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Analysis of the Evolution of Statistics in Romania

Cătălin Angelo Ioan[1]

Abstract: This article examines the evolution of statistical data (in this case GDP) from their temporarily character to the final one. It has highlighted a number of inconsistencies or opposite evolutions which implies that the use of statistical data not definitive may lead to erroneous conclusions.

Keywords: GDP; statistics; index

1. Introduction

The approach of building theoretical models for forecasting, quality and quantity of data is an essential precondition for establishing relations both, but especially for their applicability.

A model that theoretically provide all kinds of functional relationships is required to consider the possible application in practice, otherwise becoming pure speculation with no utility.

In the activity of collecting the data needed for verification of a model or another, we found over time as they undergo changes, sometimes essential, that overturns the theory formulated from the start. It is clear that a well-designed model must take into account the stability of the solutions to changes in the parameters or variables. Conjectural models based on the same kind of behaviour or on periods "well chosen" will never have a scientific character, remaining on a purely speculative level.

This analysis follows a study, but not very profound scientific, of data (*provided by the National Institute of Statistics of Romania in its official documents*) variability. Will not interest us too much the causes of these changes, but more their implications for the modeling activity or setting verdicts on the Romanian economy.

As indicator of the analysis, we considered the Gross Domestic Product (*key indicator in the diagnosis of any economy*) in the period 2006-2014, data on both quarterly (*unadjusted due to the fact that the activity comparison refers to the corresponding period of analysis*) as well as annual, so they result from INSSE Monthly Statistical Bulletin of the above period.

2. Analysis of Changes in GDP Reports

Analyzing statistical data disclose by Monthly Statistics Bulletins of INSSE, regarding both the absolute size of GDP (*in current prices*) and the growth indices, we found that over three years (*time*

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[1] Associate Professor, PhD, Department of Economics, Danubius University of Galati, Romania, Address: 3 Galati Blvd., Galati 800654, Romania, Tel.: +40372361102, Corresponding author: catalin_angelo_ioan@univ-danubius.ro.

when they are present in reports in that bulletin) they remain constant (*with very little exception, for 2012, when the indicators have changed during the fourth quarter of 2014*) over the entire year.

GDP recalculations are made at the end of the year, an interested user not having the ability to track the dynamics of adjusting on intermediate time intervals.

In what follows, we understand by "year 1" - the data at the early next year of those of reference (*for example, for 2010 – data reported in January 2011*), "year 2" - the data at the beginning of staggered 2 compared to the reference (*for example, 2010 - data reported in January 2012*), "year 3"- the data at the beginning of delayed by 3 compared to the reference (*for example, 2010 – data reported in January 2013*). Specifying these periods (*on which, repeating again, GDP remains constant*) is necessary because, during the year in question on a quarterly basis, the level of GDP is reported, but at the end it changes. It should be stated that in statistics, as they appear in the Monthly Bulletins have the mention for year 1 – "provisional data", year 2 – "semifinal data", year 3 – "final data". The only exception were the data on 2008 who underwent a correction in the fourth year also.

Table 1. Evolution GDP reports (million current prices)

Reference year	Year 1	Year 2	Year 3
2006 - Trim.I	60985,7	61081,8	61828,7
2006 - Trim.II	75967,2	76224,1	77102,2
2006 - Trim.III	92989,4	94205	92818,4
2006 - Trim.IV	112476	113025	112901
2006-TOTAL	**342418**	**344536**	**344651**
2007 - Trim.I	68841,5	73268,9	74162,8
2007 - Trim.II	87063,7	92080,5	92519,5
2007 - Trim.III	111035	111653	112223
2007 - Trim.IV	137769	135759	137102
2007-TOTAL	**404709**	**412762**	**416007**
2008 - Trim.I	91130,3	93862,8	93666,7
2008 - Trim.II	115074	116467	116496
2008 - Trim.III	138324	142491	142418
2008 - Trim.IV	159430	161833	162119
2008-TOTAL	**503959**	**514654**	**514700**
2009 - Trim.I	96616,7	97214,2	93395,9
2009 - Trim.II	112073	113309	115300
2009 - Trim.III	130289	132052	134340
2009 - Trim.IV	152295	155432	158104
2009-TOTAL	**491274**	**498008**	**501139**
2010 - Trim.I	97263,3	95209,1	101402
2010 - Trim.II	117127	118965	122652
2010 - Trim.III	139408	143103	143085
2010 - Trim.IV	159843	165284	156555
2010-TOTAL	**513641**	**522561**	**523693**
2011 - Trim.I	105129	108216	108434
2011 - Trim.II	130553	129159	129230
2011 - Trim.III	158927	154126	154262
2011 - Trim.IV	183943	165207	165423
2011-TOTAL	**578552**	**556708**	**557348**
2012 - Trim.I	112443	111662	114035
2012 - Trim.II	136291	138486	141037

2012 - Trim.III	163935	162226	164735
2012 - Trim.IV	174798	174377	176874
2012-TOTAL	**587466**	**586750**	**596682**
2013 - Trim.I	120142	121624	121621
2013 - Trim.II	146290	148146	148257
2013 - Trim.III	171539	176568	176151
2013 - Trim.IV	193158	191246	191427
2013-TOTAL	**631130**	**637583**	**637456**
2014 - Trim.I	129672	129644	**-**
2014 - Trim.II	156435	156354	**-**
2014 - Trim.III	184572	183672	**-**
2014 - Trim.IV	198831	197908	**-**
2014-TOTAL	**669509**	**667577**	-
2015 - Trim.I	140356	**-**	**-**
2015 - Trim.II	162662	**-**	**-**
2015 - Trim.III	197253	**-**	**-**
2015 - Trim.IV	209997	**-**	**-**
2015-TOTAL	**710267**	-	-

Source: Monthly Statistical Bulletin of Romania – 2006-2015.

Table 2. Evolution GDP Index reports (percent against the corresponding period of the previous year)

Reference year	Year 1	Year 2	Year 3
2006 - Trim.I	106,9	107	107
2006 - Trim.II	107,8	107,9	108
2006 - Trim.III	108,3	108,4	108,3
2006 - Trim.IV	107,7	107,9	108,1
2006-TOTAL	**107,7**	**107,9**	**107,9**
2007 - Trim.I	106,1	106,1	106,1
2007 - Trim.II	105,7	105,9	106
2007 - Trim.III	105,7	105,8	105,9
2007 - Trim.IV	106,6	106,8	106,8
2007-TOTAL	**106**	**106,2**	**106,3**
2008 - Trim.I	108,2	108,5	108,5
2008 - Trim.II	109,3	109,6	109,6
2008 - Trim.III	109,2	109,4	109,4
2008 - Trim.IV	102,9	103,1	103,1
2008-TOTAL	**107,1**	**107,3**	**107,3**
2009 - Trim.I	93,8	93,9	94,1
2009 - Trim.II	91,3	91,3	92
2009 - Trim.III	92,9	92,9	92,7
2009 - Trim.IV	93,5	93,5	94,7
2009-TOTAL	**92,9**	**92,9**	**93,4**
2010 - Trim.I	97,8	97,4	97,8
2010 - Trim.II	99,6	98,9	99,5
2010 - Trim.III	97,8	97,8	98,3
2010 - Trim.IV	99,4	99	99,5
2010-TOTAL	**98,7**	**98,4**	**98,9**
2011 - Trim.I	101,7	101,5	101,8
2011 - Trim.II	101,4	101,2	101,5

2011 - Trim.III	104,4	104,1	103,9
2011 - Trim.IV	101,9	101,6	101,9
2011-TOTAL	**102,5**	**102,2**	**102,3**
2012 - Trim.I	100,1	100,1	100,2
2012 - Trim.II	101,3	102	102,1
2012 - Trim.III	99,7	99,4	99,5
2012 - Trim.IV	100,3	100,8	100,8
2012-TOTAL	**100,3**	**100,6**	**100,6**
2013 - Trim.I	102,1	102,1	102,2
2013 - Trim.II	101,4	101,4	101,6
2013 - Trim.III	104,2	104,2	104,2
2013 - Trim.IV	105,2	105,2	105,3
2013-TOTAL	**103,5**	**103,4**	**103,5**
2014 - Trim.I	104,1	104,3	-
2014 - Trim.II	101,6	101,7	-
2014 - Trim.III	103,3	103,2	-
2014 - Trim.IV	102,6	102,8	-
2014-TOTAL	**102,9**	**103**	-
2015 - Trim.I	104,3	-	-
2015 - Trim.II	103,4	-	-
2015 - Trim.III	103,6	-	-
2015 - Trim.IV	103,7	-	-
2015-TOTAL	**103,7**	-	-

Source: Monthly Statistical Bulletin of Romania – 2006-2015.

A first analysis will be those of the percentage of variation of data from one period to another. For a more suggestive graphical representation we calculated deviation of 100%.
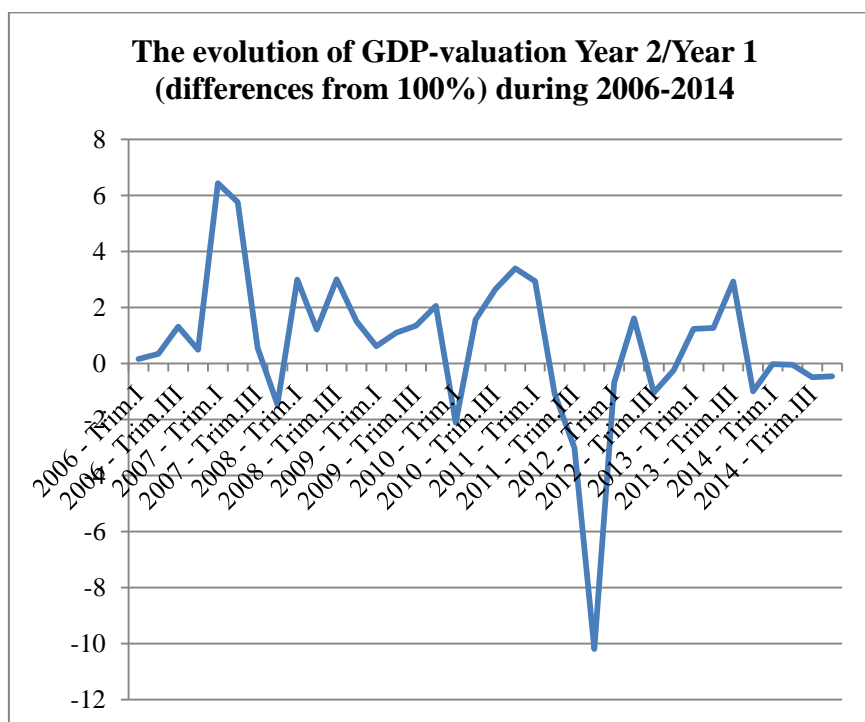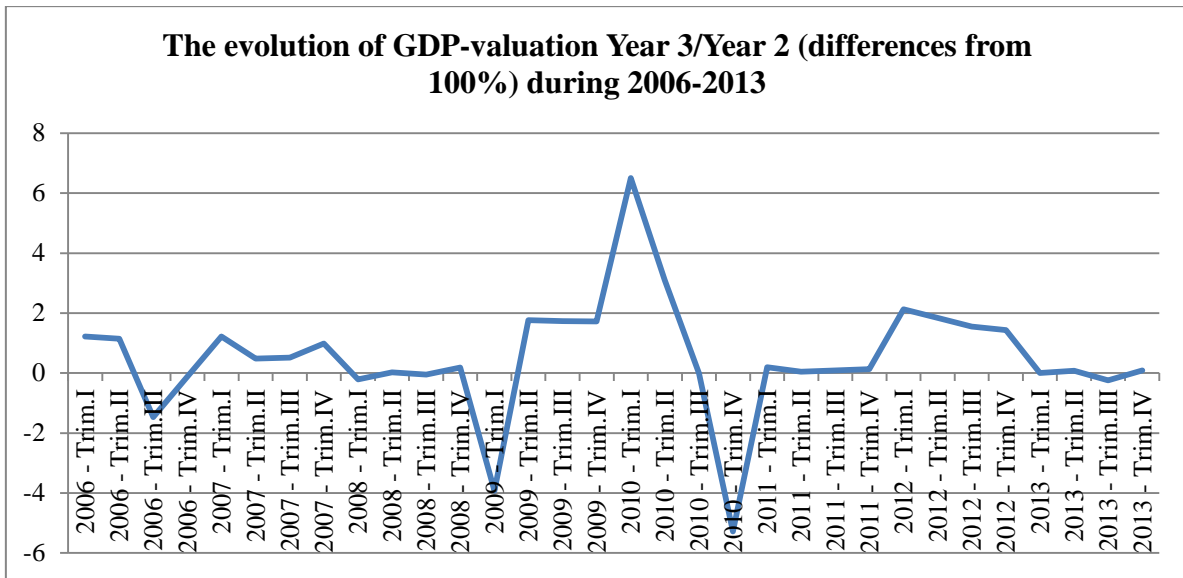

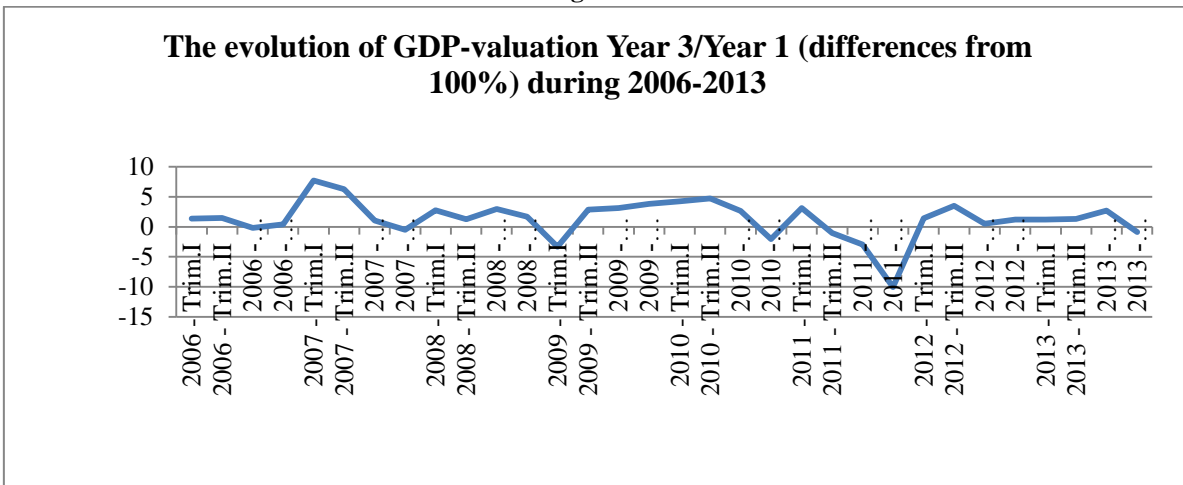**Figure 1.**

Figure 2.

Figure 3.

Analysis of variance of quarterly values of GDP (from year 1 to year 2) reveals the following:

- In the period 2006 – 2011-Q1, forecast data adjustments have seen values supraunitary (*with two exceptions – 2007-Q4 and 2010-Q1*), which indicates an underestimation of the GDP at year-end. It may here remark extreme as those from 2007-Q1 where the undervaluation was 6.43% or from 2010-Q4 – 3.4%)

- Between 2011-Q2 – 2012-Q4, data adjustments envisaged subunit values (*with one exception - 2012-Q2*) which indicates an overestimation of the GDP at year-end. It may here remark extreme as that of 2011-Q4 when the overestimation was 10.19%

- Between 2013-Q1 – 2014-Q4 the expected data adjustments have known both subunit values and supraunitary, but within acceptable errors for data collection activity.

Variations in data from Year 2 to Year 3, however, are even more interesting. Basically, these variations should be to be very small, because if initially (*in January*) GDP forecast was not based on definitive data of the year ended, after a year statements and financial reports should be final. It appears however differences situated somewhere between -2% and 2%, but which are inexplicable

(*from a strictly economic*) are the differences from 2009-Q1 (-3.93%), 2010-Q4 (-5.28%) and 2010-Q1 (6.5%). What is even more interesting is that these corrections were contrary to earlier, meaning that if a correction from year 1 to year 2 was above or below the unity, then it changed its position regarding below or above the unity.

The coincidence of that in the first quarter of 2009, economic expectations were very high after a period of expansion and forced unsustainable economy and not recognizing the signs of the announcing economic crisis and subsequent triggering of it (*official recognition came strangely after the first reporting of GDP in 2009*) is bizarre. Even if the economy had gone into recession, reporting forecast was improved after one year (*early 2011*) and later (*in 2012*) to return and to recognize a decline in GDP compared to the forecasted 3.33 %.

The situation of the fourth quarter of 2010 is less clear in the sense that after an adjustment of 3.4%, after one year data were decreased by 5.28%. The first quarter of 2010 had a contrary trend. If the initial adjustment was negative of -2.11%, after another year it jumped to 6.5%.

Overall, the dynamics of provisional data (*year 1*) to the final (*year 3*) had recorded variations between -3% and 3% with exceptions like worrying: 2007-Q1 (7.73%) and 2011-Q4 (-10.07%).

Annual data analysis reveals the same failures in taking real data, registering difference of about 2%, usually positive. The exception of 2011 with a deviation of -3.66% of forecast data (*year 1*) and the final (*year 3*) raises a warning for what could theorists define models for Romania's withdrawal from the crisis. If these percentages were not alarming for economies that record high pace of economic growth, for Romania, which stood, with very few exceptions (*and even then, questionable in terms of sustainability*), somewhere in the 0-2% they can lead to conclusions totally opposite to economic reality.
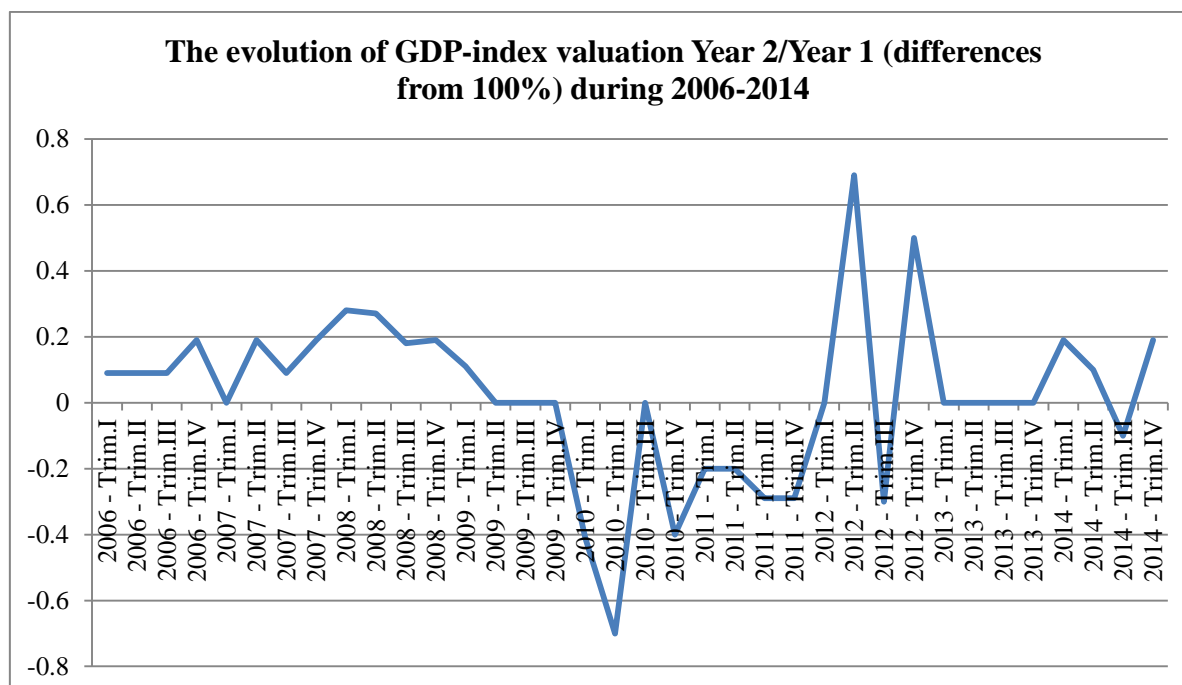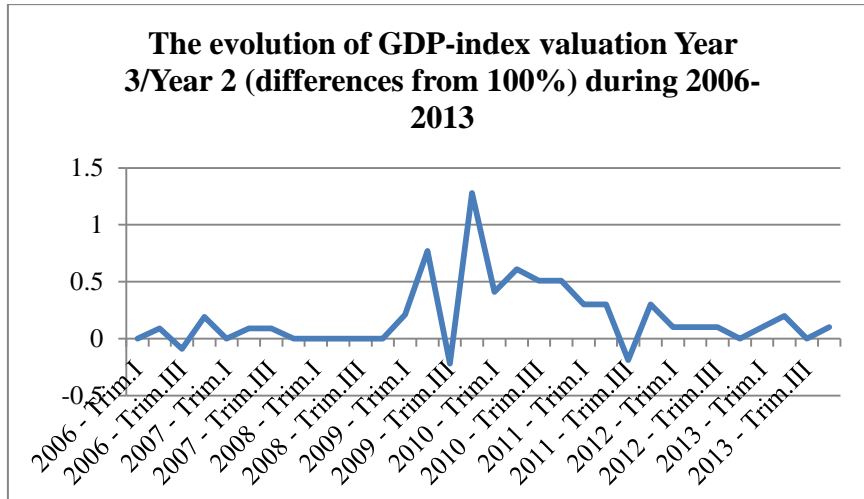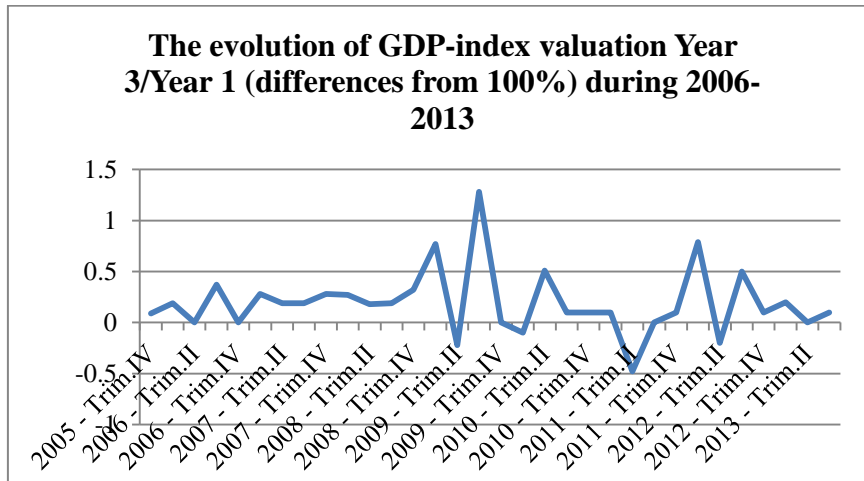

Figure 4.

Figure 5.

Figure 6.

The analysis of variance of the quarterly values of the GDP index (*from year 1 to year 2*) reveals that during 2006-Q1 – 2009-Q4 and 2012-Q1 – 2014-Q4, except for two negative adjustments, it recorded positive changes but not significant, ranging from 0 to 0.69%.

Between 2010-Q1 – 2011-Q4 the adjustments of the indices were negative (*although not very big - a minimum recorded in the second quarter of 2010 to -0.7%*) reflecting overestimation of economic growth even during the peak of the economic crisis.

Again, as in the analysis of raw data, the variations from the semifinal to the final data (*from year 2 to year 3*) were expected to be around 0. Unfortunately, again, where disruptions in the database were the biggest for the period of economic crisis, the changes were essential in the index, recording 0.77% in 2009-Q2, 1.28% in 2009-Q4, after this time hovering somewhere in the range 0.3-0.6%.

Correlating the two work areas adjustments (*Year 1-Year 2 and Year 2-Year 3*) we observe constant changes and opposite, between 2010-Q1 – 2011-Q4 occurring 6 (*out of 8*) changes in indices with opposite trends.

However, we appreciate that, unlike raw data, growth indices variations were much smaller which gives greater confidence in their use in the models than the first.

An interesting phenomenon occurs, however, in the case of GDP growth indices (*calculated in comparable prices*). Basically, I=$\dfrac{GDP_n}{GDP_{n-1}}$ where GDP0$_n$ is calculated in prices of the year "n-1". On the other hand, if we consider the adjustment of GDP$_n$ in the 2nd year (*semi-final value*), it will be divided by GDP$_{n-1}$ (*for year 3 – final value*). Noting that index with I$_{n,2}$. If we consider now the year 3 and GDP$_n$ (*final value*) it will divide also by GDP$_{n-1}$ also final date from the previous step. Let note this index with I$_{n,3}$. Therefore, at an increase in the estimate GDP$_n$ from year 2 to year 3 will must have an increase of the index I$_{n,2}$ to I$_{n,3}$ and vice versa. The problem is that at the consultation of statistical data, is often exactly the opposite. Thus, in 2006=Q4 we have a decrease in the gross amount of 0.11% (*from year 2 to year 3*), but in the same time the index increases by 0.19%. Between 2009-Q1 – 2010-Q4 longer appear also another 4 (*out of 8*) such situations. The observation could support the change in the GDP deflator, but the data do not appear explicitly in its variations from year to year, which again leads to ambiguities on statistical.

3. Conclusions

The above analysis tries to give a possible solution to the use of statistics. In principle, the statistical data should be considered in their final values at the beginning of the third year after the end of the reference year.

In this case, however, the analysis will stop at least two years before the current year, leading at virtual models, inapplicable to the current situation, especially if the economy continues changing as the Romanian one.

Using GDP ratios is useful in very rare cases, because they do not reflect the absolute sizes and do not give information on GDP components - absolutely necessary within the models (*eg IS-LM*).

We suggest, for example, the use of regression equations for the adjustments of gross GDP data to get a definitive prognosis estimation. But this is risky, especially when the economic growth rate is almost zero, propagated errors leading to erroneous conclusions.

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