T.C. YEDITEPE UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

Ph.D. IN BUSINESS ADMINISTRATION

RESEARCH METHODOLOGY

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"Analysis of Research & Development and Population Effect on Information Technology"

By

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ISTANBUL, January 2007

1- Introduction

Information Technology is a very important topic for countries in this competitive world. In this project I want to analyze is there an effect of research and development ratio in GDP and also is there an effect of population in a information technology sector growth. Information technology sectors rapid growth in Ireland and Denmark has changed their GDP incredibly, but we have to investigate that is it related with research and development and also is it related to the total population of that countries. In this project I have analyzed Sweden, Germany, France, Holland, Denmark, England, Belgium, Austria, Ireland, Italy, Spain, Portugal, Turkey and Greece.

2- Explanatory Variables

Information technology sector growth for different countries will be analyzed according to two explanatory variables. We will focus on to find the effects of these variables to the information technology sector growth alone and both also.

a. Research and Development Ratio in GDP

We have statistical values about 14 different countries research and development ratio in the counties GDP's. We hope to see a relationship between research and development and information technology sector, after eviews analysis.

b. Population of Country

We have statistical values about 14 different countries population. We will see is there a relationship between population and information technology sector after eviews analysis.

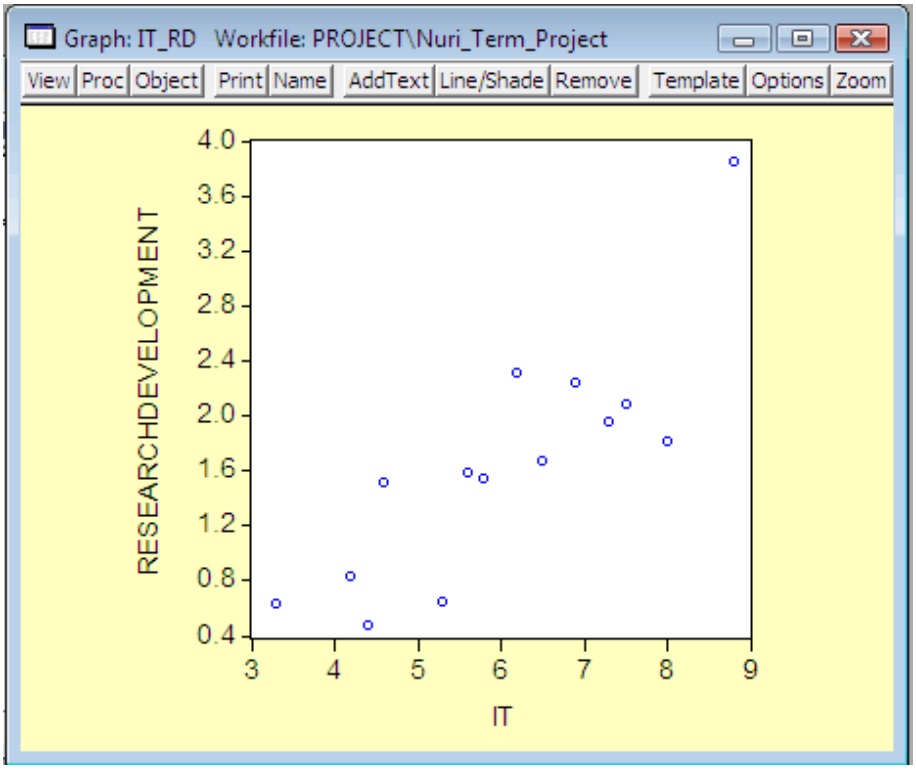
3- Data

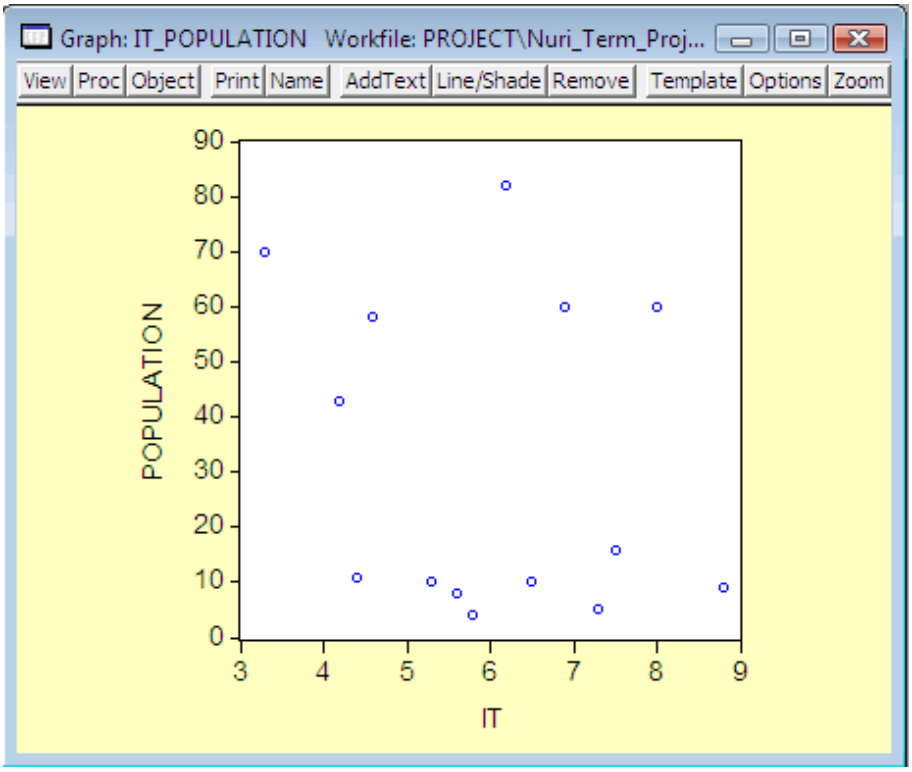
The below data is collected from different reports that is mentioned in the references part. It is a data from 14 countries:

Country	IT Sector Growth(%)	R&D in GDP (%)	Population (Million)
Sweden	8,80	3,85	9
Germany	6,20	2,31	82
France	6,90	2,24	60
Holland	7,50	2,09	16
Denmark	7,30	1,96	5
England	8,00	1,82	60
Belgium	6,50	1,67	10
Austria	5,60	1,59	8
Ireland	5,80	1,55	4
Italy	4,60	1,52	58
Spain	4,20	0,84	43
Portugal	5,30	0,65	10
Turkey	3,30	0,64	70
Greece	4,40	0,48	11

4- Graphical Relations Between Variables

In this part of the project you will see scatter graphs to see visually comparison of IT Sector growth with explanatory variables:





Above scatter plots we can observe visually that IT Sector Growth is closely related to Research and Development ratio in GDP, but there is not a strong relation between IT Sector Growth and the population. Let's analyze these by the help of some models.

5-Analysis

Model 1: it c researchdevelopment

In this model, I want to see if there is a linear relationship between IT Sector Growth alone and Research and Development ratio in GDP:

Dependent Variable: IT
Method: Least Squares
Date: 01/17/07 Time: 10:59
Sample: 1 14
Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.510390	0.523126	6.710411	0.0000
RESEARCHDEVELOPMENT	1.518937	0.281071	5.404106	0.0002

R-squared	0.708769	Mean dependent var	6.028571
Adjusted R-squared	0.684499	S.D. dependent var	1.583778
S.E. of regression	0.889599	Akaike info criterion	2.735472
Sum squared resid	9.496638	Schwarz criterion	2.826766
Log likelihood	-17.14830	F-statistic	29.20436
Durbin-Watson stat	1.467207	Prob(F-statistic)	0.000159

This model is acceptable because the P-Value of both C and RESEARCHDEVELOPMENT are low (below 10%). This means that Research and Development is related to IT Sector Growth. And also, R-Squared and Adjusted R-Squared values are very high. So this model can be a good model.

Model 2: it c population

In this model, I want to see if there is a linear relationship between IT Sector Growth alone and Population:

Dependent Variable: IT
Method: Least Squares
Date: 01/17/07 Time: 11:02
Sample: 1 14
Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.443167	0.655340	9.831792	0.0000
POPULATION	-0.013014	0.015571	-0.835821	0.4196

R-squared	0.055014	Mean dependent var	6.028571
Adjusted R-squared	-0.023735	S.D. dependent var	1.583778
S.E. of regression	1.602463	Akaike info criterion	3.912524
Sum squared resid	30.81465	Schwarz criterion	4.003818
Log likelihood	-25.38767	F-statistic	0.698596
Durbin-Watson stat	0.427368	Prob(F-statistic)	0.419587

This model is cannot be acceptable because the P-Value for POPULATION is too high (above 10%). This means that population is not related to IT Sector Growth. And also, R-Squared and Adjusted R-Squared values are very low.

Model 3: it c researchdevelopment population

From now, we have made two models and tested R&D and Population alone. Let's check both two variables together, and check for their relationship with IT Sector Growth.

Dependent Variable: IT
Method: Least Squares
Date: 01/17/07 Time: 11:29
Sample: 1 14
Included observations: 14

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.893069	0.579841	6.714026	0.0000
RESEARCHDEVELOPMENT	1.505377	0.272052	5.533423	0.0002
POPULATION	-0.011307	0.008367	-1.351411	0.2037

R-squared	0.750236	Mean dependent var	6.028571
Adjusted R-squared	0.704825	S.D. dependent var	1.583778
S.E. of regression	0.860467	Akaike info criterion	2.724726
Sum squared resid	8.144431	Schwarz criterion	2.861666
Log likelihood	-16.07308	F-statistic	16.52083
Durbin-Watson stat	1.331174	Prob(F-statistic)	0.000486

This model also show us that population is not effecting IT Sector growth because P-Value is above 10%. But when we check R-Squared values it says us that model is good because they are closer to 1 as much.

Based on this model we can conclude the following:

- For every 1% increase in the Research and Development ratio in GDP, IT Sector increases 1.505377%
- For every 1 million increase in population, IT Sector growth decreases 0.011307%.

Model 4: it c(1)*researchdevelopment^c(2)

After linear models let's use a non-linear least squared estimation model, here is the eviews output:

Dependent Variable: IT
Method: Least Squares
Date: 01/17/07 Time: 10:12
Sample: 1 14
Included observations: 14
Convergence achieved after 8 iterations
IT=C(1)*RESEARCHDEVELOPMENT^C(2)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	5.079033	0.298183	17.03326	0.0000
C(2)	0.403963	0.076357	5.290440	0.0002

R-squared	0.721256	Mean dependent var	6.028571
Adjusted R-squared	0.698027	S.D. dependent var	1.583778
S.E. of regression	0.870318	Akaike info criterion	2.691648
Sum squared resid	9.089451	Schwarz criterion	2.782942
Log likelihood	-16.84154	Durbin-Watson stat	1.782552

It is nearly the best model that we have applied, the P-Values are very good (below 10%), and also R-Squared and Adjusted R-squared values are approximately high. Standard error of regression is very low so finally we can say that this model also shows the effect of Research and Development ratio in GDP on IT Sector growth.

6- Conclusion

In this project we have analyzed 14 different counties including Turkey and researched if there are some effects on IT Sector growth like research and development ratio in GDP and also population of the country. After analyzing through 4 different models we have seen that research and development is very important for a country. This also shows that Turkey has to allocate more money on the research and development in order to be succeed in the long run.

7- References

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