Chapter 7

Correlation between Production and Labor based on Regression Model[*]

- **Some theoretical aspects**

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[22]. 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 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.

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).

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 total production as the independent variable, while labor force in financial intermediation and insurance; real estate was considered to be a dependent variable.

- **The correlation between Production and Labor**

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 1990-2014.

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[*] This chapter is based on elements included in the article *The Regression Model used to Analyze the Correlation between Production and Labor,* RRS Supplement no. 1/2014, by prof. Constantin Anghelache et. al.

[22] Anghelache, C. (2013) – „*Elemente de econometrie teoretică*", Editura Artifex, Bucureşti

By using EViews we realized an analysis of correlation between labor force in the financial intermediation and insurance; real estate branch and TOTAL PRODUCTION.

-milions-

| Year	Labor force in *Financial Intermediation and insurance; real estate* (BRANCH 5)	Total production
	x	y
1990	6.1	102.83
1991	14.4	268.32
1992	58.3	788.97
1993	185.4	2478.45
1994	453.4	6110.13
1995	704.1	8770.97
1996	911.4	13256.23
1997	3015.9	29947.45
1998	4907.7	43824.56
1999	7905.7	63554.66
2000	11674.3	93588.17
2001	17956.0	137906.86
2002	25415.5	177998.99
2003	29217.3	216582.99
2004	36531.5	287210.69
2005	35172.2	318079.84
2006	40984.9	376604.28
2007	51455.6	456099.28
2008	43078.8	596096.15
2009	43949.1	586272.83
2010	57931.9	606316.1
2011	60899.5	634053.16
2012	62448.0	665745.86
2013	65286.0	696002.33
2014	68124.3	726258.83

Financial intermediation and insurance, real estate branch has an important role in influencing the total production. Between the two indicators there is a direct and linear in shape. As we can see from the table above, the evolution of financial intermediation and insurance; real estate is more considerable starting with 2010 until 2014. The financial intermediation and insurance; real estate field recorded values on rise during this period, who caused the increased of total production. The validity of the regression model is confirmed by the F-test statistic values (value far superior to the table what level is considered to be a landmark in tests of validity of econometric models) and the degree of risk is zero (reflected by the value of Significance). The correlation between the two indicators can be analyzed using computer software Eviews.

Multiple R is the coefficient of multiple correlation, in this case the simple correlation between x and y. It is noted that between the value of Branch 5 and that of total production registered in our country between 1990-2014 there is a direct and very strong conclusion expressed based on the value of Multiple R. (Sacală 201 4)

The evolution of labor in the financial intermediation and insurance; real estate branch in Romania, during 1990-2014 (as represented by Eviews tools):
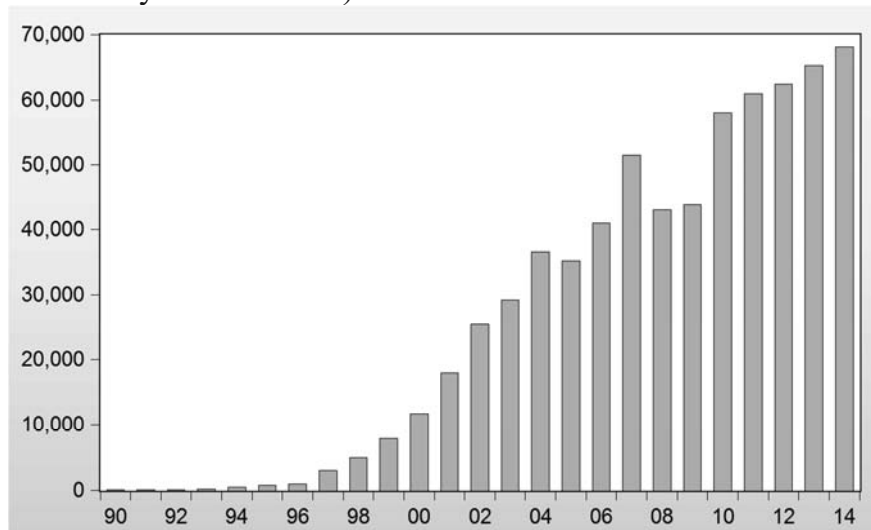
Statistical tests regarding the value of BRANCH 5 in Romania, during 1990-2014 is represented as drawn from Eviews processing:
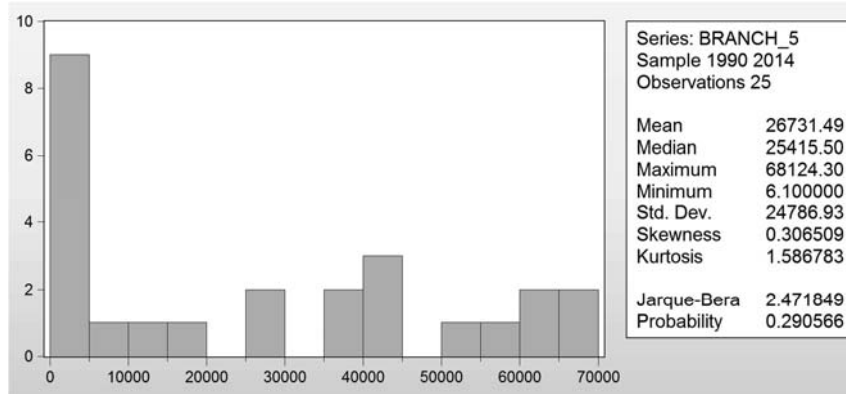
Characteristics of the regression model:

Sample: 1990 2014
Included observations: 25
TOTAL_PRODUCTION_Y=C(1) + C(2)*BRANCH_5

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-15284.69	16985.88	-0.899847	0.3775
C(2)	10.66313	0.470310	22.67255	0.0000

R-squared	0.957173	Mean dependent var	269756.8
Adjusted R-squared	0.955311	S.D. dependent var	270154.6
S.E. of regression	57110.10	Akaike info criterion	24.81997
Sum squared resid	7.50E+10	Schwarz criterion	24.91748
Log likelihood	-308.2496	Hannan-Quinn criter.	24.84701
F-statistic	514.0445	Durbin-Watson stat	1.005348
Prob(F-statistic)	0.000000		

We can conclude that as much the value of labor in the financial intermediation and insurance, real estate branch is growing, the value of the total production also is growing.

Also the validity of the regression model is confirmed by the F test value - statistically superior value than the table level, considered to be the benchmark in the analysis of the validity of econometric models and by the value of the test Prob (F - statistic) that it is zero.

Based on observations made on the analysis of Romania's Branch 5, using simple regression model, we conclude that the value of this indicator is significantly influenced by the variation of Total Production.