TRENDS IN INFLATION-UNEMPLOYMENT RELATIONSHIP
BEFORE AND AFTER ACCESSION TO EU

Lucian-Liviu Albu[∗]

Abstract

First of all, we present synthetically a few empirical results regarding changes in the inflation-unemployment relationship in West European countries during last three decades and in few Central and Eastern countries during the last fifteen years. Then, coming from a general standard model for estimating natural unemployment (Ball and Mankiw, 2002) and using four smoothing filters, we estimate some possible trajectories for this relationship and for the potential GDP in Romania.

First of all, we present synthetically a few empirical results regarding changes in the inflation-unemployment relationship in West European countries during last three decades and in few Central and Eastern countries during the last fifteen years. Then, coming from a general standard model for estimating natural unemployment (Ball and Mankiw, 2002) and using four smoothing filters, we estimate some possible trajectories for this relationship and for the potential GDP in Romania.

As in standard literature is asserted there is an implicit circular relationship between productivity growth and potential level of production (and consequently the estimation of natural rate of unemployment is also altered). In order to avoid such emerging impediment in any estimating macroeconomic model, an autonomous dynamic model to estimate the trend of productivity growth must be used. Moreover, taking into account that current level of productivity is implicitly influenced by the actual unemployment rate, usually it is recommended as a more accurate solution to try to obtain firstly an estimate for the "pure" productivity. This must be neutral relating to short-run changes in employment, but in long-run it is affected by factors such as general technological progress, rising of education level, growth of R&D system, extending of the "new economy", etc. We use a simple dynamic model to estimate the growth of pure productivity independently from the actual level of employment and implicitly of unemployment rate. Then estimated changes in pure productivity level are compared with potential production trend in case of Romanian economy during transition period.

Empirical studies demonstrate, on the background of business cycles, several major changes in economies of West European countries during last three decades (Dăianu and Albu, 1996; Albu, 1998 and 2001). Among trends it can be noted the impressive decrease in inflation followed by a continuing growth of unemployment and general diminution of the yearly growth rate of production (GDP). An important result of investigation is that of a smaller volume in 3D map (estimated by including the variation of the three macroeconomic indicators), which represents a stronger economic stability and

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consequently less strain in economic system. In the figure of Annex 1 it is shown a graphical representation of the evolution during three decades (1970-2000) in the three-dimensional space: unemployment rate (u%) - annual growth rate (y%) - inflation (π%), including ten EU countries (Belgium, Denmark, England, France, Germany, Italy, Ireland, Holland, Portugal, and Spain). The trend was from a period in which high inflation predominated toward one in which unemployment plays the main role. This evolution could mean that on the unemployment-side occurred a relaxation, higher levels of unemployment being viewed as normal but is not the case for the inflation level. A deeper analysis showed the possibility of some persistent trends and long-run attractors.

On the other hand, in East European countries there was an opposite situation at least during the first years of transition; open inflation rose rapidly in the region whereas unemployment did also rise but at a smaller pace. There are evidences demonstrating that the long-run trends tend to be similar to those registered in Western countries. In the figure of Annex 2 it is shown a graphical representation of the evolution during the last fifteen years (1990-2004) in the three-dimensional space: unemployment rate - annual growth rate - inflation, including six transitional economies from Central and Eastern Europe (Bulgaria, Czech Rep., Hungary, Poland, Slovakia, and Slovenia).

In case of each individual Eastern economy the most important question is how long the transition period will be. Despite of a relatively short period since 1989, in case of Eastern countries it seems to emerge a convergence process relating the natural rate of unemployment. The main problem continues to be a relatively high inflation comparing with the EU standards (especially in case of Romania where the annual inflation will decrease below 10% only since this year).

Following some studies existing in literature (Staiger et al., 2001; Ball and Moffitt, 2001; Ball and Mankiw, 2002), in order to estimate natural rate of employment we used aside the simple linear trend (Ye) other four trends based on the following filters: *regress* (Y_TR), *loess* (Y_L), *ksmooth* (Y_TL), and *Hodrick-Prescott* (Y_HP). On the base of simulations, we can also see the unfavourable impact of positive difference between the effective unemployment rate and its natural rate on inflation dynamics ($\Delta\pi$). In case of linear trend the unemployment gap is $\Delta U=U-Ye$, but in case of the four selected filters it is noted $\Delta UR=U-Y\_TR$, $\Delta UL=U-Y\_TL$, $\Delta UK=U-Y\_TK$, and respectively $\Delta UH=U-Y\_HP$. As we can see from the Figure 1, as general rule, the points in 2D space, ΔU-$\Delta\pi$, are distributed in sectors II and IV (in trigonometric sense) over the right line transcending the origin of coordination axes. Eventual differences (the evading from two mentioned sectors) can be attributed to the short run supply shocks.
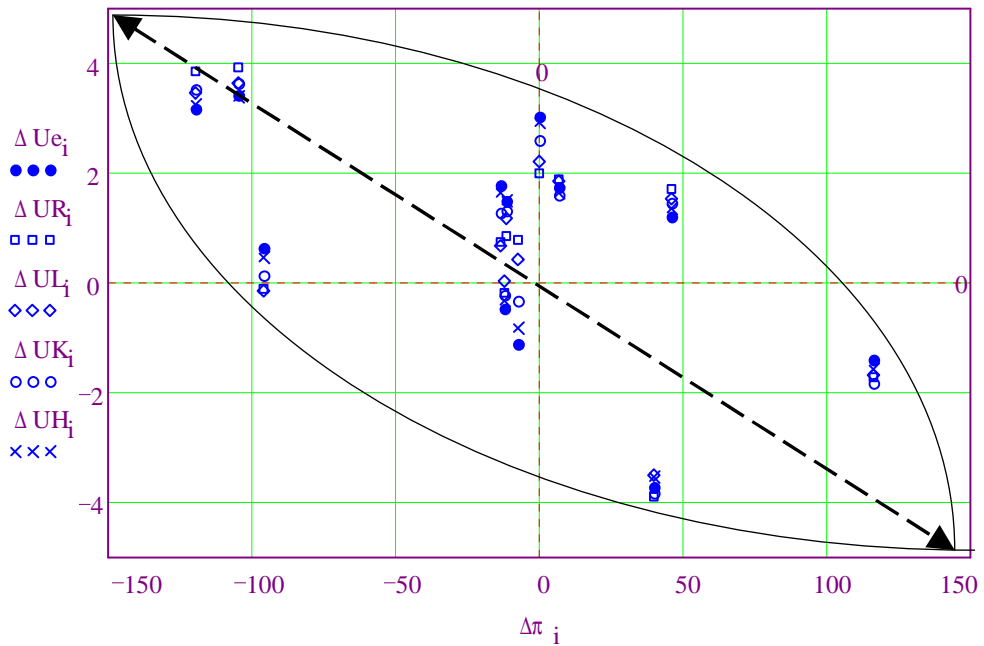
Figure 1.

Moreover, corresponding to the four used filters, we computed the natural (or potential) level of GDP, the output gap, and respectively the correlation coefficient between it and inflation variation. The general level of correlation coefficient between output gap and variance of inflation ($\Delta\pi$), for the period 1992-2003, was positive (between +0.616 and +0.644). From Figure 2, we can see that in the first part of transition period (before 1998) the inflation is accentuated procyclical relaying to output gap (correlation coefficient between +0.669 in case of TL filter and +0.714 in case of HP filter). However, after 1998 it is countercyclical (correlation coefficient between -0.420 in case of HP filter and -0.836 in case of TR filter), that could mean a favourable temporary situation when a growth in output may be accompanied by a negative change in inflation. Indeed, after the accession to EU this favourable correlation will probably change, as is the standard situation in a consolidated market functioning economy.
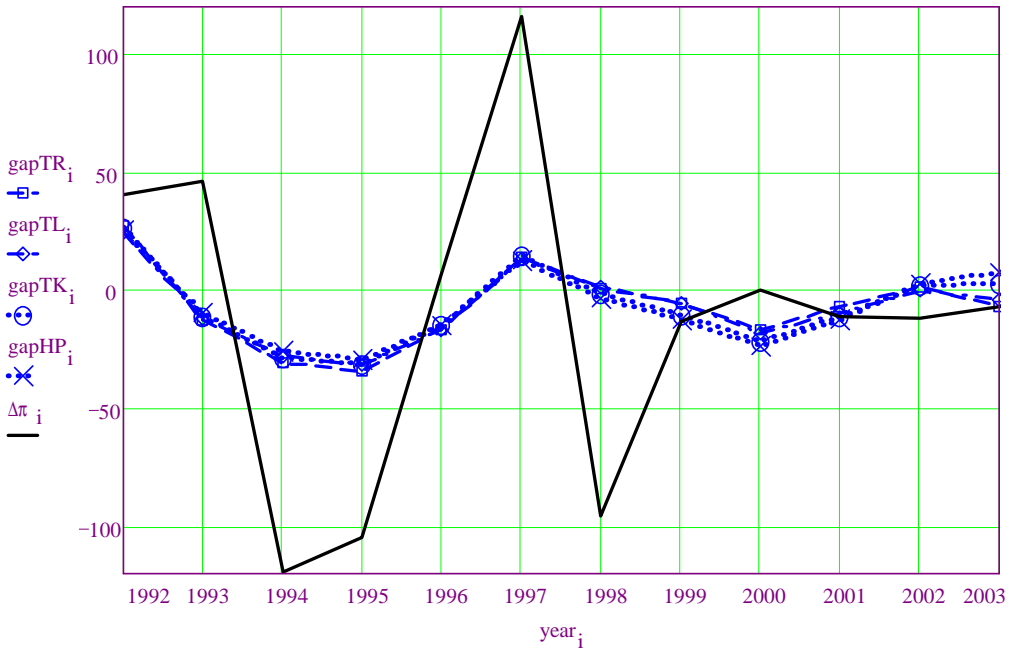
Figure 2.

Related to the past evolution, more explanation could be extracted in case of considering the dynamic process of real reforming and restructuring of the national economy: a prolonged and hesitant restructuring process of economy in first part of transition (before 1998); and a more determinate and accelerated process of it during last years (after 1998).

In order to estimate the level of pure productivity and its trend in case of Romanian economy, we conceived a simple particular model having as hypotheses the following two equations (the time subscript, i, being omitted):

$$q = A La^{\alpha} = A L^{\alpha} \mu^{\alpha} = qmax\, \mu^{\alpha}$$

$$s = s0\, La$$

where q and s are production (GDP) and respectively all costs implied by its achievement (taking into account that the production function has an alone factor, so the active labour force); La and L are employment and respectively labour force; qmax and s0 are production under the hypothesis of an integral utilization of labour force (La=L) and unitary cost (indeed including also salary) per person in active labour force, La, respectively; α is a positive and sub-unitary coefficient, which determinates how look the production curve function of employment share, μ, in total labour force, L (μ=La/L). For the moment all considered variables are evaluated in real terms, therefore under the hypothesis of constant prices (of one year selected as base).

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The difference between q and s can be interpreted as being the profit or net accumulation, therefore the quantity that stimulates entrepreneurs to make future investments and to develop their affaires. It mainly depends on two factors: employment degree, μ, and respectively coefficient α. Since the evaluation of the employment share in total available labour force is not a problem, to estimate α is an extremely difficult issue, as well as its economic interpretation. Economists generally accept the sub-unitary restriction, as it ensures the concavity of production function. The explanation is: as employment share growths, tending to value one, the average level of labour productivity tends to decrease (as well as the adapting possibilities of entrepreneurs to some permanent moving markets). In order to solve the problem of estimating the production function curvature, we took into account also the long-run price evolution. The hypothesis that we adopted, however very restrictive, is referring to the absence of some pertinent information on the future evolution of prices (as it is the case of an economic system functioning in high inflation, as well as that of Romanian economy in transition period). The remained solution is to compute maximization of the future profit by reporting to actual level of unitary costs (although knowing that in reality this is not the case for the future period). It would be reasonable that even such decision (founded on a highly restrictive hypothesis, like that of basing the maximization of the future profit on maintaining unchanged the specific costs) could yield sweet fruit in the future, in any way larger than in case of no evaluation calculus. The real adjustment to be operated (indeed instantaneously conforming to the "new wave" theory of rational expectations) then when the pressures on cost (such as for instance the trade unions' pressures) will not confirm the effective pre-evaluation. The implicit hypothesis of this "backward dynamics" mode of interpretation is that the effective change of unemployment rate in current period from precedent period corresponds even to the solution of profit maximization under the hypothesis of maintaining unchanged cost between the two consecutive periods, but also to the modification of total price of production exactly at the value effectively registered. So, the actual level of unemployment rate means even its optimal level, however computed previously on the base of total cost in precedent period together with the index of prices in current period. Since we accept this interpretation, the maximization function will be:

$Be\,(\mu) = Q - s \ = \ q\,p \ - \ s$

WHERE Be IS THE ANTICIPATED PROFIT (DESPITE OF KNOWING THAT THE PLANED BENEFIT WILL NOT BE INTEGRALLY OBTAINED), Q IS VALUE OF PRODUCTION IN CURRENT PRICES, P. THIS FUNCTION ADMITS A MAXIMUM GIVEN BY THE SOLUTION OF THE FOLLOWING EQUATION:

$p = (\ \mu^{\,1-\alpha}\ )\,/\,\alpha$

THE RESTRICTION IMPOSED BY THIS EQUATION ALLOWED US TO ESTIMATE, ONLY BY USING A SPECIAL NUMERIC PROCEDURE, THE VALUES OF α COEFFICIENT FOR THE PERIOD 1990-2003. THE MODEL PERMITTED TO ESTIMATE ALSO OTHER SYNTHETIC INDICATORS CHARACTERIZING THE EVOLUTION OF THE ROMANIAN ECONOMY DURING THE TRANSITION PERIOD, SUCH AS:

- Coefficient of using capacity (or the degree of using potential GDP, noted here as q_{max})

$$k = q / qmax = \mu^{\alpha}$$

- Share of profit

$$b = B / Q = (Q - s \, p) / Q = (q - s) / q = 1 - \mu^{1-\alpha}$$

In order to identify the type of relation between unemployment and productivity, we examined the estimated data supplied by the above two models (model of natural rate of unemployment and respectively the "pure" productivity model) together. Many times the authors are using for the productivity growth an inverted scale to reflect better the two supposed inverse movements: the long-run unemployment trend and productivity growth trend. In case of our application on Romanian economy in transition period, we maintained the original scales, but used a calibrating procedure to force the two trends to come in a closer region of their co-joint space. In Figure 3 we are presenting the natural rate trends and the growth rate of "pure" productivity (noted as y_wL90) together. On the graph, time, t, means the years in period 1992-2003, noted as 2…13 (the estimated levels of natural rate are here considered at the beginning of each year). From this graphical representation it is an evident inverse correlation between the estimated natural rate of unemployment and productivity growth. So, we could conclude that, at least in case of transition period, the productivity acceleration is accompanied by a decrease in the natural rate and when the productivity decreases the natural rate increases rapidly.
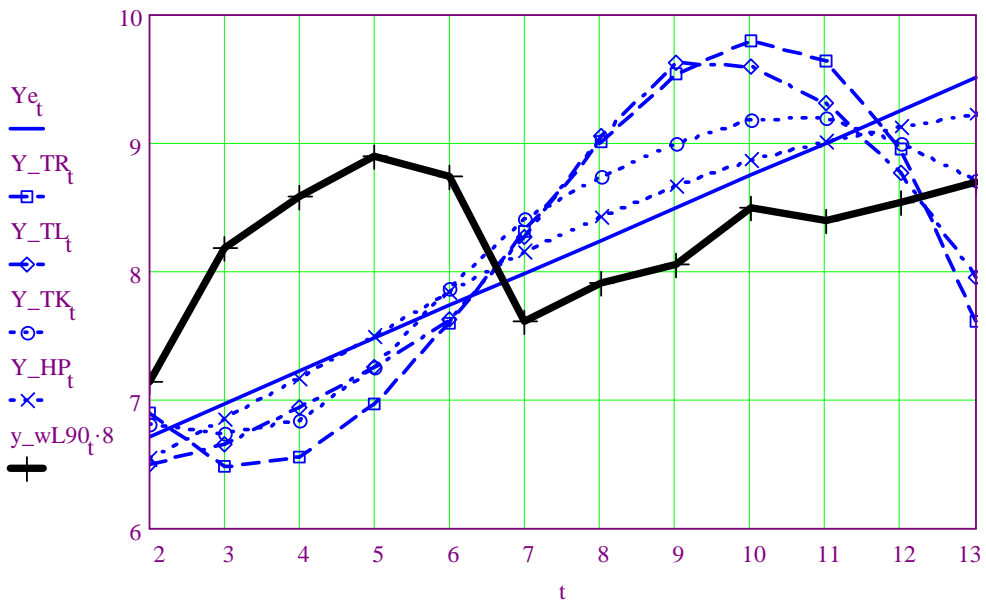

Figure 3.

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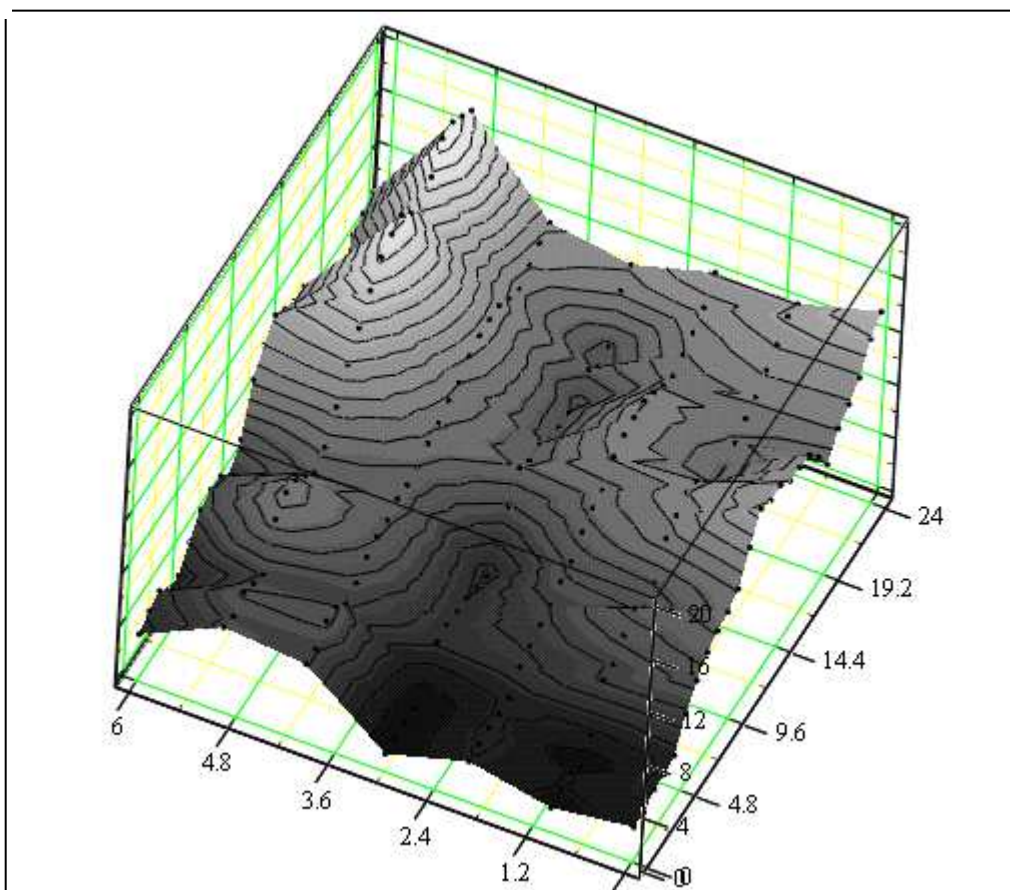
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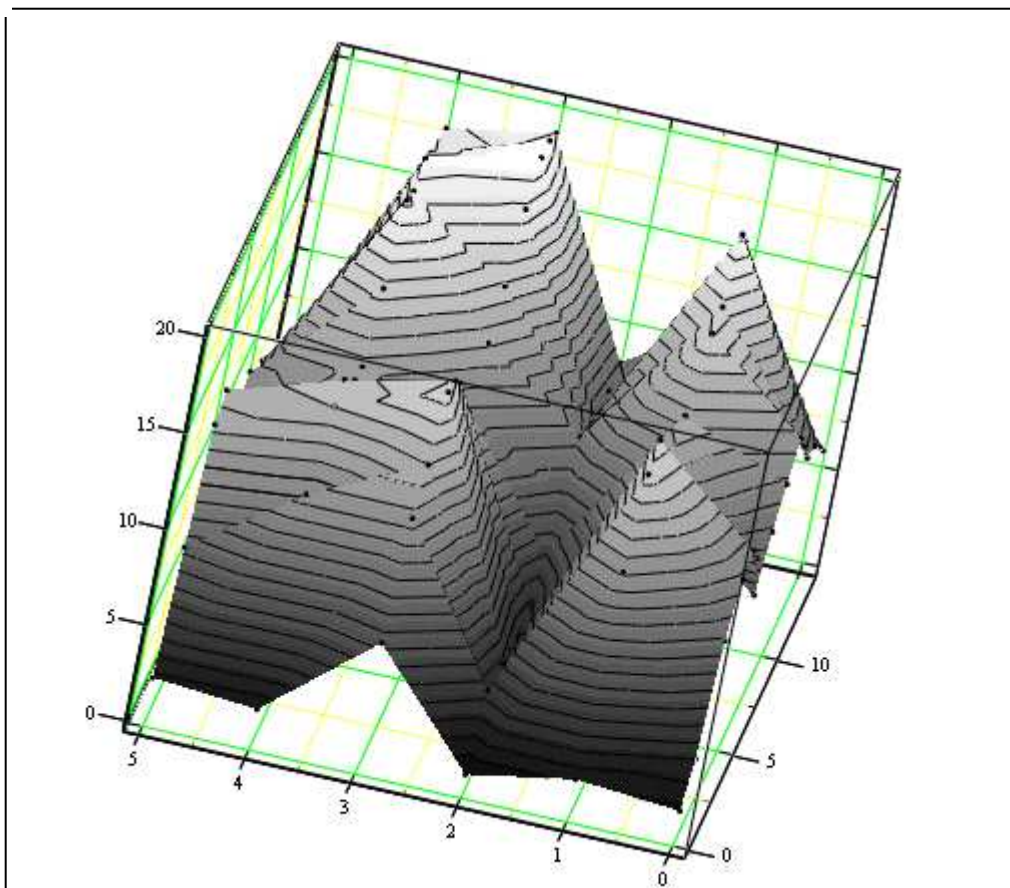
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u% , y% , π%

Annex 2

u%, y%, π%