

MONITORING IMPLEMENTATION OF THE LISBON STRATEGY AND NRP IN THE TIME DIMENSION*

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Abstract

To develop better ways of using indicators in all aspects of policy involves a vast area of research for the needed continuous improvements. The paper suggests how the S-time-distance methodology can serve as a catalyst for several improvements by making possible a better utilization of existing time series databases and indicator systems for policy considerations and for more effective communication with the public.

The position of the Commission is that in building a methodological framework for assessing progress with the implementation of the Growth and Jobs Strategy whenever possible the qualitative assessment will be accompanied by a quantification drawing on available quantification techniques. The S-time-distance is a new quantification technique with clear interpretability that is now available to complement other techniques. This special category of time distances is a generic statistical measure like static measures of disparity or growth rate. S-time-distance is theoretically universal, expressed in time units it is intuitively understandable and can be usefully applied as an important analytical and presentation tool to a wide variety of substantive fields at macro and micro levels. It represents an additional view, relevant to many problems and applications.

In this paper two illustrations are provided for benchmarking the position of the EU in comparison with the USA and for a two-dimensional analysis of deviations in models and forecasting. The main focus will be on monitoring implementation of Lisbon strategy and NRP in the time dimension. In this application it is immediately operational as an additional measure easily understandable by experts, media and general public, if policy makers would wish to follow their proclamations for the need for transparency and better communication with the public.

1. METHODOLOGY

The new generic S-time-distance method

Time, besides money, is one of the most important reference frameworks in a modern society. The time perspective, which no doubt exists in human perception when comparing different situations, has been with the S-time-distance method systematically introduced both as a concept and as a quantifiable measure in statistical and comparative analysis.

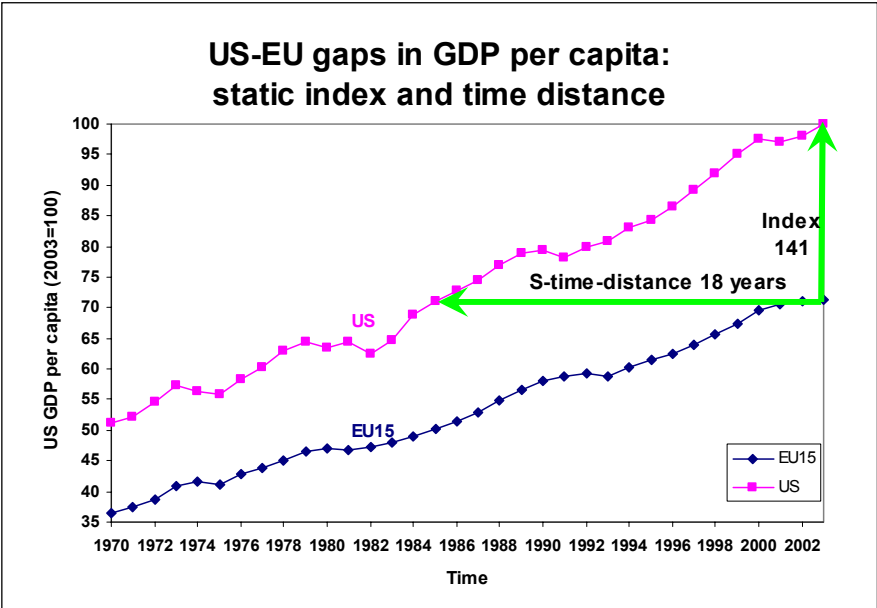
Under the perspective dominating in the literature, comparisons and evaluation of differences (disparities, gaps, deviations) between time series are made on the basis of static absolute or relative values of a given variable (e.g. a socio-economic indicator) for given points in time.

The new perspective on time series, which can usefully complement and enrich conventional analysis, has its main focus on the horizontal differences in time between the two or more compared units for each level of analysed indicator/variable.

In brief, statistical measure S-time-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.) for given levels of the indicator is used as a 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 definition and elaboration see **Methodological Annex**).

- The new generic time distance approach offers a new view of existing time series data that is exceptionally easy to understand and communicate, and it allows for developing and exploring new hypotheses and perspectives.
- Expressed in time units it is an excellent presentation tool easily understood by policy makers, managers, media and general public and can support decision-making and influence public opinion.
- The new view of information, using levels of the variable(s) as identifiers and time as the focus of comparison and numeraire, is theoretically universal, intuitively understandable and applicable as an important complementary analytical and presentation tool to a broad range of substantive issues at various levels.

A Comparison of European and US Economies Based on Time Distances



The fact that comparisons should be made in two dimensions has been verified by the worldwide media interest in my analysis for the EUROCHAMBRES Spring Business Forum. The static ratio of 1.41 does not catch much attention, while the time gap of about two decades obviously produced a different perception of reality. The same will be true for comparing within the EU.

Source: P. Sicherl, A Comparison of European and US Economies Based on Time Distances, EUROCHAMBRES, Brussels, March 2005

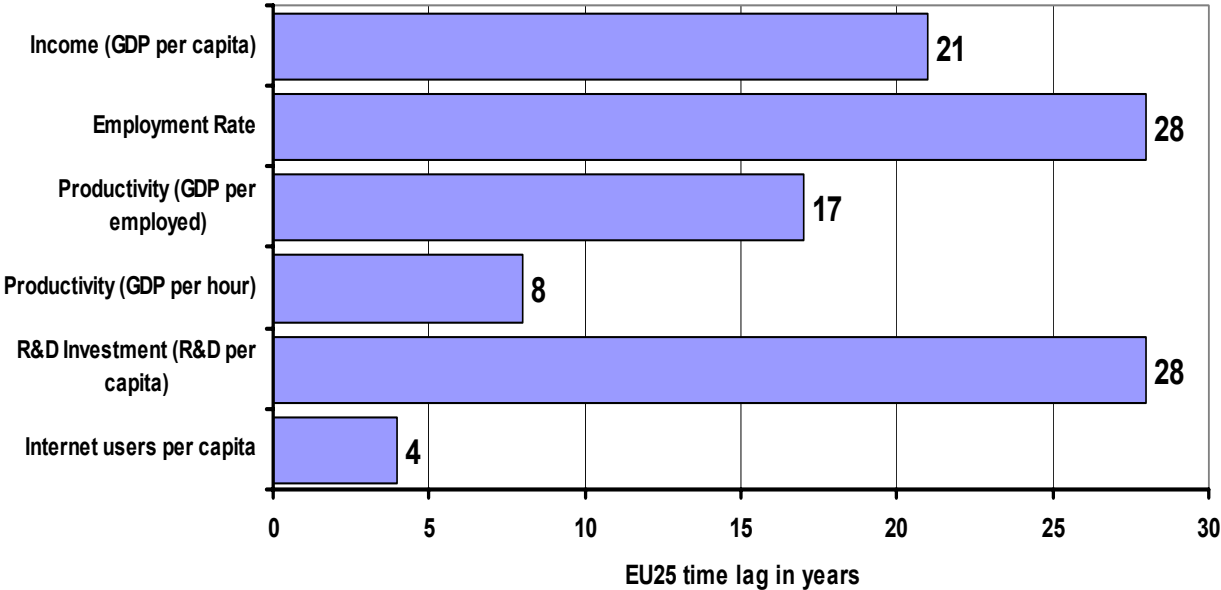
New insights for benchmarking, gap analysis, monitoring plans, budgets, projections and scenarios

The suggested new time distance (S-time-distance) analytical and conceptual framework for measuring disparities, cohesion and convergence is of substantial relevance for some of the professional work in the Commission and at the national level for improved analysis and semantics for policy analysis and public debate. Here only some of its immediate practical uses in benchmarking, target setting, and monitoring are discussed. In general it can be applied for other policy issues for a large number of indicators in many areas of concern, either for long, medium or short-term analysis.

Empirically, the perceptions of the degree of disparity may be very different in static terms and in time distance, which leads to new conclusions and semantics important for policy considerations. *This innovation opens the possibility for simultaneous two-dimensional comparisons of time series data* in two specified dimensions: vertically (standard measures of static difference) as well as horizontally (Sicherl time distance), providing a new dimension of analysis to a variety of problems.

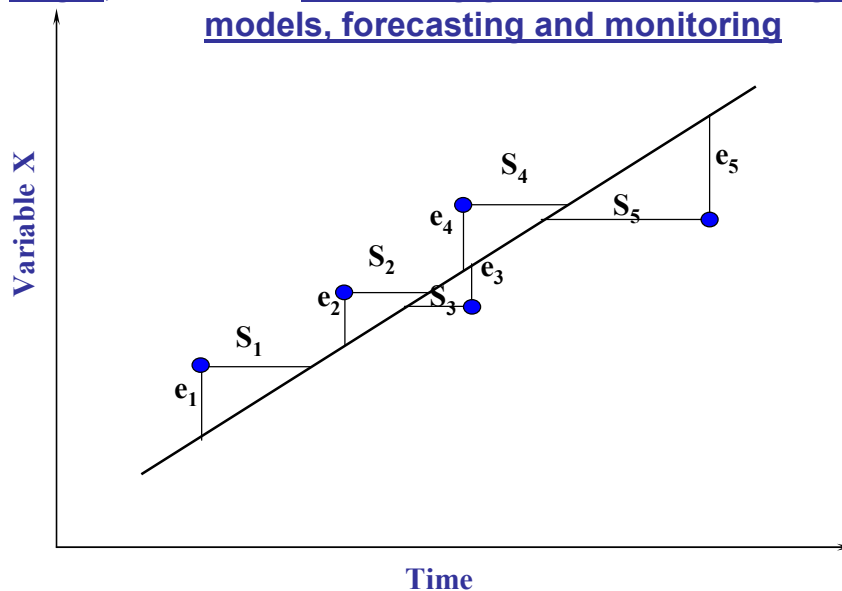
In the context of discussing Lisbon strategy this methodology could have been usefully applied for benchmarking and monitoring at various levels. As shown in the figure above, the application for the **evaluation of the magnitude of the gap in benchmarking analysis** in two dimensions is self-explanatory. It will be shown that the degree of disparities may be very different in static terms and in time. 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. It is intended to complement rather than replace the conventional static measures of disparity. For a better perception of the reality all of the perspectives have to be studied simultaneously.

S-time-distance in years between the EU25 and the USA for around 2006



The generic idea for many other applications of S-time-distance

S-time-distance adds a second dimension to comparing actual value with estimated value, forecast, budget, plan, target, etc. and to evaluating goodness-of-fit in regressions, models, forecasting and monitoring



The second immediate application is in **monitoring the implementation** of the Lisbon strategy in two dimensions. Targets are usually expressed not only in terms of the indicator values but simultaneously also in time. As processes towards their implementation are related to time, it is very natural and useful to describe e.g. the degree of implementation in two dimensions: 1 per cent below the line to target at a given date, and 2 months behind in terms of the achieved level as against the time foreseen for that actual level on the line to target. In other words, the target line (estimate) is 1 per cent too high and 2 months too early. Generally speaking, whenever there are two series with time subscripts, e.g. actual value and estimated (forecast, budgeted, planned, targeted, etc.) values, it is possible to study deviations in two dimensions: deviation in the indicator space (at a given point of time) and deviation in time (for a given level of the indicator).

There are alternative ways of expressing these matters, but it is obvious that the interpretation for how to overcome the time delay may be a very relevant additional practical procedure to be routinely applied to a large number of physical and financial indicators before turning to the more complicated programs. The use of the additional measure of deviation of the actual implementation from the plan, budget, target or forecasts at a project or activity level is straightforward and does not need at this point further elaboration. It is especially useful in the cases where the targets are clearly established and/or the monitoring is already a legal or administrative requirement. This can be a standard procedure in numerous other activities of the Commission and of national institutions like monitoring and evaluation of implementation of structural funds policy and of development plans, as well as for the relevant budgets.

The time distance information seems to be at least as helpful in providing a proper perception of the progress in implementation or the lack of it as is the percentage

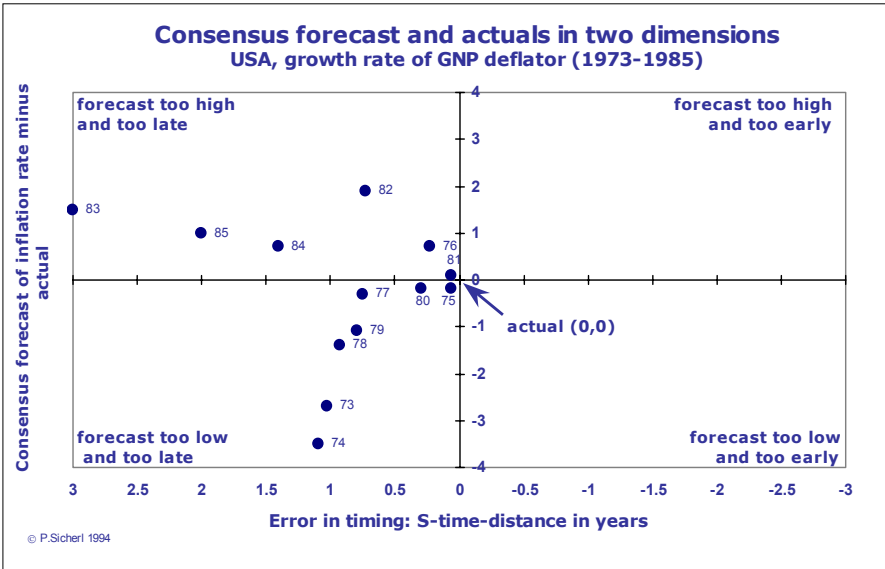
difference. Some examples of monitoring the deviations of the actual development from the Lisbon targets in two dimensions for a few indicators will be provided below.

Before turning to the main focus of this paper, i.e. application to the implementation of the Lisbon strategy and NRP, we shall briefly indicate one of the possible further developments of the generic idea for applications to measuring deviations between estimated and actual values in regressions and models, forecasting, etc. The graph below shows an example for using it as a measure of goodness-of-fit in two dimensions. In the two-dimensional presentation of deviations of actual values from the estimated (planned, budgeted, projected, targeted, etc.) values, or vice versa, the variety of categories and the semantics is enhanced. The respective values are now not evaluated only as too high or too low, there are four possibilities: too high and too early, too high and too late, too low and too early, and too low and too early.

The example of the Consensus forecast and actual growth rate of GNP deflator for USA for the period 1973-1985 presents the deviations in the two dimensions. The conventional methodology would find these Consensus forecasts unbiased as far as high and low estimates are concerned. However, this methodology finds Consensus forecasts on USA inflation rate for the analysed period biased as they are practically always too late for a given level of the indicator. If new insights can be unfolded in such an important case and for results of the most important USA forecasting institutions for this period, such example clearly indicates the potential of this methodology to provide new insights from the existing data for a variety of situations at least as a diagnostic tool for estimations of regressions, models and forecasts.

Monitoring and goodness-of-fit test in two dimensions

The importance of using S-time-distance as a second dimension for monitoring and benchmarking across indicators in many fields is self explanatory, and immediately operational. A more long term scientific assignment is to develop optimizing procedures in models based also on the time distance deviations. E.g. Nobel prize winner Granger and Jeon (1997, 2003) further elaborated S-time-distance for the use as a criterion for evaluating forecasting models of leading and lagging indicators.



2. LISBON 1 TARGETS SETTING

In dealing with target setting and monitoring of the Lisbon strategy we are essentially dealing with two cases. One is the Lisbon strategy proclaimed in 2000 within a EU15 framework, while its re-launch with National Reform Programmes has been done within the EU25 framework. In order to simplify the discussion we shall use the labels Lisbon 1 and Lisbon 2, as it was done by Pisany-Ferry and Sapir (2006).

At its time Lisbon 1 was courageous, ambitious and providing a vision in the right direction of the knowledge-based society. However, the implementation in the first four years was disappointing. While the most important reasons for this have been the lack of political will for reform and lack of co-ordination at various levels, but there were also two omissions in the preparation of the strategy. One was the over-optimistic assessment of the European position and lack of clarity about the degree of change needed; the other was that not enough attention has been paid to raising public awareness of the issues and challenges involved. Probably it was a victim of the lack of co-ordination between politicians and professionals in dealing with the usual conflict between desirability and feasibility.

If Commission services would had used the time distance estimate of the lag of EU15 behind the USA, for GDP per capita the time lag in 2000 could had been established at about 15 years. To cut a lag of 15 years to nothing in a decade demands a very large difference in the growth rate of GDP per capita in favour of EU15 over that in the USA. This growth rate in the EU15 would have to be 3.3 percent higher than in the USA to achieve that. In the 1990's the GDP per capita in the USA grew at about 2.2 percent per year. If this rate would continue in the following decade, the EU15 respective growth rate would have to be about 5.5 percent per year to converge with the USA GDP per capita in 2010.

This was also clearly inconsistent with the Lisbon 1 target that GDP in the EU15 would grow at about 3 percent per year. Such an obvious gap between desirability and feasibility (5.5 percent needed yearly increase against projected 3 percent) has been damaging to the credibility of the program. Had there been more attention to involve the men on the street by explaining the starting position and the target setting by raising awareness of and explaining them to the general public, such mistakes could had been prevented.

As mentioned before, degree of disparities may be very different in static terms and in time. Policy makers, managers, professionals, media and the general public can easily understand the S-time-distance measure. 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. This is why the results of my studies for EUROCHAMBRES Sicherl (2005a, 2007b) has been such surprise and has been widely reported in the world press. It is an example how social partners, in this case business associations, can use the new time distance perspective on statistical data for policy debate at international and national levels. This confirms that S-time-distance is not only a novel generic statistical measure but also an excellent presentation and communication tool for policy use and that it can influence public opinion.

3. IMPLEMENTATION OF LISBON 1 TARGETS AT THE EU AND NATIONAL LEVELS

Commission services and national institutions could use the S-time-distance measure and concept as an important additional analytical and presentation tool in many domains, in the case related to Lisbon and Jobs and Growth Strategy for benchmarking, monitoring and for communication with policy makers, media and general public. Here we shall demonstrate the usefulness of time distance for the monitoring process. We use the two-dimensional example of monitoring the implementation of Lisbon 1 targets in the period 2001-2005. This will serve two purposes. First it will show the implementation performance of Lisbon 1 for EU15. Second, it will be an example how the Lisbon 2 targets could be monitored in two dimensions when the results for other years are becoming available. A similar application for monitoring the UN Millennium Development Goals on the world scale is provided in Sicherl (2007c).

Table 1 illustrates the methodology of monitoring implementation of the Barcelona target in two dimensions and presents the results for the period 2001-2005. For the implied path to target of 3 percent in 2010 one can simply use a linear interpolation between the starting actual 1.92 percent in 2000 and the final point 3 percent in 2010 (or any more specific path to target). The deviations are described in two dimensions: percentage deviation and S-time-distance. For S-time-distance minus sign denotes that the actual value is ahead of path to target and plus sign means how many years (or months, etc.) actual values is lagging the same value on the path to target line.

Table 1.

Monitoring attainment of Barcelona target for EU15 in two dimension

	Share of R&D in GDP (%)		Monitoring deviations of actual from path to target in two dimensions	
	Implied path 1 to target 3%	Actual EU15	Percentage deviation of actual from path to target	S-time-distance deviation of actual from path to target (in years)
2000	1.92	1.92	0.0%	0.0 years
2001	2.03	1.94	-4.3%	0.8 years
2002	2.14	1.95	-8.7%	1.7 years
2003	2.24	1.93	-14.0%	2.9 years
2004	2.35	1.91	-18.8%	more than 4 years
2005	2.46	1.91	-22.4%	more than 5 years
2006	2.57			
2007	2.68			
2008	2.78			
2009	2.89			
2010	3.00			

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

The numerical results show that by 2005 little progress towards the Barcelona target was achieved. The actual value for 2005 was more than 22 percent below the value on the implied path to target. This is one way to express the degree of underperformance over the five year period.

S-time-distance presents another complementary way of comparing path to target with actual performance in the time dimension. The actual for 2004 and 2005 were by the latest data from Eurostat at the level which was lower than in the starting year in 2000. This means that the time delay behind the path to target is more than 5 years for the period of duration of 5 years, i.e. that by 2005 practically no continuous progress towards Barcelona target was achieved. In other words, if Lisbon 2 targets are to be taken seriously a very different performance in the second part of the decade is needed.

Monitoring deviations of actual from path to target in time distance for EU 25 and EU15 for Lisbon 1 targets for 3 indicators

	S-time-distance deviation of actual from path to target (in years) EU25			S-time-distance deviation of actual from path to target (in years) EU15		
	Share of R&D in GDP (%)	Employment rate (%)	GDP Level	Share of R&D in GDP (%)	Employment rate (%)	GDP Level
2000	0 years	0 years	0 years	0 years	0 years	0.0 years
2001	0.7 years	0.5 years	0.3 years	0.7 years	0.1 years	0.4 years
2002	1.7 years	1.5 years	0.9 years	1.6 years	0.8 years	1.0 years
2003	2.7 years	2.3 years	1.5 years	2.6 years	1.6 years	1.6 years
2004	4 years	2.8 years	1.7 years	3.9 years	2.0 years	1.9 years
2005	5 years	3.2 years	2.1 years	5 years	2.3 years	2.4 years
2006		3.4 years	2.1 years		2.3 years	2.5 years
S-time-distance in years: - actual ahead of path to target, + actual behind the path to target						

The next table shows the results of monitoring the Lisbon 1 target also for employment rate and GDP growth. For the employment rate the path to target was calculated by assuming the 70 percent employment rate target in 2010 and for GDP growth rate of 3 percent per year, using the same methodology and procedure as explained for Table 1.

Comparison across three important indicators of implementation of Lisbon 1 targets shows two major conclusions. First, according to both monitoring measures used the underperformance has been considerably larger for the indicator share of R&D in GDP than for the indicators growth rate of GDP and employment rate. The performance expressed as delay in time was more than 5 years for the share of R&D in GDP and more than 2 years for the other two analysed indicators. S-time-distance expressed in standard units – time – brings a very clear and practical message about the situation.

Second, if one would compare the underperformance for employment rate and GDP growth rate it could be shown that the percentage deviation and S-time-distance deviation from the path to target do not lead to the same conclusion. In percentage terms the gap in GDP appears

considerably greater than that for employment rate, while time distance measure puts the delay behind the respective paths to target for both at more than 2 years.

Lisbon 1 target of 70% employment rate in 2010 for all countries (deviations in the time dimension from the hypothetical path to target)

S-time-distance in years

	2000	2001	2002	2003	2004	2005	2006
EU (25 countries)	0	0.5	1.5	2.3	2.8	3.2	3.0
EU (15 countries)	0	0.1	0.8	1.6	2.0	2.3	2.1
Denmark		target 70% total employment rate already achieved					
Netherlands		target 70% total employment rate already achieved					
Sweden		target 70% total employment rate already achieved					
United Kingdom		target 70% total employment rate already achieved					
Austria	0	1.0	0.7	0.3	0.0	4.3	
Cyprus	0	-3.9	-4.7	-5.1	-3.4	-1.5	-3.8
Estonia	0	0.4	0.3	0.4	1.3	0.8	-2.0
Finland	0	-2.2	-1.2	1.2	2.6	0.7	-1.5
Ireland	0	-0.2	1.4	2.4	1.7	0.0	-1.1
Latvia	0	0.1	-0.3	-0.4	0.2	0.4	-1.0
Spain	0	-0.1	0.4	0.4	0.5	-0.1	-0.2
Slovenia	0	-0.4	1.2		0.5	0.6	0.7
Lithuania	0		1.3	1.2	2.1	1.8	1.9
Germany	0	0.5					2.4
Greece	0	1.1	1.3	1.4	1.9	2.3	2.7
Italy	0	0.3	0.9	1.5	1.6	2.6	3.1
Slovakia	0	1.0	2.0	2.3	3.8	4.3	4.0
Luxembourg	0	0.5	1.0			3.8	4.8
France	0	0.1	0.9	1.5	2.7	3.7	4.9
Hungary	0			2.5	3.6	4.6	5.3
Czech Republic	0	1.0	1.2				5.4
Belgium	0					4.4	5.5
Malta	0	0.9	1.9	3.0			5.6
Portugal	0	-2.7	-0.5				
Poland	0						

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

values fell below the starting 2000 value

target 70% total employment rate already achieved

Lisbon 1 target of 60% female employment rate in 2010 for all regions, BELGIUM

(deviations in the time dimension from the hypothetical path to target)

S-time-distance in years

	2001	2002	2003	2004	2005
Prov. Vlaams Brabant	0	0.9	1.9		
Prov. Oost-Vlaanderen	0	0.9	1.9	1.2	
Prov. Antwerpen	0	0.3	1.1	1.2	1.3
Prov. West-Vlaanderen	0	0.2	1.4	1.0	1.6
Prov. Liège	0	1.0	0.9	2.1	1.8
Prov. Namur	0	1.0	1.0	2.0	1.9
Prov. Hainaut	0	0.6	0.0	2.0	2.0
Prov. Limburg (B)	0	0.6	2.5	2.5	3.1
Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest	0	0.0	1.5	2.2	3.2
Prov. Brabant Wallon	0	2.8	1.9	3.3	3.5
Prov. Luxembourg (B)	0	2.3	4.0	3.9	3.9

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

values fell below the starting 2000 value

target 60% female employment rate already achieved

The analysis for EU15 and EU25 are extended for the case of employment rate to all 25 countries and for female employment rate for the case of Belgium regions.

We have now available two ‘objective’ measures in benchmarking and monitoring to form a subjective perception of the magnitude of the gap for a given indicator as well as across more indicators. Decision makers, professionals, interested groups and general public might attach different subjective weights to various elements on basis of which they will form their perception and action. The first question is how they weight importance of different domains like employment or GDP; the second question for a given indicator is what subjective weights are given to the gap in static percentage terms and to the time distance gap. These are the questions beyond the purpose of this paper. The possible role of the time distance measure in the inter-temporal aspect of measuring well-being and societal progress is discussed in Sicherl (2006b and 2007a).

4. LISBON 2 AND R&D INTENSITY TARGETS

As earlier seen at the EU level the delay in the implementation of the Barcelona target is much larger than for the employment rate also at the national level. By 2005 only Sweden and Finland already achieved the 3 percent target and only three more countries have less than three and a half year delay against the line to target; for seven of them their 2005 values are even lower than the starting values in 2000.

Barcelona target of 3% R&D in GDP in 2010 for all countries (deviations in the time dimension from the hypothetical path to target)

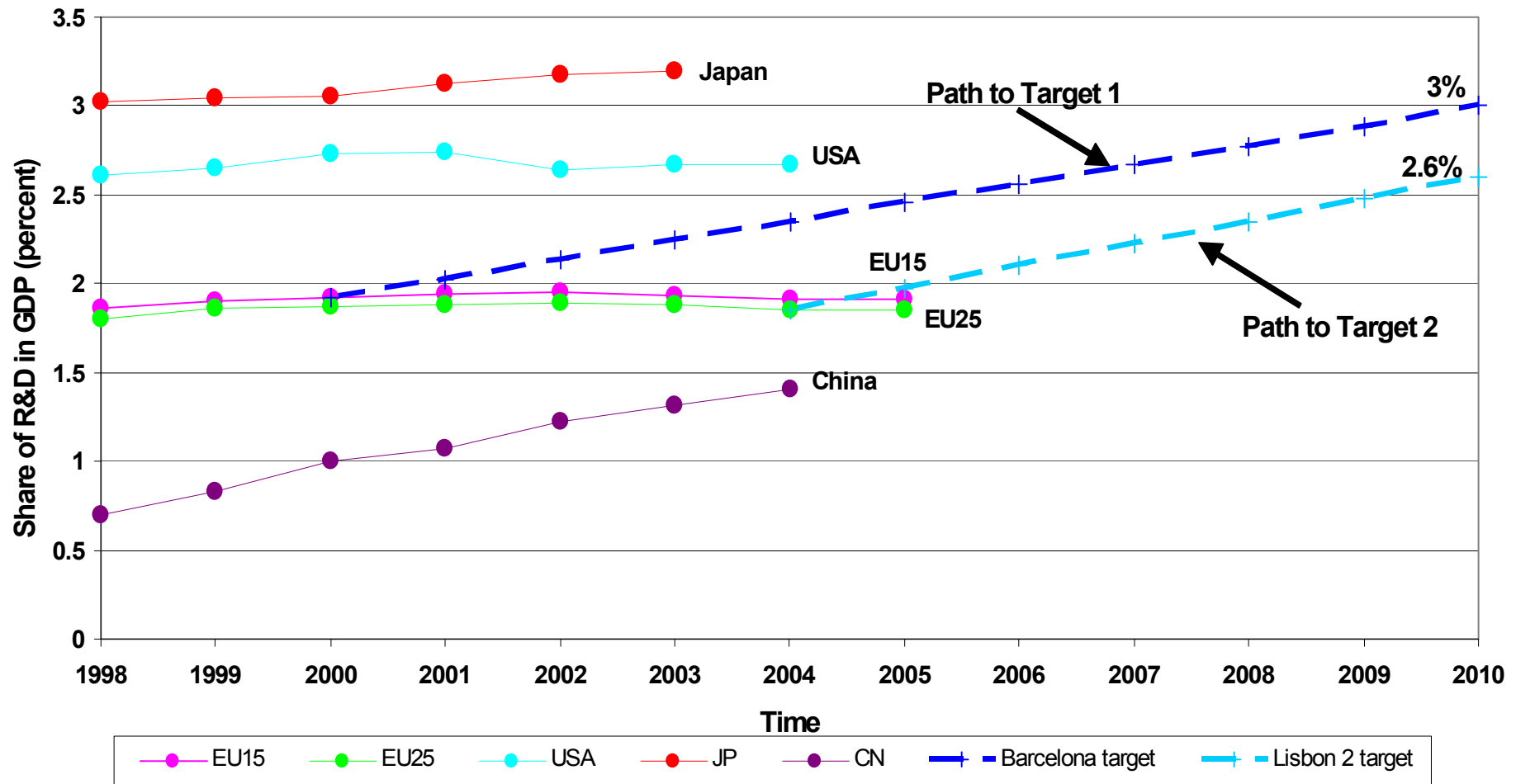
		S-time-distance in years					
2004 actual		2000	2001	2002	2003	2004	2005
1.86	EU (25 countries)	0	0.7	1.7	2.7	4.0	5.0
1.92	EU (15 countries)	0	0.7	1.6	2.6	3.9	5.0
3.74	Sweden	Target 3% of GDP already achieved.					
3.46	Finland	Target 3% of GDP already achieved.					
2.23	Austria	0	-0.2	0.1	0.3	1.1	0.9
0.63	Malta	0		0.0	1.0	0.9	2.0
2.48	Denmark	0	-1.0	-1.6	-1.2	0.8	2.4
0.88	Estonia	0	0.6	1.5	2.3	2.9	3.6
1.26	Czech Republic	0			2.8	3.7	3.8
2.50	Germany	0	0.8	1.3	1.7	3.1	3.9
1.06	Spain	0	1.0	1.6	2.3	3.3	4.0
0.88	Hungary	0	0.4	1.0	2.3	3.6	4.3
0.76	Lithuania	0	0.7	1.7	2.7	3.3	4.3
0.37	Cyprus	0	1.0	1.8	2.6	3.5	4.4
0.42	Latvia	0					4.5
0.77	Portugal	0	0.8	2.0	0.0	4.0	4.8
1.21	Ireland	0					4.9
2.14	France	0	0.4	1.1	2.8		
1.89	Belgium	0	-0.1				
1.66	Luxembourg	0			2.9	3.9	
1.45	Slovenia	0	0.2	1.4		3.9	
0.61	Greece	0	0.0				
0.56	Poland	0					
0.51	Slovakia	0					
1.78	Netherlands	0					no data
1.77	United Kingdom	0	0.9	1.7	2.8		no data
1.10	Italy	0	0.8	1.6	2.7	3.7	no data

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

Target 3% of GDP already achieved

values fell below the starting 2000 value

Monitoring Attainment of the Barcelona Target for GERD as % of GDP



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The re-launch of the Lisbon agenda with new targets in the National Reform Programmes (NRP) raises an interesting question of how does the aggregate of the national targets relate to the Barcelona target for the share of R&D in GDP. The national targets from Council of European Union (2006) are weighted by the GDP weights from 2004 for EU15 countries to arrive at an approximate target of 2.6 percent of GDP in 2010. Introducing national targets increased realism but decreased ambition. In the graph above the new line to target for Lisbon 2 is calculated by linear interpolation between 2004 actual and the weighted values of national targets for 2010. Though lower than the Barcelona target it is important to understand the order of magnitude of the challenge undertaken by Lisbon 2 targets. Only the time will show whether the still far-reaching improvements implied in these targets will be put into action.

For the share of R&D in GDP data are available only for 2005 (for three countries they are still missing); the actual values for 2005 are then compared with this implied time table to the national targets. The big problem is implementation of the so reduced national targets for Lisbon 2. For EU25 total estimates look bad again; there was no increase in 2005, which means 1 year delay in 1 year period. Only three countries were in 2005 ahead of their own line to target (Sweden, Czech Republic and Austria), for 18 countries the minimum delay expressed as S-time-distance was 7 months in a year, for some 2005 value was less than for 2004. Also China is approaching fast. Therefore it is even more important that a continuous monitoring system is to be put in place as soon as possible.

Implementation of national targets for the R&D share in GDP in 2005

(deviations in the time dimension from the hypothetical path to target)

	S-time-distance in years			Level	Target
	2004	2005	Delay in 2005 expressed in months		
EU (25 countries)	0	1	12.0	1.86	2.6*
EU (15 countries)	0	1	12.0	1.92	2.6*
Sweden	0	-1.77	(-21.24)	3.74	4
Finland	0	0.78	9.4	3.46	4
Germany	0	0.88	10.6	2.5	3
Denmark	0		more than 12	2.48	3
Austria	0	-0.01	(-0.12)	2.23	3
France	0		more than 12	2.14	3
Belgium	0		more than 12	1.89	3
Luxembourg	0		more than 12	1.66	3
Slovenia	0		more than 12	1.45	3
Czech Republic	0	-0.2	(-2.4)	1.26	2.06
Ireland	0	0.72	8.6	1.21	2.07
Spain	0	0.62	7.4	1.06	2
Hungary	0	0.61	7.3	0.88	1.8
Estonia	0	0.65	7.8	0.88	1.9
Portugal	0	0.77	9.2	0.77	1.8
Lithuania	0	1	12.0	0.76	2
Malta	0		more than 12	0.63	0.75
Greece	0	0.8	9.6	0.61	1.5
Poland	0	0.96	11.5	0.56	2.09
Slovakia	0	1	12.0	0.51	1.8
Latvia	0	0.17	2.0	0.42	1.5
Cyprus	0	0.71	8.5	0.37	1
Netherlands	0	no data	no data	1.78	3
United Kingdom	0	no data	no data	1.77	2.21
Italy	0	no data	no data	1.1	1.9

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

 values fell below the starting 2004 value

**Template for monitoring implementation in two dimensions
against NRPs specified targets at relevant levels: national,
EU and sub-national (regional, socio-economic groups)
(25 countries times number of selected indicators)**

Example: monitoring deviations of actual from path to target in two dimensions,
AUSTRIA, Lisbon 2 target for R&D share in GDP

	Share of R&D in GDP (%)		Monitoring deviations of actual from path to target in two dimensions	
	Implied Lisbon 2 path to target 3%	Actual	Percentage deviation of actual from path to target	S-time-distance deviation of actual from path to target (in years)
2005	2.36	2.36	0%	0 years
2006	2.49	2.43	-2.3%	0.44 years
2007	2.61			
2008	2.74			
2009	2.87			
2010	3.00			

S-time-distance in years: - actual ahead of path to target, + actual behind the path to target

This paper offers a blueprint of an improved extended monitoring system that could be used across countries and regions as well as across indicators. The example for Austria as one of the 25 country tables (now 27) can serve as template for any selected indicator. For 2005 and 2006 the estimates of the share of R&D in GDP for Austria are already available by Eurostat. The implied path to the Lisbon 2 target is linear extrapolation for each country from its actual value in 2004 to the proclaimed target in 2010. Austria is thus very close to the track. Such tables and the accompanying procedures could be prepared in advance.

When the values for 2005 and later for 2006 become available for other countries and other selected structural indicators, the innovation with the expanded monitoring system in two dimensions as an additional presentation tool could be in place. Such table as for Austria would be multiplied by 25 (27) and by the number of indicators analysed. These results can be then compared across countries for a given indicator and across indicators for a given country. They can be used also as input for processing with statistical and mathematical models.

5. CONCLUSIONS

1. The first conclusion is methodological. **The novel generic S-time-distance concept and statistical measure offers a very interesting new way of analyzing and presenting data.** It provides new information from existing data; it is expressed in time units **and is thus intuitively understood by policymakers, professionals, managers, media and the general public**, facilitating their subjective perception in this additional time dimension.

A new dimension is added while no earlier results are lost or replaced. **This innovation opens**

the possibility for simultaneous two-dimensional comparisons of time series data: vertically (standard measures of static difference) as well as horizontally (Sicherl time distance), providing a new dimension of analysis to a variety of problems.

2. It is important to emphasize that the **benefits of this new view in comparisons, competitiveness issues, benchmarking, target setting and monitoring** for economic, employment, social, R&D and environment indicators **could be immediately applied to a wide variety of substantive fields at macro and micro levels using existing data and indicator systems.** Here the empirical analysis provides only some examples of immediate operational use of time distance measure relevant for the Lisbon process.

3. Possible application for the **evaluation of the magnitude of the gap in benchmarking analysis was demonstrated for the case of unrealistic setting of the target in Lisbon 1.** Such gaps have been damaging to the credibility of the programme. **Had there been more attention to involve the men on the street by explaining the starting position and the target setting by raising awareness of the challenges and explaining them to the general public, such mistakes could had been prevented.**

4. Next example is related to the **monitoring the implementation** of the Lisbon strategy in two dimensions. Measuring the implementation of the Lisbon 1 targets in 2001-2005 period has shown that the **Barcelona target for R&D in GDP is about 5 years behind the path to target; for employment rate and GDP growth more than 2 years behind the Lisbon 1 targets. The time distance information seems to be at least as helpful in providing a proper perception of the progress in implementation or the lack of it as is the conventional percentage difference.** Examples are provided for also for country and regional performance against the Lisbon targets.

5. **Comparison of Barcelona target and Lisbon 2 targets for R&D in GDP** in the National Reform Programmes showed that the exact implementation of the latter would imply that EU15 would reach **around 2.6 percent in 2010.** This value was scheduled to be reached in the early months of 2007 on the original path to target 3 percent. However, the big problem is implementation of the so reduced national targets for Lisbon 2, the performance in 2005 was very disappointing. If new Lisbon 2 targets for R&D in GDP for 2005-2010 are compared with the past trends in the period 1998-2005, the outlook for implementing Lisbon 2 targets is very poor. Europe has to do much better. It is good to be proclaiming high goals, but the order of magnitude of the challenge of the needed change may have been not recognized.

6. **In such a situation it is thus even more important that a continuous monitoring system is to be put in place. This paper offers an improved extended monitoring system that could be used across countries as well as across indicators.** A template with an example for Austria shows that the innovation with the expanded monitoring system in two dimensions as an additional presentation tool could be in place when the values for 2006 and next years become available for other countries, regions and other selected structural indicators.

7. **These examples demonstrate that usefulness of the innovative time distance concept and measure for operational work of Commission Services and national institutions. Monitoring Lisbon targets and NRP in the time dimension is an excellent presentation tool, intuitively understood by policymakers, professionals, managers, media and the general public, which can also facilitate the broad participation in the Lisbon process.**

REFERENCES

- Council of the European Union (2006), Contribution of the Competitiveness Council to the Spring European Council 2006, 7281/1/06, REV 1, Brussels, 14 March 2006.
- European Commission (2006), A methodological framework for assessing progress with the implementation of the Growth and Jobs Strategy, Brussels
- Granger, C.W.J., Jeon, Y. (1997), Measuring Lag Structure in Forecasting Models – The Introduction of Time Distance, Discussion Paper No. 97-24, University of California, San Diego.
- Granger, C.W.J., Jeon, Y. (2003) A time-distance criterion for evaluating forecasting models, *International Journal of Forecasting*, Vol 19, pp. 199-215.
- Munoz P.D. (2004), Indicators for EU Policy Making, OECD World Forum, Palermo 10-13 November
- Pisany-Ferry J. and Sapir A. (2006), Last Exit to Lisbon, Bruegel Policy Brief, Issue 2/2006, March, Bruegel, Brussels.
- Sicherl, P. (1973), Time Distance as a Dynamic Measure of Disparities in Social and Economic Development, *Kyklos*, XXVI, Fasc. 3
- Sicherl, P. (1994), Time Distance as an Additional Measure of Discrepancy between Actual and Estimated Values in Time Series Models (paper presented at the International Symposium on Economic Modelling, Washington D. C., The World Bank), Sicerter, Ljubljana.
- Sicherl, P. (1997), Time Distance Measure in Economic Modelling. (Paper presented at the International Symposium on Economic Modelling in London, University of London, July 23–25), SICENTER, Ljubljana.
- Sicherl, P. (1999a), ‘A New View in Comparative Analysis’, *IB Revija*, 1/1999
- Sicherl P. (2002), Time Distance: A Missing Link in Comparative Analysis, The XV World Congress of Sociology, July 9, Brisbane
- Sicherl, P. (2004a), Time-distance Analysis: Method and Applications, *eWISDOM*, Vol 2a.
- Sicherl, P. (2004b), Comparing in Two Dimensions: A Broader Concept and a Novel Statistical Measure of the Time Dimension of Disparities, *European Societies* 6(2).
- Sicherl, P. (2004c), Time Distance: A Missing Link in Comparative Analysis, 28th General Conference of the International Association for Research in Income and Wealth, Cork, Ireland, August 22-28, www.iariw.org
- Sicherl, P. (2005a), A Comparison of European and US Economies Based on Time Distances, EUROCHAMBRES, Brussels.
- Sicherl P. (2005b), Urgent need for more R&D resources in Lisbon strategy, Sicerter, Ljubljana, June 13, www.sicenter.si
- Sicherl P.(2006a), Time Distance Measure for Analysis and Presentation: Benchmarking and Monitoring of Structural Indicators, Invited presentation at the 2nd Meeting of the EPC Task Force on Structural Indicators, Brussels, September 7, 2006
- Sicherl P. (2006b), Measuring Progress of Societies, *Statistical Days 2006*, Radenci
- Sicherl P. (2007a), The Inter-temporal Aspect of Well-being and Societal Progress, *Social Indicators Research* (forthcoming), available on FirstOnline springer.com
- Sicherl, P. (2007b), Time Distance Study 2, in Progress within EU but global comparisons underline need for vigilance, EUROCHAMBRES message to the 2007 Spring Summit, EUROCHAMBRES, Brussels, March 5
- Sicherl P. (2007c), Monitoring Implementation of the Millennium Development Goals in the Time Dimension, Paper prepared as a background paper for the OECD/ISTAT conference Dynamic Graphics to Present Statistics, Rome, March 5-6

Annex:

S-TIME-DISTANCE AS A SPECIAL CATEGORY OF TIME DISTANCE¹

The present state-of-the-art does not realise that, in addition to static comparison, there exists in principle a theoretically equally universal measure of difference (distance) in time when a given level of the variable is attained by the two compared time series. In graphical terms, the usual way is to compare the time series in the **vertical dimension**, i.e. for a given point in time. The time distance approach uses an additional perspective; it compares the respective time series in the **horizontal dimension**, i.e. for a given level of the variable (see e.g. Sicherl, 1973, 2004a).

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 variable. The suggested statistical measure **S-time-distance** measures the distance (proximity) in time between the points in time when the two series compared reach a specified level of the variable X. The observed distance in time (the number of years, quarters, months, etc.) is used as a 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.

In the analysis of time series the idea of time distance is a generic concept like static difference and the growth rate over time. Time has been until now used in comparisons mainly as locational information, i.e. as a coordinate in a parameter frame forming a coordinate system that is used to organise (or index) a set of variables. In other words, it has played the role of a descriptor, subscript or identifier. The new approach offers new avenues for detecting additional information content, without replacing the existing views. If we choose to interchange in the database the roles of the level of the variable and time, a given level of the variable becomes a descriptor or identifier and time becomes a numeraire in which certain distances between the compared units and time series can be expressed and measured.

Comparing two points in a time series database entails three elements of information: (i) the respective level of the variable, (ii) to which unit it belongs, and (iii) at what time it happened. There are two obvious generic directions of comparison: by time and by level.

The generic nature of S-time-distance can be shown also by specifying operators that can be applied to a time series database. For two units (i) and (j) we can express such database as implicit functions

$$F_i(X, t) = 0 \text{ and } F_j(X, t) = 0. \quad (1)$$

The present state-of-the-art solves these functions by one of the arguments as

$$X = X_i(t) \text{ and } X = X_j(t) \quad (2)$$

¹ This section is based on Sicherl (2004c), available on www.iariw.org. The shorter versions are available also in Sicherl (2006b and 2007a).

and arrives at static distance like $\Delta X_{ij}(t) = X_i(t) - X_j(t)$. However, it misses the point that additional theoretically universal and practically relevant measures can be obtained by solving them by the other argument using the inverse relations

$$t = t_i(X) \text{ and } t = t_j(X). \quad (3)$$

The result is a time matrix with new information from which new generic measures can be derived.

Table 1. Time matrix from the inverse relations: time when a specified level of the variable was achieved in each compared unit

Level	Time $t_i(X_L)$	Time $t_j(X_L)$
X_{L1}		$t_j(X_{L1})$
X_{L2}	$t_i(X_{L2})$	$t_j(X_{L2})$
X_{L3}	$t_i(X_{L3})$	$t_j(X_{L3})$
...
X_{Ln}	$t_i(X_{Ln})$	

Two operators applied to the above time matrix lead to the derivation of two novel statistical measures, expressed in standardized units of time that everybody understands. The first suggested statistical measure *S-time-distance* measures the distance (proximity) in time between the points in time when the two compared series reach a specified level of the variable X. It compares two series by subtracting *horizontally* the respective times for a given level in the time matrix.

S-time-distance for a given level of X_L is defined as

$$S_{ij}(X_L) = \Delta t(X_L) = t_i(X_L) - t_j(X_L) \quad (4)$$

where

$$X_i(t_i(X_L)) = X_L \text{ and } X_j(t_j(X_L)) = X_L.^2 \quad (5)$$

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

$$S_{ij}(X_L) = -S_{ji}(X_L). \quad (6)$$

S-time-distance is calculated from the original values of the variable (with some possible interpolation and extrapolation) without referring to any other information than levels of the variable and time subscripts. This is a confirmation of the statement that time distance provides an additional (n+1) dimension of description of the state of a multidimensional space of n variables ($X_i, i=1, \dots, n$).

² For details see Sicherl (2002), also on possible multiple time intersections.

Subtracting the respective times in the time matrix for consecutive levels of the variable for each column *vertically* derives the second suggested measure *S-time-step*. These vertical differences can be labeled as time steps and represent an alternative description to the growth rate measure. The concept of S-time-step measures the growth characteristics of a series, using the inverse relation to the conventional $\Delta X/\Delta t$ or growth rate metrics. S-time-step as a measure expressed in units of time is defined as

$$S_i(\Delta X_L) = (t_{XL+\Delta X} - t_{XL})/\Delta X. \quad (7)$$

S-time-step is obtained by simple subtraction of consecutive times in columns in the time matrix in Table 1 if ΔX_L is kept constant.

Using linear approximation, the relationship between S-time-distance and S-time-step for a selected ΔX_L is

$$S_{ij}(X_{L2}) = S_{ij}(X_{L1}) + S_i(X_{L2}-X_{L1}) - S_j(X_{L2}-X_{L1}) \quad (8)$$

Since events are dated in time, in time series comparisons, regressions, models, forecasting and monitoring, the notion of time distance always existed as a "hidden" dimension. What was needed was to systemize and formalise the approach and define an appropriate statistical measure for operational use. In this paper we shall apply the S-time-distance methodology in a limited way mostly to the international comparisons of per capita GDP across world regions and selected countries. In this domain S-distance plays a role of a generic concept like static measures of disparity or growth rate.

However, this generic approach can be usefully applied as an important analytical and presentation tool to a wide variety of substantive fields at macro and micro levels. For extensions to measuring deviations between estimated and actual values in regressions and models, forecasting, error in timing and causality, monitoring, business cycle analysis see Sicherl (1994, 1997), to variables other than time Sicherl (1999).

Granger and Jeon (1997, 2003) extended it to comparisons of leading and lagging indicators and used the time distance as a criterion for evaluating forecasting models³. They also analysed four models of inflation in the USA not only with the standard method of average squared deviations between the projected and actual values, but also with the time distance method deviations, which produced significantly different results.

³ 'As Sicherl (1973, 1993) proposes, for a given level of the lagged or leading indicator, a time distance measures distance *in time* between the indicator and the indicated variable. Observed time distance is a dynamic measure of temporal disparity between the two series, intuitively clear, readily measurable, and in transparent units which are comparable across a pairing of indicators and indicated variables. It is suggested that one should complement conventional vertical measures with horizontal measures'. 'Sicherl's several works have presented a non-technical discussion of the theory of time-distance. This concept can help us to think more clearly about the forecastability of series' (Granger, Jeon, 1997).