Error of Dummy Variable Treatment of Death Penalty in Regression Model

—— From the Perspective of Execution and Evolution

Shengpu Huang [1, a, *], Yibo Huang [1, b]

[1] ZUEL-SUR School of Law and Economics, Zhongnan Univeristy of Economics and Law

[a, *] 1250347383@qq.com; [b] 401084814@qq.com

Abstract. With the evolution of the empirical law methodology, a large number of statistical models have been applied in the field of law. When dealing with regression models, if the application of death penalty occurs, empirical law papers tend to deal with virtual variables, that is, to assign a value of 0 or 1. From the perspective of the evolution of execution, gun execution and injection are to abandon the cruel execution out of humanitarian care, rather than think that the standard above the death penalty is the equal evil, so it is not reasonable to treat the virtual variable of the death penalty. Through empirical research, it is found that whether the penalty amount is virtual variable treatment has a significant impact on the regression coefficient of the final regression equation, and the empirical research results are consistent with the prediction.

Key words: Death penalty execution; Evolution of punishment; Linear regression model.

1. Introduction

With the vigorous development of empirical law, various types and high-threshold statistical models have been systematically introduced into the law discipline. Especially in the field of criminal law, the criminal law scientists represented by Professor Bai Jianjun are the first and most systematic to localize the empirical law and its legal philosophy paradigm. In all the empirical models, the regression model is a great tool that can not be ignored. The regression model tries to find the relationship between the independent variables and the dependent variables by means of regression statistics, and finally obtains a relatively accurate regression equation. In general, we express this equation as: y=a1x1+a2x2+a3x3+.....+anxn+ z (y is the sentence a is the coefficient X is the sentencing plot Z is the residual). This equation can screen out the general relationship between sentencing and sentencing circumstances, and finally get the conclusion of what sentencing circumstances have an impact on the amount of punishment, and how much influence on the amount of punishment.

However, in a large number of empirical papers, the treatment of punishment amount y is not scientific, and even against the basic quantitative thought of empirical law. For example, some commentators apply logistic return to cases of intentional homicide and the death penalty, in an attempt to build a stepped sentencing mechanism.[i][ii] The theorist will "whether applicable to the death penalty" and "whether immediately" as the dependent variable , thus, the theorist will dependent variable virtual variable processing, namely the value of 0 or 1, the treatment is common in need binary processing data, such as the argument discussion of the defendant identity for penalty effect, the gender of the defendant or virtual variables.[iii] For some non-continuous variables, for the convenience of empirical development, it is advisable to treat virtual variables. Some scholars have carried out empirical research on the sentencing circumstances of pickpocketing. In terms of ensuring accuracy, the importance and embodiment of the circumstances should be considered to assign value to the characteristic sentencing circumstances, and then make comprehensive consideration to determine.[iv] However, in order to facilitate the empirical research, the scholar treated all the non-continuous variables as virtual variables, which caused some errors in the empirical research results.

It is not difficult that the above analysis is not difficult to draw the conclusion that whether the death penalty can be treated with virtual variables and how much impact the treatment of virtual

variables can have on the regression equation is a difficult problem that the empirical law methodology cannot be ignored in the discipline of criminal law, and even determines whether the foundation of the whole empirical law building is solid.

2. Humanitarian death penalty

By the Qin Dynasty, there were 19 kinds, according to Mr.Zhou Mi's statistics. In the Yuan Dynasty, they were twisted, cut, lingchi, shooting ghost arrows, yi, high cliff, peeling, killing bodies, crispus, and strokes, etc. The Ming Dynasty has twisted, beheaded, ling Chi, xiao, head, killing corpse, peeling and so on. The Qing Dynasty has beheaded, twisted, ling Chi, lords, killing corpse, corpse and so on.[v]

2.1 Cruel way of death penalty: a deterrent tool of feudal rule

The reason why the author lists the execution mode of the death penalty in the feudal society is to discuss whether the death penalty also has a "rank"? Positive law, that is, in the context of modern criminal law concept, can the death penalty be treated with virtual variables as operated by Teacher Wang Fuchun? [vi] In feudal society, the supreme rulers often stipulated a series of cruel execution methods to deter "criminals" and "potential criminals". For example, the Qing Dynasty stipulated: " Ling Chi, with the ten evil crimes, is called capital punishment. The lords, but the robbers. Kill corpse, so wait for evil and bandits should be the prison of the prison " . Although there were five ways of execution in the Qing Dynasty, the Qing Dynasty adopted the way of execution for the most serious and worst crimes, while other crimes were applied to the Lord. Therefore, it is not difficult for us to draw a conclusion that in the penalty system of Qing Dynasty, Ling Chi was at the top of the death penalty, and its corresponding charges were also at the top of the crime system of Qing Dynasty.

2.2 Humanitarian way of death penalty

With the progress of the concept of the rule of law, more and more scholars put forward that the feudal execution method of taking criminals as a performance tool is contrary to the modern theory and concept of the rule of law. Therefore, the execution method becomes more humane, and even many countries and regions have abolished the death penalty of punishment in law or essence. In China, there are generally two ways of execution, namely gun execution and injection, and these two ways are not directly related to the punishment of the criminal, which depend on the local execution conditions and the allocation of equipment. In other words, neither firing shot or injection has anything to do with the method of execution itself, nor does it represent any material problem.

The abolition of cruel execution is based on the progress of modern execution concepts, rather than the denial of the death penalty.sentencing, for example, in other cases under the circumstances of the same, smuggling, trafficking, transportation, manufacturing a ton of drugs in China, smuggling, trafficking, transportation, manufacturing ten tons of drugs in China will be sentenced to death, but the nature of the latter heavier than the former, but two criminals have reached the standard of the death penalty, out of kindness or humanity, both sentenced to the death penalty immediately.

2.3 Reduction of death penalty level

As mentioned above, since the execution method of execution does not fully represent the crimes committed by criminals, many empirical legal papers simply divide the death penalty into three quantities: "immediate execution of death penalty", "probation of death sentence" and "not reaching the standard of death penalty", which is statistically called "virtual variable treatment". But in fact, such treatment inevitably leads to the imprecision of the dependent variable, or even a large amount of incorrect data.In the regression model, the modeler tries to use statistical tools to explore the relationship between independent and dependent variables, and to determine the final regression

equation. Therefore, the selection and treatment of the dependent variable samples will directly lead to whether the regression equation is valid, whether the regression coefficient is accurate, and whether the empirical results are convincing.

3. Empirical results test: further validation based on methodology

In order to further demonstrate this argument, the article discusses it here only from the methodology. The article takes the amount of punishment (after the processing of virtual variables) and the amount of punishment (not processed) as the dependent variables, plot 1,2 and 3 as independent variables, and the three have no substantial significance, and the assigned value is automatically generated based on Excel table, so it has no practical significance. One of the penalty is a standard death penalty, that is, the standard line of death penalty. Lower than 1 means that the criminal does not meet the standard of death penalty, and greater than 1 means that the criminal still meets the standard of death penalty. This paper builds the table for modeling to get Table 1.

Table 1.

Death penalty dummy variables processing the validation datasets				
Penalty (after processing of virtual variables)	Penalty amount (not processed)	Plot 1	Plot 2	Plot 3
0	0.81	3	5	6
0	0.65	6	4	7
0	0.98	5	2	5
0	0.73	5	5	6
0	0.92	7	7	1
1	1.96	7	1	3
1	1.00	5	6	5
1	1.06	8	3	4
1	1.78	2	5	9
1	1.32	7	6	6
1	1.65	8	7	6
1	1.25	6	8	4
1	1.66	9	3	6
1	1.34	8	4	7
1	1.63	7	6	9
1	1.12	5	7	6
1	1.05	5	8	2
1	2.03	4	9	8
1	1.07	6	4	2
1	1.57	7	6	3

	Results of the linear regression analysis (n=20)						
	Non-standardized coefficients		Standardization coefficient	t	p	collinearity diagnostics	
	B	standard error	Beta			VIF	tolerance
constant	-0.290	0.607	-	-0.478	0.639	-	-
Plot 1	0.095	0.061	0.378	1.549	0.141	1.144	0.874
Plot 2	0.060	0.050	0.285	1.209	0.244	1.069	0.936

Plot 3	0.029	0.046	0.150	0.634	0.535	1.074	0.932
$R2$	0.167						
adjust R2	0.011						
F	F (3,16)=1.068,p =0.391						
D-W price	0.803						
Dependent variable: penalty amount (after treatment of dummy variable)							
* p <0.05 ** p <0.01							

From the above table, plot 1, plot 2, plot 3 as an independent variable, and the penalty (virtual variable processing) as a dependent variable for linear regression analysis, from the above table, the model formula is: penalty (virtual variable processing) = -0.290 + 0.095 * the plot 1 + 0.02 + 0.060 + 0.029 * plot 3, model R square value is 0.167, means plot 1, plot 2, plot 3 can explain 16.7% change in penalty (virtual variables processing). In the F test of the model, it was found that the model did not pass the F test (F=1.068, p=0.391> 0.05), that is, plot 1, plot 2 and plot 3 will not affect the amount of punishment (after treatment of virtual variables), so the influence of independent variables on dependent variables cannot be specifically analyzed.

It can be seen from the above table, the plot 1, plot 2, plot 3 as independent variables, and the penalty amount (untreated) as the dependent variable, from the above table, the model formula is: penalty amount (unprocessed) =0.462 + 0.061 * plot 1 + 0 + 0.021 * plot 2 + 0.065 * plot 3, the model R square value is 0.151, means plot 1, plot 2, plot 3 can explain the 15.1% of the change in punishment amount (untreated). In the F test of the model, it was found that the model did not pass the F test (F=0.951, p=0.440> 0.05), that is, plot 1, plot 2 and plot 3 will not have an impact on the amount of punishment (not processed), so the influence of independent variables on dependent variables cannot be specifically analyzed.

Results of the linear regression analysis (n=20)							
	Non-standardized coefficients		Standardization coefficient	t	p	collinearity diagnostics	
	B	standard error	$Beta$			VIF	tolerance
constant	0.462	0.563	-	0.821	0.424	-	-
Plot 1	0.061	0.057	0.266	1.080	0.296	1.144	0.874
Plot 2	0.021	0.046	0.109	0.457	0.654	1.069	0.936
Plot 3	0.065	0.043	0.360	1.508	0.151	1.074	0.932
$R2$	0.151						
adjust R2	-0.008						
F	F (3,16)=0.951,p =0.440						
D-W price	1.880						
Dependent variable: penalty capacity (untreated)							
* p <0.05 ** p <0.01							

Through the empirical analysis, whether the death penalty can be treated by virtual variables has a significant effect on the results of the regression equation. The death penalty should be adapted to the crimes committed by criminals, and be limited by the modern criminal law concept and human rights thought. The death penalty is manifested as shooting or injection, but this does not mean that the death penalty can be treated with virtual variables in the empirical analysis.

4. Conclusion

Death penalty has a unique position in the Chinese and foreign penalty system, embodied by the death penalty and free punishment exist essential difference, the death penalty is the ultimate punishment, and free punishment is to help criminals return to society, and complete the purpose, so the world mainstream criminal law said that treat the death penalty should be killed less. China is a country with a tradition of death penalty, and there has been a systematic and complicated way of execution in history. Humanhumanitarian, these methods of execution certainly need to be abolished, and many death penalty charges are of natural feudal origin, so they need to be viewed critically. However, it is undeniable that the death penalty system of different levels was simultaneously constructed in Chinese history, which has certain legal support significance for the empirical law and the treatment of death penalty punishment.

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