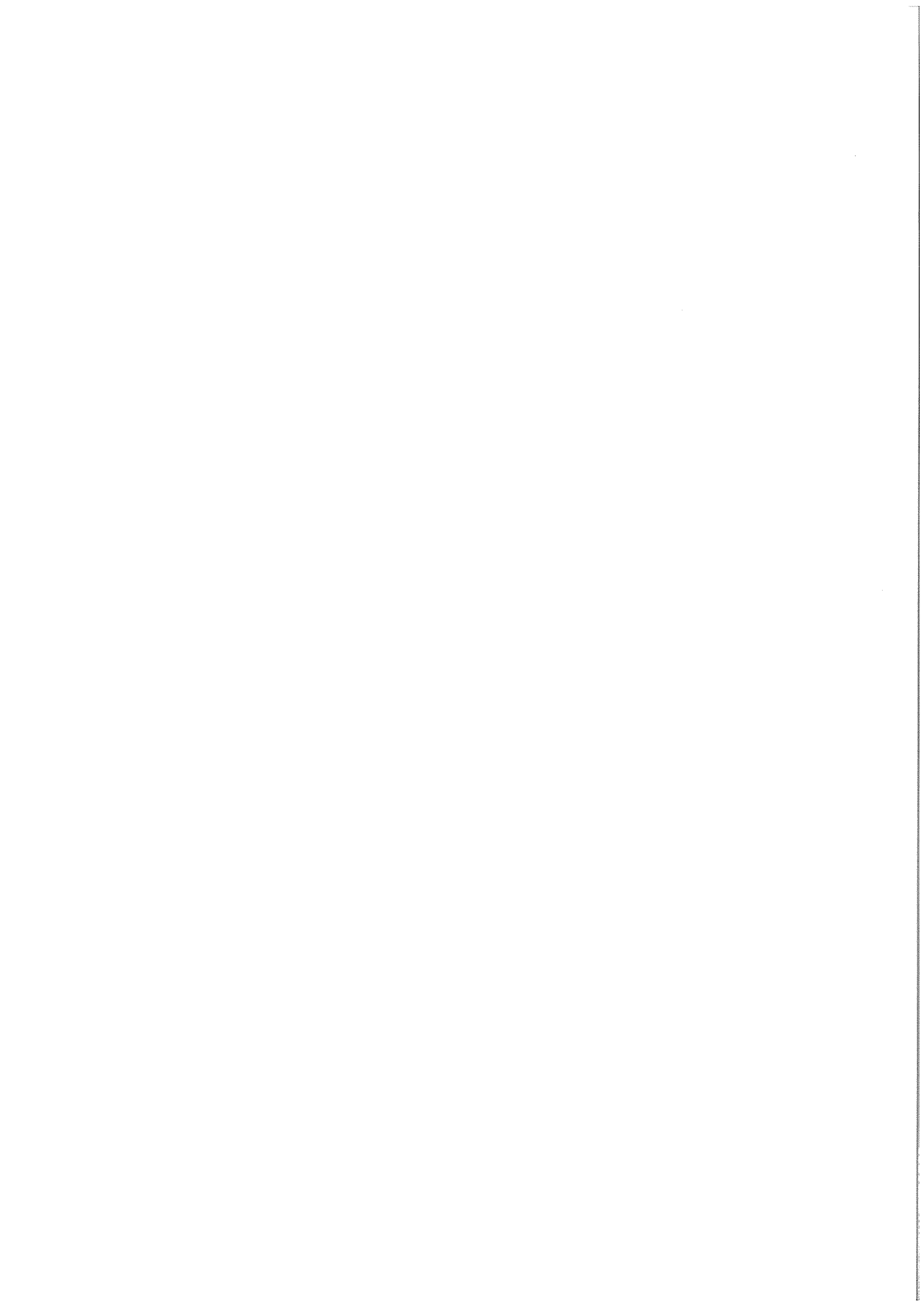
The third method is more interesting and leads even at this simple manner of exposition to important conclusions. Time distances become visible in a scatter diagram when one applies the generic idea that the time subscripts can be used not only as identifiers but also as values in the implicit time framework in the third dimension beyond the XY dimensions explicit in such scatter diagram. For any selected level of an indicator (X or Y in our simple example) one can only subtract the time subscripts for the two countries to obtain the time distance for that level of the chosen indicator.

In all three methods of estimating time distance mentioned, S-distance is calculated from original data (with some possible interpolation and extrapolation) without referring to any other information than levels of the indicator and time subscripts. This is a confirmation of the statement that one deals with the (n+1) dimension in a multidimensional space of  $n$  variables, which was always there but left unexplored.

The fourth possible method of estimating the value of S-distance is, as distinct from the other three mentioned above, based on possible integration of static and intertemporal comparisons. When they relate to the appropriate period and levels, the relationship is the obvious

$$S_{ij}(X_L) = \ln R_{ij}(t) / r_i \quad (3)$$

where  $r$  represents the corresponding average rate of growth, and  $R$  represents the static ratio between the units at time (t). This method is particularly useful for calculation of forward looking time distances, although it can be used also as an approximation in calculating backward looking time distances.



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