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Quantifying The Impact Of Current Crisis On The Convergence In EU And Post-Crisis Scenarios

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QUANTIFYING THE IMPACT OF CURRENT CRISIS ON THE CONVERGENCE IN EU AND POST-CRISIS SCENARIOS

ALBU Lucian-Liviu

Abstract

In specialised literature interest and investment are among the central variables influencing the growth rate. Due to the complexity empirically demonstrated by the interest rate – investment – GDP growth relationship when we try to analyse or to forecast the economic dynamics, last decades a growing concern over the modelling this relationship has increased attention among officials, politicians, and economists. There are several reasons why they should be concerned, as follows: under new trends in economy caused by the impact of globalisation and expanding of the “new economy”, macroeconomics policy could be based on inappropriate baseline projections or benchmark values for principal indicators; a growing tendency of foreign investment and capital and labour migration having major impact on main macroeconomic variables; integrating process and convergence, in case of new EU members; etc. Certainly the current crisis is affecting seriously the convergence process in EU. Among macroeconomic correlations, interest rate – investment – growth rate has a fundamental role. In the general process of economic development and in the context of convergence in EU for the post-crisis period, perhaps this relationship will become more studied by economists and policy makers. Based on statistical data for last years, we try to build a model in order to investigate the interest rate - investment - growth rate relationship in case of EU members and in the same time to verify some hypotheses usually in standard economic literature. Applying such simple models derived from standard ones in our experiment we estimated their parameters in case of EU countries. The main two partial models are referring to the impact of investment on GDP growth rate and respectively to the relation between interest rate and investment. Moreover, an equation including inflation dynamics was taken into account. Finally, the derived global model demonstrates complex dynamics, moreover permitting to compute so-called natural rate of interest and other key-parameters for macroeconomic decisions.

Keywords: *convergence, spatial distribution, investment ratio, growth rate, interest rate, depreciation rate, contour plot.*

JEL Classification: *C51, E22, E43, E27, O52*

Introduction

Starting from the spatial distribution in EU of some fundamental development indicators, we try to estimate the impact of the prolonged crisis. During last years, the less developed countries in EU were most affected by crisis. Their investment power, as a main factor of improving the GDP growth rate, was primary affected. Moreover, the actual global crisis seems to provoke new changes in the economic growth mechanism.

As empirical starting point, based on empirical evidence for last years, we are using a number of EU stylised maps in order to show the spatial distribution of main factors of growth and a number of 3D representations of their correlations. As convergence theory is asserting, there is in EU a relative strong inverse correlation between the initial level of GDP per capita and growth rate. Moreover, we estimated at the level of EU the impact of changes in macroeconomic policy (reflected by measures in mater of investment, inflation, interest rate, etc.) on the convergence process.

Empirical evidences in EU

In context of actual convergence policy in EU, it is useful to analyse the spatial distribution of some basic macroeconomic indicators. Among selected macroeconomic variables, the most significant is GDP per inhabitant. In Figure 1 is shown its spatial distribution in 2010, as a stylised map of EU (excluding Cyprus and Malta), where LO is longitude (on its left side relating to the origin, 0 meridian, we changed West longitude, as it is marked usually on geographical maps, in negative values), LA – latitude, and y2010 – level of GDP per capita in thousand USD. On the stylised map we can see two distinct groups of regions delimited by 40 to 100 contour lines (red colours) and respectively by 40 to 10 contour lines (blue colours) representing highest and respectively lowest GDP per capita levels. As general rule, GDP per capita level is increasing from the right side of EU stylised map (eastern EU regions) to the left side (western EU regions) and respectively from the bottom (southern EU regions) to the top (northern EU regions).

Due to the impact of the crisis that could alter the long term convergence process, in case of other macroeconomic variables we decided to show their spatial distribution in EU for the year 2007 (before crisis). In case of the main factor of development, investment ratio (evaluated as the share of investment in GDP, in %), noted as α , generally we can see higher levels in eastern and southern regions of EU and lower levels in western and northern regions (Figure 2). Moreover, in 2007, relatively similar spatial distribution resulted for growth rate (in %), r , and inflation (as GDP deflator, in %), π (Figures 3 and 4).

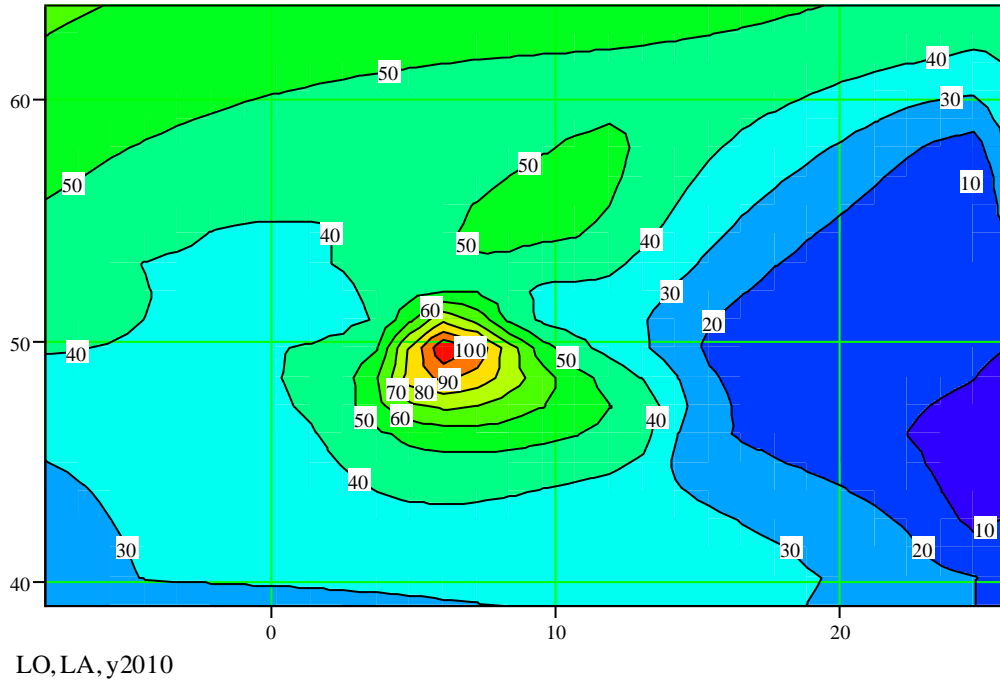


Figure 1.

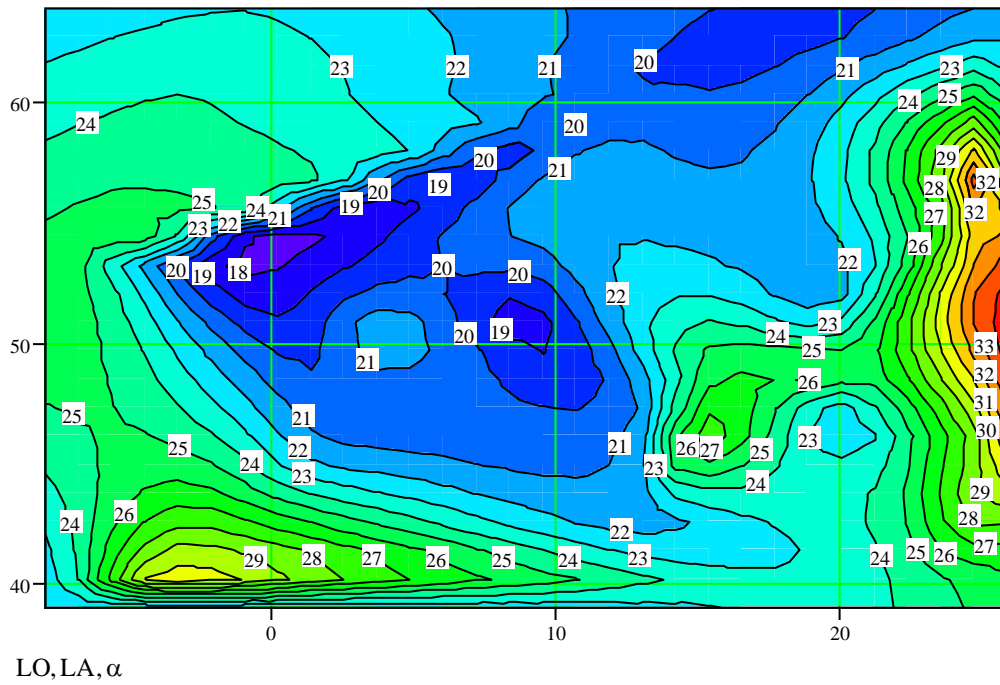


Figure 2.

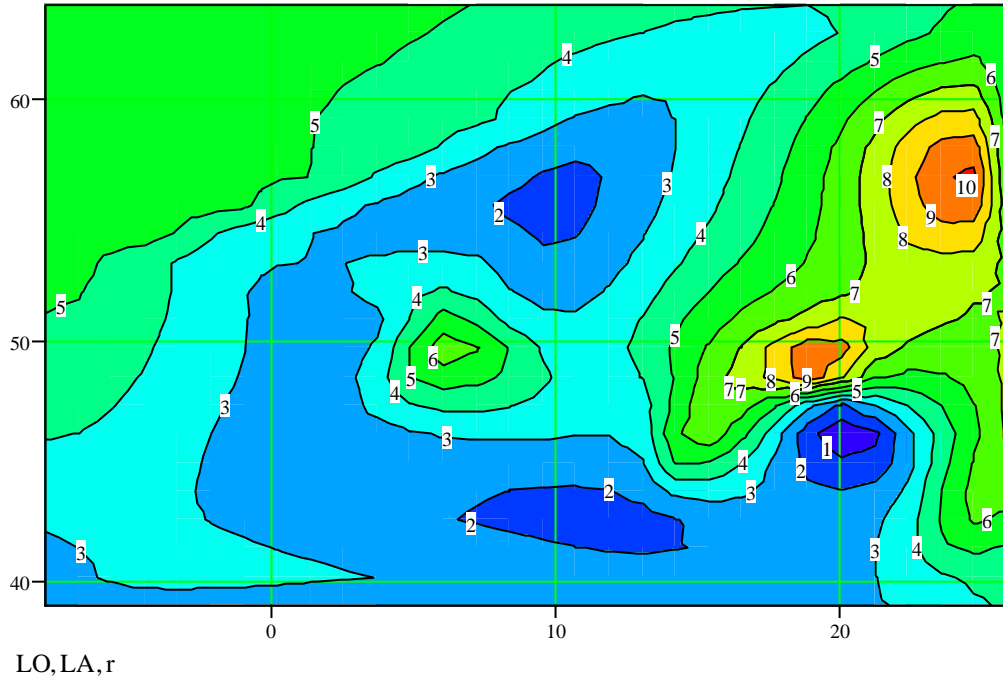


Figure 3.

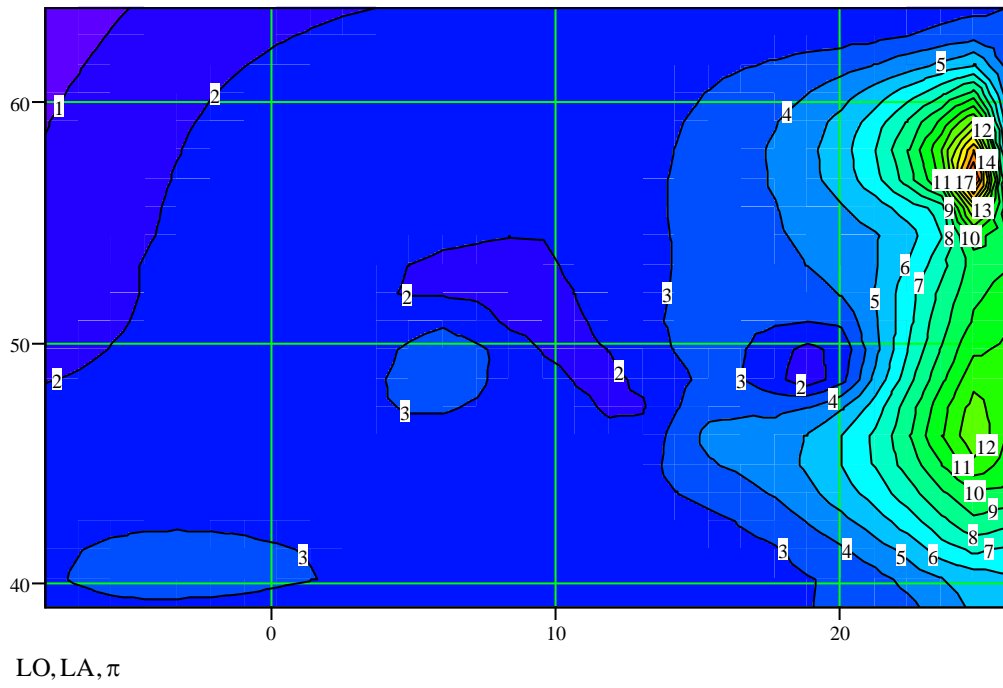


Figure 4.

In order to understand the convergence in EU, we investigated how the macroeconomic variables are related to the GDP per capita level. Thus, we are presenting in Figures 5, 6 and 7 how are varying the growth rate, investment ratio, and inflation, when GDP per capita level is growing in EU-27.

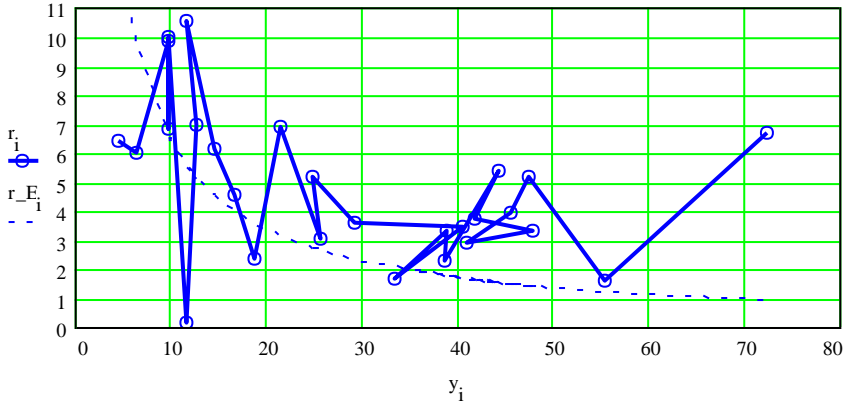


Figure 5.

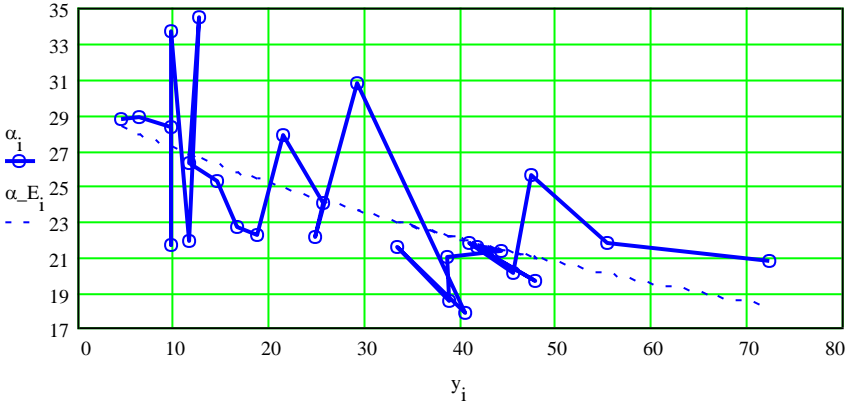


Figure 6.

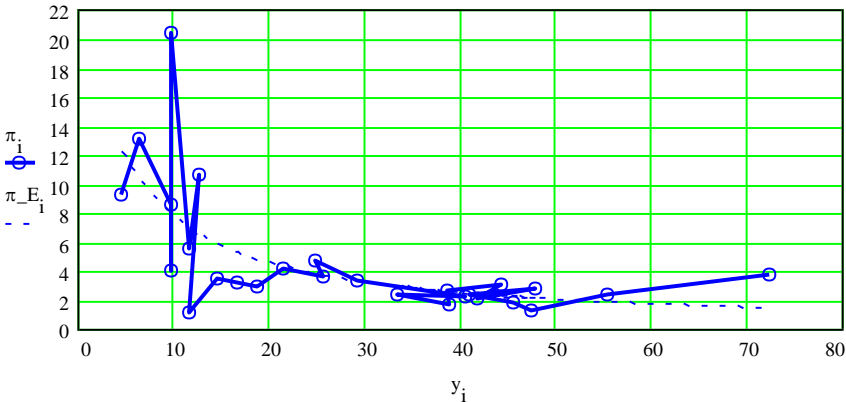


Figure 7.

We can see some strong inverse correlations between each of these three variables and the level of GDP per capita, y . Thus, in 2007, the values of the correlation coefficient are as follows: between r and y -0.412; between α and y -0.595; and between π and y -0.547. On these Figures there are also presented as dashed lines some theoretical trends of variables along with the increasing of GDP per capita level.

Moreover, for the recovery process after the actual crisis, it is important to know which factors need to be stimulated. We can see, in case of EU a strong positive impact of investment and respectively of inflation on growth rate, r . For instance, in 2007, the values of the correlation coefficient are as follows: between α and r +0.599; and between π and r +0.504. The conclusion is that in EU the investment, as the principal factor of growth, was accompanied by inflation. In fact, in 2007, the correlation coefficient between investment rate and inflation was strongly positive, +0.729.

Other significant macroeconomic variable is interest rate. Unfortunately, at this moment of our research, the available data for 2007 were only for 15 countries of EU (Bulgaria, Romania, Lithuania, Latvia, Hungary, Estonia, Slovakia, Czech Rep., Malta, Slovenia, Cyprus, UK, Italy, Belgium, and Netherlands). Interest rate that we used is a real interest rate, ip , estimated as the difference between lending interest rate, i , and inflation (we used GDP deflator), α . For these countries we show in Figure 8 the correlation between the difference between real interest rate and inflation. On this Figure there is also presented as dashed line a theoretical trend of the variable along with the increasing of GDP per capita level. We can see, in case of the 15th EU countries a strong inverse correlation between interest rate and the level of GDP per capita. For instance, in 2007, the correlation coefficient between real interest rate, ip , and GDP per capita level, y , was strongly negative, -0.763.

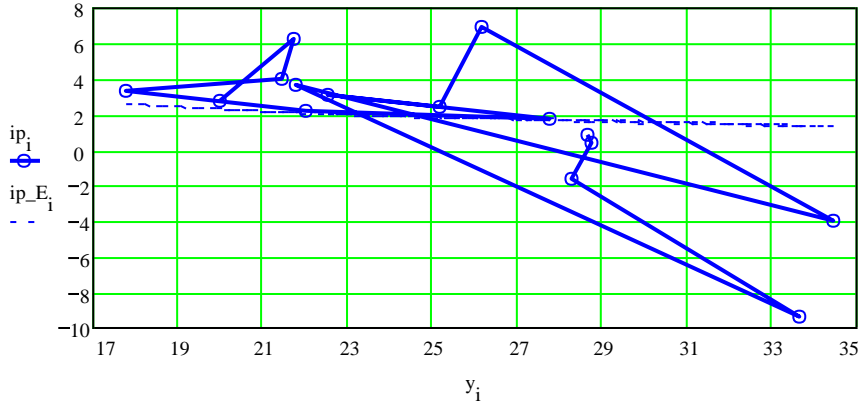


Figure 8.

A model and perspectives

Coming from standard literature and from one of our model, we used the following three basic equations:

$$r(\alpha) = a*\alpha + b \quad (1)$$

$$\alpha(i) = c / (d + i) \quad (2)$$

$$i(\pi) = e*\pi + f \quad (3)$$

where r is GDP growth rate, α – investment rate (in GDP), i – interest rate, π – inflation, a , b , c , d , e , and f – parameters (estimated econometrically).

First equation tries to capture the impact of investment on GDP growth. Second equation demonstrates an inverse relation between interest rate and investment. Third equation takes into account a direct relation between inflation and interest rate. A graphical representation of the model, in which the core equation is given by (1), is shown in Figure 9. Moreover, from this equation could be derived some other important macroeconomic indicators, as follows:

$$\rho = -b = A/K = 1/T \quad (1')$$

$$k = 1/a = K/Y \quad (1'')$$

$$\alpha_0 = \rho*k = k/T = A/Y \quad (1''')$$

where A is the annual amount of capital depreciation (amortisation); K - stock of fixed capital; Y – GDP; T – the implicit average functioning period of fixed capital (in years).

Using some simple algebraic operations, based on the above equations we can obtain also some other useful derivate equations, as follows:

$$r(i) = b + a*c / (d + i) \quad (4)$$

$$\alpha(\pi) = c / [d + (e*\pi + f)] \quad (5)$$

$$i(\alpha) = (c / \alpha) - d \quad (6)$$

Moreover, we can express the empirical inflation – GDP growth rate relation as follows:

$$r(\pi) = b + a*c / (d + e*\pi + f) \quad (7)$$

This model, combined with some theoretical trends of variables along with the increasing of GDP per capita level could be useful for decision in matter of macroeconomic policies for the recovering period. As experiment, we obtained in case of Romania for the period 2000-2008 the following values for parameters: $a=0.350$, $b=-2.2$, $\alpha_0=6.2$, and $k=2.859$. Moreover, some interesting correlations in 3D space, as contour plot graphs, are presented in Figures 10 and 11.

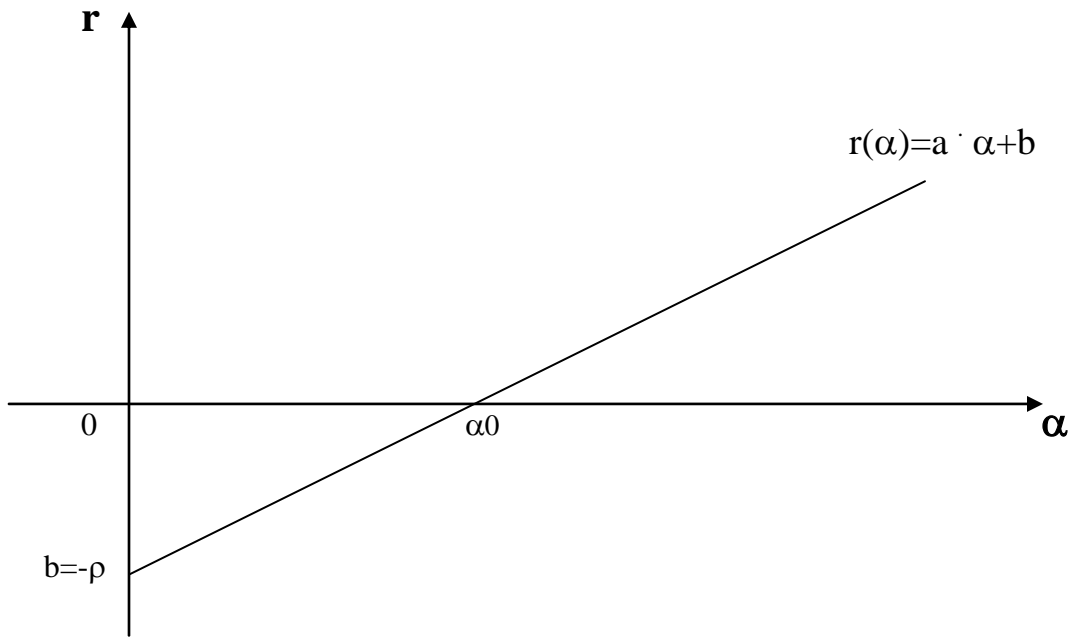


Figure 9.

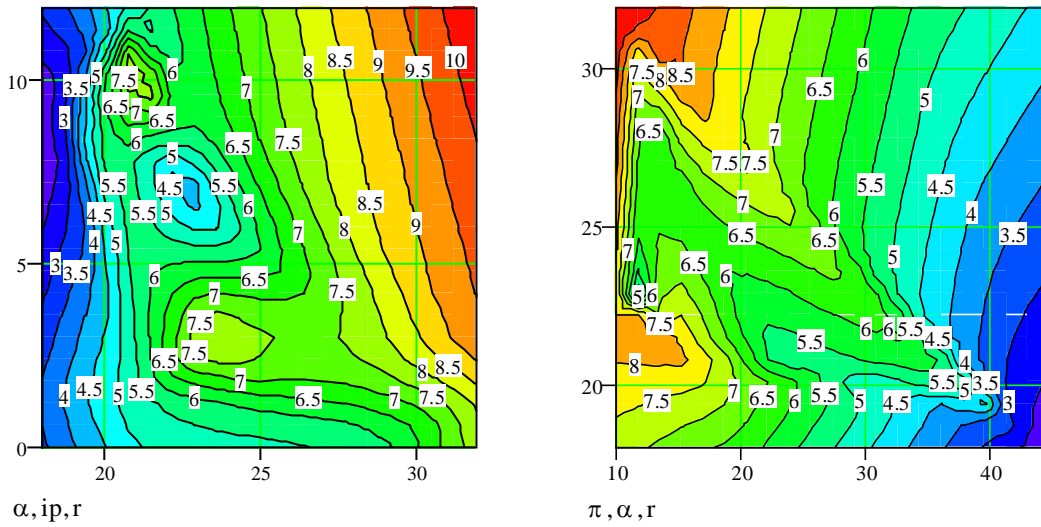


Figure 10.

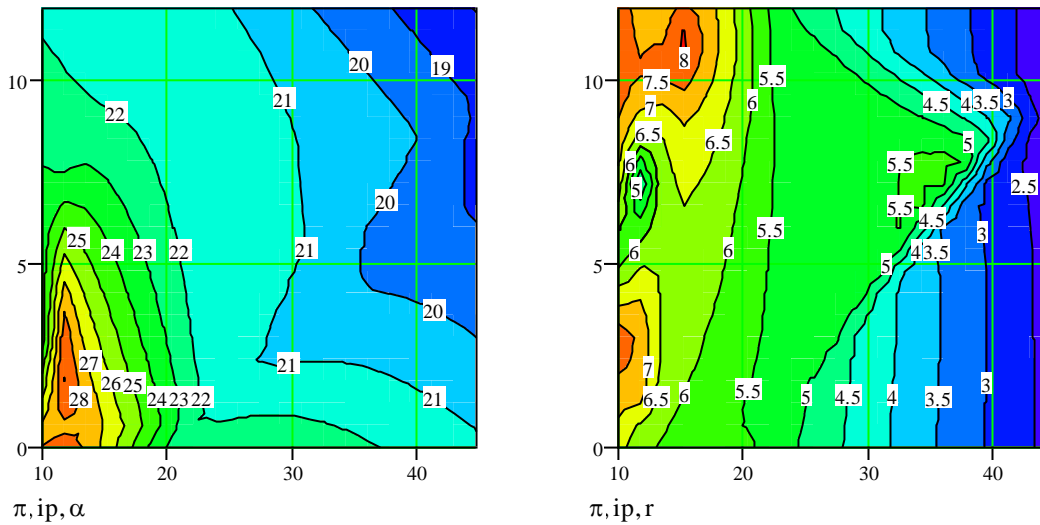


Figure 11.

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