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The role of openness in creative innovation: Evidence from digital crowdfunding

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ABSTRACT

This study analyzes the performance of new creative products by firms that engage in inbound open innovation (IOI). Creative industries have been under-examined in the context of open innovation, which is counterintuitive given emerging practices of borrowing, remix and sharing introduced by digital technologies. A unique aspect of creative production is the importance of copyright as a form of Intellectual Property (IP) used by outward- and inward-licensing firms. Evidence on the role of IOI in product performance for creative industries is so far scarce and ambiguous, with experimental results suggesting that over-estimation of value by licensors may distort the price of licenses and inhibit innovation. This may be due to lack of information about the value of a copyright to both the holder and prospective licensee. We contribute to understanding of creative industries by investigating whether the decision to inwardly license copyright affects new product development. We investigate this empirically using a unique dataset of 2040 creative products (in the creative sectors of publishing, comics, video games, and theatre) launched on a rewards-based crowdfunding platform where product performance was measured using campaign success and total funding raised. We compare the product development costs and performance for four types of producers: those that inwardly license copyright IP, those that make unauthorized use of copyright IP, those that use freely-available inputs from the public domain and those that do not use external inputs. We find that all forms of IOI improve product performance, but that formal copyright license agreements function as a signal that additionally improves performance for authorized producers. The findings yield practical implications for producer firms in terms of crowdfunding and licensing strategy. The findings are relevant for policymaking with respect to the scope of IP protection, the role of licensing and the contribution of IOI to creative sectors.

1. Introduction

It is widely recognized that innovation, whether encapsulated in a new technology or creative expression, is often sequential (Scotchmer, 2004; Brüggemann et al., 2016). Artists and inventors "stand on the shoulders of giants" when they adapt and transform existing ideas to create new products (Silbey, 2014; Buccafusco et al., 2017). Inbound open innovation (IOI) (Chesbrough and Crowther, 2006; Bianchi et al., 2016; Moretti and Biancardi, 2020; Rhaiem and Doloreux, 2024), is a widely-used framework for understanding how firms incorporate knowledge from beyond their boundaries as the basis for new products. Firms can directly trade innovations in the form of patents and know-how, as observed in studies of markets for technology (Arora et al., 2001; Arora and Gambardella, 2010). Additionally, research has shown that inwardly-licensing intellectual property (IP) can aid in new product development and innovation performance (Parida et al., 2012; Leone and Reichstein, 2012; Marzano, 2014) albeit shaped by firm's knowledge resources and capabilities (Spithoven et al., 2010; Zobel, 2017; Rhaiem and Doloreux, 2024) as well as the technology environment in which firms operate (Lee et al., 2017). Inward licensing of technology may also act as a signal to potential investors about the innovativeness of the downstream firm (Cabaleiro-Cerviño and Burcharth, 2020).

IP rights are a focal point for open innovation research because they provide a framework for commercializing and trading innovations between firms (Arora, 1995; Lee et al., 2017; Laursen et al., 2017). Two types of IP, patents and trademarks, are widely used by firms of all types, and have been used in studies of innovation as indicators of innovative behavior by firms (Von Graevenitz et al., 2013; Castaldi, 2020;

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Boudreau et al., 2022). The wealth of empirical evidence on the use of patents and to a lesser degree, trademarks is aided by the nature of these IP rights: since both must be registered with an issuing authority, and since the registration materials fully describe the scope of the IP, there are datasets accessible to track the registration and transfer of these rights by firms.

Our paper contributes to understanding of IOI by considering the role of copyright licensing, an under-studied form of IP protection in the open innovation literature. To date, there has been extremely limited empirical investigation of the effects of inward licensing of copyright (Lambrecht, 2017; Boudreau et al., 2022; Zhang, 2022). However, creative firms are known to widely engage in practices of inward licensing (Haefliger et al., 2010; Bechtold, 2013; Situmeang et al., 2014). The cultural and creative industries[1] have been conspicuously under-examined from the open innovation perspective. This is puzzling, since copyright is associated with innovative activity as a means of protecting computer software, plans, blueprints and other documentation. This lack of attention is particularly surprising given the disruptive effects of digital technology on creative sharing practices, the prevalence of remix and mashup products and the rise of platforms that promote various forms of creative exchange (Hill and Monroy-Hernández, 2013; Mangematin et al., 2014; Katzenbach et al., 2016; Adler and Fromer, 2022). Furthermore, since copyright protects computer source code, it is relevant to many firms beyond the creative industries. One reason for the lack of empirical research on inbound open innovation involving copyright may be the nature of the right: because original works automatically attract copyright at the moment of creation (in some jurisdictions, "fixation") without a registration requirement, obtaining data is more challenging (Oliar et al., 2013).

In this study, we develop an original approach to investigate the relationship between inward licensing of copyright and new product development performance by creative firms and ask the following research questions:

1. What is the impact of inward licensing of copyright on the cost of new product development?
2. What is the impact of inward licensing of copyright on the performance of products based on those inputs?
3. Does performance differ for firms that obtain a formal license agreement compared to those that make unauthorized use or obtain freely available inputs?

To overcome the persistent lack of data about copyright in IOI, we exploit an original dataset of 2040 creative products offered on the crowdfunding platform Kickstarter, initially gathered by the authors in 2014 and supplemented by repeat observation in 2023.[2] We adopt a mixed-methods data collection approach combining first, human assessment of the licensing status of products, and second, quantitative information about the funding success or failure of products and their ultimate delivery. The sample consists of products launched on the Kickstarter platform and available in the UK (the territory of the authors). The sample includes both successful and unsuccessful product pitches, enabling us to observe the role (if any) of IOI in product success on the platform. By using an automated scraping technique, we collect data about the content of product pitches, estimated production costs, eventual funding raised, and interactions between the product team and potential backers. In rewards-based crowdfunding, consumers who "back" projects by pledging funds normally receive a copy of the product upon completion and other rewards depending on the amount pledged (see e.g. Mora-Cruz and Palos-Sanchez, 2023). Since product teams receive no money if they fail to reach their funding threshold, producers are incentivized to provide accurate budget estimates that we exploit to investigate the relationship between IOI behavior, product development costs, and eventual product performance.

Our study also aims to contribute to understanding of the role of IOI in crowdfunding settings. IOI has not been extensively studied in this setting, perhaps because crowdfunding is typically associated with novel, untested ideas seeking early-stage funding (Agrawal et al., 2014; Belleflamme et al., 2014; Roma et al., 2017; Dahlander et al., 2021; Boudreau et al., 2021). Owing to the untested nature of product offerings, crowdfunding is characterized by a high degree of uncertainty and information asymmetry. Firms may fail to deliver products, or the final quality may be different than expected (Mollick, 2015; Jensen and Özkil, 2018; Appio et al., 2020; Cumming et al., 2020). The actual product development capabilities of firms are unknown to backers, who must make decisions based on public information such as the crowdfunding pitch itself or social media information about the product team. Many products in the creative industries are experience goods whose qualities cannot be demonstrated prior to sale (Kretschmer et al., 1999; Landoni et al., 2020). This means that the eventual performance of any creative product cannot be accurately known by either the licensor or the licensee (Caves, 2000). We theorize that in the context of crowdfunding, IOI helps firms signal to potential consumers about the quality and likelihood of completion of products. Obtaining a copyright license is a credible signal because it is costly to the inward-licensing producer and it represents an endorsement from an upstream rightsholder that the licensee will handle the IP with care. As we outline below, we expect the market to respond positively to inward licensing by creative producers and we test our hypotheses by evaluating market performance of authorized products against those that use unauthorized and freely available inputs in the IOI process.

By empirically investigating the performance of products based on IOI in a real marketplace, we aim to contribute to long-standing policy debates about the optimal balance of copyright (Landes and Posner, 1989; Buccafusco and Heald, 2013; Lambrecht, 2017; Linford, 2020) While strong copyright may enable an innovator to appropriate the value of an inherently "leaky" (Laursen and Salter, 2014: 869) innovation, the exclusive monopoly granted by copyright may inhibit follow-on innovators from productively building on that innovation (Cuntz and Sahli, 2023). Experimental studies suggest this may occur if copyright owners overvalue their exclusive rights, due to an "endowment effect" (Buccafusco and Sprigman, 2011; Buccafusco et al., 2017). On the other hand, it has been argued that weaker copyright protection could lead to free riding and oversupply, disinhibiting innovation and productive reuse (Landes and Posner, 2003; Linford, 2020). Our empirical insight into a market for creative products aims to offer a first view into the strategic benefit of inwardly licensing copyright compared to IOI using unprotected innovations.

The paper proceeds as follows: Section 2 introduces IOI theory, develops our main hypotheses and presents the conceptual framework. Section 3 outlines the methods used in detail, describing the sampling, variables and analytic techniques. Section 4 presents the findings. Finally, Section 5 summarizes the main results, details the contributions of our work and concludes with recommendations for future research in the area of IOI, licensing and creative firms.

[1] The precise taxonomical classification of creative industries is contested, but definitions tend to focus on the core activities of creative artistic production and symbolic reproduction (Mangematin et al., 2014). The UK Department for Digital, Culture, Media and Sport (DCMS) defines creative industries as those which "have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property" (DCMS 2001). Highlighting the importance of intellectual property, these activities are sometimes referred to as "copyright industries" (Siwek, 2004).

[2] The data were originally collected by the authors as part of research funded by the Economic and Social Research Council UK (ESRC, ES/K008137/1). The data are used here to explore the IOI behavior of producers. In 2023 the authors added to the dataset by re-scraping the original URLs to obtain information about product delivery and performance after the original crowdfunding campaign.

2. Theory and hypotheses

2.1. IOI and new product development costs

Engaging in IOI can aid new product development in several ways, including by enhancing firm knowledge and capabilities (Wang et al., 2015; Lee et al., 2017), enabling faster speed to market (Gruber and Henkel, 2006; Leone and Reichstein, 2012) and reducing the cost of new product development (Parida et al., 2012). By reducing the cost of R&D, IOI can enable firms to specialize by freeing up resources to be expended elsewhere such as marketing (Wang and Li-Ying, 2014). In markets where patents are the primary form of IP protection, it has been noted that the contribution of inward-licensed technologies to products is indirect, since patented innovations are often applied to internal processes and not sold directly to consumers (Cabaleiro-Cerviño and Burcharth, 2020). By contrast, copyright inward licensing might have a direct impact on new product development, since such materials can be directly visible in products. For example, a firm might in-license a well-known fictional character and includes it directly in a new video game to improve its marketability (Lehtonen et al., 2023). Or an app developer could in-license photographs of well-known landmarks to include in a travel app to save in production costs. Overall, IOI is expected to reduce product development costs compared to internal R&D because it provides a direct shortcut to completing a more complex product (Raasch and Herstatt, 2011). However, IOI can occur in different forms, each with different costs and benefits. Firms might inwardly license with a formal agreement, or they might borrow expressions and ideas freely available in the public domain (Erickson, 2018). The type of inward use will therefore be associated with different transaction costs, first copy costs, knowledge and integration costs, which depend on the nature of the material to be used and the requirement to negotiate a formal licensing agreement. Licensees also face transaction costs in locating and negotiating with rightsholders (made more acute by the lack of registration and other formalities in copyright) (Baldia, 2013; Fauchart et al., 2022).

Inward licensing of copyright IP is therefore a complex management decision, and may reflect different dynamics compared to neighboring studies of patent licensing. So, while IOI is expected to lower the cost of creative product development overall, we expect the effect to differ depending on the presence of a licensing agreement (whether formally licensed, unauthorized, or freely available). Table 1 below summarizes the potential benefits and drawbacks of IOI for inwardly licensing firms and key concepts from the literature that inform our hypotheses.

Table 1
Summary of IOI literature and main concepts.

Research question	Key concepts and Studies	Source
RQ1: What is the impact of IOI on new product development		
Benefits:	Improved speed-to-market	Gruber and Henkel (2006); Leone and Reichstein (2012)
	Lower development costs	Raasch and Herstatt (2011); Parida et al. (2012)
	Frees up resources elsewhere	Wang and Li-Ying (2014)
Negatives:	Search and bargaining costs	Victor (2020)
	Knowledge and integration costs	Dahlander and Magnusson (2008) Stuermer et al. (2009)
	Uncertain ownership	Arora et al. (2001)
	Benefits shaped by technology environment	Lee et al. (2017)
	Over-search leads to declining benefits	Laursen and Salter (2006)
	Benefits moderated by internal knowledge capabilities	Bagherzadeh et al. (2019); Rhaiem and Doloreux (2024)
	Licensor may over-value innovation	Bechtold et al. (2015)
RQ2: What is the impact of IOI on new product performance		
Benefits:	Participation in IOI can be a marketing channel	Gruber and Henkel (2006) Erickson (2018)
	Synergies from consumer familiarity	Basuroy and Chatterjee (2008) Situmeang et al. (2014)
	Reduction of risk	Pokorny et al. (2018)
Negatives:	Reduced switching costs for consumers	Lecocq and Demil (2006)
	Consumers may tire of derivative products from multiple sources	Landes and Posner (2003); Lambrecht (2017); Linford (2020)
	Penalty from lack of originality; competitive pressure arising from non-exclusive inputs	Hill et al. (2010) Harhoff et al. (2003)
RQ3: What is the impact of formal inward license on new product performance		
Benefits:	License can positively signal investment by licensee	Agrawal et al. (2013)
	More detailed licenses function as positive signals	Truong et al. (2022)
	Avoids competitive pressure from non-exclusivity	Harhoff et al. (2003)
Negatives:	Can signal lack of competitive capability to investors	Cabaleiro-Cerviño and Burcharth (2020)
	New firms face information asymmetry when in-licensing	Song and Lee (2023)

2.2. Product development costs with formal licensing

Firms that inwardly license copyright inputs face the cost of identifying, locating and transacting with a relevant rightsholder (Baldia, 2013; Victor, 2020). This mirrors neighboring markets for technology, where transaction costs can be significant and there can be uncertainty about the extent of what is owned and who the owner is (Arora et al., 2001; Padula et al., 2015). The relevant copyright owner may not be immediately identifiable to a prospective licensee, because of the lack of searchable databases of rightsholders. Normally, owners of a copyright work are identifiable from the work itself, however named authors may not be the actual owners (for example where a creator's work was transferred to a publisher, or where an originating firm subsequently merged with another). Uncertainty about ownership contributes to increased search and transaction costs (Erickson, 2018). Once a copyright owner is located, the licensee may be required to pay a fee or royalty in exchange for permission to use the material covered by the license. There is information asymmetry between the licensee and licensor, which favors the licensor (Song and Lee, 2023). Experimental evidence in creative markets suggest that copyright owners may overestimate the price of licenses compared to their market value (Buccafusco and Sprigman, 2010; Bechtold et al., 2015; Buccafusco et al., 2017). Such behavior may distort the market or result in a failure to reach an agreed price. An "endowment effect" has been observed experimentally, in which owners of a copyright price their creative innovations higher than a downstream innovator is willing to pay, even when the lower price would more accurately reflect market value (Buccafusco and Sprigman, 2010; Sprigman et al., 2013). The cost of copyright IOI therefore includes the license fees and transaction costs in addition to knowledge and integration costs which will be discussed in the following sections. For those reasons, we expect that among the different forms of IOI, obtaining a copyright license will be the most costly option for producers.

2.3. Product development costs with unauthorized use

Some firms may avoid transaction and licensing costs by making unauthorized use of copyright material (either purposefully or unknowingly). As discussed above, the inbound innovating firm may not be aware the inputs are covered by copyright, such as when they are near the term of expiration, or where the copyright owner is not

identifiable. The inbound innovator may believe they have the right to use the material, or that their use of the input is non-infringing. Some licensors may offer technologies on a use-first, license-later basis, such as in free software licenses which trigger commercial payment only after a certain threshold of use. This occurred for example in the 2023 dispute between middleware producer Unity and its licensees over increased fees for sales of games developed using the software (Stuart, 2023). Inbound innovators may hope that their unauthorized use goes "under the radar" of larger copyright owners, behavior which has been observed in emergent creative markets (Haefliger et al., 2010). Those firms may later be compelled to pay for a license or reach some other arrangement with the rights owner. Unauthorized use is sometimes tolerated on commercial Internet platforms, as licensors may find that the unauthorized use is complementary or is not significant enough to pursue enforcement (Heald, 2015). While unauthorized users can avoid transaction costs and license fees, they face other costs related to the risk of infringement and first-copy acquisition costs (Watt, 2000). First-copy costs relate to the expense of acquiring useful source material, and these can be significant depending on the nature of use and the technology involved. For example, a producer wishing to use a copyright-protected 3D sculpture in a video game would need to obtain a high-quality digital file and a means of inserting it into their finished product, which may be costly. The risk of infringing copyright can be high, involving legal damages as well eventual costs of re-design to remove infringing elements from the assembly process. The high cost of infringement may cause firms and organizations to be overly cautious and opt to inwardly license even in cases of ambiguous infringement, to avoid risk. Smaller firms or those operating in novel, innovative markets may still opt to risk unauthorized use, hoping that the use will be tolerated or that an agreement can be reached with rightsholders in the event of successful commercialization (Haefliger et al., 2010).

2.4. Product development costs with freely available inputs

Open innovation research has extensively investigated the impact of firms' decision to make use of freely available inputs in the form of open source software (Von Hippel and Von Krogh, 2003; Dahlander and Magnusson, 2008; Stuermer et al., 2009). Creative firms engaging in IOI can similarly draw on a range of inputs that may be free to use: 1) because they have been openly licensed by their creator, such as the case with free and open source software; 2) because the term of copyright has expired and the material is in the public domain; or 3) because the material was never protected by copyright in the first place, either because it pre-dates or is outside of the scope of copyright protection. Of the various forms of IOI, the use of freely available inputs is expected to come with the lowest cost for the innovator because the inputs do not carry associated transaction costs or fees, and they carry less legal risk for the user. However neighboring research on firms' use of FOSS in product development has found that some costs remain. IOI may incur knowledge and integration costs for producers (Von Hippel and Von Krogh, 2003; Dahlander and Magnusson, 2008). Effectively engaging in IOI presents organizational knowledge challenges for downstream creative teams. Workers must be trained to use the externally-sourced materials and new systems may need to be developed to render them compatible with the firm's product. There may be "transient incompatibility costs" (Lecocq and Demil, 2006: 893) as well as "organizational inertia costs" (Stuermer et al., 2009: 179) associated with implementing changes inside production teams to accommodate the acquisition, use and further development of innovations originating from outside the firm. The "not invented here" effect may be an important barrier to effective integration of external IP (Chesbrough and Crowther, 2006: 234). Resources may need to be allocated to learning craft techniques under which the original work was made, developing processes to index and exploit external material, and to creatively integrate external materials within newly developed products. However, these knowledge and integration costs can be expected to be equivalent for IOI from copyright as well as for IOI using freely available inputs, as they are present whenever external inputs are used. A key difference is that freely available inputs do not carry a license requirement nor associated fees. As a consequence, of the three types of IOI we expect that use of freely-available inputs should be associated with the lowest cost for innovators and vice versa leading to our first hypothesis:

Hypothesis 1. ("Licensing costs"): Products based on licensed copyright inputs will be associated with higher development budgets compared to products based on freely available inputs.

2.5. Moderating effect of creative industry type on product development costs

As an intellectual property right, copyright applies to a broad range of creative products and industries. Sector-specific research has demonstrated that patterns of re-use and licensing likely differ across industries, each characterized by different production logics and processes (Miège, 1987; Picard, 2005; Erickson, 2018). Some creative industries will be characterized by higher development costs and longer production schedules than others. Writing a novel will not incur the same labor and equipment costs as producing a computer game. The former can be accomplished by a single creator with basic tools, while the latter may require a team of programmers and artists using costly computers and equipment (Caves, 2000; Vogel, 2014; Towse, 2019). The impact of inward licensing on product development costs is therefore likely to differ between creative sub-sectors. Benefits of inward licensing are likely to be felt more prominently in product categories where inputs can be more directly applied to product development (e.g. where they can be more easily substituted for in-house R&D). Having access to a licensed input may drastically reduce costs for a print publisher, who has only to republish the copyright material in a new edition. By contrast, inwardly licensing materials will have limited benefits for the video game developer who must still code and develop a functioning product based around the licensed material. Therefore, in creative sectors where IP inputs make up a larger proportion of production costs (print publishing), we expect to see a more significant cost reduction effect for firms engaging in IOI. For sectors where inwardly-licensed IP makes up a smaller proportion of overall production costs (video games) we expect to see a smaller effect on production costs from follow-on re-use.

Hypothesis 2. ("Industry-specific costs"): Creative industry type moderates the relationship between IOI and product development budget.

2.6. IOI and new product performance

Next, we turn to the effect of IOI and inward licensing on the market performance of products. Existing research across a range of examples indicates that creative products derived from IOI perform differently from original products, and the effects of IOI are not always beneficial (Situmeang et al., 2014; Kim, 2019). Research suggests that in certain settings, consumers may penalize derivative products due to a lack of originality (Hill et al., 2010; Buccafusco and Sprigman, 2011; Monroy-Hernández et al., 2011; Lambrecht, 2017). Inwardly licensing without an agreement of exclusivity may open the field to competition, and consumers may tire of derivative products based on the same source material (Landes and Posner, 2003; Harhoff et al., 2003). On the other hand, familiarity may drive follow-on success. Evidence from the film industry indicates that the performance of sequels is linked to the success of original parent films, suggesting that consumer familiarity is an important factor in derivative product success (Basuroy and Chatterjee, 2008; Dhar et al., 2012; Situmeang et al., 2014). In studies of open source software re-use, researchers have found performance benefits to producers using IOI, notwithstanding the integration and knowledge costs discussed above (Stuermer et al., 2009). Potential reasons for

increased market performance include increased knowledge among consumers about the likely quality of follow-on products and increased use-value from familiarity with existing products. There may also be strategic benefits to IOI, including benefits from complementarity, strategic partnerships and speed to market which indirectly improve performance (Von Hippel and Von Krogh, 2003; Lecocq and Demil, 2006). Specific to creative firms, inward licensing has been identified as a strategic response to the inherent risk and low information in creative markets (Caves, 2000; Dempster, 2006; Hesmondhalgh, 2007; Pokorny et al., 2018). Social contagion effects may amplify word-of-mouth benefits for well-known products, increasing demand (Kretschmer et al., 1999; Hindman, 2008). Consumers may be fans of existing brands or stories, reducing the search costs associated with finding alternatives. In certain interactive media such as games, follow-on products may be appealing because of higher switching costs for consumers already tied to an existing ruleset or with an existing network of players (Lecocq and Demil, 2006). The overall effects of consumer familiarity, limited knowledge about new untested products and contagion effects could drive demand for products based on existing ideas.

Hypothesis 3a. ("IOI and product performance"): Products where IOI is present will have improved market performance compared to products that are not based on IOI.

2.7. Performance of products based on licensed vs unlicensed inputs

Performance of derivative products based on IOI may depend on the nature of the licensing agreement and the appropriability regime (Teece, 1986; Lee et al., 2017). Inputs which are not exclusively licensed (such as freely available inputs from the public domain) are available to competitors, leading to possible competition and market saturation (Landes and Posner, 1989; Von Hippel and Von Krogh, 2003; Harhoff et al., 2003; Lambrecht, 2017). In studies of creative industries, this has been called "overgrazing", referring to the situation in which too many users of a common resource overconsume it to exhaustion (Hardin, 1968; Buccafusco and Heald, 2013). Studies of media sequels have shown a reduction in performance compared to original releases, and lower staying power in the market compared to contemporaneous original releases (Basuroy and Chatterjee, 2008). In the eyes of consumers, too many follow-on products may result in a penalty arising from a perceived lack of originality. This has also been termed a "snob effect", referring to a potential congestion externality in cultural products that are consumed too often, lowering their use value as indicators of individual taste (Lambrecht, 2017). A series of studies by Hill et al. (2010) and Monroy-Hernández et al. (2011) examined the perceived quality of follow-on products based on free and open inputs. The studies were conducted on the multimedia creative platform Scratch, where users can openly build from blocks of code created by other users. The studies found that projects which re-used elements of other projects were rated significantly less favorably than original productions. Penalties for lack of originality may be felt more strongly when IOI uses freely available inputs available to competing innovators. Upstream copyright owners have the ability to limit undesirable downstream uses, potentially preventing tarnishment or oversupply of derivative products.

In the context of crowdfunding, formal copyright licenses may offer additional benefits. Crowdfunded ventures are perceived to be risky, with low information for potential consumers about the ultimate quality or likelihood of receiving finished goods (Appio et al., 2020). Early backers on Kickstarter have limited information about the quality of the final good as well as the capacity of the project owners to successfully deliver the product (Usman et al., 2019; Appio et al., 2020) Through signaling, individuals (in job markets), firms (in product markets) or creators (in crowdfunding markets) are in a position to communicate information that would otherwise remain hidden to the external observer (Akerlof, 1970; Hersel and Connelly, 2018; Bolandifar et al., 2023). Signaling is therefore important in crowdfunding contexts due to the anonymous, online nature of transactions and uncertainty about fundraising success and quality (Agrawal et al., 2014; Ahlers et al., 2015; Roma et al., 2017; Courtney et al., 2017; Usman et al., 2019). Engaging in IOI using licensed copyright inputs could mitigate the perceived risk of failure in crowdfunding by acting as a credible signal of capability by the downstream innovator (Agrawal et al., 2013). More detailed and formal licenses increase the signaling benefits to the licensee (Truong et al., 2022). Both the investment needed to obtain a copyright license, as well as qualities of the original parent work itself, may operate as credible signals that are difficult to imitate. Obtaining explicit permission to use a third party's copyright material indicates that the new venture has expended resources (search and bargaining costs) to obtain a license, and that the original copyright owner has endorsed the follow-on innovator by granting permission. The presence of a copyright license could therefore help persuade backers that the product developer is credible and serious about the project, spurring consumer support.

Hypothesis 3b. ("Copyright license performance"): Products resulting from IOI with formal license agreements will have improved market performance compared to other IOI products.

Fig. 1 below summarizes our conceptual model explained in the preceding paragraphs.

In summary, we hypothesize that engaging in IOI carries benefits to creative producers in the form of reduction of new product development costs as well as improvement of product performance. The impact of IOI is likely to be moderated by creative industry type, reflecting the contribution made by IOI to reduction of R&D and labor costs in product development. Benefits to product performance are likely to depend on the presence of a formal licensing agreement, which signals to potential consumers the prior investment made by the producer in seeking and obtaining a license. In the following section, we detail our method for comparing IOI product performance, using data obtained on new products launched on a popular crowdfunding platform.

3. Method

3.1. Empirical setting and sample

The setting for this study was the rewards-based crowdfunding platform Kickstarter. The platform allows producers to "pitch" projects which can include physical as well as intangible goods, separated into different product categories. Product pitches are shown to potential backers during the campaign phase at the beginning of the crowdfunding process. Pitches consist of campaign pages with unique URLs on the Kickstarter website containing information about the product, a description of the proposed work and the team responsible, as well as different rewards corresponding to levels of financial support. Pitch campaigns can include text, video and other materials such as draft documents, in support of the product pitch. Campaign duration is set by the producer and can range from 1 to 60 days in length. At the end of a campaign, if the threshold of money requested by the producer is met, the campaign is successful and the producer receives the funds, minus the platform fee. If the threshold set by the producer is not met, money is returned to backers. The campaign URL remains in place and can be used by the producer to provide updates to backers and the wider public about the status of the project during the production phase. Backers on Kickstarter are often direct consumers and early adopters of a product, with financial support tied to delivery of a product or service once it is produced. Kickstarter differs from traditional e-commerce platforms in that it requires buyers to commit funds before a product is available, making it somewhat closer to a patronage model of production (De Luca and Margherita, 2016).

Our aim was to examine new product development by creative producers. To capture a range of different creative products, the categories of publishing, comics, video games, and theatre were selected. These product types are covered by copyright and can incorporate

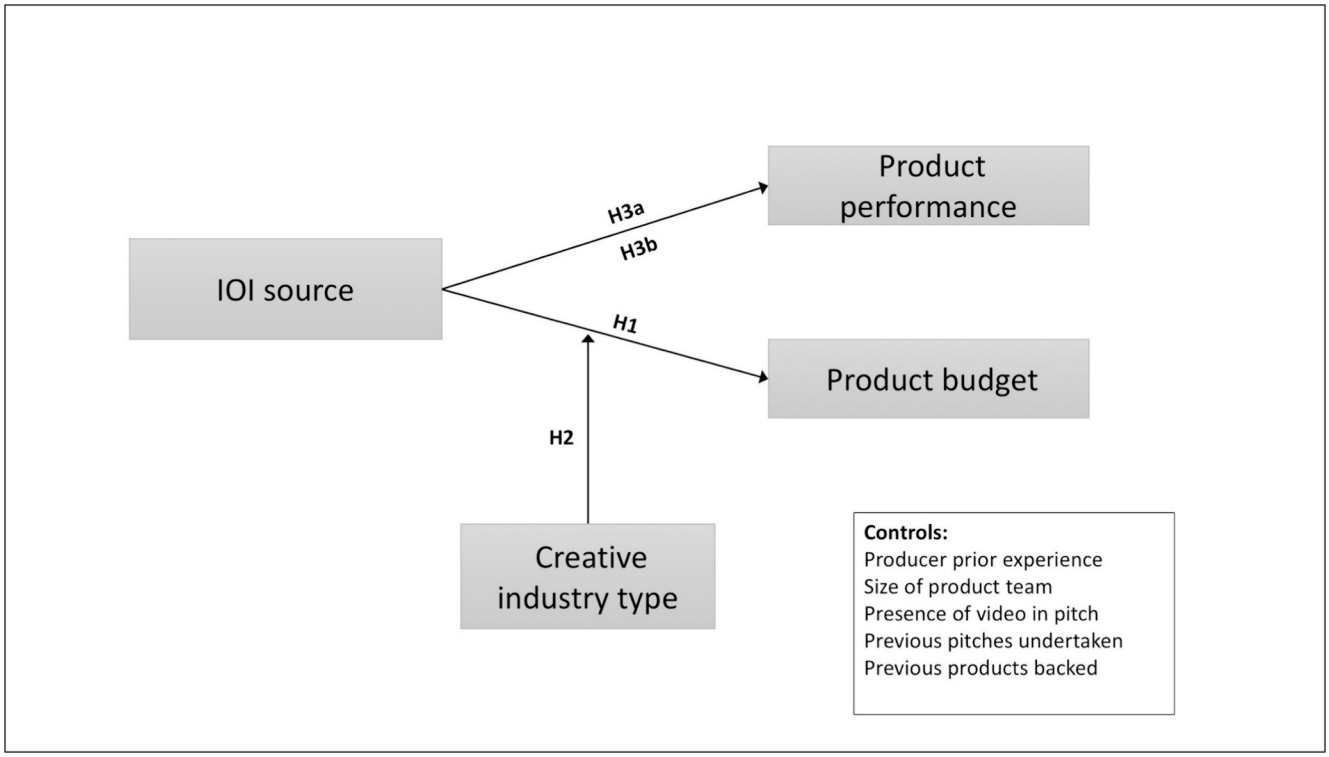

Fig. 1. Schematic summary of hypotheses.

external copyright materials via IOI. However, the product categories potentially differ in the impact of IOI, enabling us to test H2. Other product categories on Kickstarter include technology and design which include physical products covered by patent or design rights, which have different licensing requirements and thus were not included in this study. Our sample also excluded specific campaigns within the chosen categories that did not involve creative products (such as pitches to construct a community theatre building or purchase studio equipment).

Our dataset consisted of 2040 creative products pitched on the Kickstarter platform in the chosen product categories which ended their campaign period between 1st January and 31st March (Q1) 2014. The authors performed a second round of data collection on the same products in 2023 to add more information about eventual performance of products (successful delivery or failure to deliver). The date of initial capture has no impact on our ability to study the proposed hypotheses because the hypotheses are not dependent on a specific statutory or territorial framework, but on general principles in copyright law. Our observation strategy allows us to compare overall performance of products in terms of the estimated product budget as well as the amount of funding raised. The initial sample was obtained by querying Kickstarter's Application Programming Interface (API) for all projects, including those that were unsuccessful or withdrawn. The advantage of using the API to obtain projects over browser-based methods is that the API returns projects that were not visible or were withdrawn from the browser search results. We developed a data extraction script to carry out an automated web crawl to obtain data directly from pitch pages located using the API. The sample included all successful, unsuccessful and withdrawn or suspended projects during the study period. This sampling method yielded 2040 projects in total (see Table 2). The sample included successful, unsuccessful and cancelled projects with a funding cut-off date within the study range. Our scraping approach, selection of success metrics and use of product sub-genre as an independent variable is comparable to other crowdfunding studies e.g. Xue et al. (2023).

Product pitches were then further analyzed by a team of 6 human coders to record additional variables including whether the product was based on IOI, the intellectual property status of any inputs used, product team composition and prior experience of the product team (see variable definitions in Table 3). Data from human coders were collected and joined to our dataset via an electronic questionnaire instrument (SNAP programmable survey tool). To improve inter-rater reliability, the human coders were trained on the data collection protocol using a pilot sample of 100 randomly chosen products. Inter-coder reliability tests were run on the pilot data and observations were found to be closely in agreement. The list of variables is described in the following section.

Table 2
Description of sample.

Panel A. Creative industry type and budget size

	Creative industry type				
Project size (£ GBP)	Comics	Publishing	Theatre	Video games	Total
<1000	70	296	80	39	485
1000–4999	174	553	128	63	918
5000–9999	45	208	21	36	310
10,000–19,999	18	88	13	27	146
20,000–49,999	7	50	6	31	94
50,000–99,000	0	6	4	16	26
>100,000	4	30	4	23	61
Total	318	1231	256	235	2040

Panel B. Prevalence and source of IOI

	Freq.	Percent	Cum.
Non-IOI	1689	82.79	82.79
IOI from freely available	128	6.27	89.07
IOI from copyright	223	10.93	100
Total	2040	100	

3.2. Variables

The full list of variables and their definitions is provided in Table 3.

Table 3
Variable definitions.

Variable	Definition
Product budget	Logarithm of the total amount of funds requested in £GBP.
Funds raised	Logarithm of the total amount of funds raised in £GBP.
Success	A binary variable which captures whether a campaign successfully reached its funding threshold. Values are 1 = successful and 0 = otherwise.
Successful delivery	Binary variable capturing whether a product was successfully delivered to backers after the producer received funding.
Copyright	Dummy variable indicating that the product uses inputs protected by copyright.
Public_domain	Dummy variable indicating that the product uses inputs from the public domain.
Original	Dummy variable indicating that the product is original and does not use external inputs
Copyright_license	Dummy variable indicating that a producer has obtained a license from a copyright owner
Media type: Publishing, Theatre, Video games, Comics	Dummy variables indicating a product comes from one of the four Kickstarter product categories included in the study: print (non-illustrated), theatre, video games or comics.
Video	1 = Product pitch contained a video, 0 = otherwise
Number of backers	Total number of individuals who contributed funding to the project at the end of the campaign.
Project size	Categorical variable capturing the size of product budgets. Values are micro (0 < 1 k), small (1 k–4999), medium (5 k–9999), large (10 k–19,999), very large (20 k+).
Creator_female	Binary variable capturing whether the product team includes a female member. Values are 1 = female, 0 otherwise.
High_exp	Dummy variable indicating that the pitch team has a high degree of production experience that would be visible to potential backers.
Some_exp	Dummy variable indicating that the product team has claimed to have some previous production experience.
No_exp	Dummy variable indicating that the product team has no previous production experience.

The main dependent variable used to test H1 and H2 was *product budget*, which is defined as the amount of funding requested by pitch creators in £GBP. All currencies were automatically converted to our local currency at the time of data collection. We use the amount of funding requested by a campaign as an estimate by the product team of the costs of production. Our assumption is supported by a number of factors: (1) the platform guidelines encourage producers to report their expected budget for completion transparently in the pitch materials; (2) the all-or-nothing nature of the funding campaign means that projects not achieving their minimum funding threshold receive nothing, incentivizing producers to make accurate estimates; (3) the norms and ethos of Kickstarter promote transparency and direct communication with backers about the costs and risks of production. The funding threshold feature likely offers a strong incentive: no producer can be certain of how much they will raise in advance of their campaign, so they should be expected to ask for the minimum amount necessary for production, or risk receiving no funds at all.

We use two separate dependent variables to test H3 and H4, which relate to product performance. The first measure of performance is the variable *funds raised*, defined as the total amount of funding raised during the campaign period. This operationalization accounts for situations in which project exceed the minimum funding threshold set by the producer (sometimes by a considerable amount). A second, more conservative operationalization of performance is the success of the campaign indicated by achievement of the set funding threshold specified in the pitch. To this extent we created a dichotomous variable measuring success or failure of the campaign to achieve its initial funding goal. This operationalization of performance has been used in other studies of crowdfunding as an effective measure of success (Mollick, 2014; Courtney et al., 2017). Using this measure, campaigns are deemed successful on Kickstarter once they achieve the minimum amount of money requested by the producer (the threshold amount) and unsuccessful if they do not. This variable does not capture information about funds raised beyond the initial goal but it has the benefit of capturing whether the product budget estimated by the producer was achieved, since highly-funded products could still fall short of their initial funding request.

We follow the approach of previous studies by combining web-scraped data with additional information provided by human coders (Schoeneborn and Homberg, 2018). Certain structured and quantitative data were able to be obtained directly from the scrape of product pitch descriptions, such as total number of backers and number of previous campaigns launched by producers. Other, qualitative variables included the intellectual property status of any source inputs to products based on IOI. Such information is not systematically categorized by Kickstarter, so the research team used human coders to analyze product pitch narratives for that information. The independent variables of interest are as follows:

Source of IOI: human coders were asked to identify whether a product was a result of IOI and to classify the source of any materials used in products. We recorded this information as a categorical variable taking the following values: (1) products that used material protected under copyright; (2) products that used material residing in the public domain; (3) products that did not use any identifiable external inputs.

Copyright license status: in addition to the presence of IOI in a project, we recorded the presence of a license for any copyright inputs used. The values were: (1) copyright license obtained and explicitly mentioned in the product pitch; (2) copyright license to be sought by the pitch creator after funding; (3) copyright license not required due to fair use; (4) copyright license not sought. From the categorical variable we created dummies for each category in the analysis, and this is used in the analysis of H4.

Creative industry type: This variable records whether a product pitch was in one of Kickstarter's existing product categories of print publishing, theatre, video games or comics.

Video in pitch: Guidelines for pitch creators strongly encourage including a video explaining the product for which they are pitching. Following Courtney et al. (2017) we recorded whether videos were embedded into project pitches, as this could represent an investment of labor by the pitch creator and could improve the quality of the overall pitch and likelihood to succeed.

Product budget size: There was a significant variation in the size of product budgets across campaigns. To control for the effect different sizes of budgets, we include a dummy variable capturing those projects that requested £20 k GBP or more in their campaigns.

Producer Characteristics: Following previous empirical research on crowdfunding, we control for producer characteristics such as gender (Mollick, 2015), social capital accumulated on the platform (Colombo et al., 2015; Cai et al., 2021) and previous crowdfunding experience (Courtney et al., 2017; Appio et al., 2020). We recorded the number of previous interactions by the product team on the platform (other products backed and previous products launched). Previous production experience could also affect the performance of campaigns, as backers may be more likely to support producers who could demonstrate prior performance. We constructed a categorical variable which asked human coders to evaluate whether producers demonstrated previous experience in their pitch materials, by linking to or citing previous products they had worked on. To control for effects of fame or notoriety on project success, we constructed a variable to measure the amount of production experience stated in

the pitch, and an assessment about their fame or notoriety outside of the platform. These were used to control for the possibility that commercially successful creators bring existing audiences with them to more easily fund new ventures.

3.3. Estimation strategy

The estimation strategy is as follows: First, we evaluate H1 and H2 by using the log transformed *funds requested* (i.e. the product development budget requested at the outset of the campaign) as dependent variable in an OLS regression with robust standard errors. To test whether creative industry type moderates the relationship between IOI and product development cost, we include interaction effects for media type.

Second, we evaluate H3a and H3b, focusing on performance of products on Kickstarter. First we use an OLS regression on the log-transformed dependent variable *total funding raised* as displayed in Table 5. We include interaction effects for each of the media types of print publishing, theatre, video games and comics. Second, we evaluate the overall performance of products using a binary logistic regression on the dichotomous variable *success* (i.e. whether or not a campaign met its

Table 4
IOI and product budget.

Dependent variable:	(1) log_budgetGBP	(2) log_budgetGBP	(3) log_budgetGBP	(4) log_budgetGBP
Interaction effects:	Publishing	Theatre	Games	Comics
Original	−0.341**	−0.149*	−0.136*	−0.154*
	(0.104)	(0.0657)	(0.0640)	(0.0687)
Public_domain	−0.444**	−0.130	−0.209	−0.549***
	(0.142)	(0.134)	(0.115)	(0.131)
Copyright	−0.542***	−0.254*	−0.305**	−0.354***
	(0.140)	(0.119)	(0.0995)	(0.105)
No_exp_dum	0.147	0.168	0.150	0.105
	(0.112)	(0.104)	(0.104)	(0.114)
Some_exp_dum	0.113	0.150	0.135	0.0716
	(0.103)	(0.101)	(0.0994)	(0.107)
High_exp_dum	0.480**	0.480**	0.481**	0.447**
	(0.154)	(0.152)	(0.153)	(0.150)
Creator_female	0.0540	0.0541	0.0705	0.0311
	(0.0630)	(0.0617)	(0.0629)	(0.0625)
Project_size >20 k	2.431***	2.442***	2.370***	2.445***
	(0.105)	(0.104)	(0.113)	(0.105)
Video_in_pitch	−0.348***	−0.348***	−0.327***	−0.342***
	(0.0702)	(0.0700)	(0.0701)	(0.0700)
INTERACTIONS:				
Publishing	−0.178			
	(0.0997)			
Public_domain × Publishing	0.336			
	(0.267)			
Original × Publishing	0.266*			
	(0.130)			
Copyright × Publishing	0.337			
	(0.198)			
Theatre		−0.0393		
		(0.153)		
Public_domain × Theatre		−0.580*		
		(0.245)		
Original × Theatre		−0.206		
		(0.202)		
Copyright × theatre		−0.256		
		(0.230)		
Games			0.366*	
			(0.157)	
Public_domain × Games			−0.706	
			(0.456)	
Original × Games			−0.166	
			(0.219)	
Copyright × Games			−0.0293	
			(0.432)	
Comics				−0.0867
				(0.135)
Public_domain × Comics				0.808***
				(0.240)
Original × comics				−0.0593
				(0.161)
Copyright × comics				0.153
				(0.264)
_constant	8.122***	7.982***	7.913***	8.047***
	(0.140)	(0.128)	(0.127)	(0.141)
N	2040	2040	2040	2040
Adj.-R^2	0.262	0.264	0.264	0.264

Standard errors in parentheses.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

funding goal) displayed in Table 6. In the logistic regression output tables coefficients are displayed as odds ratios for ease of interpretation.

4. Findings

4.1. IOI and product development costs

Hypotheses H1 ("licensing costs") and H2 ("industry-specific costs") relate to the impact of IOI on new product development. We assess this by examining the relationship between the source of IOI and costs of development estimated by producers in their campaigns. Table 4 presents the results of an OLS regression using the log-transformed amount of funding requested as the dependent variable. The columns present interaction effects with 4 main creative industry types: print publishing, theatre, video games and comics. Overall, IOI is significantly associated with reduced development costs compared to products that did not use IOI. We find that formal in-licensing of copyright has the most significant negative impact on production budgets, which is an unexpected result. We find that producers engaging in IOI using copyright sources request lower budgets than all other types of producers. The use of freely available inputs in IOI does not reduce product development costs as significantly as copyright inputs. Based on the results displayed in Table 4 we reject H1 that the budgets of follow-on project obtaining a copyright license will be higher than budgets for freely available inputs. The coefficient on the copyright variable is negative and significant (Model 1: coeff. = −0.542***; Model 2: coeff. = −0.254*, Model 3: coeff. = −0.305*) throughout all specifications implying lower production costs on average compared to the rest of the sample. Only in model 4 the coefficient for public domain inputs (coeff. = −0.549***) implies a greater reduction of budgets than the coefficient for copyright IOI (coeff. = −0.354***). However, the latter is strongly significant, and substantial in size holding up the overall pattern of lower production costs for IOI based on copyrighted inputs.

Examining interaction effects between creative industry type and product development costs for different forms of IOI, we find that creative industry type moderates the effect of IOI on product development cost in specific situations. For example, *Media type: theatre* has a moderating effect on the impact of IOI on development cost, with reduced production cost for products that incorporate public domain inputs (coeff. = −0.58*). Also, *Media type: publishing* moderates the effect of IOI on product development cost with non-use of IOI increasing development costs (coeff. = 0.266*). Finally, also a significant interaction is present between public domain use and *Media type: Comics* (coeff. = 0.808***). Overall, these results indicate partial support for H2, that the moderation of creative industry type on product development costs will be stronger in publishing and theatre. Significant interactions are displayed in Fig. 2 below. Among the control variables, previous successful experience of the producer stands out as having a significantly positive association with amount of funding requested.

4.2. IOI and product performance

Hypotheses H3a ("IOI and product performance") and H3b ("copyright license performance") relate to the impact of IOI on product performance, measured using two dependent variables: first, the total amount of funding raised by campaigns and second, a dichotomous measure of success or failure of campaigns. Table 5 presents results of an OLS with the dependent variable the log-transformed value of total funding raised. As in the previous model we include interaction effects of creative industry type for the four main product categories studied. We hypothesized (H3a) that products based on IOI would perform better than products that did not use external inputs. We find partial support for H3a in the product categories of comics, video games and theatre that all exhibit negative coefficients on the variable indicating original inputs as the main source of the work. There was no consistently significant effect in the amount of funding raised for either copyright or public domain inputs. The direct effect of public domain IOI in model 2 and model 3 is positive and significant whereas direct effects for copyright IOI are not significant in all specifications. Looking at moderation effects, we find that creative industry type also moderates the effects of IOI on total funding raised. In the games category, performance of both PD (coeff. = −2.081*) and copyright (coeff. = −2.183*) are significantly negative, suggesting that crowdfunding backers are less supportive of IOI in video game products. In the comics category, the effect of originality (coeff. = 0.671*) is positively associated with funding level received, suggesting that IOI is less rewarding in that category also (Fig. 3).

To further evaluate H3a, we examined the likelihood that products succeeded in their campaigns, measured as a dichotomous variable indicating whether a campaign managed to reach the threshold of funding set at launch. Compared to total funding raised, this variable is sensitive to the size of the overall product budget as well as the match between producer expectations and total demand from backers. Only if the two are aligned will projects be successful. The results of a logistic

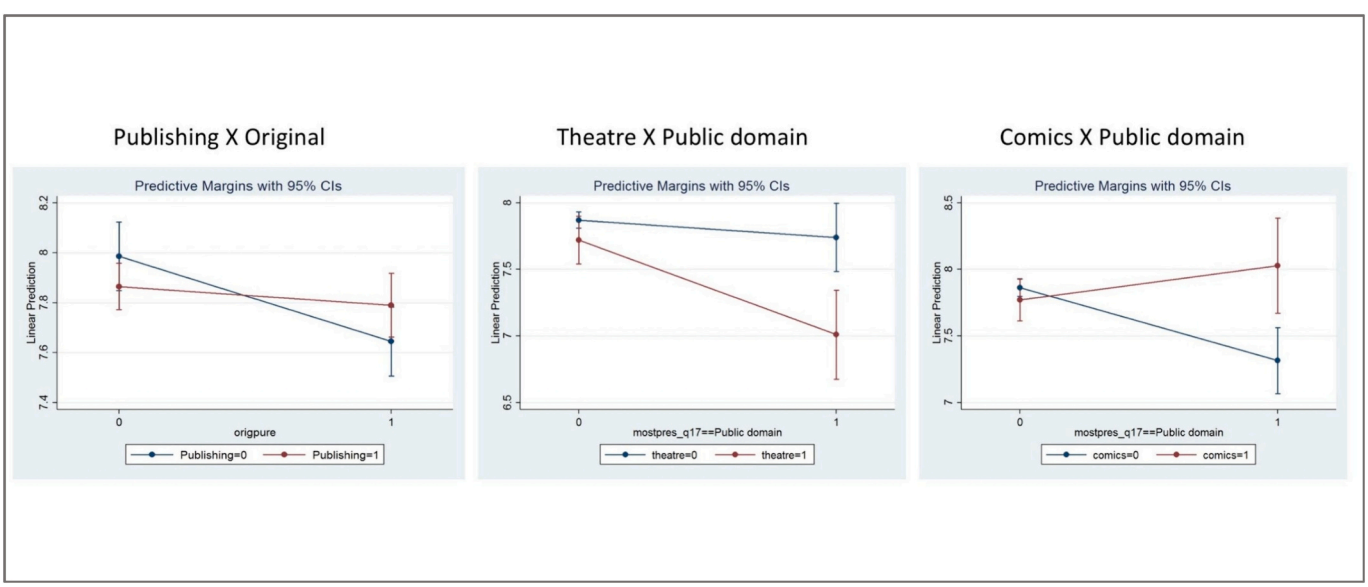

Fig. 2. Significant interactions of media type with IOI input source and product budget.

Table 5
IOI and total funding raised.

Dependent variable:	(1) Log_raised_GBP	(2) Log_raised_GBP	(3) Log_raised_GBP	(4) Log_raised_GBP
Interaction effects:	Publishing	Theatre	Games	Comics
Original	−0.324	−0.378**	−0.340*	−0.516***
	(0.189)	(0.140)	(0.140)	(0.148)
Public_domain	0.206	0.574*	0.686**	0.207
	(0.250)	(0.234)	(0.213)	(0.264)
Copyright	−0.213	−0.0440	0.336	0.212
	(0.279)	(0.249)	(0.198)	(0.204)
No_exp_dum	−1.003***	−1.562***	−1.504***	−1.357***
	(0.217)	(0.202)	(0.201)	(0.222)
Some_exp_dum	0.460*	−0.0540	0.0902	0.156
	(0.195)	(0.190)	(0.186)	(0.200)
High_exp_dum	1.924***	1.666***	1.653***	1.723***
	(0.246)	(0.241)	(0.241)	(0.240)
Creator_female	0.414**	0.277*	0.351*	0.320*
	(0.138)	(0.138)	(0.138)	(0.138)
Project_size >20 k	0.739**	0.819***	0.633**	0.857***
	(0.235)	(0.239)	(0.241)	(0.241)
Video_in_pitch	−1.662***	−1.765***	−1.745***	−1.757***
	(0.156)	(0.156)	(0.155)	(0.155)
Publishing	−0.797***			
	(0.184)			
Public_domain × Publishing	0.00787			
	(0.491)			
Original × Publishing	−0.222			
	(0.259)			
Copyright × Publishing	0.516			
	(0.393)			
Theatre		0.638**		
		(0.213)		
Public_domain × Theatre		−0.828		
		(0.496)		
Original × Theatre		−0.342		
		(0.377)		
Copyright × Theatre		0.191		
		(0.375)		
Games			0.727**	
			(0.262)	
Public_domain × Games			−2.081*	
			(0.971)	
Original × Games			−0.141	
			(0.417)	
Copyright × Games			−2.183*	
			(1.036)	
Comics				0.00166
				(0.264)
Public_domian × Comics				0.852
				(0.444)
Original × Comics				0.671*
				(0.321)
Copyright × Comics				−0.499
				(0.739)
_cons	8.277***	8.327***	8.150***	8.168***
	(0.270)	(0.251)	(0.255)	(0.271)
N	2040	2040	2040	2040
Adj.- R^2	0.230	0.218	0.220	0.218

Standard errors in parentheses.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

regression using funding success as dependent variable are displayed in Table 6. Coefficients are presented as odds ratios for ease of interpretation. Specification 1 presents only the main independent variables related to follow-on source, while each subsequent specification adds controls. Column 4 adds significant interactions effects of media type. Multicollinearity checks raised no concerns (mean VIF = 1.72; single highest VIF = 3.87). We also ran Hosmer-Lemeshow goodness of fit tests which were not significant, providing no evidence for lack of fit. While pseudo-R2s may appear low in absolute values, they are still sufficiently large to indicate that our models explain a relevant amount of variation.

Overall, the results indicate significantly increased odds of success for IOI using public domain (model 4: OR = 3.142***) and copyright inputs (model4: OR = 2.313***) compared to products that were not based on IOI. The size, gender and previous experience level of the product team are included as controls and are also significantly associated with campaign success. Products requesting >£20 k in funding are significantly associated with reduced odds of success (model 4: OR = 0.349***), reflecting the higher development budgets set by those producers. Creative industry type moderates the effect of IOI source on successful outcome in specific situations shown in column 4. *Media type:*

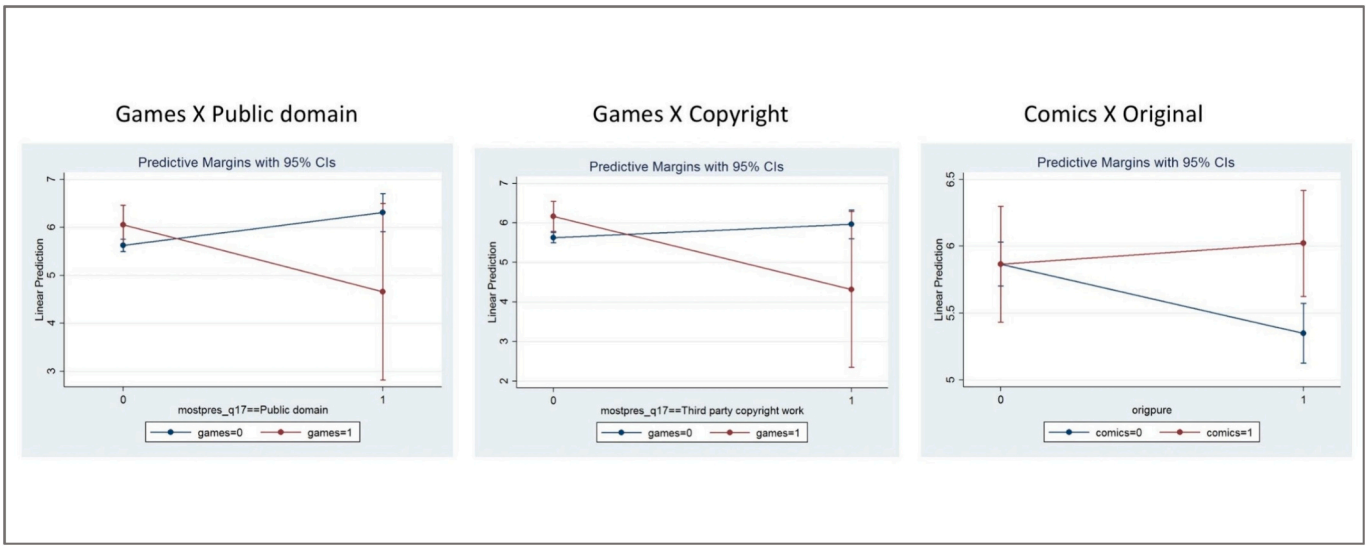

Fig. 3. Significant interactions of media type with IOI input and product performance.

Table 6
IOI and odds of reaching success threshold.

	(1)	(2)	(3)	(4)
Dependent variable:	Success (binary)	Success (binary)	Success (binary)	Success (binary)
Original	0.950	0.986	0.998	1.297
	(0.0948)	(0.103)	(0.107)	(0.221)
Public_domain	2.718***	2.387***	2.572***	3.142***
	(0.535)	(0.487)	(0.539)	(0.858)
Copyright	2.296***	2.056***	2.156***	2.313**
	(0.352)	(0.328)	(0.353)	(0.590)
No_exp_dum		0.368***	0.413***	0.627*
		(0.0636)	(0.0731)	(0.119)
Some_exp_dum		0.970	1.050	1.486*
		(0.161)	(0.179)	(0.269)
High_exp_dum		2.608***	2.791***	3.569***
		(0.623)	(0.685)	(0.896)
Creator_female		1.475***	1.456**	1.586***
		(0.164)	(0.167)	(0.188)
Project_size >20 k			0.352***	0.349***
			(0.0653)	(0.0652)
Video_in_pitch			0.355***	0.385***
			(0.0454)	(0.0499)
Publishing				0.690*
				(0.112)
Interactions:				
Public domain × publishing				0.313*
				(0.156)
Original × Publishing				0.587*
				(0.130)
Copyright × publishing				0.811
				(0.272)
N	2040	2040	2040	2040
Nagelkerke R^2	0.029	0.101	0.144	0.164
pseudo R^2	0.022	0.078	0.114	0.131

Exponentiated coefficients; Standard errors in parentheses.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

print publishing moderates negatively the effect of both public domain IOI (OR = 0.313*) and non-use of IOI (OR = 0.587*) on successful outcome.

Finally, we evaluate H3b ("copyright license performance") which predicted that product performance would be positively associated with formal inward licensing of copyright. We evaluated this by analyzing products that used copyright inputs whether licensed or unlicensed. We recorded a variable which captured whether a producer made reference to a copyright license in their pitch materials. The values of the variable were: (1) license obtained; (2) license to be sought after campaign; (3) reliance on fair use; (4) not indicated. We combined cases with the value (1) to create a new dummy variable *copyright license*. The results using the dependent variable *success* are displayed in Table 7. We find that obtaining a license prior to the launch of a Kickstarter campaign is significantly positive on likelihood of successful funding (model 3: OR = 1.536*). As with the regressions displayed in Table 6 we ran several diagnostic checks which did not provide indications for concern (e.g. mean VIF = 1.62, goodness-of-fit tests: no concern).

To further evaluate the potential for formal license agreements to function as credible signals to backers, we tested whether there was a relationship between copyright IOI and the eventual delivery of products. We did so by re-visiting the original dataset in 2023 to ascertain the

Table 7
Presence of copyright license and odds of reaching success threshold.

	(1)	(2)	(3)
Dependent variable:	Success (binary)	Success (binary)	Success (binary)
Original	0.950	1.032	1.136
	(0.0948)	(0.111)	(0.131)
Public_domain	2.718***	2.928***	2.885***
	(0.535)	(0.586)	(0.616)
Copyright	2.296***	2.192***	2.001***
	(0.352)	(0.340)	(0.332)
Copyright_license		1.317*	1.536**
		(0.173)	(0.217)
No_exp_dum			0.395***
			(0.0703)
Some_exp_dum			1.014
			(0.173)
High_exp_dum			2.813***
			(0.692)
Creator_female			1.433**
			(0.165)
Project_size >20 k			0.342***
			(0.0638)
Video_in_pitch			0.356***
			(0.0456)
N	2040	2040	2040
Nagelkerke R^2	0.029	0.031	0.148
pseudo R^2	0.022	0.023	0.117

Odds ratios displayed; standard errors in parentheses.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

delivery status following the initial successful funding of campaigns. The variable *delivery status* recorded the status from among four outcomes: (1) successfully delivered; (2) partially delivered; (3) failure to deliver; and (4) unknown. We combined cases with the value (1) to create a new dummy variable *successful delivery*. The 9-year interval between first funding and the new data collection should not be a significant source of observation bias, since ample time should have elapsed for product status to be determined, although there were a handful of products delivered as late as 2021. The results of a binary logistic regression on the dependent variable *successful delivery* are shown in Table 8. We find that IOI involving formally licensed copyright inputs is associated with greater odds of successful delivery (OR = 2.364*). This suggests that inward licensing copyright not only acts as a signal encouraging higher levels of support at the crowdfunding stage; it is a credible signal of likelihood that products will eventually be delivered by the product team.

5. Discussion

This study examined the effects of IOI and inward licensing on new creative product development. We extend understanding of IOI and its effects to a new field site (creative industry crowdfunding) and an understudied form of IP (copyright). Although crowdfunding has been characterized as a source of support for novel, early-stage innovation, we find that IOI is frequently pursued by crowdfunding producers launching new products. We examined whether IOI using different inputs (licensed, unauthorized or freely available) had an impact on new product development budget and performance. We find that engaging in IOI is advantageous for producers in two ways: it lowers the costs of product development and it increases the likelihood of product success (measured by the funding received exceeding the estimated development budget). The fact that IOI from copyright inputs reduces costs for producers is an intuitive result, since copyright inputs can be directly applied to reduce production costs. However, the fact that IOI from freely-available inputs is associated with increased product performance compared to non-IOI products contributes new understanding of the benefits of open licensing in creative industries, where theory indicated the possibility of reduced benefits from over-use (Landes and Posner, 2003; Harhoff et al., 2003; Lambrecht, 2017).

Table 8
IOI from copyright and odds of successful delivery.

	(1)	(2)	(3)	(4)
Dependent variable:	Delivered (binary)	Delivered (binary)	Delivered (binary)	Delivered (binary)
Original	0.883	0.919	1.290	1.286
	(0.0948)	(0.105)	(0.317)	(0.326)
Public_domain	2.093***	1.962***	1.386	1.569
	(0.535)	(0.401)	(0.565)	(0.671)
Copyright	1.585**	1.424*	2.364*	2.216
	(0.246)	(0.234)	(0.999)	(0.959)
No_exp_dum		0.507***		2.011
		(0.0960)		(0.754)
Some_exp_dum		1.270		2.508**
		(0.226)		(0.835)
High_exp_dum		2.959***		1.523
		(0.704)		(0.593)
Creator_female		1.508***		2.082*
		(0.179)		(0.666)
Project_size >20 k		0.300***		0.232***
		(0.0645)		(0.0771)
Video_in_pitch		0.340***		0.959
		(0.0495)		(0.368)
Constant	0.435***	1.592*	5.500***	2.984*
	(0.0321)	(0.372)	(0.863)	(1.525)
N	2040	2040	738	738
Nagelkerke R^2	0.014	0.117	0.013	0.098
pseudo R^2	0.011	0.100	0.009	0.07

Odds ratios displayed; standard errors in parentheses.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

IOI using licensed copyright inputs resulted in the greatest benefit to IOI producers. It was anticipated that IOI using public domain inputs would have the strongest effect in reducing the cost of new product development, because those inputs avoided licensing fees and transaction costs, as well as the experimentally observed "endowment effect" of rightsholders (Buccafusco and Sprigman, 2010). However, we find that the cost-reducing effect of IOI from public domain inputs is less significant than for copyright inputs. What might explain this? One interpretation is that engaging in IOI from copyright provides higher-quality inputs and as know-how. These may include more readily usable inputs with lower associated knowledge costs compared to other forms of IOI. Freely available inputs may have increased knowledge and integration costs that offset the presence of a licensing fee for copyright materials. Our results also suggest that industry type is a significant moderating factor in any cost reduction from engaging in IOI. In theatre and print publishing the cost-savings effect of IOI is stronger than in comics and video games. This is an expected result for publishing, where labor costs of writing are expected to make up a large proportion of the total production costs.

We investigate whether obtaining a copyright license could act as a positive signal. We find specifically that the presence of a formal copyright license agreement further increases the odds that a crowdfunding campaign will be successful compared to copyright IOI without a formal license agreement. By re-analyzing our dataset in 2023, we find that obtaining a copyright license was a credible signal because it also increased the likelihood that producers would ultimately see a product through to completion and delivery. The possibility for copyright to act as a signal extends traditional economic understanding of copyright, which has focused only on direct cost-savings in the innovation process and benefits from exclusivity granted by the IP right.

5.1. Theoretical contributions

Our paper makes two main theoretical contributions: first, we have found it productive to integrate signaling theory (Akerlof, 1970; Hersel and Connelly, 2018; Bolandifar et al., 2023) with theory on the incentives-access balance in copyright (Lambrecht, 2017; Linford, 2020; Boudreau et al., 2022; Zhang, 2022). In studying the effects of copyright IOI we advance understanding of how creative markets respond to different licensing approaches in innovative crowdfunding products. The main contribution to signaling theory is that copyright licensing arrangements appear to function as signals that allow market participants to evaluate unknown, innovative products more accurately. Our focus on the presence of formal vs informal licensing arrangements sheds light on the value of obtaining a copyright license itself, separate from the content covered by the license.

Our study contributes to theory about the incentives structure underpinning the scope of copyright protection. The dominant paradigm that the copyright owner's power to control access acts as an incentive (which serves as a justification for copyright policy) is predicated on maximizing the production of new goods in society (Landes and Posner, 2003; Lambrecht, 2017; Adler and Fromer, 2022). The strength of copyright protection and by extension the ability of upstream owners to appropriate the value of innovations, should be balanced with the desired outcome that downstream producers will also find it valuable to inwardly license and build upon protected innovations. Our study shows that inwardly-licensing producers obtained value from licenses in the form of cost savings in new product development as well as greater likelihood of success compared to other sources of IOI. The fact that license agreements enabled the downstream innovator to succeed, suggests that in those cases the rewards structure was appropriately balanced to reward both the owner of the copyright and the innovator willing to pay for that protected expression and add their own efforts to

it. If unauthorized users had been rewarded more than licensees, that would suggest an imbalance.

5.2. Practical implications

Our findings have relevance for innovation policy and creative managers. In copyright policy, identifying the appropriate balance of rewards between original rightsholders and downstream users has been persistently contentious (Landes and Posner, 2003; Dobusch and Schüßler, 2014; Lambrecht, 2017; Linford, 2020). The monopoly granted to copyright owners is not absolute – the law limits the scope and duration of protection to enable some amount of open innovation to exist (Varian, 2005). Economic theory of copyright suggests a theoretically optimal balance between protection and access, but falls short of identifying specific policy mechanisms to achieve it. Empirical data on copyright's role in open innovation have been scarce. We empirically demonstrate the prevalence of different forms of IOI involving transfer of copyright in a crowdfunding market. Our data reveal that IOI producers were rewarded for inwardly-licensing copyright, despite the theorized higher costs of doing so. Further research with upstream rightsholders and across creative market settings is required to assess the protection-access trade off, but our study is a starting point in collecting these perspectives. As underlying technologies and creative practices evolve, the protection-access balance may also shift over time. Some legal scholars have argued that the traditional balance of copyright policy already lags behind the needs of emerging forms of digital creativity (Adler and Fromer, 2022).

Policy makers may want to consider initiatives to overcome barriers to IOI, such as: (1) facilitating licensing between innovators by improving availability and interoperability of rights information and smart licensing; (2) unlocking repositories of freely-available copyright materials, for example via digitization by libraries, archives and museums; (3) increasing support for volunteer collective initiatives such as open software projects, open licensing protocols, and other knowledge sharing activities as inputs to IOI; (4) providing educational support for entrepreneurs to increase awareness of IP licensing options. In general, innovation policy could place more emphasis not only on the role of IP in appropriability but also in its role in follow-on and open innovation.

Our analyses have implications for creative producers and firms engaging in crowdfunding. We provide evidence supporting the added benefit of highly descriptive pitches, prior experience of the pitch creator and the signaling potential of IP licenses. Pitch creators are well advised to detail these aspects in their crowdfunding efforts to attract backers. Additionally, with reference to obtaining licenses for copyrighted materials, our findings indicate that IOI producers have reasonable chances to recoup the initial investment associated with a license fee. Entrepreneurs might consider the potential signaling benefit of copyright, in addition to other traditional benefits when negotiating license agreements.

5.3. Limitations and future research

The present study has some limitations which present opportunities for future research. First, while our sample from Kickstarter is original and allows a unique view into both production costs and performance of new products, our results may have limited generalizability to other technology and product markets. As our study focused creative, early-stage products on a crowdfunding platform, it would be advantageous to expand the study setting to other sectors and IP regimes, such as patent and trademark. Researchers could also examine conditions in larger firms, as firm size might be a factor impacting the benefit that can be obtained from inward licensing (Rhaiem and Doloreux, 2024).

Additionally, caution needs to be exercised in context of time duration (3-month initial data collection period) as well as in applicability beyond the specific creative industries we studied (publishing, theatre, comics, video games). Cultural trends change over time, and the relatively short history of remix as a recognized mode of expression may limit generalizability of our results as cultural tastes evolve. The visibility of IOI was a challenge that we attempted to overcome in this study by using human coders to identify the source of external material. Other creative sectors such as music, visual arts and photography present difficulties for coding variables related to source of IOI. Expanding the range of creative industries analyzed is a worthwhile aim for future research. Expanding the scope of time covered in the research might illuminate trends or changes in follow-on production and performance that occur over longer durations.

Further studies may benefit from triangulating data from crowdfunding platforms with firm-level survey data gathered from innovators to more directly explore the decision to engage in IOI. Future research might also explore the complete timeline of the innovation process, including subsequent product releases into wider markets (see Vanacker et al., 2019). Surveys of producer firms could be used to enrich understanding of licensing costs and benefits by providing insight not visible on the crowdfunding platform.

Widespread availability of information from social media platforms about the characteristics of producers and backers presents opportunities for future research. These data might provide insights about the extent to which IOI behavior incorporates co-production and knowledge from users, and how those behaviors intersect with IP licensing approaches.

Adding signaling theory to the consideration of copyright's role in innovation opens exciting new avenues of research. Future studies may consider whether the signaling potential of copyright influences licensing negotiations and the value that parties assign to the market potential of licenses. We theorize that the signaling effect of a copyright license arises partially from the endorsement of a licensed product by the upstream rights holder. Further research with copyright owners could deepen understanding of the decision to grant a license, including whether such agreements constitute endorsement. Research might also examine how consumers respond to IP signals and what factors may increase or decrease their credibility as signals (e.g. exclusivity, duration, scope). Our study has specifically focused on copyright, but other forms of IP remain under-studied in the context of IOI, such as trademarks and design rights.

6. Conclusion

Our study addresses the relative lack of attention paid to copyright in studies of innovation. The advent of digitalization has brought copyright to prominence across a range of innovative and creative pursuits, including as embedded software in Internet-of-Things devices (Rosborough, 2020). The lack of registration formality has made it challenging for researchers to exhaustively track the owners of copyright and transfers between firms. The scope of what is protected by copyright is more ambiguous than other IP rights, making it a challenge for researchers, and courts, to determine whether a follow-on copyright innovation may infringe existing rights. However, in this paper we have outlined an approach to study copyright licensing by gathering original data from an online marketplace to track product performance. These unique challenges offer a research opportunity to develop and refine new methods to collect and analyze data on copyright's role in the innovation process and we encourage future research to do so.

CRediT authorship contribution statement

Kristofer Erickson: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation. **Fabian Homberg:** Writing – review & editing, Validation, Investigation, Formal analysis, Data curation. **Martin Kretschmer:** Writing – review & editing, Funding acquisition, Conceptualization.

Data availability

Data will be made available on request.

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