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AI - POWERED ANALYSIS OF FACTORS IMPACTING TAXES ON IMPORTED SERVICES TO THE REPUBLIC OF UZBEKISTAN

Abstract: This article leverages artificial intelligence (AI) to examine taxes paid on services imported to Uzbekistan between 2011 and 2022. The study identifies key factors influencing tax revenues by integrating econometric models with AI techniques such as machine learning and predictive analytics. AI insights enhance the analysis, providing data-driven conclusions and strategic policy recommendations.

Keywords: AI in taxation, machine learning models, econometric analysis, tax policy optimization, taxes on imported services, value-added tax, inflation rate, corruption index, import of financial services.

Introduction

Nowadays among countries importing goods and services from other countries is rising. It is true that in almost all countries taxes are charged for imported goods and services. For the example of Uzbekistan, there have been a dramatic increase in taxes which were paid on import operations the last 13 years. In this article, I determine the factors causing such growth in the field of imported services, one part of import operations in Uzbekistan.

Methods

In the article I used induction, deduction, scientific observation, economic and statistical methods, expert evaluation methods. As well as, I used econometric models, OLS model.

Results

I decided to get the following factors: Import of financial services, travel services and transport services imported (their share in import of services), VAT, corruption index, unemployment (its share in total labor market), inflation rate (in consumer prices) and taxes on import of services (in billion soums). In Uzbekistan there are 2 types of taxes paid on imported services which are value-added tax and income tax. There taxes on services imported is taken as a dependent variable, the others are as independent variables.

From the below table it can be seen that the number of observations, mean values, standard deviation as well as minimum and maximum values of each variable are given. For example, there have been 12 observations on taxes paid on services imported which means that a 12-year period (from 2011 to 2022) is taken. The average value of it is equal to 682.758 billion soums, while its lowest and highest amounts are 153.2 and 2836.3 billion soums respectively.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max

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Taxes on import se~s	12	682.758	826.939	153.2	2836.3
Import of Financia~s	11	3.017	1.192	.96	4.53
Transport services	11	48.067	3.801	41.837	54.482
Travel services	11	41.143	7.192	25.295	51.554
VAT	12	17.667	2.995	12	20
Corruption index	10	152.3	12.41	126	168
Unemployment	11	5.635	.81	4.9	7.161
Inflation rate	11	12.24	2.818	8.131	17.524

Figure 1 illustrates the fitted values of taxes on imported services. According to the information of statisticsbyjim.com, a fitted value is a statistical model's prediction of the mean response value when you input the values of the predictors, factor levels, or components into the model and it shows among variables how relationship there is. It is true that there is a positive relationship between inflation rate and taxes on services imported during the period. This means that if there is a rise in the inflation rate, taxes on imported services will also increase or vice versa.

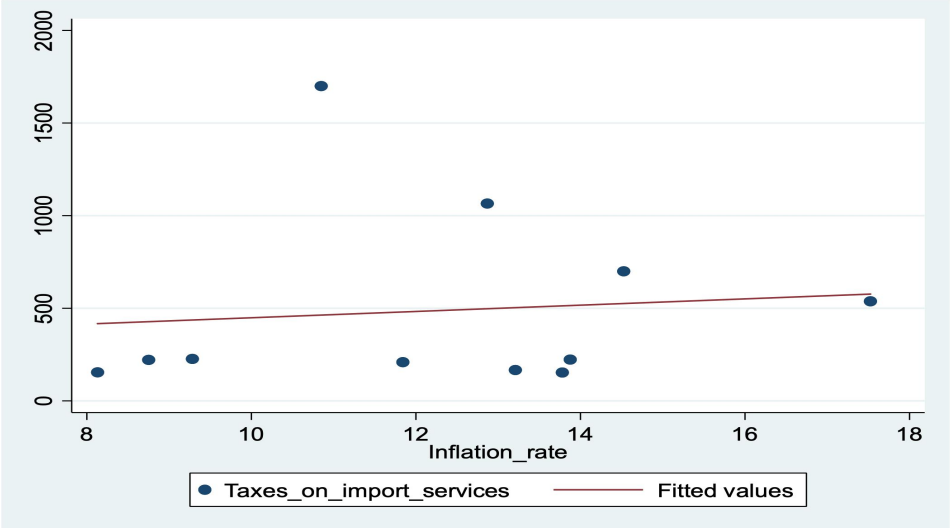

Figure 1. Fitted values of Inflation rate.

From Figure 2, it can be seen that there is a negative relationship between corruption index and taxes paid on imported services. The going up of the corruption index causes the falling down of taxes paid to the state budget from importing services.

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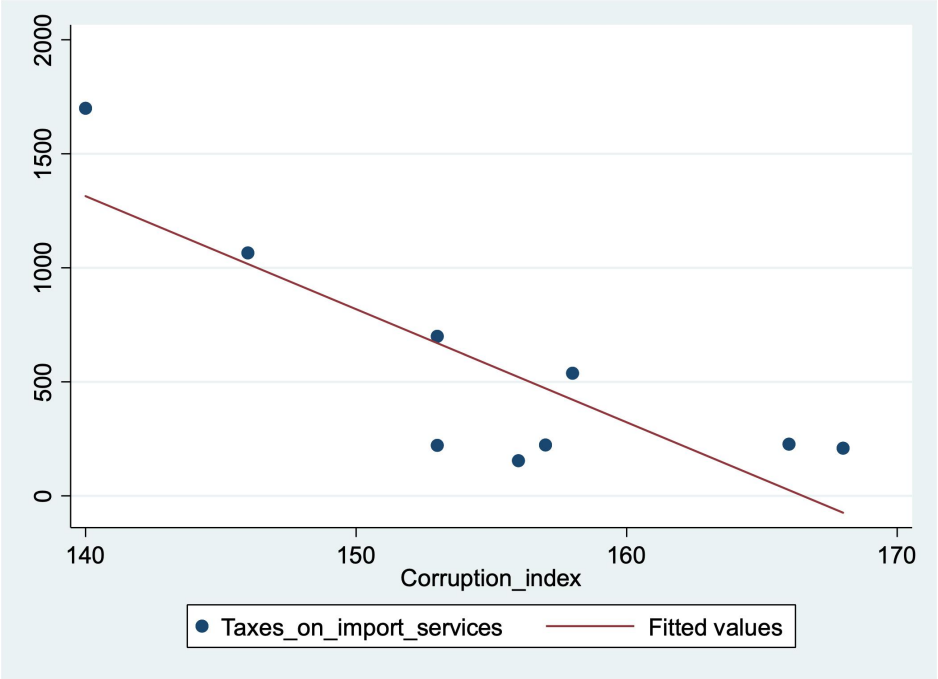

Figure 2. Fitted values of Corruption index.

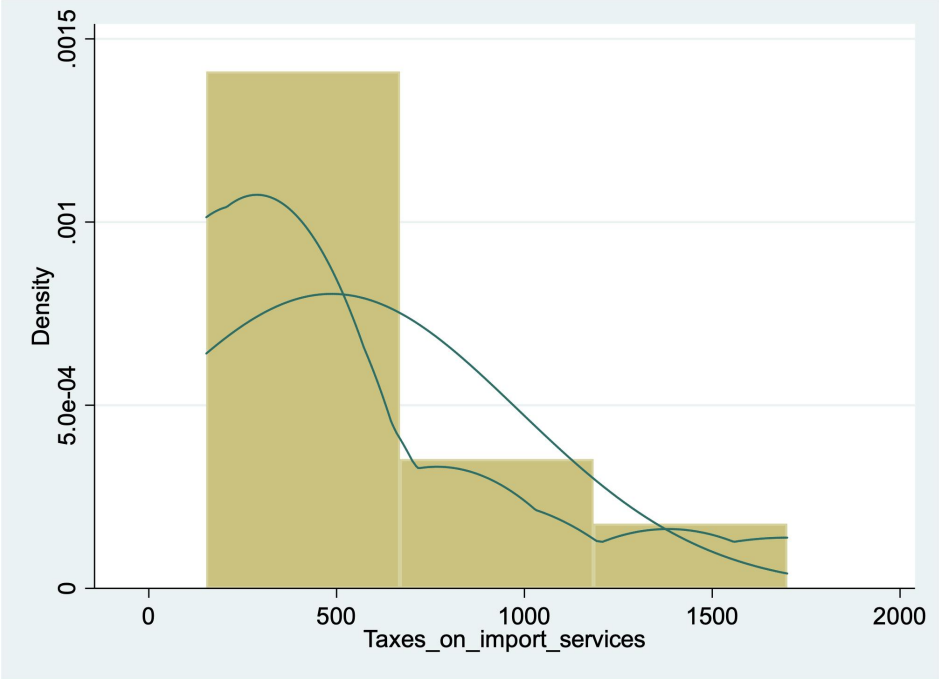

Figure 3. The distribution of the data of Taxes on import of services

Figure 3 shows whether the information about taxes is normally distributed or not. It can be seen that it differs from its density plot. This means that the data is not normally distributed.

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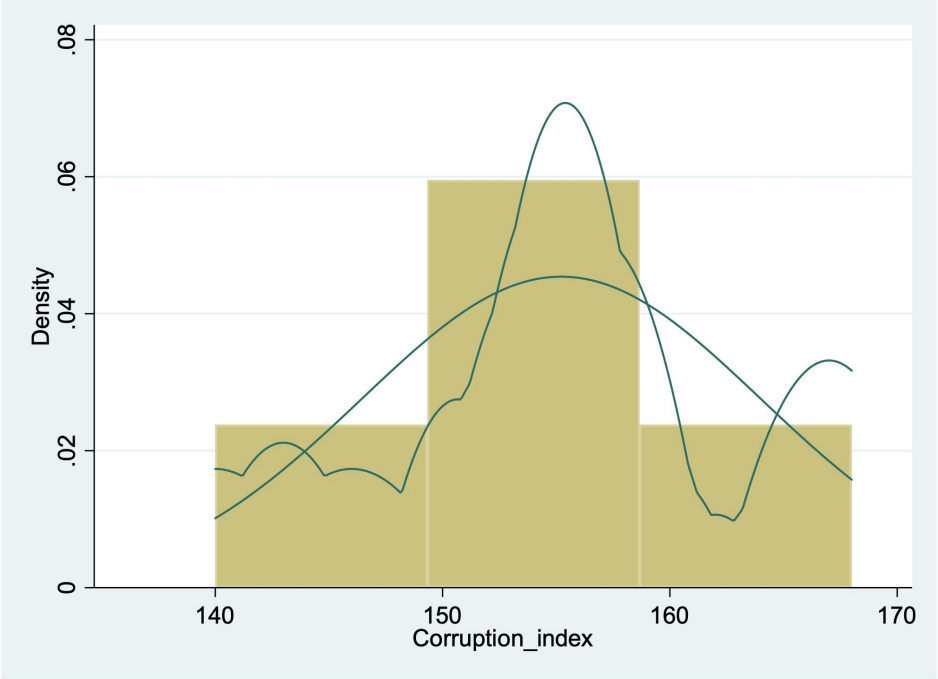

Figure 4. the distribution of the data of Corruption index

Like Figure 3, Figure 4 and 5 also shows the distribution of information about 2 independent variables, which are Corruption index and Inflation rate. It can be seen from Figure 4, the data of corruption index is not normally distributed. However, from Figure 5 we can determine that the information of inflation rate is normally distributed.

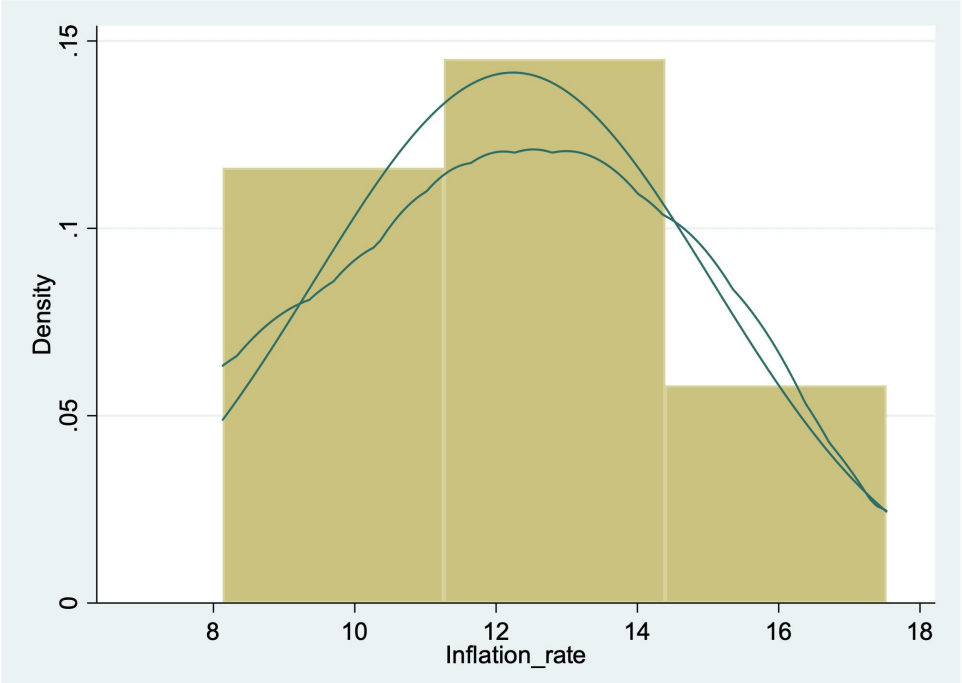

Figure 5. The distribution of the data of Inflation rate

Table 3. Shapiro-Wilk W test for normal data

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Variable	Obs	W	V	z	Prob>z
Taxes_on_i~s	12	0.704	4.949	3.116	0.001
Import_of_~s	11	0.938	1.002	0.003	0.499
Transport_~s	11	0.980	0.326	-1.818	0.966
Travel_ser~s	11	0.938	1.005	0.009	0.496
VAT	12	0.918	1.372	0.616	0.269
Unemployment	11	0.819	2.937	2.131	0.017
Inflation_~e	11	0.959	0.661	-0.712	0.762
Corruption~x	10	0.930	1.080	0.133	0.447

H0 hypothesis: the data is normally distributed.

Table 3 gives information about Shapiro-Wilk W test. By this test it can be known whether the data is normally distributed or not. In this test H0 hypothesis is put as the following: the data is normally distributed. If $p<0.05$, the hypothesis is rejected and this means that the data is not normally distributed. In my research except taxes on imported services and unemployment, the others' data is distributed normally.

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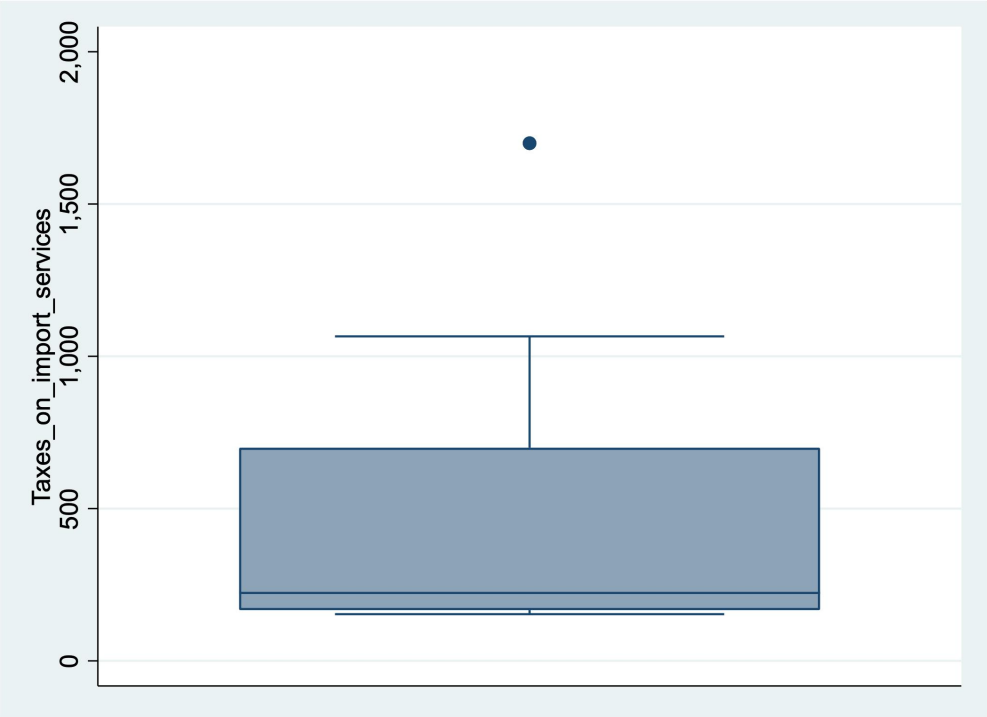

Figure 6. The location of data of Taxes on services imported

Figure 6 shows that a ¾ part of the information of taxes on services imported to Uzbekistan is located between approximately 200 and 700 billion soums. As well as, from figure it can be known that the information is not normally distributed. Shapiro-Wilk w test also gave such a kind of result.

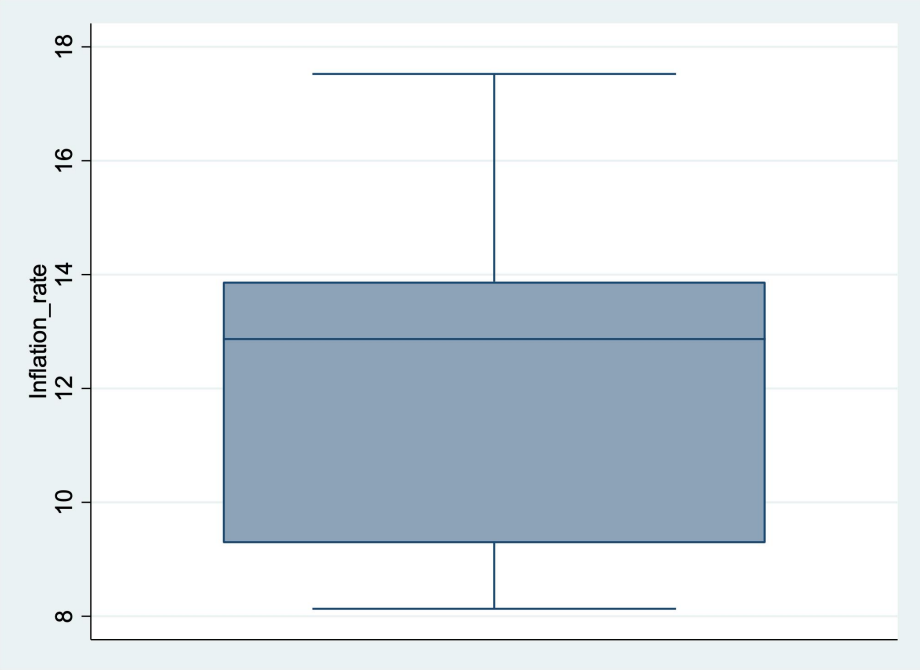

Figure 7. The location of information about Inflation rate.

Figure 7 also illustrates that 75 percent of the data of Inflation rate is located 9.5-14 %. However, it can be said that the information is normally distributed.

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Below Table 4 determines linear regression of my research. According to it, corruption index, inflation rate and VAT, which I chose for regression are very important independent variables with *** or **. This means that my research is considered to be statistically important. Besides, R-squared is equal to 93.2%, meaning that all independent variables together determine 93.2 percent of a dependent variable. This is also statistically significant.

Table 4. Linear regression

lnTaxes_on_import_~s	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Corruption_index	-.073	.011	-6.45	.001	-.102	-.044	***
Inflation_rate	.135	.033	4.06	.01	.05	.221	***
lnVAT	-2.47	.675	-3.66	.015	-4.205	-.736	**
Constant	22.79	2.546	8.95	0	16.245	29.335	***

Mean dependent var	5.984	SD dependent var	0.851
R-squared	0.932	Number of obs	9
F-test	22.736	Prob > F	0.002
Akaike crit. (AIC)	5.425	Bayesian crit. (BIC)	6.214

*** p<.01, ** p<.05, * p<.1

My research's regression is

Reg(lnTaxes on imported services)= 22.79 – 0.073*Corruption index +0.135 *Inflation rate – 2.47 * lnVAT

From the regression, results can be as the following: for example, 1) if the corruption index decreases by 100 points, taxes on services imported will increase by 15 %. 2) If the inflation rate rises by 10 points, taxes paid on imported services will also go up by 36.3 %. 3) if VAT increases by 5 percent, taxes will also arise by 10.4 % and others.

Discussion

Several scientists say about some factors which affect international trade and import operations. For instance, Eelke de Jong and Christian Bogmans think that "corruption is predicted to reduce the volume of international trade. On the other hand, if the quality of customs is low and the tariff structure complicated, corruption can facilitate international trade. Uncertainty about the process of corruption, however, reinforces the arguments for a negative effect of chaotic corruption on trade.[1]"

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Besides, according to "Federal Reserve Issues FOMC Statement" of the Board of Governors of the Federal Reserve System., inflation and interest rates affect imports and exports primarily through their influence on the exchange rate. Higher inflation typically leads to higher interest rates.[2] As well as, Omari Coates and Florence Couedel also agree the above idea "inflation has impacted prices for raw materials which in turn has meant higher costs for importing goods. This has caused further challenges to import & export goods in the UK". [3]

Youssef Benzarti and Alisa Tazhitdinova say "….. a large set of VAT changes to provide empirical evidence on the effect of VATs on trade flows. …. VATs have very little effect on imports or exports and our elasticity estimates are substantially lower than the tariff elasticities estimated in the trade literature."[4]

Conclusion

To conclude, in Uzbekistan the corruption index, the inflation rate and VAT are considered to be factors which affect taxes paid on imported services significantly. Changes in them influence the amount of money from taxes on imported services to the state budget. For instance, going down of the corruption index of Uzbekistan will improve taxes on services imported. In the country in order to pay taxes fully and in time, I think that there should be a tax control on affecting factors.

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