DISTANCE IN TIME BETWEEN SLOVENIA AND THE EUROPEAN UNION

(An example of possible visualization of time distance results)

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Introduction

In the process of the enlargement of the European Union an important question is how similar or dissimilar are candidate countries with respect to EU countries. Many different statistical methods can be used in international comparisons to explore various perspectives of differences between the compared countries. Such comparisons have to take into account that development is by its nature long-term and multidimensional. Special emphasis is given to the importance of dynamic analysis and thus time distance as a new statistical measure is introduced in comparative analysis. The purpose of introduction of time distance in the analysis of development gaps is not to replace the conventionally used statistical methods and measures but to enhance and broaden the theoretical and methodological approach. The analysis of time distance will play two roles in the evaluation of the baseline situation for Slovenia. The first role of the concept of time distance and the novel statistical measure S-distance is descriptive; it offers an additional perspective on development and inequality issues. In this role it can be used as an important analytical, presentational and communication tool for better understanding of development processes, both for the discussion of development strategy and economic policy as well as for a better integration of civil society in these processes. The second role is conceptual; the broader dynamic framework adds a new perspective to many questions about growth, efficiency and inequality, with important theoretical and policy consequences.

In this paper only a very short description of time distance methodology is given, as it is provided in much more detail e.g. in Sicherl (1994, 1997a, 1997b, 1998, 1999a, 1999b, 1999c, 2000). Here the intent is to present an example of possible visualization of time distance results for a case of comparison of economic and social indicators among selected countries. In this case the focus is on comparison of Slovenia with EU15 average, selected EU countries and for some indicators also with selected candidate countries. The goal here is not to provide an in depth substantive analysis of the position of Slovenia, but rather a series of graphical presentations that can provide at a glance an impression of presentation capabilities of the time distance methodology. The short comments will be oriented both to methodological points and in some cases also to interesting substantive conclusions that are different in time distance analysis in comparison with conclusions based on static measures of disparity.

Time distance methodology

A major innovation needed in comparative analysis is an application of an expanded theoretical and analytical dynamic framework that would offer a better integration of comparisons across time and space. This would represent an important amendment in methods and techniques of analysis, as well as in their use for policy analysis and debate, and for monitoring of progress. In the learning society the process of change in the economy and
society is becoming much faster. Now, more than ever, there is a need that the conceptual and statistical framework employed to deal with these problems goes beyond the conventional static approach and provides a broader dynamic framework for policy analysis and debate.

Time is one of the most important reference frameworks in a modern society. The time distance measure will thus provide new insights from existing data expressed in units of time, which can be understood by everybody. The application of the novel methodology for analyzing disparities in economic and social indicators will show that the degree of disparities may be very different in static terms and in time.

First, a broader theoretical framework is required. The perception of and the conclusions about the degree of disparity are based on two-dimensional analysis of proximity (proximity in time and proximity in the indicator space), which provides a better understanding of the situation. A new dimension is added to complement the conventional static measures of disparity. Second, a statistical measure S-distance is defined to suggest a possibility how the broader concept and reference framework can be measured in operational terms and integrated with the conventional statistical measures. 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 analyzed 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. The observed distance in time (the number of years, quarters, months, 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.

For a given level of $X_L$, $X_L = X_i(t_i) = X_j(t_j)$, S-distance is the time separating unit (i) and unit (j) for the level $X_L$

$$S_{ij}(X_L) = \Delta T(X_L) = t_i(X_L) - t_j(X_L)$$  \hspace{1cm} (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 may 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 ($T_1, T_2, \ldots, T_n$). In Table 1 it is demonstrated that time distance is a generic concept like relative disparity or growth rate (for more details consult Sicherl, 1998 and 1999a).

S-distance as a statistical measure has two important advantages. One big advantage is that it is defined in standardized units - time - which means that everybody understands the notion of the time lead or time lag between two compared units for a given level of the indicator. This makes it not only a transparent analytical measure but also an excellent presentation and communication device, which is of great importance for its practical use and which could have considerable influence on public opinion. The second big advantage of this approach is that the results and conclusions based on the two-dimensional analysis add a new dimension and new insight, while none of the earlier results are lost or replaced.

There is an important distinction between backward looking (ex post) and forward looking (ex ante) time distances. They relate to different periods, past and future. The first belongs to the domain of statistical measures based on known facts; the second is important for describing the time distance outcomes of the results of alternative policy scenarios for the future. In this
paper we will use mainly the backward looking time distances, i.e. the time distances will be used in the descriptive role to express the development gaps between Slovenia and EU in this additional perspective. In such application the time distance for the past period will introduce additional information about the fact at what point in time for a given indicator the comparison country, region or other unit observed the same level of the indicator that Slovenia is experiencing at present. This gives us the information about the magnitude of lead (lag) in time between the two compared units for a given level of the indicator. This information is independent of the static difference or the rate of growth; it is a statistical fact reflecting one of the possible perspectives on the magnitude development gap. Thus it can serve as an additional analytical method in numerous areas and for numerous indicators.

**Time distance comparisons between Slovenia, EU average and selected EU countries**

The difference between backward looking S-distance and forward looking S-distance can be observed in Graph 4.4.1. where time distances for GDP per capita at purchasing power parity between Slovenia and five other candidate countries and EU15 average are presented. Gross domestic product (GDP) is one of the most frequently used indicators of development in economic analysis and policy debate. Two derived indicators – GDP per capita and growth rate of GDP – are furthermore principal indicators used in assessing the level of development and the results of diverse development strategies and policies. Frequently they are used as variables in which the targets of economic policy options are expressed and the success of the implementation measured. However, it should be mentioned that GDP per capita cannot be considered as the only relevant or representative indicator across a whole set of development and welfare issues. Therefore this analysis will be supplemented by an overview of other indicators presented in Tables 4.4.4. and 4.4.5.

The logic of calculation for both types of time distances can be easily explained by looking at the values for the candidate countries and EU15 in Graph 4.4.1. In 2000 GDP per capita at purchasing power parity for Slovenia was evaluated at 72 per cent of the EU15 average value. In the time series for EU15 one looks for the year in which the EU15 had the same percentage of its 2000 value of GDP per capita as Slovenia had in 2000. This was approximately in the year 1984, which means that the backward looking time distance is about 16 years. In other words, the same value of the analyzed indicator was achieved in EU15 16 years ago (1984 compared to 2000 in Slovenia). The corresponding values are for Czech Republic 28 years, for Hungary 31 years, for Slovakia 32 years, for Poland 38 years and for Estonia 39 years.

Forward looking S-distance for the level of EU15 average for 2000 are calculated based on a scenario that GDP per capita for the candidate countries will grow at 4 per cent per year. If this scenario would be implemented, the level of EU15 average for 2000 would be reached by Slovenia at about 2008, which means that at this level of GDP per capita the time distance for Slovenia would be about 8 years. Since we do not have the scenario for growth of GDP per capita for EU15 average in the future, it is not possible to calculate what will be the conventional absolute or percentage difference between EU15 average and Slovenia in 2008. However, under the assumed scenario we have the estimate of one dimension of disparity in 2008, the time distance is expected to be about 8 years. Such scenario tells us that the time dimension of disparity between Slovenia and EU15 average is expected to be reduced from 16 years to 8 years. For the situation in 1998 Graph 4.4.2. shows time distances from EU15 average, while Graph 4.4.3. combines static differences and time distances for GDP per capita (ppp) in one presentation.
Distance in time (projected) at the level of EU15 average GDP per capita for 2000
Scenario: growth rate 4% CEEC

Backward looking S-distances for EU15 average
backward looking S-distance for SLO 16 years
backward looking S-distance for CZE 28 years
backward looking S-distance for HUN 31 years
backward looking S-distance for SVK 32 years
backward looking S-distance for POL 38 years
backward looking S-distance for EST 39 years

Forward looking S-distances for EU15 average for 2000
SLO 8 years
CZE 14 years
HUN 17 years
SVK 19 years
POL 24 years
EST 25 years
GDP per capita (ppp): time distance for EU15 and selected CEEC from EU average for 1998

Graph 4.4.2
GDP per capita (ppp): static difference and time distance for EU15 and selected CEEC from EU average for 1998

Graph 4.4.3

Per cent difference from EU15 average

Time distance (years): - time lead, + time lag

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Table 4.4.4 **Magnitude of development gaps** between Slovenia and EU15, Austria, Ireland, Finland, Spain, Portugal and Greece as measured by *time distance in years* (Slovenia=0, for time distance: -time lag of Slovenia, + time lead of Slovenia)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EU15</th>
<th>AUT</th>
<th>IRL</th>
<th>FIN</th>
<th>ESP</th>
<th>PRT</th>
<th>GRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GDP per capita (ppp)</td>
<td>-18</td>
<td>-20</td>
<td>-7</td>
<td>-17</td>
<td>-7</td>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>2 GDP per employed</td>
<td>-17</td>
<td>-15</td>
<td>-8</td>
<td>-9</td>
<td>-12</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>3 Exports per capita</td>
<td>-3</td>
<td>-10</td>
<td>-12</td>
<td>-8</td>
<td>-5</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>4 Imports per capita</td>
<td>-2</td>
<td>-12</td>
<td>-10</td>
<td>-5</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>5 Share of working population</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>6 Life expectancy (female)</td>
<td>-12</td>
<td>-9</td>
<td>-2</td>
<td>-10</td>
<td>-18</td>
<td>-1</td>
<td>-11</td>
</tr>
<tr>
<td>7 Infant survival rate</td>
<td>0</td>
<td>-2</td>
<td>4</td>
<td>-6</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>8 Telephones per capita</td>
<td>-12</td>
<td>-12</td>
<td>-2</td>
<td>-17</td>
<td>-4</td>
<td>-2</td>
<td>-9</td>
</tr>
<tr>
<td>9 Mobile phones per capita</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td>-3</td>
<td>0</td>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>10 Internet hosts per capita</td>
<td>-2</td>
<td>-2</td>
<td>-1</td>
<td>-4</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11 Cars per capita</td>
<td>-8</td>
<td>-7</td>
<td>5</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
<td>9</td>
</tr>
<tr>
<td>12 Emissions CO(_2) per capita</td>
<td>6</td>
<td>26</td>
<td>19</td>
<td>29</td>
<td>-1</td>
<td>-2</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: own calculation

Table 4.4.5 **Magnitude of development gaps** between Slovenia and EU15, Austria, Ireland, Finland, Spain, Portugal and Greece as measured by *percentage difference* around 1998 (Slovenia=0, positive value higher than Slovenia, negative value lower than Slovenia)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>EU15</th>
<th>AUT</th>
<th>IRL</th>
<th>FIN</th>
<th>ESP</th>
<th>PRT</th>
<th>GRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 GDP per capita (ppp)</td>
<td>47</td>
<td>68</td>
<td>50</td>
<td>50</td>
<td>15</td>
<td>4</td>
<td>-1</td>
</tr>
<tr>
<td>2 GDP per employed</td>
<td>38</td>
<td>48</td>
<td>43</td>
<td>38</td>
<td>26</td>
<td>-15</td>
<td>0</td>
</tr>
<tr>
<td>3 Exports per capita</td>
<td>27</td>
<td>78</td>
<td>271</td>
<td>104</td>
<td>-29</td>
<td>-36</td>
<td>-76</td>
</tr>
<tr>
<td>4 Imports per capita</td>
<td>15</td>
<td>95</td>
<td>142</td>
<td>43</td>
<td>-23</td>
<td>-14</td>
<td>-54</td>
</tr>
<tr>
<td>5 Share of working population</td>
<td>-4</td>
<td>-3</td>
<td>-6</td>
<td>-4</td>
<td>-2</td>
<td>-3</td>
<td>-3</td>
</tr>
<tr>
<td>6 Life expectancy (female)</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>7 Infant survival rate</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8 Telephones per capita</td>
<td>41</td>
<td>35</td>
<td>13</td>
<td>53</td>
<td>11</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>9 Mobile phones per capita</td>
<td>20</td>
<td>82</td>
<td>52</td>
<td>161</td>
<td>21</td>
<td>69</td>
<td>25</td>
</tr>
<tr>
<td>10 Internet hosts per capita</td>
<td>71</td>
<td>103</td>
<td>56</td>
<td>700</td>
<td>-19</td>
<td>-42</td>
<td>-45</td>
</tr>
<tr>
<td>11 Cars per capita</td>
<td>22</td>
<td>22</td>
<td>-20</td>
<td>-2</td>
<td>3</td>
<td>11</td>
<td>-38</td>
</tr>
<tr>
<td>12 Emissions CO(_2) per capita</td>
<td>-26</td>
<td>-12</td>
<td>-47</td>
<td>-76</td>
<td>10</td>
<td>26</td>
<td>-18</td>
</tr>
</tbody>
</table>

The comparison of GDP per capita has to be supplemented by other indicators. Tables 4.4.4. and 4.4.5. from Sicherl and Vahčič (2000) illustrate the application of comparison of position of Slovenia in two dimensions for 12 selected indicators from various areas: economic indicators (indicators 1-4), demographic indicator (indicator 5), social indicators (indicators 6-7), indicators of communication and information infrastructure (indicators 8-10), indicator of mobility (indicator 11) and indicator of environmental pollution (12). In this summary illustration it is of course impossible due to the lack of space to present all the results of quantitative analysis of the selected indicators. These two tables show the summary results of the development gap between Slovenia, EU15 average, Austria, Ireland, Finland, Spain, Portugal in Greece in two dimensions: by time distance and by percentage difference in a given moment (i.e. around 1998, depending on availability of data).
For the selected 12 indicators the largest differences with the average of EU15 occur in the indicators GDP per capita (purchasing power parity) and GDP per employee. Thus the basic problem of approaching the EU15 is to increase the productivity of the Slovenian economy. The catching up will not be simple. If the growth rates of GDP per capita would be two percentage points above EU average (for example scenario 5 percent and 3 percent) Slovenia would need 16 years for full equalization with the EU15 average. The best performance in the past was that of Ireland, which for about the same percentage gap in this indicator needed about 6 years time to reach the average of EU15. However, Ireland has at least three times higher exports per capita than Slovenia and in this indicator it leads Slovenia for at least ten years at Irish export growth rates. It is clear that if Slovenia does not succeed to change the conditions for the achievement of development consensus and at the same time substantially improve the group of indicators concerning government, internationalization and finance, Slovenia would not be able to repeat the Irish experience in the approaching or catching up with the EU15 average. Graph 4.4.4. presents time distances between Slovenia and EU countries for exports of goods per capita. Slovenia is lagging behind other countries and it is ahead of Italy, UK, Spain, Portugal and Greece. Similar picture of time distances is given in Graph 4.4.5. for imports of goods per capita.

With respect to human resources Slovenia is lagging behind the EU15 average. It is necessary in the first place to increase the level of education and to prepare all generations for lifetime learning and fast changes in the working conditions and activity, to ensure the changes in the people mentality and to prepare conditions for much more dynamic and flexible way of work activity. The danger in this respect is indicated by a survey replies on the adult illiteracy where a large part of respondents replied that they do not intend to engage in further education and training. In spite of the stagnation of population, Slovenia has a higher share of total population in the age group 15-64, while at the same time this potential is both quantitatively and qualitatively used less efficiently as EU15 average. The analysis of indicators by time distance revealed another important conclusion: life expectancy of females, and particularly males, lags more than one decade behind the EU15; while the infant mortality in Slovenia is on the EU average. The indicator of life expectancy is an excellent example of the previous indication that the degree of disparities may be very different in static terms and in time. For life expectancy (female) the percentage difference between EU15 and Slovenia is only 2 per cent, which gives a false impression that the gap in this domain is negligible. The time distance of 12 years gives a completely different perception of the gap in this domain and leads to a qualitatively different policy conclusion. Graphs 4.4.6. and 4.4.7. indicate the time distances in life expectancy between Slovenia and EU countries and some candidate countries. The respective time distances for infant survival rate in Graph 4.4.8. are much smaller.

In the field of telecommunications and information infrastructure in all three indicators Slovenia lags behind the EU15 average and also behind the six explicitly compared individual EU countries; the exception are Internet hosts were Slovenia is ahead of Spain, Portugal and Greece. The basic problem is, of course, the purpose and contents of the use of this infrastructure but we have to be aware of the fact that, in spite of the very high rates of growth, Slovenia is still lagging in these areas. Slovenia cannot afford the absence of clear strategy in such an important area and leave its development to spontaneous events. However, the time distances are small because of the high dynamics of this phenomenon. This is in sharp contrast with the conclusion with respect to life expectancy. In the case of very fast growing phenomena like Internet hosts per capita or mobile phones per capita the time
Graph 4.4.4

Time distance between Slovenia and EU countries for exports of goods per capita (1999)

-30 -20 -10 0 10 20 30

Time distance (in years): - time lead, + time lag

LUX more than 40 years
BEL
NED
SVE
DAN
IRL
AUT
FIN
DEU
EU15
FRA
SLO
ITA
UK
ESP
PRT
GRE

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Graph 4.4.5

Time distance between Slovenia and EU countries for imports of goods per capita (1999)

- Italy (ITA)
- Portugal (PRT)
- Spain (ESP)
- Greece (GRE)
- Finland (FIN)
- Ireland (IRL)
- Austria (AUT)
- Sweden (SVE)
- Denmark (DAN)
- Netherlands (NED)
- Belgium (BEL)
- Luxemburg (LUX)
- Slovenia (SLO)
- France (FRA)
- Germany (DEU)
- EU15

Time distance (in years): - time lead, + time lag

© P. Sicherl 2000
Differences in time from Slovenia for life expectancy - female (1998)

Graph 4.4.6

Time distance in years: - time lead, + time lag

© P. Sicherl 2000
Graph 4.4.7

Differences in time from Slovenia for life expectancy - male (1998)

Time distance in years: - time lead, + time lag
Time distance between Slovenia and EU countries for infant survival rate (1998)

Graph 4.4.8
Graph 4.4.9

Time distance in years from Slovenia for telephones per capita in time (1997)

Time distance (in years): - time lead, + time lag

© P. Sicherl 2000
Differences in time from Slovenia for mobile telephones per capita (December 1999)

Graph 4.4.10

Time distance in years: - time lead, + time lag
Time distance between Slovenia and EU countries for Internet hosts per capita (Avgust 1999)

ITU and RIPE data

Graph 4.4.11

Time distance (in years): - time lead, + time lag

© P. Sicherl 2000
distances are small while the percentage differences are quite substantial. Graphs 4.4.10. and 4.4.11. show that even for all analyzed candidate countries the time distances are very small. The maximum difference in time distance for EU countries and candidate countries from Slovenia is less than 5 years in either direction. In the area of environmental pollution Slovenia as a less developed country is better off concerning the emissions of CO2 per capita relative to the EU15 average, while at the same time it is in a worse position concerning the emissions per unit of GDP and in terms of energy intensity. Presented tables 4.4.4 and 4.4.5 and numerous graphs in the study enable a large number of comparisons between Slovenia and these countries for selected indicators.

**Comparing development gaps across different fields of concern**

For the evaluation of the starting position of Slovenia it is not only important to compare the indicators for individual areas but also to assess the magnitudes of differences and development gaps relative to EU15 average and selected countries across different fields of concern. We shall now compare the gaps across a number of indicators, which have been in the previous section discussed individually.

Graph 4.4.12. presents time distances between Slovenia and EU15 average around 1998 for the 12 selected indicators from Table 4.4.4. At a glance one can see that for 5 indicators the time lead of EU15 is about 10 or more years, for 5 other indicators the time lead of EU15 is 3 or less years, and for 2 indicators Slovenia is ahead of EU15. Graph 4.4.13. shows the two-dimensional presentation of disparities between EU15 and Slovenia for selected indicators, simultaneously in static differences and time distances. Here it is again possible to observe that the degree of disparities may be very different in static terms and in time. The two extremes are Internet hosts per capita, where the static difference is 71 per cent and time distance about 2 years, and life expectancy (female) with static difference of 2 per cent and time distance of 12 years. Such a graph allows visualization of many elements in a single graph. Between the two compared units (here EU15 and Slovenia) information on two dimensions of disparity (static disparity and time distance) are presented for a number of indicators and the ray between a single point and the center of the graph (0,0) provides an indication of the growth rate of the phenomenon under scrutiny. At the same time comparison of these elements across all selected indicators is provided.

Graph 4.4.14. provides a visualization for an important conclusion of comparison between Slovenia and Spain, Portugal and Greece across 12 selected indicators. The time distances between Slovenia and the group of three countries in EU15, which according to the GDP per capita are significantly below the EU15 average (Spain, Portugal, and Greece), show that Slovenia for the 12 selected indicators does not differ significantly from these countries. Approximately for the same number of cases Slovenia has an advantage in comparison to these countries, or is lagging behind, respectively. Only for three cases Slovenia lags behind one of the countries for more than ten years: 18 years behind Spain and 11 years behind Greece in female life expectancy and 12 years behind GDP per employee for Spain. Even if we look at the percentage difference around 1998 (Graph 4.4.15.) the conclusion does not change. The only two cases out of the 12 indicators for the three countries, where the value of the indicator is 40 percent greater from the value for Slovenia are the number of mobile phones per capita for Portugal and the number of stationary phones per capita in Greece. As mentioned before, on the basis of selected hard indicators Slovenia undoubtedly belongs to this group of three EU countries, while with respect to the soft indicators provided in the IMD analysis it lags behind them most for groups government, internationalization and finance.
Time distances between Slovenia and EU15 average around 1998 (Slovenia=0)
S-distance in years, - time lead, + time lag

Graph 4.4.12

1. GDP per capita (ppp)
2. GDP per employed
3. Exports per capita
4. Imports per capita
5. Share of working population
6. Life expectancy (female)
7. Infant survival rate
8. Telephones per capita
9. Mobile phones per capita
10. Internet hosts per capita
11. Cars per capita
12. Emissions CO2 per capita

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Graph 4.4.13

Static difference and time distance between EU15 and Slovenia for selected indicators around 1998
(Slovenia=0)


© P. Sicherl 2000
Time distance from Slovenia for Spain, Portugal and Greece for around 1998 in years
(Slovenia=0: positive value advantage of Slovenia, negative values advantage against Slovenia)

Graph 4.4.14
Percentage difference from Slovenia for the three less developed EU countries for around 1998 (Slovenia=0: positive value advantage against Slovenia, negative values advantage of Slovenia)
A comparison with other three EU countries, which are of particular interest for Slovenia, (Austria as our neighbor, Ireland and Finland as two small countries that turned out to be very dynamic economies and have already reached the EU average) is also presented. The time lag of Slovenian behind Austria is 20 years for GDP per capita, 15 years for GDP per employee and 12 years for imports per capita and the number of stationary phones per capita and ten years for export per capita. In comparison with Austria the differences in economic indicators are greater than the differences in social indicators. Ireland has the greatest advantage against Slovenia in exports per capita and imports per capita, the values for these indicators are more than three times or two times greater than in Slovenia, respectively. The time distances for these two indicators are about ten years, they may increase further if the rate of growth of foreign trade for Ireland will continue to be much higher than in Slovenia. Finland differs from Slovenia most in mobile phones and stationary phones per capita and again in export per capita, which is at least twice as high as for Slovenia. These two comparisons confirm results of other research indicating that Ireland and Finland based their fast approach to EU15 average on the successful breakthrough in export and technology.

Visualization of selected comparisons of Slovenia with individual EU countries for the selected 12 indicators in Graphs 4.4.16, 4.4.17 and 4.4.18 provides an easily understandable overview of the time dimension of disparity between compared countries. For instance, Slovenia and Portugal are very similar; except in two cases in favor of Slovenia the time distances are nowhere larger than five years. The average difference is three years. The information content of such visualization is considerable, one does not need a voluminous report to substantiate the initial conclusion that Portugal and Slovenia are similar in many respects, before one embarks further on an in depth analysis of the issue. Similarly, the comparison with Greece shows that Slovenia lags behind only for 3 of 12 indicators.

Conclusions

The first important conclusion of this paper is methodological. To deal effectively with the new opportunities and threats under conditions of accelerated change and continuous learning we need both adequate changes in the strategies at various levels and their integration, on the one hand, and appropriate adjustments in the state-of-the-art of socio-economic analysis in line with the new circumstances, on the other. This paper presents an illustration of one of such improvements. It shows that the conventional analysis of disparities should be complemented by the time distance concept and measure to ensure a more comprehensive vision of the situation for analysis and policy decisions in a dynamic context. The novel time distance methodology provides new insight to the problems, an additional statistical measure, and a presentation tool for policy analysis and debate expressed in time units, readily understood by policy makers, media and general public.

In its role as a descriptive statistical measure, complementing existing approaches, time distance can be applied literally to thousands of cases of time series comparisons so that additional information content embodied in countless databases in different fields of concern for socio-economic research is not left unutilized. In addition to the use of S-distance as a descriptive statistical measure, the broader conceptual framework poses new interesting questions for growth and welfare theory, and the related policy issues. It relates performance and efficiency in a novel way to the broader notion of the overall degree of disparity. If one does not use explicitly the broader framework outlined here, there is a possibility that in political debate and policy formulation various interest groups would intentionally look only at the specific statistical measure that will suit their particular interest.
Time distances between Slovenia and Spain around 1998 (Slovenia=0)
S-distance in years, - time lead, + time lag

GDP per capita
GDP per employed
Exports per capita
Imports per capita
Share of working population
Life expectancy (female)
Infant survival rate
Telephones per capita
Mobile phones per capita
Internet hosts per capita
Cars per capita
Emissions CO2 per capita
Time distances between Slovenia and Portugal around 1998 (Slovenia=0)

S-distance in years, - time lead, + time lag

Graph 4.4.17
Time distances between Slovenia and Greece around 1998 (Slovenia=0)
S-distance in years, - time lead, + time lag

-20
-15
-10
-5
0
5
10
15
20

Graph 4.4.18
Especially in dealing with a wider set of fields of concern and a greater number of indicators the additional view of the problem provided might 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. This methodology can be usefully applied also to benchmarking, target setting and monitoring of progress for a large number of indicators in many areas of concern, either for long-term, medium-term or short-term analysis.

The second important conclusion refers to the application of this methodology to a particular example where this methodology was applied to the evaluation of the degree of the disparity between Slovenia and the European Union. It was confirmed that the degree of disparities may be very different in static terms and in time, some indicators showed small disparity in percentage terms and large disparity in terms of time distance, and vice versa. Furthermore, the visualization of the time distance results confirmed the proposition that time distance comparisons can serve as an important analytical, presentational and communication tool for many purposes and across many fields of concern.

References

Eurostat (2001), The GDP of the Candidate Countries, Statistics in focus, Theme 2, 18/2001


Sicherl P (1997b), A Novel Methodology for Comparisons in Time and Space, East European Series No. 45, Institute for Advanced Studies, Vienna


Sicherl P. (1999a), 'A New View in Comparative Analysis', IB revija, 1/1999


Sicherl P., Vahčič A. (2000), Indikatorji razvojnih razlik med EU in Slovenijo kot podlaga za pripravo SGRS in DRP, Sicenter, Ljubljana