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Competition, Contracts, and Creativity: Evidence from Novel Writing in a Platform Market

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Abstract. A growing number of people today are participating in the gig economy, working as independent contractors on short-term projects. We study the effects of competition on gig workers' effort and creativity on a Chinese novel-writing platform. Authors produce and sell their works chapter by chapter under a revenue-sharing or pay-by-the-word contract with the platform. Exploiting a regulation that induced a massive entry of novels in the romance genre but not other genres, we find that, on average, intensified competition led authors to produce content more quickly, whereas its effect on book novelty was weak. However, revenue-sharing books responded to competition substantially more than pay-by-the-word books, particularly regarding novelty. Moreover, the effect of competition on novelty is considerably stronger for books at earlier stages of the product life cycle. Finally, the platform increased the promotion of contracted books, which disproportionately favored pay-by-the-word books. We discuss the implications of these results for creative workers, platform firms, and policy makers in the gig economy.

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Keywords: competition • contracts • creative production • platform bias • gig economy

1. Introduction

Our workforce has increasingly shifted toward a gig economy, in which people take on a variety of short-term jobs and projects, known as “gigs” (e.g., McKinsey Global Institute 2015, 2016; and Burtch et al. 2018).¹ Many gig workers leverage digital platforms such as YouTube (videos), the Apple AppStore and Google Play (apps and games), Kindle Direct Publishing (books), and Coursera (education) to commercialize their talents (e.g., Benner and Waldfogel 2016, Zheng et al. 2016, Hong and Pavlou 2017, and Burtch et al. 2018). Although these platforms reduce the cost of finding customers, they drastically decrease entry barriers and thus fuel competition among gig workers (e.g., Waldfogel 2017 and Peukert 2019). How competition affects gig workers' motivation and productivity is crucial for understanding labor supply and the production of creative content in the gig economy.

Although competition has long been regarded as a driving force that can spur workers' efforts to improve productivity and upgrade products (e.g., Hicks 1935, Leibenstein 1966, and Machlup 1967), several factors may impede this positive effect of competition. First, intensified competition tends to reduce the market value of new product features and thus to discourage innovative efforts (e.g., Aghion et al. 2001, 2005; Vives

2008; and Lu et al. 2017). Second, the effect of competition on workers' behavior may depend on incentive structures. A few theoretical studies point out that only under a sufficiently high-powered incentive structure are workers likely to react to competition by improving productivity (e.g., Hart 1983, Scharfstein 1988, Hermalin 1992, Schmidt 1997, and Raith 2003). Several experimental studies (e.g., Amabile 1996, Hennessey and Amabile 2010, and Eisenberg and Thompson 2011), however, find that under a high-powered incentive structure, workers may choke under pressure, reducing their productivity. Finally, although competition encourages firms to replace existing products (Arrow 1962), the effect will depend on the cost of replacement, which differs across products at different stages of their life cycle. Therefore, the effect of competition on worker effort is generally ambiguous, and unravelling it requires empirical investigation.

This paper is among the first to investigate how competition affects workers' efforts in the gig economy. We assemble a unique data set on the daily writing activities of novelists on a leading Chinese online-novel-writing platform. Authors contract with the platform to produce commercial novels chapter by chapter, and readers purchase chapters at a fixed unit price set by the platform. An author can sign a

revenue-sharing contract with the platform and tie her income to sales, or she can sign a fixed-price contract and be paid by the word. We measure an author's routine effort by the word count and frequency of updates of a book per month. Moreover, on the basis of approximately one million review posts written by readers, we construct monthly measures of book novelty to capture an author's exertion of creative effort.

Identifying the causal effect of competition is notoriously difficult, because competition is often an endogenous outcome. An important innovation of this paper is that we leverage a sudden regulatory change that induced a massive entry of novels in the romance genre, but not other genres, to identify the effect of product competition. The difference-in-differences (DID) estimates show that, in response to intensified competition, authors substantially increased their routine efforts: At the monthly level, the number of characters nearly doubled, the number of chapters increased by 29%, and the amount of bonus content increased by 88%. These effects remain strong after excluding the influence of platform promotion and other potential confounding factors. However, the effect of competition on book novelty is insignificant.

We further examine these effects under two types of contracts—revenue sharing (pay by performance) and fixed price (pay by the word)—to elucidate how competition interacts with incentive structures to affect worker behavior. Exploiting a sample in which contract assignments are nearly random, we find that the effects on the novelty and quantity for revenue-sharing books are positive and statistically significant, whereas the effects for fixed-price books are insignificant.

Moreover, we find that the effect of increased competition on book novelty is strong for books at an earlier stage of their product life cycle (hereafter, “younger books”), whereas it is absent for those at a later stage (“older books”). However, this differential effect does not appear when the outcome concerns the quantity measures. These results suggest that for books at the different stages of the product life cycle, competition does not have a differential effect on their authors' routine efforts, which enhance existing product attributes, but has a differential effect on their creative efforts, which incur the cost of replacing existing attributes.

Regarding a book's market performance, we find that intensified competition increased sales of contracted books by almost 48%, consistent with the positive effect of competition on author effort. However, both reader clicks and purchases of fixed-price books increased considerably more than those of revenue-sharing books, although revenue-sharing authors exerted significantly more effort than paid-by-the-word authors did. To address this somewhat puzzling

result, we investigate the platform's response to intensified competition. We find that when product competition intensified, the platform increased its promotion of books in favor of the fixed-price ones, of which the platform is the sole residual claimant. Thus, a platform's strategic promotion may distort the relationship between effort and payoff.

This paper contributes to emerging research on the efficiency of the gig economy. A central theme of this literature is how to mitigate moral hazard such as shirking and ensure product quality in the presence of job fragmentation and workplace flexibility (e.g., Mas and Pallais 2017, Burtch et al. 2018, Liu et al. 2018, and Athey et al. 2021). Studies have focused mostly on the disciplinary effects of consumer feedback and reputation (e.g., Dellarocas 2003, Cabral and Hortaçsu 2010, and Tadelis 2016).² To the best of our knowledge, our paper is the first to systematically study the effect of competition on gig workers' efforts and productivity. Our finding that workers respond to intensified competition by substantially increasing output suggests a strong effect of competition on productivity in the gig economy. The positive effect of competition on book novelty for authors under revenue-sharing contracts is another important source of welfare gains in the digital economy (e.g., Brynjolfsson et al. 2011 and Aguiar and Waldfogel 2018, 2021).

Our study also relates to the long-standing inquiry into the role of competition in innovation and creative production. Past studies (e.g., Aghion et al. 2005, 2014; Boudreau et al. 2016; and Gross 2020) suggest an inverted U-shaped relationship between competition and firms' incentives to innovate: the incentives increase with the level of competition for low levels of competition but decrease for high levels of competition. By contrast, we find that in the gig economy, a high-level competition does not appear to suppress workers' productivity and creativity, likely because gig workers' labor supply is highly flexible and the cost of expanding one's effort is relatively low. Furthermore, we show that the effect is moderated by two factors—a high-powered incentive structure and a low cost of creative destruction (i.e., product replacement).

Finally, this paper adds to the literature on platform markets. Platform owners engage in contractual relationships with individual producers in many markets, such as the home video game industry, e-book industry, and daily local deal market (e.g., Lee 2013, Hao and Fan 2014, and Li and Wu 2018). However, because of data limitations, few studies have investigated the effects of contractual arrangements. Our study provides some of the first evidence on the impact of contractual arrangements on the behavior of the contracting parties in a platform setting. Existing studies have examined how platform owners use

nonpricing tools, such as information disclosure (e.g., Sun et al. 2019), ancillary services (e.g., Han et al. 2020), matching mechanisms (e.g., Wei and Lin 2017), and degree of openness (e.g., Parker and Van Alstyne 2018), to influence their market participants' performance. Our study contributes to this literature by showing that platform firms can use a combination of contracts and strategic promotion to capture more value.

The remainder of this paper is organized as follows. Section 2 describes the empirical setting. Section 3 presents the theoretical framework. Section 4 describes the data. Section 5 discusses the empirical strategy and presents the main results. Sections 6–8 provide further evidence on the mechanisms. Section 9 concludes the paper with a discussion of the managerial implications.

2. Institutional Background

Since 2002, the Chinese online-novel business has evolved into a multibillion-dollar industry, with over 300 million users and more than 1 million novelists (China Internet Network Information Center 2017). This entertainment business operates through platforms that match authors with readers. During our study period (2013–2015), 10 leading platforms dominated the industry, all backed by Chinese technology giants such as Tencent, Baidu, and Alibaba (Jiang 2017). Our study focuses on one of these top platforms. Its business model is representative of the industry.

2.1. Business Model

The online-novel-writing platform we study provides a digital infrastructure for authors to post their work and for consumers to read books on their computers or mobile devices. As a commitment to providing a clean production and reading environment, neither the platform nor the authors use advertising for income. Instead, the platform plays the role of a publisher: it charges readers and pays contracted authors. The platform uses a pay-per-view model instead of a subscription model. In practice, it sets the same unit price per reader purchase for all book chapters across genres, which is RMB 1 (approximately US\$0.17) per 1,000 Chinese characters per view.³

The burgeoning online-novel-writing business in China is driven by the growing popularity of online reading and the abundant supply of part-time writers.⁴ A platform market has the advantage of offering a huge variety of books to satisfy readers with heterogeneous preferences. Although many authors write part-time, some of them are highly competent.

Competition in this market is fierce. The low entry cost on these platforms invites many aspiring novelists to enter the market. Hundreds of thousands of novels,

distributed among 10 big platforms and more than 100 small platforms, compete for readership. Fewer than 20% of authors are ever contracted with platforms, and fewer than 10% of books can generate sufficient income for their authors to make a living. According to industry experts, each platform has a loyal readership, and reader multihoming (reading books on multiple platforms) is uncommon. Thus, product competition occurs mostly among books published on the same platform, where a typical book competes with dozens of other books on similar topics.

2.2. Production

Online-novel writing is mostly an individual activity; coauthorship is rare. Any potential author can approach the platform and propose an original book project with sample chapters. Once the platform reviews and approves the proposal, the author begins to post her work chapter by chapter on the site. After a trial period, during which these chapters are free to view, the platform's editorial team assesses the book's quality and popularity. If the platform sees business potential, it offers its author an "up-to-the-shelf" opportunity, whereby the author signs a contract with and receives payment from the platform. Then, readers have to pay to read the subsequent chapters.

As part of the contract, a book project's market position (genre) is fixed. An author exerts two types of effort to attract and maintain a readership. First, she can write lengthier chapters and provide updates more frequently. We see abundant compliments in readers' reviews when an author's pace exceeds the average level (one chapter or 3,000 characters per day), whereas readers leave negative comments and give up on books that are not updated for several consecutive days. An author may even offer bonus content—extra words free of charge—in each chapter. We refer to these efforts to expand content quantity as routine efforts.

Second, to retain a loyal readership and entice new readers, an author needs to maintain and improve the novelty of her work. This is particularly true when a book is produced chapter by chapter. A book can start with an already well-liked story, but if its author does not continue to introduce new features, readers' interest will wane. Conversely, a book stands out when its author develops unexpected plots, adds clever twists, builds suspense, writes unanticipated cliffhangers, and creatively combines elements from other artistic formats, such as serious and folk literature, movies and television, and even talk shows. We refer to these novelty-enhancing efforts as creative efforts.

The platform engages in book production in two ways. First, it assigns an editor to each book to perform quality control and screen socially or politically inappropriate content. In practice, the quality-control

function is rather weak, because an editor typically handles dozens of books at a time. Second, the platform can decide how to promote books on its web page. The home page of the platform website is its most visible space, and appearing on it is important for authors to reach readers. However, the platform can place only a small subset of all available books on the home page. To find other books, readers must click a specific category to browse books or search the name of a specific book. The platform promotes contracted books and uncontracted new arrivals for different purposes. It promotes contracted books to increase readership, which drives the platform's revenue, but promotes new books to discover promising books and attract potential authors.

2.3. Contracting and Incentive Structures

After contracting, an author begins collecting income from the platform but forfeits the right to publish the same book or similar books on other platforms in the contracting period (typically 10 years). During this period, authors hand over the selling rights of their books to the platform, which sets the price, receives payments from readers, and decides on promotion.

All contracted books are under one of two types of contract—revenue sharing or fixed price (pay by the word). Both are common practice in creative industries (Caves 2000). The default contract is revenue sharing, under which an author and the platform share the revenues generated by sales. The platform uses a 50–50 split rule for all revenue-sharing books. The other contractual format is fixed price, under which an author is required to produce a minimum amount of content per month and receives a fixed payment for every thousand characters she publishes. Under the fixed-price contract, the platform buys out a book, and the payment of the author is independent of sales. Under either contract, the platform owns the right to terminate a book project if the author fails to update the book regularly or meet the minimum quality standard.

From the platform's perspective, the fixed-price contract has two advantages. First, it guarantees the publication of a constant number of books to meet reader demand because authors are required to produce a regular amount of quantity. Accordingly, the platform offers a high price to buy out books written by a number of well-known authors. Second, once a fixed-price book has attracted a large audience, the platform has the right to claim all the residual income. This motivates the platform to make fixed-price offers to certain nascent authors.

To acquire potentially lucrative books without paying high prices, the platform often approaches unknown authors to make fixed-price offers, because books by unknown authors are far cheaper than books

by established authors. The platform regularly makes a number of low-price offers to upcoming authors. A senior manager explained this strategy:

Buying out future superstar books at a low price is the best deal. The problem is that it is extremely hard to predict the long-run market performance of a book if its author is not well known. Even books that are welcomed by the market in the beginning may fizzle out later. If we wait until the book becomes popular, the price the author asks for will be a lot higher. So our strategy is to offer a low price to upcoming authors when their books are still in the early stages. This is like gambling, but the cost is low.

This bet-on-the-promising strategy generates randomness in the selection of the fixed-price contracts among unknown authors, which we will exploit to identify the contractual effect.

2.4. The Web-Cleaning Campaign

On April 13, 2014, the Chinese National Internet Control Office and the National Police Department jointly waged a campaign to crack down on internet pornography. Secretly planned by central government agencies, the campaign was unexpected, resulting in the sudden arrest of many writers who were involved in the production and dissemination of internet pornography and did not have the opportunity to remove inappropriate content. The Web-Cleaning Campaign (WCC) lasted until the end of November 2014 and had a profound effect on the online-novel-writing market. Most dramatically, dozens of platforms that specialized in publishing romance novels were permanently shut down. Authors of romance fiction who had been active on these platforms or who were new to the business had to seek opportunities on mainstream platforms with solid reputations, including the one examined in this paper. Figure A1 in the online appendix illustrates the situation. We will provide a detailed account of how this event created asymmetric shocks to the entry of romance novels and other genres of novel.

3. Theoretical Framework

Economists and management scholars have debated about how market competition stimulates an organization's internal dynamics and spurs firm productivity. Leibenstein (1966, 1987) argues that market competition provides a powerful curb to managerial inefficiency, which arises from shirking, free riding, multitasking, and suboptimal decision making. When offering advice to managers, Simons (2010, p. 111) asserts that "the marketplace is an impartial and unsympathetic judge of competitive success. If you shield people in your business from such competitive pressures, they are unlikely to innovate."

Despite this positive managerial view of market competition, industrial organization economists contend that its effect can be reversed because, in a highly competitive environment, the cost of productivity-enhancing effort may exceed the return. This view dates back to Schumpeter (1942), who posits that monopolistic profit (or rent) inspires firms to innovate, whereas market competition causes rent to dissipate and thus discourages innovation. As summarized in Vives (2008), for a given total market size, an increase in competition tends to reduce innovation effort in a variety of market structures. In a dynamic setting, Aghion et al. (2001, 2005) argue that the effect of product competition on innovation depends on a firm's market position—firms in laggard positions will respond negatively to intensified competition because it reduces their expected rents from innovative activities, whereas firms in a neck-and-neck race will respond positively because successful innovation allows them to replace existing products and thus escape the competition.

When it comes to individual behavior in creative production, competition may generate additional negative effects. Competitive pressure reduces creative workers' tolerance of failure and thus impedes innovative effort (e.g., Azoulay et al. 2011 and Ederer and Manso 2013). Moreover, numerous psychological studies show that creative workers tend to choke under pressure (e.g., Amabile 1996, Hennessey and Amabile 2010, and Eisenberg and Thompson 2011).

These theoretical arguments altogether stipulate a set of conditions that direct the impact of competition on worker behavior and firm productivity: (a) the extent of managerial inefficiency in production, (b) the market conditions that govern the trade-off between rent dissipation and product replacement, and (c) the nature of production effort (routine or creative). We discuss how these three conditions are relevant to the gig economy, particularly in our context of online-novel writing; from this discussion, we develop testable hypotheses regarding the effects of competition on authors' behavior.

As noted in Section 2, being a gig worker, an author is likely to pay close attention to the changing competitive environment induced by the entry of new rivals. Because of the flexible production process, managerial inefficiency arises easily when an author engages in multiple tasks (e.g., main job versus novel writing) or is distracted by other activities. Thus, competitive pressure tends to discourage shirking, resulting in greater routine effort and higher labor productivity.

The effect of competition on novelists' creative effort is less clear. The entry of new books will erode the market share of existing books. If these new books are authored by famous novelists, existing books will be placed in a laggard position, and the rent-dissipation effect

will reduce incumbent authors' incentives to increase their effort. However, authors in this market are mostly aspiring and part-time novelists; new books are seldom more attractive than existing ones. Within the same novel category, books are rather similar in quality, and product competition can be characterized as a neck-and-neck race. Thus, increased competition is likely to increase creative effort.

Given that novel writing, just like many other tasks performed by gig workers, is individual-based production and involves substantial mental activity, the behavioral view of competition is relevant. A priori, intensified competition tends to reduce an author's tolerance of failure and may also cause authors to choke. This negative effect of competition can counteract the positive effects coming from the mitigation of shirking and the pressure of escaping competition. With these mixed views in mind, we propose the following hypothesis for our empirical test.

Hypothesis 1 (Average Effect of Competition). *After the entry of new books induced by the WCC, existing authors (a) increase their routine efforts to produce more content and to provide updates more frequently and (b) increase their creative efforts to improve the novelty of their work.*

An incentive structure has been well recognized as an important mediator that channels the effect of competition on worker behavior (e.g., Hermalin 1992, Schmidt 1997, and Raith 2003). In corporations, the tie between an employee's pay and firm performance is usually weak because an individual's sole effort rarely generates a deterministic impact on firm performance. This weak tie dampens workers' motivation to respond to changing market conditions that have an impact on firm performance. By contrast, a typical gig worker is the residual claimant of the incomes accrued to his or her effort. We expect gig workers to be more willing to respond to changing market conditions that affect their pay.

Our empirical setting creates a sharp contrast between two types of workers in the gig workplace: revenue-sharing authors, whose pay is high-powered, and paid-by-the-word authors, whose pay is low-powered. Because the latter's pay is not affected by market conditions, we expect that only the former will adjust their efforts in response to increased market competition. This response could be particularly strong for routine effort because gig workers have great flexibility in adjusting their labor supply.

The aforementioned predicted positive effect of competition can be offset by a negative behavioral response when it concerns authors' creative effort. The behavioral view of incentive contracts contends that high-powered incentives will discourage exploration of new approaches (e.g., McGraw 1978 and Amabile 1996) and crowd out intrinsic creativity (e.g.,

Bénabou and Tirole 2003 and Gneezy et al. 2011). Again, it becomes an empirical question of how contractual arrangements channel the effect of competition for an author. We therefore formulate the following hypothesis for our empirical test.

Hypothesis 2 (Effects of Competition Under Different Contracts). *After the entry of new books induced by the WCC, revenue-sharing authors respond to increased competition more than fixed-price authors in their exertion of routine efforts as well as creative efforts.*

We next consider the heterogeneous effect of market competition on products across different stages of their life cycle. This effect has important implications for how market competition affects the process of creative destruction and the stage of innovation. From a theoretical point of view, Arrow (1962) famously argues that firms in a competitive environment are more willing to replace existing products than monopolists because the market value of existing products is smaller for competitive firms. This logic implies that the effect of competition on innovation differs across products with different degrees of maturity because the benefits and costs of creative destruction are likely to change over a product's life cycle.

For a typical firm, launching a new product usually involves complex corporate decisions, and changing the features of a newly marketed product is risky and costly. Thus, a firm's incentive to replace a product is likely to be stronger in its later stages, when the existing customer base starts to decay. By contrast, gig workers are often amateur producers who are not afraid of introducing premature products and changing features over time. This is particularly true in our setting, where books are produced chapter by chapter. It is much easier to innovate a new book project than a mature one whose plot and style have been set in stone. Therefore, we argue that authors of an earlier-stage novel have a stronger incentive to replace old features with novel ones, as summarized in the following hypothesis.

Hypothesis 3 (Effects of Competition over the Product Life Cycle). *After the entry of new books induced by the WCC, authors of younger (earlier-stage) books will exert greater creative efforts than those of older (later-stage) books.*

We do not expect that this hypothesis applies to authors' exertion of routine effort, which tends to exploit existing product features rather than change them.

4. Data

We assemble a data set that combines detailed personnel information and textual data. We scrape information

about books from the platform website. For each book, we obtain the first 200 characters of every chapter and the corresponding reader comments.⁵ We also obtain information on a book's category, keywords describing the book, and the time at which each chapter was uploaded to the platform. The platform provides data on the approximately 2,000 books that were contracted during 2013–2015. For each book, we obtain information on its contractual format, contracting time, monthly updates, and market outcomes. Our baseline sample contains 1,944 books by 1,784 authors.

4.1. Outcome Measures

A major advantage of this study is our ability to observe the production process and measure intermediate outcomes with high frequency. The platform provides the number of reader clicks ($Clicks_{it}$) and purchases of chapters ($Purchases_{it}$) for each contracted book i for each month t during the sample period. We also construct outcome variables with regard to authors' efforts and platform promotion.

4.1.1. Quantity (Routine Effort). We use two variables to measure the quantity dimension of effort—the number of characters ($Chars_{it}$) and number of chapters ($Chapters_{it}$) for book i in month t . We construct a variable that measures the amount of free content offered by authors to readers, exploiting the fact that the payment of each transaction is rounded down to thousands of characters. That is, when an author publishes a chapter of $1,000m + n$ characters, where m and n are integers ($m \geq 0$ and $0 \leq n < 1,000$), readers pay for only $1,000m$ characters and receive the n extra characters for free. An author who internalizes this cost will minimize n . Conversely, an author who wishes to please readers will increase n . Given that the price per 1,000 characters is fixed, a larger n means a lower effective price that a reader pays per purchase. We calculate the number of extra characters per chapter and aggregate it to a monthly level, $Extra\ Chars_{it}$, which measures an author's offering of bonus content as a means of price reduction.⁶

4.1.2. Novelty (Creative Effort). It is genuinely difficult to measure an individual's creative effort and its direct outcome (e.g., book novelty). To overcome this difficulty, we exploit the content of the reviews posted by readers for each book chapter.⁷ Although many are short and emotional, lengthy reviews with critical opinions about the plot, characters, and writing are common. The review data scraped from the website consisted of approximately 1.2 million posts. After purging self-promotion or favoritism-exchange posts, we obtained a clean data set of almost one million posts.⁸

We used two approaches to classify these posts. First, we used a dictionary search (or “bag of words”) approach. Using a standard Chinese dictionary, we developed a list of Chinese words indicating “novel” or a “lack of novelty.”⁹ A post is coded as 1 if it contains any of the “novel” words, -1 if it contains any of the “lack of novelty” words, and 0 if it contains none of these words. Second, we used a machine-learning approach to classify the posts. Specifically, we familiarized two Chinese research assistants with descriptions of novelty or creativity (or of the lack thereof) in the context of novel writing. They were assigned several tasks, in which they labeled small samples of posts independently, until 90% of each assistant’s labeling agreed with that of the other assistant. Then, they manually classified 20,000 posts randomly selected from the data set into one of three categories: “novel,” “lack of novelty,” and “neutral.” We use 10,000 coded posts as a training data set to construct a support vector machine (SVM), another 5,000 posts as a test set, and the final 5,000 for cross-validation. The accuracy rates in both the test data and cross-validation data reached 95%. We thus use this SVM to classify the posts for the entire data set.

For each approach, we aggregate the classified outcomes to the book-month level and compute the following variable: $\log(\#novelty + 1) - \log(\#lackofnovelty + 1)$, where $\#novelty$ (or $\#lackofnovelty$) is the number of posts that were classified as novel (or had a lack of novelty) in a month. Note that the logarithm operation is used to neutralize the disproportionate influence of popular books that tend to receive many comments. We label our measures of novelty from the two approaches as $Novelty(DS)_{it}$ and $Novelty(ML)_{it}$, where DS stands for dictionary search and ML for machine learning. These two measures are positively correlated.

These measures largely capture the type of novelty perceived by readers. Admittedly, such measures do not necessarily reflect genuine creativity in the writing of serious novels. However, readers’ perception is key to commercializing arts and entertainment products. To assess the relevance of our novelty measures to the readership, we collect data on book performance from an independent online-novel website, which reposted a subset of novels originating from the platform in our study. The data display a strong positive correlation between our novelty measures and the readership of books on this website. A detailed discussion is available in Section A2 of the online appendix.

4.1.3. Platform Promotion. To measure the platform’s promotion activities, we extract its historical web pages from the Internet Archive (<https://archive.org/>), which stores a large number of randomly selected home pages of the platform over time. The platform does not have specialized pages for promoting books.

Rather, it divides its home page into various promotional zones, each containing a list of recommended books. Some lists are generated algorithmically based on readers’ reactions, such as the most clicked or most purchased books in the past month, whereas others are based on editors’ discretionary recommendations. We focus on the editor-based promotion, which reflects the platform’s intention to help a book reach its audience. To verify that our measure is not affected by the platform’s expansion of promotion space, we examine a number of randomly selected web pages and find that the layout of the platform’s home pages remained unchanged during our sample period.

Using the number of times that the Internet Archive captures the snapshots in a month and the number of days in that month, we measure $Promotion_{it}$, the number of times a book is subjectively promoted by the editors in a month. For books that do not appear on any archived home pages in a given month, the measure is coded as 0. Note that the platform’s promotion is organized by book categories. Thus, increased promotion in one category does not reduce promotion in other categories. The substitutive allocation of promotion occurs among revenue-sharing books, fixed-price books, and books without contracts in the same category.

4.2. Summary Statistics

Panel A of Table 1 reports the summary statistics of the books published on the platform during the sample period, classified into five categories: modern romance, ancient romance, martial arts, science fiction/gaming, and others (e.g., mystery and crime fiction). In total, there are 9,160 books, among which modern and ancient romance are the two most popular categories. On average, modern romance novels are longer than novels in the other categories. The share of contracted books in each category ranges from 15% in the others category to 29% in the martial arts category. Contracted books are far longer than the average because many uncontracted books terminate before they are completed. The average length of a chapter is approximately 3,000 characters; most contracted books contain over 300 chapters.

Panel B reports the summary statistics of the outcome measures at the book-month level. On average, an author produces approximately 94,000 characters, or 31 new chapters, per month. She also supplies, on average, approximately 8,447 characters free of charge (bonus content) per month. Both measures of novelty produce similar statistics.¹⁰ With regard to platform promotion, on average, editors promote a book 0.65 times per month. The large standard deviation verifies that promotion is highly skewed toward a subset of books. In fact, many books in our sample never received any platform promotion. In terms of market

Table 1. Summary Statistics

Panel A: Basic book information by category					
	Modern romance	Ancient romance	Martial arts	Science fiction/gaming	Others
All books					
No. of books	3,500	2,189	1,174	1,203	1,094
No. of characters/book	328,029	243,899	296,130	282,914	166,645
Contracted books					
No. of books	706	372	345	367	154
No. of characters/book	984,736	893,712	745,091	768,736	649,878
Panel B: Summary statistics of outcome variables					
Variable	Mean	Std. dev.	Min	Max	
<i>Chars</i>	93,757	94,800	0	4,427,575	
<i>Chapters</i>	31.35	31.21	0	1,416	
<i>ExtraChars</i>	8,447	11,217	0	225,598	
<i>Novelty (DS)</i>	0.393	0.735	-2.063	5.024	
<i>Novelty (ML)</i>	0.387	0.419	-2.231	4.351	
<i>Promotion</i>	0.65	1.95	0	31	
<i>Clicks</i>	9,738	42,250	0	1,450,545	
<i>Purchases</i>	46.88	215.34	0	6,430	

Notes. Observations in panel B are at the book-month level. *Chars* is the number of characters, *Chapters* is the number of chapters updated, and *ExtraChars* is the number of free extra characters (bonus content). *Novelty (DS)* and *Novelty (ML)* are the novelty indices constructed from review posts classified by the dictionary search approach and the machine-learning approach, respectively. *Promotion* is platform promotion based on editors' subjective recommendations, and *Clicks* and *Purchases* are the counts of reader clicks and purchases, respectively.

performance, the average number of monthly clicks for a book is 9,738, whereas the average number of purchases is only 47. The standard deviations of these variables are also large: extremely successful books attract over 1 million clicks and thousands of purchases per month.

5. Main Analysis

Our identification strategy relies on the exogenous change in the competitive environment induced by the WCC, as described in Section 2.4. Here, we first show that the WCC generated an asymmetric impact that divided existing books into a treatment group (romance) and a control group (other categories), thereby permitting a DID estimation to identify the causal effects. We then specify the regression that will be used to test the main theoretical predictions. After presenting the main results, we provide further evidence to rule out potential confounding factors that may threaten the validity of the DID identification.

5.1. Asymmetric Impact of the WCC

Recall that the WCC led to the closing of dozens of platforms that specialized in romance novels, to which some authors added salacious content to attract readers. Because the skills for writing romance novels are not platform specific,¹¹ authors previously active on the closed platforms and new authors who aspired to write romance novels sought business opportunities in the well-established mainstream platforms. Given the large number of aspiring authors, the influx of novice authors who would have gone to the closed

platforms had there been no WCC was substantial. The platform in our study was particularly attractive to these authors for two reasons. First, romance was its major book category, as shown in Table 1. Second, the platform had a reputation for serving aspiring newcomers. One of the senior managers of the platform said, "After the WCC, an unexpectedly large number of authors approached us. The majority were novice authors."

5.1.1. Entry of Books by Category. Table 2 reports the number of new books per month in each category during different periods. The platform grew over time, regardless of the policy shock, but an asymmetric jump occurred during the WCC (April–November 2014). The entry of books tripled in the modern romance category and doubled in the ancient romance category, whereas the number of new books in the other categories changed modestly. After December 2014, the entry pattern remained stable in every category except martial arts, which experienced a substantial increase in new books. This abnormal surge was driven by a sudden entry of martial arts books after July 2015. All the results reported in this paper are robust after excluding the period after July 2015.

5.1.2. Spillover Across Book Categories. One concern is whether the entry of new authors caused romance novelists to switch to other types of novels. Industry experts note that, except for few extremely talented writers, most authors specialize in one type of novel, because the skills required for writing the different

Table 2. Book Entry over Time by Category (Number of New Books per Month)

Time frame	Modern romance	Ancient romance	Martial arts	Science fiction/gaming	Others
Before WCC	58.65	41.66	22.59	27.9	34.94
During WCC	172.79	99.59	18	40.3	55.20
After WCC	223.82	94.59	79.45	47.25	53.70

Note. “Before WCC” denotes January 2013–March 2014, “During WCC” denotes April 2014–November 2014, and “After WCC” denotes December 2014–December 2015.

genres are substantially different. Accordingly, we find that of the over 400 authors who wrote a modern romance novel before the WCC, only 57 also wrote books in other categories. Among them, 37 extended their writing to ancient romance, and only 20 ever ventured into other categories. Similarly, among the 246 science fiction authors, only 7 wrote either a modern or an ancient romance novel; a similar pattern is observed among the martial arts novelists. These findings show that modern and ancient romance novels are substitutes to a certain extent but that the substitutability between romance and other genres of book is weak. This evidence also helps explain why the WCC, despite inducing the massive entry of books into the two romance categories, had little impact on other categories.

5.1.3. Treatment and Control Groups. Given the evidence presented, we define the books in the categories of modern and ancient romance as the treatment group and the books in the categories of martial arts, science fiction/gaming, and others as the control group. Figure 1 shows the number of new books per month (in logarithm) during the sample period. The two vertical dotted lines indicate the launch of the WCC (April 2014) and its end (November 2014). Before the WCC, despite the continuous rising trend, the gap between the two groups remains stable. It widens drastically during the WCC and narrows slightly a few months after the WCC.

Our analysis will focus on the effect of competition on the books that were contracted before the WCC. Although we will not use the variation from the books entering the market after the WCC in our empirical analysis, it is important to understand how the new entries imposed competitive pressure on existing books. In Table A1 in the online appendix, we compare the precontract characteristics of the new entries and existing books in the treatment and control groups. In both groups, these characteristics of the new entries are similar to those of the existing books. This demonstrates that the new entries were competitive with existing books.

5.2. Econometric Specification

We now turn to regression analysis. Our DID estimation uses the following specification:

$$Outcome_{it} = \alpha + \beta_1 WCC_t + \gamma WCC_t \times Treatment_i + X' \delta + \lambda_t + \theta_i + \epsilon_{it}, \tag{1}$$

where the subscript *it* indicates book *i* in month *t*. The dependent variables (in logarithms) are the outcome variables described in the data section. Of the independent variables, *WCC_t* is a dummy that equals 1 if an observation occurs in or after April 2014 and 0 otherwise, and *Treatment_i* is a dummy indicating whether a book is in the treatment group. The coefficient of the interaction variable, *γ*, estimates the competition effect on books in the treatment group relative to those in the control group. The vector variable, *X*, includes a set of time-variant characteristics, such as market-level demand factors (e.g., monthly clicks in each category) and supply factors (e.g., monthly entry of books in each category).¹² We include year-month fixed effects *λ_t* to control for seasonality and for temporal shocks common to both the treatment and control groups.

It is worth noting that, we control for book-level fixed effects (*θ_i*) throughout in our estimation. This within-estimator means that, effectively, we use variation from books observed both before and after the

Figure 1. (Color online) Entry of New Books over Time by Treatment



Notes. “Treatment” refers to books in the categories of modern and ancient romance novels, and “control” refers to books in the categories of martial arts, science/gaming, and other novels. The two dashed vertical lines indicate the beginning and the end of the WCC, respectively.

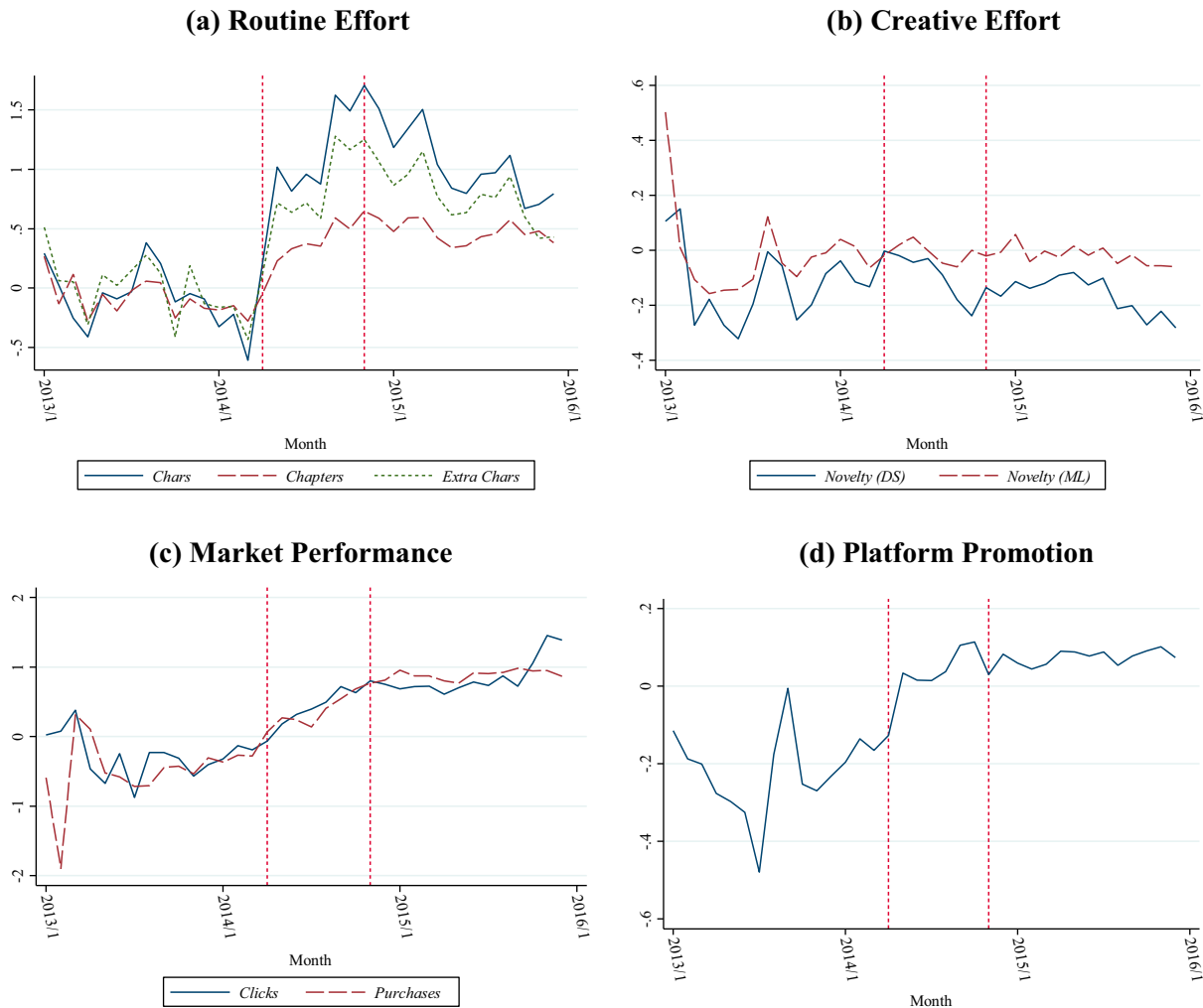
WCC, thereby eliminating the potential selection bias caused by book entry after the WCC. Note that because each book is written by a single author, time-invariant author characteristics such as ability and writing style are differenced out in our estimation. In the most complete specification, we also include category-specific time trends and book age (defined as the number of months since a book’s first publication) to further control for the potential impact of gradual shocks.

Finally, we cluster the standard errors (ϵ_{it}) by book category. We use a wild bootstrapping procedure (with Webb weights) to deal with clustered standard errors with few clusters, as recommended by Cameron et al. (2008). Other clustering strategies (e.g., at the individual book level) barely change the statistical significance of our main results.

5.3. Average Treatment Effects

Figure 2 shows the monthly difference between the treatment and control groups for each of the main outcome variables (in logarithms) within the sample of books that are observed both before and after the WCC. Panel A illustrates the treatment-control differences in terms of the numbers of characters, chapters, and extra characters (bonus content) per month. Before the WCC, authors in the treatment group wrote slightly less than authors in the control group, and the difference was stable. After the WCC, the differences in all three of these quantity measures increased immediately and remained persistent. Panel B shows the differences in the two measures of novelty (*DS* and *ML*). The pattern is drastically different from that shown in panel A. The differences in both measures

Figure 2. (Color online) Differences Between Treatment and Control



Notes. All variables on the *y* axis are in logarithms except for the novel index, which is a relative measure in logarithm. The variable *Chars* is the number of characters produced within a month, *Chapters* is the number of chapters updated, and *ExtraChars* is the number of free extra characters (bonus content). *Novelty (DS)* and *Novelty (ML)* are the novelty indices constructed from review posts classified by the dictionary search approach and the machine learning approach, respectively. *Clicks* and *Purchases* are the counts of reader clicks and purchases. The two dashed vertical lines indicate the beginning and the end of the WCC, respectively. *Promotion* is platform promotion based on editors’ subjective recommendations.

fluctuated around -0.1 before the WCC and exhibited a similar pattern during the WCC. After the WCC, the machine-learning novelty measure barely changed, and the dictionary-search novelty measure declined slightly. Panel C plots the differences in the two market performance measures (reader clicks and purchases), and panel D shows the difference in platform promotion. Although these figures display a larger volatility in the earlier period of our sample because of smaller sample size, the absence of notable pretrends provides strong support for our DID estimation strategy. We will formally test the nonappearance of pretrends later.

Table 3 presents results of the DID estimation specified in Equation (1). For each outcome variable, we report the results that include time and book fixed effects (FE) as well as the time-variant category-level controls. We then report the results that include additional controls for category-specific time trends and book age: the magnitudes of the coefficients become slightly different, but the results are qualitatively similar. Unless otherwise specified, we focus on the most complete specifications. The results in Table 3 remain virtually unchanged when we restrict the analysis to a

balanced sample excluding exits and entries; see Table A2 in the online appendix.

Panel A indicates that increased competition had a strong effect on an author’s routine effort to produce more content. Relative to the control group, authors in the treatment group responded to the WCC shock by writing approximately 182% more characters, 29% more chapters, and 88% more bonus content per month.¹³ These results are consistent with Hypothesis 1(a). The large magnitudes suggest that it is relatively easy to increase quantity when writing commercial novels and that authors’ labor supply is very elastic in this market. Our interviews with industrial experts show that it is highly plausible for authors to achieve such a rise in productivity with a reasonable amount of effort, particularly when they are flexible in their time allocation. In the English-speaking world, some popular guidance for writing commercial novels also confirms the feasibility of doubling, tripling, and even quadrupling productivity in a short period (among many others, see Aaron (2012) and Fox (2015)).¹⁴ One concern is that this drastic expansion of quantity may come at the cost of quality. However, as shown in what follows, we find no evidence for this concern.

Table 3. DID Estimation of the Effects of Competition

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Effects on author routine effort						
Variable	log(<i>Chars</i>)		log(<i>Chapters</i>)		log(<i>ExtraChars</i>)	
<i>WCC</i> × <i>Treatment</i>	1.118*** (0.097) [11.578]	1.035*** (0.200) [5.185]	0.375** (0.086) [4.373]	0.254*** (0.052) [4.915]	0.763*** (0.151) [5.060]	0.630** (0.204) [3.094]
Observations	17,235	17,188	17,235	17,188	17,211	17,164
R^2	0.518	0.522	0.530	0.536	0.531	0.535
Category trend/book age	NO	YES	NO	YES	NO	YES
Year-month FE	YES	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES	YES
No. of books	1,944	1,944	1,944	1,944	1,944	1,944
Panel B: Effects on author creative effort						
	<i>Novelty (DS)</i>			<i>Novelty (ML)</i>		
<i>WCC</i> × <i>Treatment</i>	0.062 (0.089) [0.700]		0.148 (0.073) [2.039]	0.016 (0.018) [0.853]		0.001 (0.028) [0.018]
Observations	15,074		15,033	15,074		15,033
R^2	0.368		0.370	0.271		0.272
Category trends/book age	NO		YES	NO		YES
Year-month FE	YES		YES	YES		YES
Book FE	YES		YES	YES		YES
No. of books	1,944		1,944	1,944		1,944

Notes. WCC is a dummy for observations in and after April 2014; *Treatment* is a dummy for books in the treatment group. All regressions also include time-variant characteristics at the category level. Standard errors clustered by category are in parentheses, with corresponding wild bootstrap *t*-statistics in brackets.

*** $p < 0.01$; ** $p < 0.05$.

Panel B reports the estimation with regard to book novelty. Note that the number of observations is smaller than that in panel A, even though the number of books is the same in both panels. This is because the measures of book novelty are available only when readers start to post reviews. The estimates are small in magnitude and statistically insignificant. These results appear to suggest a rather weak impact of competition on creative effort. Note that the average treatment effect here combines the effects on both revenue-sharing and fixed-price books. As we show later, revenue-sharing authors did increase creative effort significantly in response to competition. The simultaneous increases in authors' production of quantity and novelty suggest that a book's quantity expansion does not come at the expense of quality.

5.3.1. Examination of Pretrends. The key assumption underlying the DID estimation for causal inference is that, absent the WCC intervention, the control and treatment groups evolve in a similar way. We thus examine the trends of the differences between the treatment and control groups before the WCC. Thus, we extend the DID specification to examine pre- and posttrends by interacting the treatment dummy with 10 timing dummies for six, five, four, three, two, and one month before the launch of the WCC; the month in which the WCC was launched; and one, two, and three or more months after the launch. Observations more than six months before the WCC are used as the comparison group. To mitigate potential sample-selection bias in the estimation of dynamic effects, we use a balanced sample excluding exits before the WCC and entries after the WCC. As shown in Table A3 in the online appendix, none of the outcomes exhibits a pretrend.

5.4. Potential Confounding Factors

We discuss here two major factors that may confound the effect of competition: demand changes and authors' direct response to platform promotion. In the online appendix, we also rule out a number of other potential confounders, including the direct impact of the WCC on authors' writing style (Section A3.5), multihoming (Section A3.6), and book exits (Section A3.7).

5.4.1. Demand Changes. A notorious challenge in the identification of competition effects is the change of demand caused by factors other than competition. In the current setting, the WCC might generate an increase in the demand for romance books on the platform under investigation for reasons unrelated to market competition. To assess this possibility, we decompose the demand for romance novels on the platform into the following four components.

1. *Readers who migrated from the closed platforms:* This factor constructs the most direct threat to our identification, because the closed platforms mostly specialized in romance fiction, and the influx of readers would have concentrated precisely on the treatment group. Our interviews with the platform suggested that the salacious romance novels on closed platforms were not substitutable for romance novels on the focal platform. After the shutdown of their existing channels, readers of the closed platforms sought pornographic content from other channels, for instance, by using a virtual private network to access porn websites hosted outside of China.

To assess the mobility of readers who were drawn to salacious romance novels, we compare readers' clicks and purchases of books with different pornographic content. If there was a shift of readership from the closed platforms, these readers were likely to seek books with more pornographic content. Clicks and purchases for such books after the WCC would then increase more than those with less pornographic content. To test this conjecture, we construct a "porn value" for every book ever published on the platform in our study. Specifically, we searched a list of pornographic words that were used by the National Internet Control Office of China to identify salacious content. We then calculated the number of these words in the first 200 characters of each book chapter and defined the average number across book chapters as a book's porn value. We create a dummy variable, *high_porn*, which equals 1 if a book's porn value is above the mean for all books before the WCC and 0 otherwise. We add an interaction between this variable and the WCC dummy to our main regression (1). As shown in Table A4 in the online appendix, there is no significant difference in either clicks or purchases between the high-porn and low-porn books.

2. *New readers:* A significant flow of new readership would reflect the overall demand on the platform under investigation. Thus, we obtained the platform's traffic data between January 2014 and December 2015.¹⁵ As shown in Figure A3 in the online appendix, the daily volume of active users exhibits no discontinuity after the launch of the WCC.¹⁶ To further verify that the WCC itself did not increase demand on the mainstream platforms, we exploit the fact that many readers, particularly new readers, reach their online-novel platform by searching its name on Baidu, the most popular Chinese search engine. If there was an influx of new readers into a platform, it should be reflected in the search frequency of the platform name. Therefore, we searched the name of the largest online-novel platform in China on Baidu.¹⁷ As depicted in Figure A4 in the online appendix, its daily Baidu search frequency is virtually unaffected by the WCC.

3. *Readers who migrated from other mainstream platforms:* It is unlikely that the WCC induced readers to migrate from other mainstream platforms to the

platform in our study because the increased supply of romance novels after the WCC occurred on all the mainstream platforms.¹⁸ The evidence on the stable overall demand after the WCC (Figures A3 and A4 in the online appendix) also helps rule out this reader-migration explanation. Any notable reader migration, whether from the closed platforms or other mainstream platforms, would have increased the overall readership and likely the traffic on the platform in our study.

4. *Readers who shifted from other categories to romance novels:* Factors such as changes in readers' preferences could cause existing readers in the control group to switch to the treatment group. If such a structural change coincides with the WCC, our DID estimation would be contaminated. Unfortunately, data on readers' allocation of their reading time to different books are not available. Thus, we used reviewer data to assess the possibility of such a structural change in demand. On the basis of information about reviewer identity, we found that reviewers typically posted reviews on books in a single category and that the number of reviewers in each category remained stable before and after the WCC. In Table A5 in the online appendix, we show that the baseline results presented in Table 3 barely change when we use science fiction—whose readers rarely read romance novels—as the only control group. This result provides further evidence to exclude the possibility of a significant demand shift within the platform in our study.

We also investigate the dynamic pattern of the treatment effect. If readers migrated from the closed platforms or followed authors who migrated to the platform in our study, this expansion in market size is likely to be a gradual process. However, the results presented in Table A3 in the online appendix show that the effects do not become increasingly larger after the WCC.

5.4.2. Author Response to Platform Promotion. Is it possible that the change in authors' routine efforts was driven not by market competition but by their response to platform promotion that changed with the WCC shock? To address this question, we add the variable $\log(Promotion_{it})$ as a control in our baseline regression. Table A6 in the online appendix reports the results of the regression with the most complete controls. Compared with the baseline results reported in Table 3, the corresponding coefficients in Table A6 are only slightly changed, suggesting that platform promotion did not bias the estimated effect of competition.¹⁹

To overcome the endogeneity problem as a result of the inclusion of platform promotion as a control variable, we single out a sample of books that received no promotion from the platform during the study period. Their authors were unlikely to expect the platform to promote them, regardless of the WCC shock. We

interact a dummy for this nonpromotion sample with $WCC \times Treatment$ to evaluate the differential effect of competition on books that were intended to receive different levels of promotion. Table A7 in the online appendix presents the results. The coefficients of the main terms are comparable to their counterparts in our baseline estimation in Table 3. It is important to note that, the coefficients of the triple-interaction terms are small relative to the main effects and statistically insignificant. This suggests that promotion status does not cause a differential effect of intensified competition induced by the WCC. Overall, the preceding evidence shows that it is unlikely that platform promotion has a first-order impact on author effort after the WCC shock. However, platform promotion may affect a book's sales, as will be discussed in detail in Section 8.

6. Effects Under Different Contracts

This section focuses on testing Hypothesis 2, which states that when competition intensifies, authors under a revenue-sharing contract increase their efforts more than authors under a fixed-price contract, which mutes an author's incentive to respond to market conditions. We first present the effects of the WCC on revenue-sharing books using the same DID specification as in the baseline estimation. We then extend the DID estimation to a triple-differences estimation to formally test the difference in the effects of competition on books under the two forms of contract.

6.1. DID Estimation for Revenue-Sharing Books

Table 4 reports the estimates for the subsample of revenue-sharing books, using the most complete specification. In terms of routine effort (the first three columns), the effects of competition on authors' writing of characters and updates of book chapters are substantial and statistically significant at the 1% level, and the effect on the offering of bonus content is also large and significant at the 5% level. Columns (4) and (5) show that the effects on the two novelty measures are both positive and statistically significant. These results show that when the incentive is sufficiently high powered, authors will adjust their efforts by internalizing the benefit and cost associated with the change in market conditions. The results also suggest that the insignificant effect of competition on book novelty for the entire sample (panel B of Table 3) is driven by the fixed-price authors' lack of response to competition, which we will verify in the next subsection.

6.2. Triple-Differences Estimation

The average treatment effect for revenue-sharing books estimated in the preceding may not unbiasedly capture the effect of contractual status, because the

Table 4. Average Treatment Effects of Competition on Books Under Revenue-Sharing Contracts

Variable	(1) log(<i>Chars</i>)	(2) log(<i>Chapters</i>)	(3) log(<i>ExtraChars</i>)	(4) <i>Novelty</i> (DS)	(5) <i>Novelty</i> (ML)
<i>WCC</i> × <i>Treatment</i>	1.495*** (0.217) [6.889]	0.482*** (0.054) [8.911]	0.913** (0.239) [3.814]	0.120* (0.052) [2.308]	0.084** (0.019) [4.414]
Observations	9,011	9,011	8,998	7,555	7,555
R^2	0.538	0.554	0.554	0.305	0.292
Category trends/book age	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES
No. of books	1,095	1,095	1,095	1,095	1,095

Notes. All regressions include a set of time-variant characteristics at the category level. Standard errors clustered by category are in parentheses, with corresponding wild bootstrap t -statistics in brackets.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

choice of a contractual format depends on the characteristics of the contracting parties and the tasks to be performed. This problem of endogenous contractual matching makes it difficult to estimate the causal effect of contractual arrangements in observational studies (e.g., Akerberg and Botticini 2002, Mortimer 2008, and Ho et al. 2012).

In our setting, one side of the contractual arrangement is a single player—the platform—which typically makes a take-it-or-leave-it offer to authors, especially to unknown authors. Thus, the matching problem is reduced to an assignment problem, which is relatively easy to deal with, because heterogeneity comes solely from the author side. Therefore, our empirical strategy is to construct a sample in which the assignment of contracts to authors mimics a random assignment. We then use a triple-differences method to identify the interaction effect of increased competition and contractual status.

6.2.1. Addressing Endogenous Contractual Choices.

In general, the platform is more willing to offer a fixed-price contract to better authors, who then demand a higher price. To avoid paying high royalties, the platform uses a bet-on-the-promising strategy of offering fixed prices (per thousand words) to buy out potentially lucrative books written by inexperienced authors (recall Section 2.3). According to industry experts and our interviews with the platform, the practice of the bet-on-the-promising strategy is largely random, because it is difficult to judge the ability and market potential of new authors at an early stage. To verify this in our setting, we plot the signals of a book's success before it is contracted against its postcontract performance. As shown in Figure A5 in the online appendix, the correlations between a book's postcontract purchases and its precontract clicks (left panel) or novelty as perceived by readers (right panel) are rather weak. A notable number of books that appear successful initially (with a large number of

precontract clicks) become mediocre performers later, whereas other books exhibit the opposite pattern.

Given the difficulty of predicting performance, the platform often makes low-price offers to a number of randomly selected unknown and inexperienced authors. An author who rejects such a fixed-price contract would be matched with the default revenue-sharing contract if the platform is still willing to contract with her. In practice, most authors offered a fixed-price contract accepted it, given the low success rate of books by novice authors and their negligible bargaining power in contracting.²⁰ Therefore, we select a sample that includes (a) all revenue-sharing books and (b) the set of fixed-price books with a low price, which we define as RMB 20 or fewer per 1,000 characters. First, according to the platform, this was a typical paid-by-the-word price offered to novice authors. We verify that all the books that were contracted below this threshold price were written by authors who were unknown in the market prior to the publication of their books on the platform and who had no contracting experience. Second, at this price level, editors in charge of contracting with authors would not be afraid of making the wrong bet because, even were the book unsuccessful, the financial consequences would not be significant. Third, this threshold is practical, because it allows us to maintain a reasonable sample size for fixed-price books.

In this arguably random subsample, we examine the balance of the precontract characteristics between books under the two types of contracts. Table 5 reports the basic statistics of the main outcome variables before a book is contracted by contractual type. Despite the large variances, all the variables, including the measures of quantity expansion ($Chars_{it}$, $Chapters_{it}$, and $Extra Chars_{it}$), novelty ($Novelty (DS)_{it}$ and $Novelty (ML)_{it}$), platform promotion ($Promotion_{it}$), and market performance ($Clicks_{it}$), have similar means across the contractual types. The last column shows that there are no statistically significant differences between

Table 5. Comparison of Precontracting Characteristics of Books Under Two Contractual Types

Variable	Fixed price		Revenue sharing		Mean diff.	<i>p</i> -value
	Mean	Std. dev.	Mean	Std. dev.		
<i>Chars</i>	69,393.52	64,253.12	67,326.01	47,765.29	−2,067.51	0.80
<i>Chapters</i>	23.40	22.94	24.19	17.75	0.79	0.79
<i>ExtraChars</i>	6,792.35	9,037.36	7,864.60	6,836.44	−1,072.25	0.34
<i>Novelty (DS)</i>	0.69	3.09	0.79	2.83	−0.10	0.82
<i>Novelty (ML)</i>	0.68	2.65	0.62	2.63	0.06	0.89
<i>Promotion</i>	0.64	2.01	0.62	1.86	0.02	0.95
<i>Clicks</i>	5,447.00	13,132.25	5,173.90	11,028.73	273.10	0.88

Notes. Observations are at the book-month level. The variable *Chars* is the number of characters produced within a month, *Chapters* is the number of chapters updated, and *ExtraChars* is the number of free extra characters (bonus content). *Novelty (DS)* and *Novelty (ML)* are the novelty indices constructed from review posts classified by the dictionary search approach and the machine learning approach, respectively. *Clicks* is the counts of reader clicks. *Promotion* is platform promotion based on editors’ subjective recommendation.

the two types of books along these variables. Note that there is no *Purchases* variable, because readers do not need to pay before a book is contracted.

6.2.2. Econometric Specification and Results. In the aforementioned quasirandom sample, we estimate the differential effect between two contractual formats in a triple-differences specification, as follows:

$$\begin{aligned}
 Outcome_{it} = & \alpha + \beta_1 Treatment_i \times Share_i \\
 & + \beta_2 WCC_t \times Treatment_i + \beta_3 WCC_t \\
 & \times Share_i + \gamma WCC_t \times Treatment_i \\
 & \times Share_i + X' \delta + \lambda_t + \theta_i + \epsilon_{it}.
 \end{aligned} \tag{2}$$

The new variable, *Share_i*, is a dummy that equals 1 if book *i* is under a revenue-sharing contract. The coefficient of interest, γ , associated with $WCC_t \times Treatment_i \times Share_i$, captures the extent to which competition more strongly affects revenue-sharing books than fixed-price books. Again, we use the most complete specification. The standard errors are clustered in the same manner as in the DID estimation.

Table 6 reports the estimates. The first three columns show that, after the WCC, the revenue-sharing authors exerted far more routine effort than the fixed-price authors. Most strikingly, the difference in the amount of bonus content nearly doubles, which suggests that under more competitive pressure, the revenue-sharing authors did offer free content to attract readership.

In terms of book novelty, the substantial and highly significant triple-differences estimates, shown in columns (4) and (5), demonstrate that the revenue-sharing authors exerted considerably more creative effort to improve book novelty after the WCC than did the fixed-price authors. These results show that the effect of competition on authors’ efforts is moderated by contractual arrangements in a manner that squares with our theoretical argument. The large gap between the two types of authors in their responses to competition suggests that, in our setting, intrinsic motivation is unlikely to be a major consideration.

6.2.3. Robustness Checks. To verify that the differential effects of competition examined in the preceding are not driven by systematic differences between the two types of book before the WCC, we analyze the pre- and post-WCC dynamics of the triple-differences estimates. As shown in Table A10 in the online appendix, no significant pretrends are observed.

In the above-mentioned sample, we select fixed-price books whose prices are at or below RMB 20 and show that their precontract characteristics are comparable to those of revenue-sharing books. To ensure that our results are not driven by this specific choice of threshold, we construct samples with two other threshold values: RMB 15 and 30. Within this range, the sample of fixed-price and revenue-sharing books is still well balanced in terms of precontract characteristics. The regression results (Table A11 in the online appendix), which indicate the effects of the WCC on authors’ efforts for fixed-price books under these thresholds, are similar to those in the sample with a threshold of RMB 20.²¹

7. Effects over the Product Life Cycle

In Hypothesis 3, we propose that the effect of competition is larger for books at an earlier stage of the product life cycle because the cost of product replacement is lower for younger books. To test this hypothesis, we construct a measure of book age according to the difference between a book’s contracting time and the start month of the WCC (April 2014). We define a book as “younger” if its age is under six months (contracted after September 2013), with the remaining books defined as “older” (older than six months). Note that, with our measure of book age, whether a book is younger or older is determined before the WCC and thus not confounded by the WCC. Using a stricter definition of younger books does not qualitatively affect the results.

Table 7 reports the baseline DID estimation of the effect of competition on authors’ efforts for younger

Table 6. Triple-Differences Estimation in the Quasirandom Sample

Variable	(1) log(<i>Chars</i>)	(2) log(<i>Chapters</i>)	(3) log(<i>ExtraChars</i>)	(4) <i>Novelty</i> (DS)	(5) <i>Novelty</i> (ML)
<i>WCC</i> × <i>Treatment</i>	0.306 (0.283) [1.078]	0.054 (0.052) [1.038]	−0.134 (0.220) [−0.610]	−0.287 (0.144) [−1.986]	−0.303* (0.131) [−2.317]
<i>WCC</i> × <i>Treatment</i> × <i>Share</i>	1.086*** (0.187) [5.796]	0.306** (0.070) [4.378]	0.981*** (0.107) [9.163]	0.523** (0.138) [3.778]	0.409** (0.106) [3.868]
Observations	11,944	11,944	11,926	10,232	10,232
R^2	0.530	0.541	0.543	0.313	0.282
Category trends/book age	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES
No. of books	1,424	1,424	1,424	1,424	1,424

Notes. *WCC* is a dummy that equals 1 if an observation occurs in and after April 2014 and 0 otherwise; *treatment* is a dummy for books in the treatment group. *Share* is a dummy for books under the revenue-sharing contract. All regressions include time-variant characteristics (monthly clicks and monthly entry of books) at the category level. Standard errors clustered by category are in parentheses, with corresponding wild bootstrap *t*-statistics in brackets.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

books (the first four columns) and older books (the last four columns). The effects of competition on the novelty measures of the younger books (columns (1) and (2)) are positive, sizeable, and statistically significant, whereas the corresponding effects on the older books are statistically insignificant. This finding supports Hypothesis 3. By contrast, the differential effects on the quantity measures for younger and older books do not exist, as shown in columns (3) and (4) and columns (7) and (8). This is likely because routine efforts enhance existing product features without incurring—as creative efforts do—the cost of diminishing the value of existing features. These results also provide further evidence ruling out the concern that authors intended to terminate current book projects earlier in response to the *WCC*.

In Table A12 in the online appendix, we report the same DID estimation by book age as in the preceding but in the samples of books under the two contractual formats. We restrict our attention to the quasirandom sample as in Section 6. The results for revenue-sharing books (panel A) are qualitatively similar to those in

Table 7: the effect on novelty is substantial for younger but absent for older books. However, such a heterogeneous effect on novelty by book age does not appear for fixed-price books (panel B). This is consistent with our previous result that the fixed-price contract mutes the effect of market competition and that it is the revenue-sharing contract that channels the effect.

8. Effects on Market Performance and Platform Promotion

Finally, we investigate the effect of competition on book performance (reader clicks and purchases) and on the platform’s promotion of books. In panel A of Table 8, we report the DID estimation of the effect of the *WCC* on book performance and platform promotion, using Specification (1) with the same controls as in Table 3. Columns (2) and (4) show that, for the same books, intensified competition increased reader clicks by 33% and purchases by 48%. These results are consistent with the previous finding that author effort increased after the *WCC*. Column (6) shows that, after

Table 7. Heterogeneous Treatment Effects by Book Age

Variable	Younger books (contract date after Sept. 2013)				Older books (contract date in or before Sept. 2013)			
	(1) <i>Novelty</i> (DS)	(2) <i>Novelty</i> (ML)	(3) log(<i>Chars</i>)	(4) log(<i>Chapters</i>)	(5) <i>Novelty</i> (DS)	(6) <i>Novelty</i> (ML)	(7) log(<i>Chars</i>)	(8) log(<i>Chapters</i>)
<i>WCC</i> × <i>Treatment</i>	0.189* (0.070) [2.708]	0.056** (0.013) [4.353]	1.230** (0.420) [2.925]	0.304* (0.136) [2.246]	0.135 (0.232) [0.583]	−0.077 (0.146) [−0.529]	1.060** (0.243) [4.368]	0.397*** (0.084) [4.716]
Observations	11,319	11,319	12,508	12,508	3,164	3,164	4,077	4,077
R^2	0.390	0.293	0.502	0.511	0.362	0.276	0.570	0.618
Category controls	YES	YES	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES	YES	YES	YES

Note. Standard errors clustered by category are in parentheses, with corresponding wild bootstrap *t*-statistics in brackets.

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

the WCC, the treated books received approximately 17% more platform promotion—in terms of editors’ subjective recommendations—than books in the control group. This is consistent with the argument that, as a result of the WCC, the platform no longer has to promote these uncontracted new books in the treated categories to attract new authors and hence can reallocate more promotion resources to contracted books in these categories (recall Section 2.2). Such an increase in platform promotion improves a book’s sales.

The platform is likely to distribute its promotion among contracted books in an asymmetric way. As the sole residual claimant of fixed-price books, the platform has a strong incentive to allocate more promotion resources to these books and less incentive to promote revenue-sharing books. Therefore, we should expect that after the WCC, the increase in platform promotion of contracted books disproportionately favors fixed-price books over revenue-sharing books. We test this prediction using the same econometric models as in Section 6. Panel B of Table 8 presents the relevant empirical results. Specifically, the first three columns report the DID estimation of the effect of the

WCC on the fixed-price books whose price is at or below the threshold of RMB 20 per 1,000 characters. For these books, the platform bet on the promising ones and had a strong incentive to promote them. Columns (1) and (2) show that competition significantly increased clicks on and purchases of fixed-price books. Column (3) shows that, relative to the control group, intensified competition increased the platform’s promotion of fixed-price books in the treatment group by over 50% and that the effect is significant at the 1% level.

Columns (4)–(6) report the triple-difference estimation of the differential effect of the WCC on the performance and promotion of books under the two contracts in the quasirandom sample, as previously defined. The triple-difference coefficients in columns (4) and (5) show that intensified competition increased the performance (both clicks and purchases) of fixed-price books considerably more than that of revenue-sharing books. This result is striking, given that revenue-sharing authors exerted substantially more effort than paid-by-the-word authors (recall Table 6). The result in column (6) offers an explanation: intensified competition led

Table 8. Effects on Book Performance and Platform Promotion

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: DID estimation in the entire sample						
Variable	log(<i>Clicks</i>)		log(<i>Purchases</i>)		log(<i>Promotion</i>)	
WCC × <i>Treatment</i>	0.936** (0.226) [4.144]	0.282*** (0.058) [4.905]	0.661** (0.190) [3.480]	0.369** (0.131) [2.820]	0.206** (0.047) [4.376]	0.161** (0.041) [3.955]
Observations	31,653	31,620	29,071	29,071	33,622	33,548
R ²	0.753	0.756	0.742	0.743	0.361	0.364
Category- trend/age	NO	YES	NO	YES	NO	YES
Year-month FE	YES	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES	YES
No. of books	1,944	1,944	1,944	1,944	1,944	1,944
Panel B: Effects by contractual status						
	DID estimation for fixed-price books (below RMB 20)			Triple-diff. estimation in the quasirandom sample		
	log(<i>Clicks</i>)	log(<i>Purchases</i>)	log(<i>Promotion</i>)	log(<i>Clicks</i>)	log(<i>Purchases</i>)	log(<i>Promotion</i>)
WCC × <i>Treatment</i>	0.524*** (0.086) [6.101]	0.750** (0.167) [4.500]	0.517*** (0.064) [8.124]	0.914** (0.286) [3.191]	1.357*** (0.203) [6.693]	0.571*** (0.061) [9.324]
WCC × <i>Treatment</i> × <i>Share</i>				−0.700* (0.290) [−2.411]	−1.150*** (0.159) [−7.245]	−0.466** (0.109) [−4.285]
Observations	4,658	4,203	4,965	23,523	21,747	24,995
R ²	0.715	0.628	0.353	0.725	0.686	0.318
Category trends/age	YES	YES	YES	YES	YES	YES
Year-month FE	YES	YES	YES	YES	YES	YES
Book FE	YES	YES	YES	YES	YES	YES
No. of books	329	329	329	1,424	1,424	1,424

Notes. All regressions include time-variant characteristics (monthly clicks and monthly entry of books) at the category level. Standard errors clustered by category are in parentheses, with corresponding wild bootstrap *t*-statistics in brackets.

****p* < 0.01; ***p* < 0.05; **p* < 0.1.

the platform to promote fixed-price books substantially more than revenue-sharing books.²²

These results shed light on the role of incentive contracts in channeling the effect of market competition on product performance. For revenue-sharing books, the positive effect of market competition on performance is driven primarily by authors' increased effort to improve the product. For fixed-price books, performance improvement in a more competitive environment appears to be driven by a significant increase in the platform's promotion rather than by greater effort by the authors. This sharp contrast confirms the argument that the fixed-price contract mutes an author's response to intensified competition but strengthens the platform's incentive to promote her book, whereas the revenue-sharing contract spurs an author's reaction to changing market conditions but weakens the platform's role in boosting sales.

9. Discussion and Conclusions

Competition has long been considered one of the most important mechanisms for disciplining slack producers and spurring effort. This is especially relevant in the gig economy, in which individual-based production prevails and traditional within-corporate management is lacking. Despite the importance of the competition mechanism, how effective it is and what factors constrain it are not yet well understood. This paper addresses these questions in the setting of a Chinese online-novel-writing platform, leveraging unusually rich personnel data and a regulatory change that generated an exogenous and asymmetric impact on the competitive environment across different genres.

Our main finding is that intensified competition substantially increased workers' routine efforts—those determining the quantity of output (measured by the number of words, frequency of updates, and amount of bonus content). We also find that whereas the fixed-price (pay-by-the-word) contract muted authors' reaction to market conditions, a revenue-sharing contract drove authors to improve book novelty significantly in response to increased competition. In addition, the effect of competition on novelty is considerably stronger for books at earlier stages of the product life cycle. Finally, increased competition led the platform to promote fixed-price books considerably more than revenue-sharing books, resulting in higher sales for the former. We argue that such a platform response is driven by the platform's incentive to maximize its return from the books for which it is a residual claimant. This result shows that a platform's involvement in commercializing creative work can distort the relationship between producers' efforts and market performance. These findings have important managerial implications for the digital economy.

9.1. Implications

9.1.1. Competition as a Substitute for Authority-Based Management. The digital economy allows for more fragmented production than the traditional economy, resulting in more individual-based production. This, in turn, replaces authority-based management with self-management. Although helping individual workers make better use of their spare time, individual-based production may also encourage shirking because of the lack of monitoring. Thus, the labor supply for each individual depends crucially on the degree of market competition. This point is borne out by our finding of a sizeable effect of market competition on novelists' supply of routine efforts, regardless of the stage of the product life cycle. Such a positive effect of competition on workers' use of spare time may generalize to settings in which the labor supply is elastic in production.

The implications for the effect of competition on creative activities are more intricate. Competition does not necessarily spur creativity just because it reduces the rent accrued to creative activities. To have a positive effect on creativity, competition must impose considerable pressure on producers, inspiring them to innovate for survival. Online production on a digital platform entails easy market entry and a low search cost for consumers. Producers typically engage in neck-and-neck races, and the enormous pressure to survive propels them to continuous creative effort. Our finding that the effect of competition on novelists' creative efforts is substantially stronger for revenue-sharing authors than for paid-by-the-word authors suggests that, in commercial creative production, the increasingly popular mode of freelancing production is more effective in inspiring creative workers to respond to market conditions than the mode of employing salaried workers.

Our study also demonstrates the importance of the product life cycle in mediating the effect of market competition on creative production. Innovation often incurs a cost of destroying existing attributes of a product. This cost is typically lower for products at an earlier stage of their product life cycle. Encouraging grassroots participation, many digital platforms are crowded with products that are at their early stages and thus have the flexibility to change attributes. Therefore, as a mechanism to spur creative activities, market competition is likely to be more effective on digital platforms than in traditional marketplaces.

9.1.2. The Role of Platforms. This study enriches our understanding of the managerial roles of digital platforms. Few studies have examined how platforms allocate their promotion resources. Despite the platform's ability to accommodate a large number of products, space for promotion (more generally, space

to catch consumers' limited attention) is scarce. This gives the platform bargaining power over a producer and allows it to capture a larger share of the product's market value. We show that intensified producer competition further enhances the platform's advantage. In addition, platform promotion can have a much greater influence on producers' market performance than the producers' own efforts do. A platform can be biased toward the producers who earn it the most, hurting producers with whom the platform has a looser partnership. This accords with several recent studies showing that platform owners may have incentives to be biased in their treatment of producers (e.g., Edelman and Lai 2016; Li and Agarwal 2017; Aguiar and Waldfogel 2018, 2021; Zhu and Liu 2018; Wen and Zhu 2019; and Zhu 2019). In certain extreme cases, the biased treatment by platforms has led to interventions from policy makers.²³ Our empirical finding that increased competition enhances the disproportionate platform promotion of paid-by-the-word books shows that competition can exacerbate such a platform bias. This insight is particularly relevant to the ongoing debate on whether the recent emergence of powerful gatekeepers harms producer welfare.

9.2. Limitations and Future Research

In this paper, we study creative production that is individual based and process oriented. Upon increased competitive pressure, a worker can immediately adjust her effort to make incremental improvement by changing certain attributes of the product. This feature is common in the making of entertainment, cultural, and artistic products. It can also be likened to grassroots innovation in the digital economy, such as app development and online product design. However, our research is relatively limited in addressing complex innovation, such as corporate research and development, which requires long-term investments, high fixed costs, and coordination among numerous workers. The effect of competition on this type of innovation is likely to be more complicated. The type of creative activity examined in our study is also different from creativity in scientific and academic research. Such creativity requires strong intrinsic motivation and high tolerance of failure, and intensified competition may suppress creative production—an effect contrary to our findings.

Our study focuses on the effect of competition on worker effort and performance for novelists who had signed a contract with the platform before the policy intervention. In addition to the effect of competition on the intensive margin, the effect on the extensive margin is important. For instance, when intensified competition increases the value of platform promotion in production, a novelist is more likely to forgo the ownership of her product and sign a paid-by-the-word contract with the platform. To the extent that

the paid-by-the-word contract mutes an author's incentive to exert effort, competition induces contractual sorting that may be detrimental to creative activities and consumer welfare. Because only a few authors signed multiple contracts during our study period, we leave this important topic for future research when suitable data become available.

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Endnotes

¹ According to a survey conducted by the Freelancers Union and Upwork, 57.3 million people were freelancing in the United States in 2017, amounting to 36% of the workforce and contributing \$1.4 trillion to the economy (see <https://www.upwork.com/i/freelancing-in-america/2017/>, accessed June 2019).

² See Cabral (2012) and Goldfarb and Tucker (2019) for surveys of the literature.

³ A Chinese word is typically formed by two or three characters.

⁴ In the traditional Chinese publishing market, book publication is subject to strict regulation, including quotas and a long period of content examination by the government. The regulation of online publication is much less strict, and publication of an author's work is instantaneous.

⁵ For contracted books, the platform provides readers free access to the first 200 characters of every chapter. Reader comments are organized by chapters.

⁶ The bonus words could be simply part of the writing process. This would be more likely when the number of bonus words is small. However, in the data, the average number of bonus words per chapter is about 272 characters, which requires deliberate effort. Moreover, we observe that, at the end of a chapter, authors sometimes explicitly wrote that they were offering bonus content as a favor to readers. So we tend to believe that the bonus content, to a

large extent, captures an author's intention to please readers by expending more effort.

⁷ The platform does not use a star-rating system for the reviews. To express opinions, readers must post their reviews to the discussion forum associated with each book.

⁸ Self-promotion posts were easy to identify because they usually contained words calling for readers' attention. A number of posts were written by authors who complimented other authors' books in exchange for favorable comments on their own. Thus, we omitted reviews that contained both other authors' names and words that conveyed flattery. We manually read a random sample of 2,000 posts in the self-promotion and favoritism-exchange data set and 2,000 in the remaining clean data set. In the former data set, these selected posts conveyed strong sentiments but were rarely about novelty. In the latter, we found no signs of self-promotion or favoritism exchange.

⁹ The "novel" word list includes three types of words: (a) words relating to "new," "creative," and "innovative," (b) words relating to "unique," "different from others," "original," and "pioneering," and (c) words relating to "surprisingly clever," and "unexpected." The "lack of novelty" word list includes words that negate the "novel" words and other words that convey a lack of originality such as "copy," "imitation," "plagiarize," "conventional," "banal," and "cliché."

¹⁰ Our novelty measures can take a negative value because they are calculated in terms of differences between "novelty" and "lack of novelty" (in logarithms).

¹¹ It should be noted that most romance novels published on the closed platforms were not exactly pornography. They just contained scattered salacious content and were otherwise similar to the romance novels published on the mainstream platforms. According to our interviews, the skills of writing romance, with or without salacious elements, were similar; as one editor said, "Adding salacious content is just a matter of boldness."

¹² Given the many books in each category, these market-level controls can be regarded as exogenous to each individual book. Regression results excluding these controls are virtually the same.

¹³ We use the formula $100(e^{\beta} - 1)$, where β is the estimated coefficient of interest, to calculate the marginal effect. See Halvorsen and Palmquist (1980) for a detailed explanation of the formula.

¹⁴ A potential concern is that authors may privately keep a complete draft and release portions of it strategically. Then, with more intense competition, authors release their stocks more frequently without increasing their efforts. However, this hoarding strategy is undesirable for authors, because it would blind them to reader responses. An examination of authors' daily writing patterns shows that the dates on which an author publishes nothing are rather random, which is inconsistent with the strategic release of saved chapters. Close reading of the content also shows that authors frequently apologize explicitly for not being able to maintain continual writing.

¹⁵ Data before January 2014 were unavailable.

¹⁶ An active user is defined as one who signs onto her account on the platform from an IP address. If a user signs onto the same account repeatedly within eight hours even from different IP addresses, only one active use will be counted.

¹⁷ We are unable to obtain accurate data regarding the search frequency if we search the name of the platform in our study because its name is a commonly used Chinese word that people may search for other purposes.

¹⁸ We documented the writing history of authors in the baseline sample and found that more than 70% of the authors after the WCC were first-time authors with on existing readers to bring in. Among the experienced authors, we estimate that about half were from

other mainstream platforms, but most were insignificant novelists and had limited ability to carry their readership over to the platform in our study.

¹⁹ Note that we include platform promotion as a control merely to check the robustness of the results in our baseline estimation. The effect of platform promotion in Table A6 in the online appendix should not be interpreted as causal, because promotion is another outcome occurring simultaneously with author efforts.

²⁰ Authors we interviewed were often disappointed but also relieved when given a fixed-price offer: "The price is unfairly low. But what can we do? If we don't take it, other people will. So realistically, we don't think about being ripped off by the platform; we just take their buy-out as a victorious sign."

²¹ When the threshold goes above RMB 0, the sample is less balanced, and the corresponding regression results deviate from the result in the quasirandom sample. If the threshold is reduced below RMB 15, the number of observations is too small.

²² In the online appendix, we also assess the effect of platform promotion on book performance by including platform promotion as an additional control variable in the performance regression. Although not serving for identification purposes, the results, reported in Table A13, are informative. Platform promotion affects the performance of both revenue-sharing and fixed-price books, but the effect is much stronger for fixed-price books. In particular, for fixed-price books, when promotion is included in the regression, the effects of increased competition on reader clicks and purchases are considerably reduced and statistically insignificant. However, such attenuation does not appear for revenue-sharing books.

²³ For example, the European Union imposed a record-high fine on Google for favoring its own comparison-shopping service on its search engine in 2018.

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