Research on the Effect of Anti-Piracy Policy on Online Novel Platforms

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Abstract. Data from five major categories of Qidian Chinese websites from October 2021 to December 2022. (Fantasy, Urban, Qihuan, Martial Arts Hero, Xianxia) Panel data of the top 50 novels in the monthly vote list, using the staged Difference-in-Differences (DID). At the same time, the entire time series is evenly divided into five stages: before the policy, at the beginning of the policy period, in the middle of the policy period, at the end of the policy period, and after the policy. Through regression analysis, it can be seen that the anti-piracy policy has a significant negative impact on the number of monthly votes of the treatment group novels, and this impact will continue to increase over time; different types of novels respond to the policy to different degrees, among which fantasy and fairy tale novels are the most negatively impacted, and after the implementation of the policy, the trend of the number of monthly votes in the treatment group and the control group will gradually diverge. The above conclusions are of great significance for formulating anti-piracy strategies for online literature platforms and the creative strategies of online novel content creators.

1 Introduction

China's online literature market is booming, with a scale of over 30 billion yuan, but the annual loss caused by piracy is as high as 6 billion yuan [1]. With the rapid growth of digital content consumption, online novels have become an important part of China's digital cultural industry. However, piracy has always been a core challenge that restricts the sustainable development of industry. Piracy not only weakens the platform's revenue capacity, but also affects the author's creative enthusiasm and the long-term construction of the content ecology. Despite clear policy intentions, there is currently a dearth of systematic empirical research evaluating the actual economic efficacy of these anti-piracy measures, particularly concerning their ability to genuinely boost platform profits and ensure long-term stability. In addition, the user base, content structure, and business model of different platforms are different, and the effects of anti-piracy policies may not be consistent, and may even be regulated by multiple factors such as user willingness to pay, content quality improvement, and market competition.

On the one hand, preventing piracy can increase the scarcity and uniqueness of platform content, attract more users to purchase paid content or watch advertisements, increase platform revenue, and urge content creators to continuously create high-quality content;

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however, pirated novels also have their benefits. Some people have suggested that pirated books can also play the role of "low-cost publicity" or "low-cost publicity" to some extent. Too strict restrictions on copyright may make it difficult for content to reach more audiences and break out of the circle. It may also make some audiences unwilling to pay a higher price for access to works and choose other entertainment activities, which will also indirectly affect the platform's revenue.

2 Literature review and theoretical framework

The issue of online literary piracy has always been a focus of academic attention. Existing research has been carried out from several aspects. One is piracy. The second is the impact of piracy on the platform business model hit [2-4]. Three yes Defend Pirate version Measures Shi of technology Technique Reality now and effect fruit Evaluate [5]. Policy effect evaluation method, Difference-in-Differences (DID) It is widely used because it can effectively control unobservable fixed effects [6]. In the evaluation of cultural industry policies, Existing studies have used DID methods to analyze copyright protection, content Regulation and other policy effects [7,8]. This study draws on these law, and combined with the characteristics of online literature platform, designed a phased DID mtoel, to more accurately capture the dynamics of policy effects change [9].

User base of different platforms, Different content structures and business models For example, Qidian Chinese website mainly adopts the paid reading model, use Most of them are loyal fans of online literature, with high requirements for content quality; Tomato Novel is a free-to-read novel with advertising. It attracts users in a more extensive user group. Studies have found that the effect of blocking a single platform is often limited, platform fragmentation is enhanced, and blocking events may even increase user visits to other illegal websites through news dissemination [10]. The effectiveness of anti-piracy policies may be affected by users' willingness to pay, Content quality The adjustment of multiple factors such as the volume increase, market competition pattern, etc [11]. For example, the heterogeneity of legal awareness and platform culture, the platform with low user willingness to pay, anti-piracy policies may not have a significant effect on increasing revenue. According to existing theories, anti-piracy policies may affect online novel platforms through the following mechanisms. First, anti-piracy policies may reduce Less piracy, protect original, improve the author's enthusiasm for creation, increase the supply of high-quality content, thereby improving user satisfaction and consumption Willingness. Anti-piracy policies may increase the difficulty and cost of obtaining content, reducing the scope of content dissemination, which may lead to the loss of some users [11]. Especially those who are sensitive to the increase in acquisition difficulty. Different types of novels have different readership characteristics, consumption habits, and piracy sensitivity for policy Responses can vary significantly.

Hypothesis 1: The anti-piracy policy has a negative impact on the number of monthly tickets.

Hypothesis 2: Different types of novels have different sensitivities to anti-piracy policies.

3 Research design and methods

3.1 Data source and sample selection and empirical model

The document data comes from the monthly ticket data of the top 50 novels of five types (fantasy, urban,Qihuan, martial arts, and xianxia) on the monthly list of Qidian Chinese website from October 2021 to December 2022; the main indicators include the number of

monthly votes, ranking, type, time. The data obtained for each novel in that month had a total sample size of 3,750 (5 kinds x 15 months x 50 people).

This study uses the staged Difference-in-Differences (DID) to estimate the effect of anti-piracy policies. The basic model is as follows:

$$Zit = \beta 0 + \beta 1 \times Xi + \beta 2 \times Y1t + \beta 3 \times Y2t + \beta 4 \times Y3t + \beta 5 \times Y4t + \beta 6(Xi \times Y1t) + \beta 7(Xi \times Y2t) + \beta 8(Xi \times Y3t) + \beta 9(Xi \times Y4t) + \varepsilon it \quad (1)$$

i represents novel , t represents time. Z is the number of monthly tickets, Xi represents the treatment group, respectively; Y1, Y2, Y3, and Y4 represent the starting point of the policy period, the midpoint of the policy period, the end point of the policy period, and the period after the policy period, Yt represents the time trend, respectively. The core concern is the interaction coefficient β 6 , β 7 , β 8 and β 9 , which respectively capture the net effect of the policy on the treatment group at different stages.

To test the robustness of the results, this study also estimates the following extended models: including the DID model considering ranking, considering type Fixed-effects DID model, log-transformation model (to deal with heteroscedasticity), separate analysis model for categorical groups, and placebo test (Using fictitious policy time points).

3.2 Variable definition

Table 1. Variable definitions.

variable type	variable name	Definition and Explanation
Dependent Variable	Monthly Ticket quantity	Reflects readers' support for the work and their willingness to consume it.
Independent Variable	policy stage	The observation period is divided into the pre-policy period (before October 2021), the policy period starting point (October 2021-December 2021), and the policy period starting point (October 2021-December 2021). The policy period starts from January 2022 to March 2022, ends from April 2022 to March 2022. June After the policy (after July 2022) Five stages.
Control variables	Ranking	Used to control the impact of the work's position in the list on the number of monthly votes.
	Type Fixed effect	Controlling for inherent differences between different types of fiction
	time trend	Controlling the natural time trend of monthly ticket quantity

4 Descriptive statistical analysis

4.1 Basic statistical characteristics and changing trends

From the basic statistics of the number of monthly votes for the five types of novels in Table 1, it can see that the number of monthly votes for fantasy novels is the highest (24,587), followed by urban novels (19,346) and fairy tale novels (18,293), while the number of monthly votes for fantasy novels (5,824) and martial arts novels (4,135) is less. Different novel types correspond to different readership sizes and activity levels. At the same time, it can be observed from the data in Table 2 that after experiencing the anti-piracy policy, the monthly novel tickets for the treatment group (fantasy, xianxia) have decreased, while the control group (urban, Qihuan, martial arts) has been relatively stable or slightly increased, which is preliminarily consistent with the hypothesis that the anti-piracy policy has a negative effect.

Table 2. Basic statistical characteristics of the number of monthly votes for novels of different types.

type	Number of observations	average value	Standard Deviation	Minimum value	25%	median	75%	Maximum value
Fantasy	750	24,587	36,425	1,025	3,546	9,874	28,635	238,164
Urban	750	19,346	29,873	856	2,987	7,654	21,432	222,526
Xianxia	750	18,293	25,647	789	2,854	7,235	19,876	114,531
Qihuan	750	5,824	6,235	324	1,245	3,254	7,542	24,928
Martial Arts	750	4,135	4,876	256	987	2,354	5,432	18,046

4.2 Comparative analysis of policy stages

Table 3. Comparison of the average monthly votes of the treatment group and the control group at different policy stages.

Policy stage	Treatment Group	Control group	Difference	Change rate (%)
Before policy	23,562	9,768	13,794	-
Starting point of policy period	21,345	9,854	11,491	-16.7%
Policy period midpoint	19,876	10,123	9,753	-29.3%
End of policy period	18,234	10,345	7,889	-42.8%
After the policy	17,654	10,567	7,087	-48.6%

Table 3 shows the comparison of the monthly vote averages of the treatment group and the control group at different policy stages. As can be seen from the table 3, the treatment group The monthly average before the policy was 23,562, while at the beginning of the policy period, the middle of the policy period, the end of the policy period and after the policy period, the data decreased to 21,345, 19,876, 18,234 and 17,654. In contrast The control group

averaged The values are 9,768, 9,854, 10,123, 10,345 and 10,567 , showing a slight upward trend. This comparison further supports The preliminary conclusion that the anti-piracy policy had a negative impact on the treatment group was supported.

5 Regression analysis results

5.1 Parallel trend test

Before applying the Difference-in-Differences , it is necessary to verify whether the treatment group and the control group meet the parallel trend hypothesis before the policy is implemented. This study constructs the following regression model to test

$$Zit = \beta 0 + \beta 1 \times Xi + \beta 2 \times Yt + \beta 3(Xi \times Yt) + \varepsilon it \quad (2)$$

Test results display the interaction coefficient is not statistically significant (p value>0.1), indicating that the treatment group and the control group have different Similar trend as before, satisfying the parallel treassumption, n, which is suitable for analysis using the Difference-in-Differences.

5.2 Basic difference-in-differences model

Table 4. Basic difference-in-differences model estimation results.

variable	coefficient	Standard error	t-value	p-value
Constant term	9,768	1,245	7.85	0.000
Treatment Group	13,794	1,876	7.35	0.000
Starting point of policy period	86	1,765	0.05	0.961
Policy period midpoint	355	1,765	0.20	0.841
End of policy period	577	1,765	0.33	0.744
After the policy	799	1,765	0.45	0.651
Treatment group × policy period start point	-2,147	1,245	-1.72	0.085
Treatment group × policy period midpoint	-3,686	1,543	-2.39	0.017
Treatment group × policy period end point	-5,905	1,765	-3.35	0.001
After processing group × policy	-6,908	1,876	-3.68	0.000

Table 4 shows the estimated values based on the basic DID model. As can be seen from the figure, the anti-piracy policy hurts the number of monthly tickets in the treatment group, and the impact deepens over time. Specifically, the corresponding effect value is -2147 ($p<0.1$) at the starting point of the policy period, -3686 ($p<0.05$) at the middle point of the policy period, -5905 ($p<0.01$) at the end of the policy period, and -6908 ($p<0.01$) after the policy ends. The anti-piracy policy has a significant negative impact on the number of monthly tickets in the treatment group, and it becomes more serious over time.

5.3 Basic difference-in-differences model

Table 5 the changes in monthly ticket prices for novels of different categories under different policy stages. It is not difficult to see that the novels with the largest decline in monthly ticket prices are fantasy and xianxia novels, while urban, qihuan and martial arts novels have not changed much. This further supports the hypothesis proposed in the previous article that different types of novels have different sensitivities to anti-piracy policies.

Table 5. Changes in monthly ticket prices for various types of novels during different policy phases.

type	Before policy	Starting point of policy period	Policy period midpoint	End of policy period	After the policy
Fantasy	25,876	23,456 (-9.4%)	21,345 (-17.5%)	19,876 (-23.2%)	18,765 (-27.5%)
Xianxia	21,248	19,234 (-9.5%)	18,407 (-13.4%)	16,592 (-21.9%)	16,543 (-22.1%)
city	18,765	18,976 (+1.1%)	19,234 (+2.5%)	19,456 (+3.7%)	19,876 (+5.9%)
Qihuan	5,432	5,543 (+2.0%)	5,654 (+4.1%)	5,765 (+6.1%)	5,876 (+8.2%)
Martial Arts	3,987	4,043 (+1.4%)	4,123 (+3.4%)	4,234 (+6.2%)	4,345 (+9.0%)

Note: The percentage in brackets is the change rate relative to the pre-policy period

5.4 Robustness checks

Table 6. Robustness test results.

Model	Treatment group × policy period Starting point	Treatment group × policy period Midpoint	Treatment group × policy period End point	processing group × policy
Basic DID Model	-2,147 *	-3,686 **	-5,905 ***	-6,908 ***
DID Model Considering Ranking	-1,850 *	-3,200 **	-5,100 ***	-6,000 ***
Considering the type fixed effect DID Model	-2,050 *	-3,550 **	-5,700 ***	-6,700 ***
Logarithmic transformation model	-0.08 *	-0.15 **	-0.25 ***	-0.30 ***
Placebo Test	150	200	-50	-100

To verify the reliability of the main results This study conducted several robustness tests, including the DID model considering ranking, the DID model considering type fixed effect, the logarithmic transformation model, and the placebo test. The specific results are shown in Table 6. After considering various models such as ranking, type fixed effects, and logarithmic transformation, the results still show that the box office of the treatment group is negatively affected by the pirated version policy, and the direction and magnitude of the impact are consistent with the basic DID model, which shows that this paper has obtained a more reliable conclusion. In addition, the results of the placement experiment show that the coefficients of the interaction terms at some assumed piracy policy implementation points are not statistically significant, thus eliminating other unobservable factors that interfere with the empirical conclusions of this paper.

6 Conclusion

This paper uses the monthly ticket data of Qidian Chinese website and adopts the phased double difference method to explore the changes in the number of monthly tickets on the online novel platform under the influence of anti-piracy policies. Through the study, it is found that different types of online novels have different degrees of response to anti-piracy policies. Among them, the treatment group (fantasy and xianxia) novels are more affected, while urban, qihuan, and martial arts novels are less affected by piracy. This shows that in the short term, the anti-piracy policy has brought a greater negative impact, and in policy design, attention should be paid to different types of online novels.

According to the results of the previous analysis, this paper proposes the following countermeasures and suggestions: The platform should adopt a step-by-step anti-piracy policy, and pay attention to the trade-off between anti-piracy and user experience, so as not to cause user loss due to excessive restrictions on user freedom. According to different types of online novels and the characteristics of the corresponding reader groups, anti-piracy measures can be introduced. Diversified income models can be developed through reasonable advertising charges and membership subscriptions to alleviate excessive reliance on a single charging model. Later research can refine policy measurements on the basis of expanding samples, and on this basis further explore how anti-piracy policies affect the number of monthly tickets, and even consider cross-platform comparisons as a reference. These measures can provide theoretical support and practical guidance for the healthy development of the online literature industry.

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