

S-time-distance shows that EU27 has lost 4 years of growth of GDP and employment

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How to make the situation more understandable to experts and to the general public?

The perceptions of well-being and societal progress are subjective and the resulting decisions, behaviour and actions are not influenced only by the statistical data and indicators. They are influenced also by the statistical measures used in the measurement, analysis, presentation and semantics of discussing these issues as indispensable elements to form these perceptions.

There are several ways of describing economic development over time. It seems that the prevailing one used by statistical offices, national and international organisations and media are growth rates of the respective magnitudes or indicators in percentage changes. This has advantages and disadvantages. On the one hand it is simple to understand a time series of yearly (or quarterly) growth rates over time; on the other, they refer to changing base values so it may not be easy to grasp the cumulative change over a period of time. Table 1 shows the example of growth rates for EU27 in the period of the current crisis. The fall in 2009 is clear yet the small growth rates for GDP forecast for 2010 and 2011 are many times interpreted as successful recovery from the crisis. They could be understood as a small improvement in the sense that further fall in GDP is not expected. However, they by themselves are not a proper signal of the severity of the fall in the crisis and that we can continue business as usual.

Table 1. Growth rates for EU27 in the period 2007-2011

	2007	2008	2009	2010	2011
GDP	2.9	0.7	-4.2	1.0	1.7
Total employment	1.8	0.9	-1.8	-1.0	0.2

Source: Eurostat data and forecast, see Tables 2 and 3

The examples below in Tables 2 and 3 will show that more attention needs to be paid also to levels and time, which can bring about additional information for a more thorough analysis and understanding of the situation. This does not mean that **growth rates** are not useful statistical measures for describing the situation; they **need to be complemented by other easily understandable statistical measures to facilitate the stakeholders understand the situation in a broader framework**¹.

Tables 2 and 3 offer two more statistical measures that can additionally describe the situation for GDP and total employment for EU27 countries, United States and Japan: **static index** of fall from the peak level **and S-time-distance**, which in this special declining phase indicates for how many years the current levels have fallen back to levels already achieved earlier.

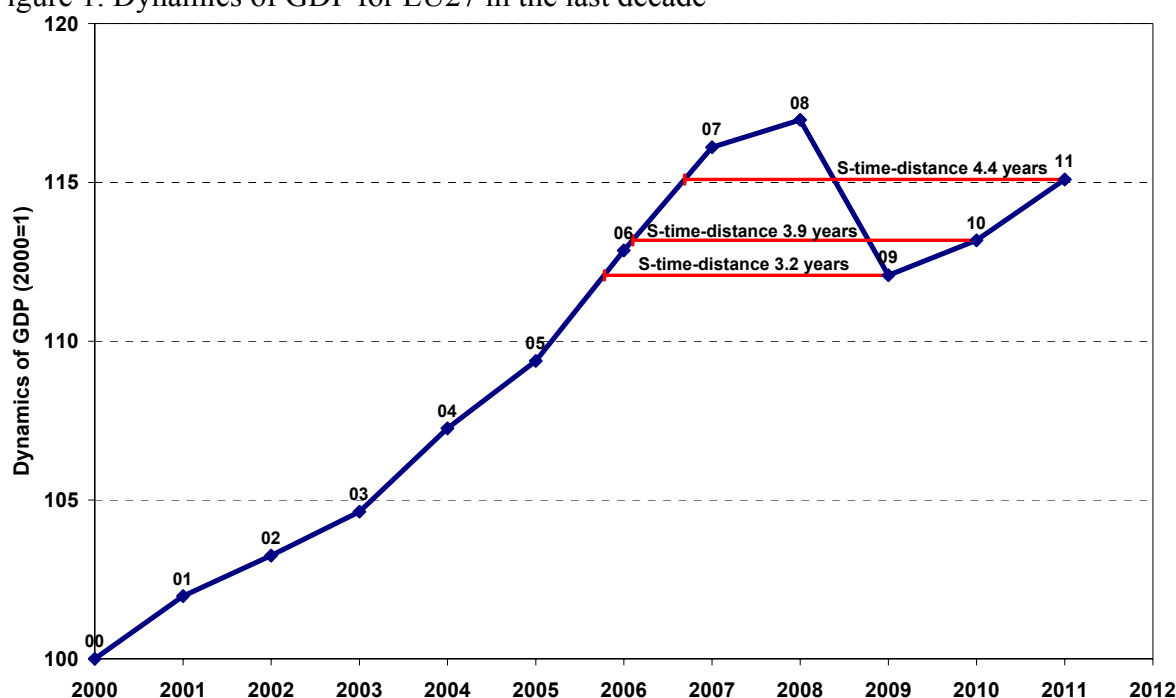
¹ In this field the present state-of-the-art is not fully exploiting the information content available in existing data with respect to certain elements of the time dimensions involved. A new generic statistical measure S-time-distance is suggested to open a new view to many aspects of time series analysis to be combined with existing static measures and growth rates.

For methodology see: http://www.gaptimer.eu/overview_of_the_methodology.html.

We shall pay more attention to the levels to look at the situation in the current crisis in the time distance perspective in two time frames: the immediate 5 year period 2007-2011 and the longer past historical reference. For yearly values of GDP the peak year was 2008, for two EU aggregates and for selected countries the Eurostat forecasts for the next 2010 and 2011 are evaluated in two dimensions: static index (2008=100) and S-time-distance. For the latter we estimate how many years will the level of GDP in years 2009, 2010 and 2011 expect to fall back according to Eurostat data and forecast. Details are in Table 2.

The fall in static terms is provided in the last three columns of Table 2. The S-time-distance fall back for EU27 can be visualised in Figure 1. The value of GDP in 2009 is compared with the past trend, in one year it fell to the value before 3.2 years, i.e. below the 2006 value. The expected level for 2010 shows slight improvement but it is 3.9 years behind the earlier trend, i.e. at about the 2006 level. While in percentage terms with the peak value of 2008 there is an improvement in 2010 but the lag to previous levels expressed with S-time-distance is still increasing as the growth rate in 2010 is lower than the earlier growth rates.

Figure 1. Dynamics of GDP for EU27 in the last decade



Source: Own calculations based on Eurostat data and forecast

Thus the additional description of the severity of the crisis beyond growth rates with two measures related to levels (static decrease from the peak level and time distance from the same historical levels) makes the situation much more transparent and understandable. **Time distance analysis lead to a summary statement that EU27 has in the current crisis lost 4 years of growth of GDP and of total employment.**

In Table 2 EU countries are sorted by the index of decrease from the peak value of 2008. The rows in the table refer to dynamics of GDP in the current crisis for each country separately; they can be compared as levels within each country in this period but these levels are very different among countries. With the exception of Poland in all other EU countries GDP fell in 2009 in various degrees, in Latvia to 82% of the peak value. Ranking of countries by S-time-distance fall back is different as it depends also on the past dynamics of GDP.

Table 2. How many years would the level of GDP in years 2009, 2010 and 2011 fall back according to Eurostat forecast

	S-time-distance (years) of fall back in the current crisis			Which past values of GDP are forecast for 2010 and 2011			Index (2008=100)		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
EU27	3.2	3.9	4.3	2005.8	2006.1	2006.7	95.8	96.8	98.4
EU15	3.4	4.1	4.5	2005.6	2005.9	2006.5	95.8	96.7	98.2
Poland	0.0	0.0	0.0	2009.0	2010.0	2011.0	101.7	104.5	107.9
Malta	1.9	2.4	0.0	2007.1	2007.6	2011.0	98.1	99.1	100.8
France	3.1	3.5	0.0	2006.0	2006.5	2011.0	97.4	98.7	100.1
Luxembourg	2.6	3.2	0.0	2006.4	2006.8	2011.0	96.6	98.5	100.9
Belgium	2.7	3.3	3.2	2006.3	2006.7	2007.8	97.0	98.3	99.8
Slovakia	1.8	2.4	0.0	2007.2	2007.6	2011.0	95.3	97.9	101.4
Portugal	3.6	4.2	4.8	2005.4	2005.8	2006.2	97.3	97.8	98.6
Cyprus	1.5	2.6	3.3	2007.5	2007.4	2007.8	98.3	97.8	99.1
Austria	2.5	3.1	3.4	2006.5	2006.9	2007.6	96.4	97.7	99.3
Netherlands	2.6	3.2	3.5	2006.4	2006.8	2007.5	96.0	97.3	99.1
Czech Republic	2.3	3.1	3.1	2006.7	2007.0	2007.9	95.8	97.3	99.7
Denmark	4.4	4.8	5.2	2004.6	2005.2	2005.8	95.1	96.6	98.4
Sweden	3.6	4.2	4.5	2005.4	2005.8	2006.5	94.8	96.5	98.9
Germany	3.4	4.0	4.4	2005.6	2006.0	2006.6	95.1	96.3	97.8
United Kingdom	3.7	4.3	4.5	2005.3	2005.7	2006.5	95.1	96.2	98.3
Spain	2.8	3.9	4.7	2006.2	2006.1	2006.3	96.4	96.0	96.7
Italy	8.2	8.0	7.1	2000.8	2002.0	2003.9	95.0	95.8	97.1
Greece	2.0	3.7	4.8	2007.0	2006.3	2006.2	98.0	95.1	94.7
Bulgaria	1.9	2.9	3.4	2007.1	2007.1	2007.6	95.0	95.0	97.5
Hungary	4.3	5.3	5.6	2004.7	2004.7	2005.4	93.7	93.7	96.3
Romania	2.1	2.9	3.5	2007.0	2007.1	2007.5	92.9	93.6	96.9
Finland	3.5	4.2	4.7	2005.5	2005.9	2006.3	92.2	93.5	95.5
Slovenia	2.7	3.6	4.3	2006.3	2006.5	2006.7	92.2	93.2	95.0
Ireland	3.9	5.1	5.5	2005.1	2004.9	2005.5	92.9	92.0	94.8
Estonia	4.3	5.2	5.8	2004.7	2004.8	2005.2	85.9	86.7	90.0
Lithuania	3.5	4.6	5.2	2005.5	2005.4	2005.8	85.2	84.7	87.4
Latvia	4.4	5.7	6.4	2004.6	2004.3	2004.6	82.0	79.1	81.7
United States	3.0	0.0	0.0	2006.0	2010.0	2011.0	97.6	100.3	102.8
Japan	5.1	5.1	5.4	2003.9	2004.9	2005.6	94.8	96.7	98.2

Own calculations based on Eurostat estimates and forecast

http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=nama_gdp_k&lang=en

Millions of euro, chain-linked volumes, reference year 2000 (at 2000 exchange rates)

Also for 2010 it is expected that all EU countries except Poland will still be below the 2008 level: from 1% to 22% according from one measure and falling back from 2.4 to 8 years according to the time distance measure. However, USA are expected to return to its 2008 GDP level while for Japan time distance would be 5 years. The time distance lag would be between 2 and 3 years for 5 EU countries, between 3 and 4 years 9 countries, between 4 and 5 years 7 countries and for 4 countries between 5 and 6 years. Mostly positive growth rates of GDP in 2010 were much too low to compensate for the fall in 2009.

Table 3. How many years would the level of total employment in years 2009, 2010 and 2011 fall back according to Eurostat forecast

S-time-distance (years) of fall back in the current crisis				Which past values of total employment are forecast for 2010 and 2011			Index (2008=100)		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
EU27	2.5	4.1	4.9	2006.5	2005.9	2006.1	98.2	97.2	97.5
EU15	2.7	4.3	5.2	2006.3	2005.7	2005.8	98.1	97.3	97.4
Luxembourg	0.0	1.0	0.0	2009.0	2009.0	2011.0	100.9	100.9	101.6
Poland	0.0	1.0	0.0	2009.0	2009.0	2011.0	100.4	100.4	101.0
Malta	1.3	2.1	0.0	2007.7	2007.9	2011.0	99.3	99.6	100.4
Germany	1.0	2.3	3.4	2008.0	2007.7	2007.7	100.0	99.6	99.5
Austria	1.5	2.6	3.5	2007.5	2007.4	2007.5	99.1	99.0	99.2
Belgium	1.2	2.7	3.6	2007.8	2007.3	2007.4	99.6	98.8	99.0
Cyprus	1.3	2.5	3.6	2007.7	2007.5	2007.4	99.2	98.6	98.4
United Kingdom	3.2	4.5	4.7	2005.8	2005.5	2006.3	98.4	98.2	98.8
France	2.5	3.9	4.7	2006.5	2006.1	2006.3	98.8	98.1	98.4
Netherlands	1.6	3.4	4.5	2007.4	2006.6	2006.6	99.1	97.5	97.4
Italy	3.1	4.6	5.5	2005.9	2005.4	2005.5	98.3	97.3	97.5
Sweden	2.5	3.8	4.7	2006.5	2006.2	2006.3	98.0	97.1	97.4
Portugal	9.2	10.4	11.4	1999.9	1999.6	1999.6	97.5	97.0	97.0
Greece	2.8	4.8	6.5	2006.2	2005.2	2004.5	98.8	97.0	96.2
Czech Republic	2.0	12.0	13.3	2007.0	1998.0	1997.7	98.8	96.9	97.3
Romania	N/A	N/A	N/A	N/A	N/A	N/A	98.2	96.6	97.4
Hungary	17.0	18.0	19.0	1992	1992	1992	97.2	96.3	97.0
Bulgaria	1.9	3.4	4.1	2007.1	2006.7	2006.9	97.1	95.9	96.5
Slovakia	1.9	3.7	4.2	2007.1	2006.3	2006.8	97.6	95.8	96.9
Slovenia	1.8	3.6	4.8	2007.2	2006.4	2006.2	97.8	95.5	95.1
Finland	2.7	4.8	5.6	2006.3	2005.2	2005.4	97.0	95.0	95.4
Denmark	2.8	4.7	9.3	2006.2	2005.4	2001.7	96.4	94.5	94.5
Spain	4.2	5.8	6.8	2004.8	2004.2	2004.2	93.3	91.0	91.0
Lithuania	9.3	9.4	10.4	1999.7	2000.6	2000.6	93.1	89.7	89.9
Ireland	4.4	6.2	7.0	2004.6	2003.8	2004.0	91.8	88.6	89.0
Estonia	9.8	10.0	11.1	1999.2	2000	2000.0	90.1	87.7	89.1
Latvia	12.5	>20	>21	1996.6	<1990	<1990	86.4	80.2	80.8
United States	4.8	6.0	6.7	2004.2	2004.0	2004.3	96.2	95.9	96.4
Japan	19.7	21.4	22.5	1989.3	1988.6	1988.5	98.4	97.4	97.2

Own calculations based on Eurostat estimates and forecast, for Estonia, Latvia and Hungary:

The Conference Board and Groningen Growth and Development Centre, Total Economy Database, June 2009
http://nui.epp.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace06_e&lang=en, Total employment, 1000 persons

Table 3 presents similar analysis for total employment showing even a more difficult situation. As seen in Table 1 the fall of total employment in 2009 was -1.6 percent, which is less than in GDP of -4.2 percent. However, growth rate and static index of decrease do not by themselves properly describe the severity of the present crisis with respect to employment. S-time-distance measure show a different complementary view of the situation as it takes into account that the growth rates of employment are generally considerably lower than that of GDP. Though in 2010 it is expected that for EU27 the fall from 2008 will be less than 3% as a combination of negative growth rates of employment in two years the S-time-distance lag is more than 4 years and is expected to increase to 5 years in 2011.

Compared with USA and Japan the situation for total employment in the EU in the current crisis seems to be less detrimental. In percentage terms total employment fell more in the USA, in EU and in Japan the fall was similar. However, S-time-distance shows again a different picture. The time lag for the USA is expected to be in 2010 about 6 years, for Japan about 21 years (USA level of total employment is expected to be at their 2004 level and for Japan at their 1988 level). The latter result is due to the fact that total employment in Japan was growing very slowly so that a decrease of less than 3% in the current crisis moved them back for more than two decades.

The forecast for 2011 shows that for 7 countries total employment would be shifted back to levels attained more than 10 years ago (before 2001). They are Portugal and six earlier socialist economies (Czech Republic, Hungary, Romania and the three Baltic members Lithuania, Estonia and Latvia). Even in static terms total employment fell for 5 countries (which include Ireland) between 9% and 19%.

S-time-distance measure adds a perspective that is easily understandable by everyone. This additional time distance perspective can be a very useful tool for better understanding of the situation needed for policy discussions among social partners in difficult circumstances. Looking only at growth rates of GDP and employment does not give a clear indication of the severity of the crisis to policy makers and to the general public.

The summary statement that EU27 has in the current crisis lost 4 years of growth of GDP and of total employment needs to be complemented with a large range of diverse situations in the countries. Also, the employment situation is shown to be even more difficult than that with GDP. In the next paper we shall show that investment rate has declined even more to affect the medium term possibilities of growth.