Model based on Linear Regression Function

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Abstract

Linear regression model involves the identification of variables for defining specification for variable and model residuals; the context in which the regression model is used. Analysis of chronological (time) using a temporal function which, in essence, is also a regression, with a variable time (t). The purpose of using the regression model is to obtain the parameters that correspond to the set of variable dependency analysis, formulated between variables, where the series of data are recorded in the statistical units of the population for a period or a moment, and for highlighting the dependence between the variables within a specified time-frame.

Key words: *regression, dependency, estimation, method, variable*

In the theoretical analysis, dependency of variables is stochastic. Consideration of the residual variable within such a model is needed. Other factors that influence the score variable are grouped in the residual.

Uni-factorial nonlinear models are linearized transformations that are applied to the variables, the regression model. So, for example, a model of the form turns into a linear model by logarithm of the two terms of the above equality, resulting in linear function.

This model is recommended when the points are located, that the cloud of points around a line.

Sometimes, for estimating parameters using other techniques of estimation, which cannot be incremental transformations, linear estimation of parameters is made by numerical methods. Linear regression model is based on the series of data for the two features. They are represented by vectors x (the variable factor) and y (variable score).

This requires completion of the methods used for the estimation of the two parameters; specify the methods to be used for testing the properties of the

estimators of regression model and setting the framework for the use of the regression model in making predictions.

In defining the function of linear regression are considered, most commonly, four hypotheses:

- data series are not affected by the errors.
- for each fixed value of the characteristic factorial, residual variable is zero, i.e. on average:

$$E\left[\varepsilon_i \middle| X = x_i\right] = 0$$

for all i,

- the lack of correlation between residues expressed that the terms do not exhibit the phenomenon of covariance, which means the variable correlation hypothesis
- residuals with the independent, which means that

$$\text{cov}(X, \varepsilon_j) = 0$$

for any j, showing an increase in the value of the variable factorial does not automatically lead to an increase of the values of the variable.

On the basis of the four assumptions define the linear regression model through the function: $y_i = b + a \cdot x_i + \varepsilon_i$, i = 1,..,n

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- **The regression model used in the analysis of the correlation between GDP and labor resorces**

Simple regression aim is to highlight the relationship between a dependent variable explained (endogeneous, score) and an independent variable (explanatory note, exogenous factor predictors).

To be able to build a linear regression model we defined labor resorces as the independent variable, while the gross domestic product was considered to be a dependent variable.

To determine the parameters of the linear regression model we have considered a variety of data on the evolution of the macroeconomic indicators of outcomes in the period 1990-2012.

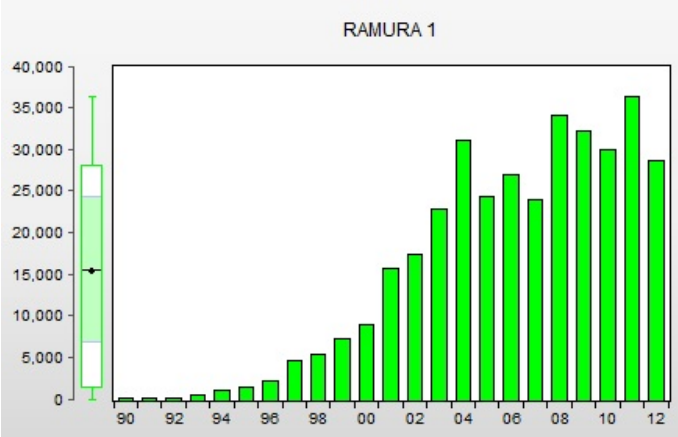
Correlation analysis of TOTAL PRODUCTION and BRANCH 1

-milions-

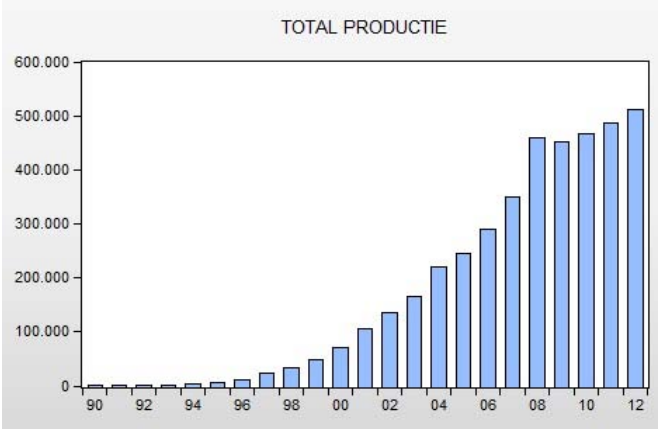
Year	Agriculture, forestry and fisheries BRANCH 1	**Total production**
	x	y
1990	18.7	**79.1**
1991	41.6	**206.4**
1992	114.8	**606.9**
1993	420.6	**1906.5**
1994	989.8	**4700.1**
1995	1426.9	**6746.9**
1996	2094.9	**10197.1**
1997	4553.3	**23036.5**
1998	5377.3	**33711.2**
1999	7280.5	**48888.2**
2000	8901.5	**71990.9**
2001	15617.9	**106082.2**
2002	17289.3	**136922.3**
2003	22847.5	**166602.3**
2004	31055.0	**220931.3**
2005	24291.8	**244676.8**
2006	26861.9	**289695.6**
2007	23992.2	**350845.6**
2008	34126.4	**458535.5**
2009	32297.8	**450979.1**
2010	29874.2	**466397.0**
2011	36341.6	**487733.2**
2012	28638.1	**512112.2**

From the analysis of correlation between total production and the first branch, namely agriculture, forestry and fisheries, have cost and then unearthed graphic that during the analysis period from 1990 to 2012 as the value of agriculture, forestry and fisheries is stronger. For this, from 2001 onwards and until the year 2012 the correlation between the two factors is significant, and the relationship of interdependence between those two factors.

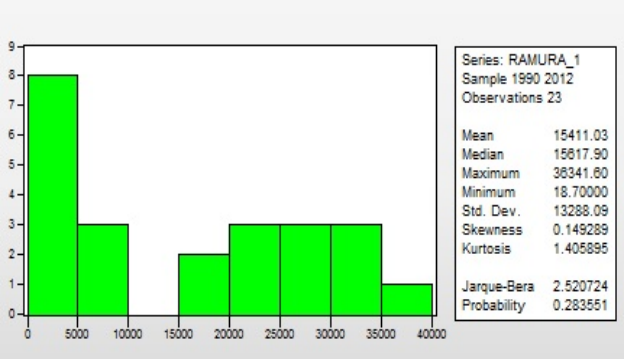
Developments in the field of agriculture, forestry and fisheries in Romania in the period 1990 to 2012



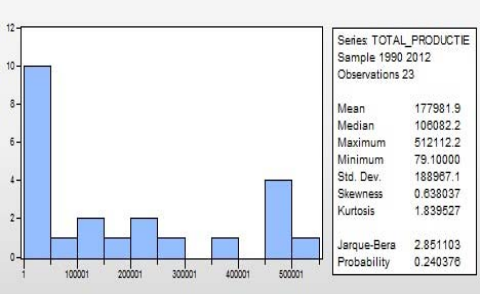
Graphical representation of the total production in Romania during 1990-2012 is as follows:



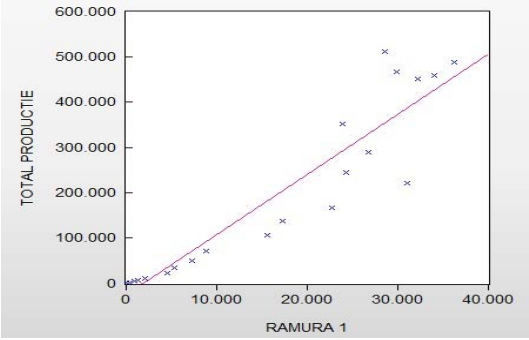
Statistic tests regarding BRANCH 1 of Romania during 1990-2012



Statistics tests upon the value of total_production of Romania between 1990-2012 are plotted:



Corelation BRANCH 1 – TOTAL PRODUCTION is represented:



Characteristics of regression model are:

Dependent Variable: TOTAL_PRODUCTIE
Method: Least Squares
Date: 02/17/14 Time: 14:05
Sample: 1990 2012
Included observations: 23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RAMURA_1	13.28463	1.107328	11.99701	0.0000
C	-26747.84	22322.92	-1.198223	0.2442

R-squared	0.872672	Mean dependent var	177981.9
Adjusted R-squared	0.866609	S.D. dependent var	188967.1
S.E. of regression	69016.07	Akaike info criterion	25.20501
Sum squared resid	1.00E+11	Schwarz criterion	25.30375
Log likelihood	-287.8576	Hannan-Quinn criter.	25.22984
F-statistic	143.9282	Durbin-Watson stat	0.549909
Prob(F-statistic)	0.000000		

References

Benjamin, C.; Herrard, N.; Houée-Bigot, M.,;Tavéra, C. (2012) – *„Forecasting with an Econometric Model”*, Springer Press

Anghelache, C. (2008) – *„ Treaty of theoretical and economic statistics”*, Publishing House Economics, Bucharest

Anghelache, C.; Anghelache, G. (2009) – *Utilization of the chronological series within the Stochastic processes*, Metalurgia International Vol. XIV, nr. 4, Science Publishing House F.M.R.

Anghelache, G.V.; Anghelache, C.; Mitruț, C.; Bădulescu, M.C.; Marițescu, M. (2009) – *„Decomposition of time series dynamic aspects”*, National Scientific Symposium „Octav Onicescu”, Romanian Statistical Review-March Supplement

Codirlaşu, A.; Chidesciuc, N.Al. (2008) – *„ Banking finance. Applied econometrics with Eviews 5.1. -Lecture notes”*, www.dofin.ase.ro

Dougherty, Ch. (2007) – *“Introduction to Econometrics”*, Oxford University Press

Sima, I.A. (2007) – *„Stochastic valuation models and financial time-series features”,* International Conference „Financial and monetary policies in the European Union„ Academy of Economic Studies of Bucharest, Department of Finance

Andrei, T.Bourbonnais, R. (2003) – *„Econometrics”*, Economic Publishing House