The Impact of China's Demerit Goods Consumption on Profit Growth in the Pharmaceutical Industry

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ABSTRACT

The pharmaceutical industry is one of the most critical industries for the health and the sustainability of the human race; moreover, the modernized goods can be much more harmful than people expected, which led to severe health problems for humans. The whole experience adopts empirical analysis on the significant number of data of demerit goods and the pharmaceutical industry, so the astonishing results declare that the pharmaceutical industry could have highly relied on the sales of demerit goods. Therefore, the policy advises is that to help the situation of the medical sector, the government should intervene and, when facing any crises, the industry should pay caution on rapid value plunge. The entire study is undoubtedly contributive to give the Chinese example on the relationship of the sales of demerit goods and the profit earned by the pharmaceutical industry, which could help a massive amount of developing countries make the right decisions.

Keywords: Pharmaceutical Industry, Demerit Goods, Economic Crises, Accumulative Sales, Accumulative Profit.

1.INTRODUCTION

Accompany with the fantastic speed of development of the world is some modernized products which could carry various health problems-overlooking the fundamental purpose of finding out more detailed results to provoke a multitude of helpful ideas, which is the reason for the choices of variables. For example, the profit earned by the pharmaceutical industry can perfectly demonstrate not only the level of development of the pharmaceutical industry as any progress needs the support of profit, but also the ratio of diseases. Meanwhile, the demerit goods are the economic goods with negative externalities, where asymmetric information between suppliers and consumers leads to an oversupply and consumption of such goods. So cumulative retail sales of demerit are selected as the satisfactory variable to represent the consumption of these harmful goods. Combining these two variables allow us to discover the effect of harmful goods on the health condition of people and the entire pharmaceutical industry adequately. The crucial problems could be solved with the original china results in order to provide an ideal example for other developing countries facing the equivalent issues.

2.LITERATURE REVIEW

Recently there are few people focusing on the worldwide pharmaceutical industry data. For example, Chen Sumei and Shi Dan [1], based on the world input-output table and the United Nations commodity trade database, used the analysis methods of the input-output and social network to explore the characteristics of China's medical industry's participation in the global industrial chain. And Wei Con et al.[2] through a comparative study of the patent linkage systems in the United States, Korea and Canada, the critical elements of the early settlement mechanism for pharmaceutical patent disputes with Chinese characteristics are analyzed in light of the current development status of China's pharmaceutical industry and the legislative situation, and the current situation of China's pharmaceutical industry and the characteristics of the judicial and administrative systems are explored and constructed under the framework principles established by the patent law based on the systems of other countries. Based on the current situation of China's pharmaceutical industry and the characteristics of the judicial and administrative system, we explore the construction of an early resolution mechanism for pharmaceutical patent disputes suitable

for China's national conditions under the framework principles of the Patent Law.

Otherwise, many of the researchers interested in the data of China or its province, such as Li Hongyan et al. [3], analysed the development status of China's marine biomedical industry. They quantitatively analysed the contribution of various influencing factors of the industry by using the grey correlation model. Furthermore, Hong Jin and Liu Liying [4], based on the data of Chinese Biomedical patent inventions, analysed the problems of too few patent applications, single patent direction and insufficient attention to biomedical patents in their field of patent inventions, and put forward suggestions to improve the national attention to biomedical patents, improve the training rate of talents and strengthen the protection of knowledge from the perspective of the network. For more, Wang Na et al. [5] found that in recent years, due to its rich marine medicinal biological resources, Guangxi's maritime biomedical industry has developed rapidly, which is mainly reflected in the improvement of essential R&D capacity, the expansion of industrial-scale and the increase of industrial added value.

Some of the researchers use the information of the typical enterprises to study the whole industry of pharmaceutical. Based on the data of Listed Companies in the pharmaceutical industry from 2014 to 2016, Zhang Yang and Li Wenjun [6] explored the relationship between capital structure related indicators and Tobin Q value from two aspects of debt structure and equity structure and then analysed the relationship between capital structure and corporate performance in the pharmaceutical industry. Wang Dongmei and Yao Yali [7] conducted an empirical analysis on the relationship between the capital structure and enterprise value of Listed Companies in the biomedical industry in three growth stages: growth stage, maturity stage and recession stage, based on the data of 125 listed companies in the biomedical sector from 2013 to 2015.

Based on the capital structure theory, Wang Huihui [8] selected Jilin Aodong, which is represented in the pharmaceutical industry, and pointed out the problems existing in the capital structure of the listed company through the analysis of financial indicators. Others may use them to study the situation of the entire country-China, and its sub-province, just like Wang Qinghua and Tian Xiaojie [9] took 51 listed companies in the pharmaceutical sector of Shanghai Stock Exchange and Shenzhen Stock Exchange as research samples, based on the C-D production function, conducted empirical research on the input-output model of R & D expenses, and analysed the role of R & D investment in China's pharmaceutical industry. Moreover, Yunnan Baiyao, as an example to study the key factors affecting the success of brand extension in China's medical and pharmaceutical industry, is done by Yu Chunying [10].

As well, Jin Qu [11] believes that we should cultivate leading enterprises and improve the industrial chain; Promote the integrated development of "production, learning and research", and strengthen the introduction and training of talents; Establish the relevant standard system of Zhuang, Yao and folk medicine to promote the development of biomedical industry and provide a new growth point with innovation as the driving force for the economic development of Guangxi. Li Kai [12] consider that to explore the spatial spillover effect of buyer power on suppliers' profits, we can rely on the spatial Durbin model to address the particular many-to-many interactions in vertical relationships by analyzing data from the pharmaceutical manufacturing industry and the medical industry and, in recent years, comparing the size of the average direct effect and the average indirect effect of the downstream industry on the upstream industry in the local and the rest of the region.

Based on the above-mentioned existing literature, the possible contributions of this article are unlimited. Firstly, the topic chosen is relatively unique, and original compare with the article already existed. Furthermore, an insignificant amount of research was made on the pharmaceutical ground, even less on its connections with demerit goods. In plus, it employed the heterogeneity analysis, which is rare to adopt since its complicity-heterogeneity analysis required a massive quantity of data to break down in tinier periods, afterwards be analysed separately. Essential to mention that this article had utilised the most recent data possible from February 2002 until December 2020. Finally, the outbreak and pandemic of the new crown pneumonia epidemic has constituted a global public health crisis. In this context, research on the impact of the profit growth of the pharmaceutical industry is particularly important. Therefore, the conclusions and policy recommendations of this article have important theoretical significance and practical value, and can provide valuable Chinese cases, Chinese experiences and Chinese solutions to other developing countries in the world.

3.STUDY DESIGN

3.1. Variable Selection

To find the relationships between the profit earned by the pharmaceutical industry with the sales of demerit goods. The data specifically chosen is the retail sales of alcohol and tobacco consumption and the total cumulative profit in the pharmaceutical industry. Alcohol and tobacco are chosen as they are representative figures of demerit goods, also for the reason that the data for other drug and demerit goods are complicated to collect as data.

3.2. Source of Data

Total cumulative profit in the pharmaceutical industry monthly data are from The Chinese national bureau of statistics and the cumulative retail sales of demerit products data are collected from CEIC. The time interval of the sample is from February 2002 to December 2020. Because of the specialty of the source of the data every January of the moth were not collected, so they are not use in the calculation, equally with some few data are missing in either one they are cutting out when matching up the two data base.

3.3. Model setting

The research method selected in this paper is empirical analysis, the research model is a linear regression model, and the specific econometric model is:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \tag{1}$$

Among them, Y_i is the profit earn by the pharmaceutical industry of the explained variable (mai), X_i is the sales of demerit goods of the explanatory variable (das), and ε_i is the random error term.

3.4. Descriptive statistics

The specific statistical description of related variables is shown in Table 1. In the empirical process, all data has been logarithmic processing. It can be discovered from the chart above that the maximum and the minimum for both mai and das have a noticeable difference. The mai had about 103370 million RMB during the year, das even more about 138800 million RMB. For both variables, the quantity of data chosen was 185. The chart also illustrates a very high standard divination which means the two variables had to vary a lot during years.

Table 1. Descriptive statistics

Variable	Unit	Obs	Mean	Std.Dev.	Min	Max
mai	Millions RMB	185	103370	96820	2369	412294
das	Billions RMB	185	1388	1144	75.90	4430

4. EMPIRICAL ANALYSIS

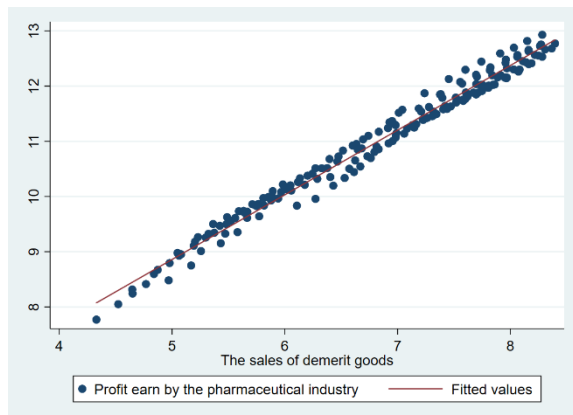### 4.1. Correlation Analysis

Figure1 The correlation between profit earn by the pharmaceutical industry with the sales of demerit goods

Figure 1 represent the relationship between profit earn by the pharmaceutical industry with the sales of demerit goods. It obviously present that these two feature have a positive correlation as one of the feature increase the other would have the same trend. The reason behind can be explain probably by the harmful effect of the demerit goods to the health to the human, especially the alcohol and tobacco. Tobacco can cause server lung damage the diseases it may led would be lung cancer, chronic bronchitis and cerebrovascular diseases etc. As well as the alcohol can led several diseases mostly related with the liver function. The increase of the consumption directly led to a higher demand for medical services hence increase the profit of pharmaceutical industry. The relationship between profit earn by the pharmaceutical industry with the sales of demerit goods needs to be further confirmed by regression analysis in this article.

4.2. Analysis of Regression Results

The table 2 show the results from the regression. Obviously, there are a very high correlation between the das and mai, because the core explanatory variable of model (1) is significantly positive at the significance level of 1%. Every grow of one unit in das led to 1.1715 unit of growth in mai. Also, it is crucial to mention that $R^2 = 0.9823$, this indicates that the model is well fitted.

Table 2. Basic regression results

	(1)
	mai
das	1.1715***
	(100.8697)
_cons	3.0018***
	(37.5803)
N	185
R2	0.9823

Note: 1. ***, ** and * mean that the variable is significant at the significance level of 1%, 5%, and 10%, respectively. 2. The brackets show the standard error.

4.3. Heterogeneity Analysis

During the sample period of this article, the subprime mortgage crisis broke out in August 2007, and the global economy entered a period of "secular stagnation"; the US versus China trade friction was initiated in March 2018, and China's international trade was greatly impacted; the corona virus pandemic broke out in January 2020, and the Chinese economy was pressed the "pause button".

Therefore, the text will take August 2007, March 2018, and January 2020 as the time nodes, and divide the sample period into four time periods for heterogeneity analysis. Table 3 models (1), (2), (3), (4) respectively report the regression results of the impact of the sales of demerit goods on profit earn by the pharmaceutical industry from February 2002 to August 2007, August 2007 to March 2018, March 2018 to January 2020, and January 2020 to December 2020. The estimated coefficients of the explanatory variables are 1.3283,

1.1508, 1.1424 and 1.2052, respectively, and the regression results are all significantly positive at the 1% significance level. All R^2 are greater than 0.9, that is, the models are well fitted.

The regression results show that the sales of demerit goods played the greatest role in improving the profit earn by the pharmaceutical industry from February 2002 to August 2007, and it declined after the subprime mortgage crisis broke out in August 2007. It is probably the consequences of the diminution of consumer disposable income had made the consumption of demerit goods decrease. After the US versus China trade friction the result even drop down to 1.1424, which was probably the consequence of trade protection, pharmaceutical services and goods and demerit goods both would face a demine on demand as response of lower profit. Inversely, after the pandemic arrive the index had rebound to 1.2052, probably the situation already made the demand for pharmaceutical services soar.

Table 3. Heterogeneity analysis

	(1)	(2)	(3)	(4)
	mai	mai	mai	mai
das	1.3283***	1.1508***	1.1424***	1.2052***
	(47.4428)	(55.4016)	(48.0514)	(29.1488)
_cons	2.1636***	3.0708***	3.3515***	3.0521***
	(13.8657)	(20.2411)	(18.3752)	(9.8069)
N	57	96	21	11
R2	0.9761	0.9703	0.9918	0.9895

Note: 1. ***, ** and * mean that the variable is significant at the significance level of 1%, 5%, and 10%, respectively. 2. The brackets show the standard error.

5.CONCLUSION

This study confirms that the accumulative profit in the pharmaceutical industry is positively relevant to the accumulative sales of demerit goods using empirical analysis, which offers the thinking that the pharmaceutical industry is possibly dependent on the productivity or sales of the demerit goods. Moreover, with the heterogeneous analysis, it can be discovered that any sort of trading conflict and economic crisis would cause a tremendous decrease in the pharmaceutical industry's profit, but it is the inverse when there is a pandemic.

Therefore, there are five pieces of advice. Firstly, consider that the government could change a certain amount of taxes on demerit goods and partially invest them in the pharmaceutical industry to prevent the fact that the industry is too dependent on the sales of demerit goods. Secondly, this is a warning to the medicine industry to not only focus on the fatal disease that destroys people's lives but also specialise in improving the life quality of people, for example, on ameliorating

the visual condition of people; the breakthrough that bases on an initially not terrible condition of people trying to provide to people an even better condition. Thirdly, in private sectors, the enterprise in the pharmaceutical industry could regard the sales of demerit goods as an index to decide whether to set up firms in that places ditto for the tobacco and alcohol firms that the profit earning by the pharmaceutical could be an excellent indication to determine the level of competition in that area. Fourthly, the impact of the subprime mortgage crisis and the US versus China trade friction has penetrated all walks of life in China, and the impact of the pharmaceutical industry cannot be underestimated. In the face of the shock, the government needs to help the pharmaceutical industry develop new businesses and markets, increase newly listed drugs, and ensure the continued growth of the biopharmaceutical industry. Fifthly, the corona virus pandemic has caused untold damage to society and industries, but the medical industry has also taken advantage of the crisis to promote virus detection, disease diagnosis, clinical treatment drug development, and vaccine development.

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