It was Fifty Years Ago Today: Recording Copyright Term and the Supply of Music

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Abstract

This paper examines the effect of the expiry of recording copyright on the supply of music – in the form of re-releases, availability in streaming platforms, and concert performances – by artists popular in the UK in the 1960s. The term of recording copyright in the UK was extended from 50 to 70 years in 2013, implying that copyrights on recordings made in the late fifties and early sixties are no longer in force, while tracks recorded a few years later remain under copyright protection. In a sample of 13,238 tracks by 140 artists first released between 1928 and 1975, we find that the expiry of recording copyright leads to an approximately 141-247% increase in the number of re-releases, holding constant artist, age and year fixed effects. The effect is not significantly different for the most popular artists in our sample, and is not apparent in placebo regressions on a sample of US re-releases. Results on availability on the Spotify streaming music platform tell a different story: there is no significant effect of copyright expiry on the availability of tracks recorded before 1963. However, when a track’s original recording copyright expires, it becomes less likely to be performed in concert. These results point towards substantial heterogeneity in the effects of copyright on availability of cultural products across different distribution channels, and raise the question of whether the digital platform distribution model may moderate the negative effects of long copyright terms on availability.

Keywords: Intellectual Property, Copyright, Music Industry

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A related paper using different data was titled “Copyright Extensions and the Availability of Music: Evidence from British Hits of the 1960’s” and was written by John McKeon as part of Boston University’s Undergraduate Research Opportunities Program (UROP), under the supervision of Megan MacGarvie. McKeon would like to thank UROP for funding. MacGarvie and Watson thank the NBER Program on Digitization for funding, and all authors thank Jon Bartlett, David King, Matthew Sag, Ben Shiller, Tim Simcoe and participants at the 2017 SERCI Annual Congress, the 2018 NBER Digitization Meeting, the Toulouse School of Economics Digital Workshop, and the 2018 MIRA Conference for helpful comments and suggestions.
Digitization enables information goods to propagate through electronic networks at near-zero marginal cost. However, intellectual property rights restrict the unbridled flow of information, especially creative works. Copyright systems, which grant creators of original works of authorship a limited monopoly to exploit and distribute their works, may incentivize artists and firms to invest in new works, but also impose a monopoly deadweight loss on society. Some have argued that postponing the expiry of copyright many decades in the future has a negligible impact on the present value of the stream of revenues derived from a copyrighted work, and creates little additional incentive for creation (Akerlof et al., 2003). Furthermore, broad property rights may impede follow-on innovation, restrict cumulative creativity, and limit the availability of works (Heald, 2014a; Menell, 2016; Nagaraj, 2017; Reimers, 2018; Watson, 2018).

Policymakers face tradeoffs designing a copyright system that balances incentives, deadweight loss, and potential holdup. The most prominent recent example of a copyright term extension – the controversial Sonny Bono Copyright Term Extension Act of 1998 – extended the term of US copyrights to the life of the author plus 70 years.\(^1\) Rights holders, including media firms and artists themselves, have lobbied for term extensions to protect the excludability of their works.\(^2\) At the same time, firms whose business model depend upon the public domain oppose efforts to extend or preserve existing copyrights.\(^3\) Although there is a burgeoning literature on the effects of internet piracy, there has to date been relatively little research on the effect of copyright expiry on the distribution of works through digital platforms. As the expiry of the first copyrights extended by the Sonny Bono act approaches, we lack an understanding of whether copyright’s effects on the availability of content differ between traditional distribution models and the digital platforms that are quickly becoming the dominant medium through which content is accessed.

This paper examines the effects of copyright on the availability of recorded music across multiple distribution channels, using as identifying variation an extension that took place during the lifetimes of many of the affected artists. In 2011 the UK enacted Directive 2011/77/EU,

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\(^1\)For works of corporate authorship, the term is the earliest of 120 years after creation or 95 years after publication.

\(^2\)Some of the copyrights extended by the Sonny Bono act are scheduled to lapse in 2019, and a recent statement by a spokesperson for the Recording Industry Association of America (RIAA) suggests there will not be lobbying efforts to further extend terms (Lee, 2018).

\(^3\)The plaintiffs in the Supreme Court case Eldred v. Ashcroft (2003), which challenged the constitutionality of the 1998 copyright term extension, were publishers of public-domain books.
which extended the copyright of sound recordings from 50 years to 70 years.\footnote{Copyrights on the composition lasted for 70 years before and after the change.} This became known as “Cliff’s Law” since Cliff Richards, not the owner of his songs’ recording rights, was a major advocate for the extension. We examine the effect of the expiry of sound recording copyright on the availability of affected tracks by artists popular in the 1960s. In addition, because artists can use live performances to promote album sales, we also ask whether artists performed more and/or different songs before and after the change in the copyright term, and whether copyright protected songs are more likely to be performed than songs of the same age for which recording copyrights have expired.

We find heterogeneous effects of copyright expiry on supply across different channels of distribution. Results suggest a substantial increase in the number of releases of tracks once recording copyright expires, relative to tracks of the same age and approximate vintage remaining under copyright protection. This finding is consistent with prior findings for books (Heald, 2014a; Reimers, 2018). In contrast to results on sound recordings and books, we find a negative effect of public domain status on live performances of songs (after controlling for year, age and artist fixed effects). This result is consistent with the idea that artists use performances to promote sales of recordings with higher royalty revenues. In contrast, we find no effect of copyright status on availability on the Spotify streaming platform. These results point towards the importance of differences in distribution models and licensing arrangements in determining how copyright status affects availability. This may imply that the ongoing transformation of the distribution of recorded music away from physical instantiations like CDs and towards digital streaming platforms (DSPs) like Spotify may curtail the negative effects of copyright term extensions on the availability of music.

This work extends the literature on the relationship between physical and digital distribution channels by incorporating the role of intellectual property rights. Prior work has assessed the extent to which digital content competes with physical versions in several different contexts (e.g., Mortimer et al. 2012; Kretschmer and Peukert 2017; Chen et al. 2018). However, this is to our knowledge the first paper that compares the impact of copyright status on content availability across three distinct distribution channels for music: physical, live, and streaming.
1 Prior Literature

Prior research on copyright in books has found an association between copyright status and the availability of creative works. Heald (2008a) frames the question of whether copyright expiry leads works to be under-exploited or over-exploited and finds that, in a sample of books published between 1913 and 1932, titles first published before 1923 (and therefore in the public domain) were available from a larger number of publishers and were more likely to be in print than books published in the subsequent decade (which are protected by copyright). Figures in Heald (2014a) display a discrete drop in availability on Amazon for titles first published in the 1920s, relative to titles published earlier. Reimers (2018) examines the contemporary prices, availability, and sales ranks on Amazon for 249 book titles originally published between 1910 and 1936, and finds that titles published before 1923 are available in 26.5 more editions than titles published after 1923. The effect is largest for paperback editions, and is only marginally significant for e-books (copyrighted titles are available with 2.9 fewer e-book editions, with a standard error of 1.5).

The expansion in supply as a result of copyright expiry has been found to be associated with price declines. Reimers (2018) finds that titles in the public domain have prices that are up to 35% lower on average. Examining an extension of copyright terms that unintentionally extended terms differentially for titles by dead authors but not for those by living authors, Li et al. (2018) show that prices of books decline as copyright expiry approaches, and increase substantially for titles affected by an increase in the term of copyright in 1814 relative to unaffected titles with similar characteristics. Pollock et al. (2010) find that the UK prices of recordings on CD whose recording copyrights had expired were significantly lower than the prices of recordings of approximately the same age still protected by copyright.\footnote{For example, using data on CDs from early 2009, Pollock et al. 2010 find that recordings originally released in 1954-1958 (and therefore with expired recording copyright) were approximately 30p less expensive on average than recordings originally released in 1960-1964 (with valid recording copyrights), though the median prices are the same. In a broader comparison of pre-1959 recordings with post-1959 recordings, both average and median price differences are larger, possibly due to declines in price as copyright expiry approaches (as seen in Li et al. 2018 and St Clair 2004).}

While prior work has quantified the effect of public domain status on availability in formats with physical distribution formats, less is known about how copyright affects access to products
distributed primarily through internet platforms. One exception to this is Reimers (2018), who finds that the negative effects of copyright on availability for e-books are comparable in percentage terms to the effects for hardcover and paperback, though only statistically significant at the 10% level (perhaps due to the relatively small number of e-books in Reimer's sample). Another is Heald (2014b), who finds that the availability of copyrighted songs from the 1920s on YouTube is actually somewhat higher than for slightly older songs in the public domain. This conflicting evidence suggests the need for further investigation of the effects of copyright status on availability on online platforms.

Other work has focused on the effects of copyright on reuse of copyrighted material. Heald (2008b) finds no effect of copyright vs. public domain status on the probability a popular song from the years 1913-32 is used in a movie released between 1968 and 2007, after controlling for time period effects. Heald (2014a) examines a sample of songs that appear in high-grossing movies listed on imdb.com and boxofficemojo.com and finds a statistically significant increase in the rate of inclusion in movies when songs are in the public domain. Heald (2014b) examines the availability on YouTube of 385 popular U.S. songs recorded between 1919 and 1926, and finds similar rates of availability for public domain and copyrighted songs (70% for songs in the public domain and 77% for songs protected by copyright). Nagaraj (2017) finds that digitized material from Baseball Digest protected by copyright is significantly less likely to be reused in Wikipedia pages than material from earlier issues not protected by copyright. This effect is more pronounced for the less popular players. Biasi and Moser (2018) study the US book republication program during World War II, which abrogated the copyrights of German authors, and find an increase in citations to scientific works made available through the program. Watson (2018) estimates the impact of broadened copyright policy on re-use in music, showing that strengthening the scope of copyright reduces the extent of downstream re-use along the intensive margin, without affecting the propensity of new works to re-use prior work, but also finds that this negatively impacted the creativity of re-use through less diversity in re-purposed works.

While several of the aforementioned works show that extending copyright terms increases prices and reduces availability of affected works, relatively little research has focused on the impact of extensions on incentives to create new work. MacGarvie and Moser (2015) study
payments to authors by publishers around the time of the copyright term extension of 1814 and find that payments increased substantially after the extension, particularly for superstar novelists like Sir Walter Scott. Giorcelli and Moser (2016) show that Italian states that adopted copyright laws as a result of annexation by Napoleon in 1801 saw a five-fold increase in the creation of historically significant operas and a ten-fold increase in the creation of operas still available in recordings today.

Ellison and Ellison (2011) examine drug companies’ advertising, product offerings, and pricing in the years prior to patent expiry for a panel of drugs whose patents expired between 1986 and 1992. They find that levels of some forms of advertising are lower than expected in intermediate-sized markets, consistent with theoretical predictions of investing less in advertising in such markets to deter entry. To the extent that live performances are used to promote sales of recordings, this paper contributes to our understanding of strategic responses by holders of intellectual property (IP) to the threat of entry as the expiry of IP rights approaches.

2 Music Copyright and “Cliff’s Law”

In UK copyright law, a piece of recorded music is protected by three separate copyrights. The first is the musical composition which is the musical score, or the pattern of notes, for the song. The rights to the musical composition are typically owned by the composer. The second aspect of copyright is the right to the lyrics to the song, which are treated as a literary work and typically owned by the lyricist. The third aspect is the sound recording which is the right to a specific fixation or recording of a song. Performers typically enter into contracts which assign the recording copyright to the record label in exchange for a royalty. The sound recording can be thought of as the specific way that the song is performed and recorded. There can be multiple different sound recordings copyrighted separately for the same song performed in different ways or by different artists. 

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6Directive 2011/77/EU, section (9). Non-featured performers (i.e. session musicians who play in the background), who typically received lump-sum payments rather than a royalty, became entitled to receive royalties 50 years after the recording when the directive came into being.

7“Cover versions” are a common example of sound recordings that are distinct from the original version’s recording copyright.
These aspects of copyright law affect various artists and songs in different ways. Artists who chiefly write and compose their own songs will receive revenues from both the musical composition and sound recording rights to their music while others may only receive copyright royalties from the sound recording.

In the UK, the copyright on the musical composition lasts for the author’s lifetime plus 70 years. However, artists who have others compose and write their music for them depend on sound recording rights for copyright income. Regardless of the nature of the benefits to the artist, a third party must pay for recording as well as composition rights when reissuing music. Labels wishing to reissue and distribute (e.g. on CD) a recording still on copyright must obtain a license to reproduce the recording from the label holding the copyright on the “master” recording. Streaming platforms like Spotify must also obtain licenses from the labels holding recording copyrights.

Copyright in sound recordings – or “records, perforated rolls, and other contrivances by means of which sound may be mechanically reproduced” – was established in the UK by the Copyright Act of 1911, which limited the term to fifty years from the making of the recording (Copyright Act, 16/12/1911, Article 19, section 1). In 2011 the UK enacted Directive 2011/77/EU, which extends the copyright of sound recordings from 50 years to 70 years. This extension is a step towards what advocates were pushing for but it is still a very short term compared to the United States, which protects the copyright of sound recordings for the artist’s life plus 70 years. Cliff’s Law extends protection on songs first published in November 1963 or later. Songs published before that date entered the public domain after 50 years.

The text of the directive states that the motivation for the copyright term extension is to benefit artists facing an “income gap” at the end of their lifetimes. However, according to The-
ofilos (2013), “[m]ost artists who were young and just starting their careers were systematically forced by powerful record companies into signing deals that paid only low royalty rates and effectively forced those artists to relinquish all other rights to their music.” Theofilos notes that Kretschmer (2011) finds that approximately 72% of the monetary benefits of term extension will go to record labels, with only 28% going to artists (and only 4% to artists facing an income gap).

In addition to providing artists with revenue from ticket sales, concert performances are also a form of advertising for record releases.\footnote{Though distribution of recorded music can also increase demand for live performances, artists have performed more concerts as record sales dropped during the digital music era (Cho et al., 2017).} If artists derive a significant amount of royalty revenue from sales of recordings, and concert performances are used to promote sales of these recordings, artists may prefer to perform copyright-protected songs and rather than public domain songs, as the former generate more recording sales for the artist. However, if they do not derive significant royalties, we may not see differences in the rate of performance of the two types of songs. Note that tracks recorded before and after 1963 have the same status with respect to the composition copyright, since the term on compositions was already 70 years before Directive 2011/77/EU. Thus any effect on set lists is not caused by differences in the right to perform.

### 3 Copyright Term and its Effects on the Supply of Music

We examine how copyright protection and its expiration affect the supply of music in terms of physical releases, availability on digital channels, and the live performance of songs in concert. These distribution channels represent the majority of current revenue streams for musicians as of 2017, with streaming representing 65% of recorded music revenues in the U.S., and physical formats accounting for 17% of revenues (Recording Industry Association of America, 2018). Because we lack data on synchronizations (3% of U.S. recorded music revenue) and terrestrial radio airplay, we do not examine the impact of copyright on these channels.\footnote{Synchronizations are licenses for attaching music to other forms of media (e.g. TV, film, advertisements, etc.).} We focus upon copyright’s role in markets for existing products and do not consider copyright’s incentives to
create new products, a question outside the scope of this paper.

3.1 How Might Copyright Expiration Affect the Supply of Music in Physical Channels?

Copyright grants creators a property right to exclude others from using, exploiting, or distributing a work for a set length of time. This right may be sold to an assignee (e.g., a record label), or licensed to a third party. Under copyright protection, record labels may exploit their recording copyrights for a monopoly profit for the duration of the copyright. Alternatively, the copyright-owning record label may instead license copyrights to entrants, or what we term “reissue” labels, with licensing fees set at a level such that the label is indifferent between options.

Upon expiration of recording copyrights, entrant labels may enter the market with licensing fees for the recording falling to zero (although entrants must still license other rights). Market entrants may distribute reproductions of the original recording, near-perfect substitutes for the original good, at low marginal cost. These reproductions may either be sold directly to the consumer by the entrant label or through retail outlets. Entry, and the associated increase in supply from physical recordings, should lead to lower average prices for consumers due to competition between close substitutes for a public domain recording. We observe only releases, not prices, and so do not estimate this latter price effect, which has been demonstrated elsewhere (Reimers, 2018; Pollock et al., 2010).

According to the above, we should expect to see more reissues of a recording once it enters the public domain. However, some have argued that extending copyright terms may actually increase availability because it creates incentives for rights holders to “invest in the restoration and public distribution of their works” (Eldred v. Ashcroft, 537 U.S. 186, 207 (2003), cited by Heald 2014a).12 Prior research has not found support for this idea (Buccafusco and Heald, 2013).

12One possible example that could be cited in support of this idea is the recent 50th anniversary reissue of the Beatles’ Sgt. Pepper’s Lonely Hearts Club Band, which included previously unreleased takes of all tracks as well as remixes and 33 additional recordings from the original recording sessions.
3.2 Copyright’s Role in Digital Channels

The digitization of information and the diffusion of network technologies disrupted rightsholders’ existing business models for physical channels. Piracy, enabled by peer-to-peer networks, weakens the excludability offered by copyright protection and hence threatens the potential profits of rightsholders.\textsuperscript{13} Early efforts by media firms in response to the threats and opportunities posed by digitization focused on the unbundling of album sales to a-la-carte digital song downloads (Danaher et al., 2014). With distribution through digital channels approaching zero marginal cost, the music industry has enjoyed more recent success bundling entire catalogs of music for a fixed monthly subscription through digital streaming platforms (DSPs).

Streaming music royalties represent a source of growth for an industry that has faced declining revenues since the advent of peer-to-peer file sharing. Music distribution through streaming is concentrated among just several large platforms, especially Spotify, Apple Music, Pandora, and YouTube (Steele, 2018). Since the value of a platform is greater to both buyers (listeners) and sellers (labels) when large numbers of buyers and sellers are present on the platform, a notable feature of DSPs is the availability of a near-complete catalog of music.\textsuperscript{14} Consumers pay a fixed monthly subscription for a bundle representing unlimited streaming of the entire catalog of music licensed to the DSP. Major record labels have entered into blanket licensing agreements with DSPs, such as Spotify, that have enabled this bundling strategy. Spotify has given record labels large advances on royalty payments and an 18% equity stake in the company in exchange for clearing the labels’ recording copyrights (Cohen et al., 2015).\textsuperscript{15} In addition to the incentives created by equity ownership, labels also have incentives to make content available on Spotify because “We have to be where the fans are.” (Scott Borchetta, chief executive of Big Machine Label Group, quoted by Nicolaou 2018).

The blanket licensing of large catalogs of rights may negate the effects of copyright expiration

\textsuperscript{13}Digitization has also enabled uninformed copyright infringement (Luo and Mortimer, 2016).

\textsuperscript{14}Nicolaou (2018) quotes Matt Pincus, chief executive of music publisher SONGS as saying that, “[t]he problem with audio streaming is you need to have 100 per cent of the content rights in the world for music, otherwise nobody buys your product.”

\textsuperscript{15}These advances can be recouped by Spotify against usage/streams, with royalty payments subtracted from the total advance. A 2011 contact between Spotify and Sony specified a $25 million advance for the first two years of the agreement, with a $17.5 million advance should Sony agree to a third year. (https://www.rollingstone.com/music/news/leaked-sony-spotify-contract-reveals-inner-workings-of-streaming-music-20150521 accessed 2/7/2018)
for any individual song. Rights holders bundle on-copyright recordings with public domain recordings, with no space for a potential entrant label to enter with public domain recordings once the DSP has negotiated a blanket license covering nearly all content owned by a label with the rights holding label. With this structure, potential entrants of public domain recordings could instead create their own DSP, but face high fixed costs along with stiff competition against incumbents in a market with network effects. This model stands in contrast to the distribution model described in the previous section, in which even small reissue labels can at relatively low cost distribute a compilation CD of public domain tracks.\textsuperscript{16}

However, the long life of copyrights provides challenges for the digitization of information from past generations.\textsuperscript{17} Aging recording and distribution contracts between record labels and artists may have ambiguous terms regarding the control of digital distribution rights, and thus the recordings and rights covered by aging deals may be omitted from blanket licensing agreements. While major labels presumably have little difficulty finding and interpreting their contracts with the most prominent artists, agreements made more than 50 years ago between small independent labels and more obscure artists may be harder to locate and interpret. Knowing that a recording is in the public domain in the UK because its date of original recording is prior to 1963 eliminates this uncertainty for Spotify, and may increase the likelihood of availability on the platform. If it is true that public domain status increases the likelihood of a track being available on Spotify due to reductions in uncertainty about the ownership of rights, we would expect this effect to be primarily observed among the relatively obscure artists.

3.3 Promotion and Live Performances

Can copyright status affect the selection of songs that an artist performs in concert? It is clear that the protection of a recording copyright does not limit an artist from performing a song publicly. However, live concert performances by artists act as complements for their recorded music (Mortimer et al., 2012). If concert performances promote sales and streaming of recorded

\footnote{16While there could in principle exist an analog to a reissue label in the digital setting, in which small DSPs offer primarily public-domain tracks, it is difficult to imagine why a listener would choose such a DSP over Spotify, which offers nearly all popular music for free or for a low monthly subscription.}

\footnote{17For example, the litigation regarding Google Book Search in Authors Guild, Inc. v. Google, Inc.}
music, artists may use concerts to promote on-copyright songs instead of public domain songs.

Artists choose a set of songs to perform in concert subject to their private rewards for performing each song. These rewards are a mixture of monetary and non-monetary rewards (i.e., personal taste of the artist). The monetary rewards to performing a given song are a function of (i) the potential royalties recouped from sales of the song, conditional on the performance promoting its sale and (ii) matching setlists to audiences tastes to ensure continued audience patronage. The expiration of a recording copyright could potentially affect both rewards. First, artists may receive no royalties for the sale of a song in the public domain, but may receive royalties for sales of on-copyright songs. Second, labels may promote and market on-copyright songs rather than public domain songs, which may predispose audiences to prefer songs that are still under copyright protection.

4 Data

In order to identify a set of songs affected by the copyright term extension, we collected all Top 20 UK Album charts from 1960 through the end of 1965 from Officialcharts.com. OfficialCharts provides a top 10 list of UK albums for the first 11 weeks of 1960, whereas for the remainder of 1960-1965 it provides weekly top 20 lists. These charts were then carefully hand-matched to the MusicBrainz database (musicbrainz.org) to link the artists in the OfficialCharts data to the unique artist identifiers in the MusicBrainz database. There are 140 artists from OfficialCharts that match to the MusicBrainz data, and 44 artists that did not appear in the database or had no relevant releases. Soundtrack albums appearing on OfficialCharts were excluded, including albums credited to “Original Soundtrack,” “Original Cast Recordings,” “Original Broadway Cast,” etc.

Using the sample of artists gathered from OfficialCharts, we then collect all tracks released by these artists in the MusicBrainz database. We collect: artist name, release name (e.g., the name of the album/EP), the country of release, the date of release, the track name (standardizing case and stripping accent marks), the release type (album/single/ep), whether the track is part of a re-release, and the year of original release. A track is considered a re-release if there is an exact match for the artist and song title with a prior date in the database. We retain bootleg
releases in some specifications and drop them in others.

The resulting dataset contains information on 13,363 tracks by 140 artists from 1960 up to and including the beginning of 2017. Year of original recording of these tracks runs from 1928 to 1975.\textsuperscript{18} We create a final dataset in which the unit of observation is at the track-year level, and the key dependent variable is the number of re-releases of that track \(i\) in year \(t\).

Note we are imputing the original release year from the first observed year of the recording in our dataset. In order to ensure an accurate observed original year of release, original release dates were taken from the earliest observed release date in MusicBrainz data as well as earliest release obtained from the Discogs music database (discogs.com). Artists in our MusicBrainz data were carefully hand-matched to artists appearing in the Discogs data, and song names were standardized using the aforementioned method to merge the two databases. According to the directive, the copyright term starts with “the fixation of the phonogram or its lawful publication” (section (3), Directive 2011/77/EU).

Information on the record label is available for 85\% of the recordings in our dataset. There are 753 unique record label names in the data, which makes it somewhat difficult to identify and track the ownership of recordings, particularly in cases in which the label is an imprint of or is owned by another major label (e.g., Island Records, a division of Universal). As a rough estimate, however, we define a “major label” recording in the following way. If the “label type” field on MusicBrainz classifies the release as production, original production, imprint, or holding, we classify the label as a major label. “Reissue Production” labels are the second most common label type in our database, with 25.2\% of releases overall and 61.7\% of public domain releases. The final two types are bootleg productions (0.5\% of observations overall, and 0\% of public domain) and “other” productions (1.2\% overall, 3.6\% of public domain tracks), the latter of which includes releases by distributors, publishers, and rights societies.

There are clear patterns of specialization by label and copyright status of tracks. The major labels comprise 60.8\% of the recordings of songs under copyright protection, but only 22.9\% of the songs in the public domain. The four of these with the largest shares in the on-copyright sample (Columbia, EMI, Parlophone and Virgin) issue 23.1\% of the on-copyright recordings, the releases from the 1920s and 1930s are by Louis Armstrong, Bing Crosby, Judy Garland, Glenn Miller and Frank Sinatra.

\textsuperscript{18}The releases from the 1920s and 1930s are by Louis Armstrong, Bing Crosby, Judy Garland, Glenn Miller and Frank Sinatra.
but the same four firms issue only 3.2% of the public-domain recordings in our sample. In the public domain sample, the four largest labels (Real Gone Jazz/Real Gone Music, Not Now Music, GO Entertain and 100 Hits) represent 33.4% of tracks in our dataset. The latter four firms release only 1.1% of copyright-protected tracks.

Most of the tracks in the dataset are in CD format. In our final analysis dataset, 74.33% are CDs, 18.52% are released on vinyl, 0.69% are released on digital media, and 6.46% are released in other formats such as DVD, cassette, etc.

Data are missing on the original release year of the track for 7,796 of 427,786 total observed track releases, and 5,528 of 369,224 observations when the sample is restricted to official releases. These observations are dropped from the sample. Country of release is missing for 94,489 of these observations, or 63,066 of 369,224 for official releases. Observations with missing data on country of release and year of release are dropped from the dataset.

Artist popularity data come from the British Magazine NME’s list of the top 500 albums of all time, as well as Recording Industry Association of American (RIAA) certifications data for any artists with more than 1 million certified units.

Table 1 lists summary statistics on the release regression dataset. Figure 1(a) displays the mean reissue count by age and type of release before the copyright term extension, with Figure 1(b) similarly demonstrating the discontinuity in availability upon lapse of the recording copyright. This shows an unambiguous increase in the number of re-releases of a track after age 50, when the recording copyright expires. The increase appears to come almost entirely from entry by non-major labels.

### 4.1 Streaming Data

Artists in our MusicBrainz data were hand matched to Spotify’s artist unique identifiers (URIs). Catalog information, including geographic availability, was then downloaded from Spotify’s API for all of the artists in our MusicBrainz dataset, and song titles were matched between the two datasets (see the Data Appendix for details). The resulting match allows us to identify which
tracks are available on Spotify, by year of recording and by location of the Spotify user.\footnote{Although it is probable that a small percentage of potential matches were missed in our matching procedure, it is unlikely that the missed matches are in any way related to copyright status, especially since we can observe a track’s availability in the US as a baseline estimate.} Our hypothesis is that pre-1963 UK availability may be different from US availability due to differences in public domain status.

In contrast to the release and set list datasets, which are panels, the Spotify data is a cross section reflecting availability on Spotify as of September 2017. The variation in copyright status comes from the fact that recordings made before 1963 are in the public domain in the UK, while recordings made after that date are under copyright protection in the UK, while none of the recordings in the dataset are in the public domain in the US. We do not observe tracks suddenly reaching the age-50 cutoff in this dataset, because it was collected after the 2011 term extension directive was enacted.

Summary statistics on Spotify availability are found in Table 2. Of the 16,352 tracks in the sample, 69.4% are available in the US, and 74.1% are available in the UK. Because there may be differences in demand for tracks pre- and post-1963, and because we may not have 100% coverage in our match between Spotify and MusicBrainz, we also compare availability in the UK market on Spotify for songs first recorded pre- and post-1963 with availability of the same song in the US market on Spotify. Of the 5,419 tracks in our sample recorded between 1928 and 1962, 72.6% are available in the US market on Spotify, and 79.5% are available in the UK. For the 10,933 tracks recorded between 1963 and 1975, 67.8% are available in the US and 71.5% are available in the UK. For the median artist in our sample, 83.33% of the artist’s tracks are available either in the US or in the UK.\footnote{The artists with availability rates below the 5th percentile of 21\% are The Big Ben Banjo Band, Harry Secombe, Paddy Roberts, The Dave Clark Five, The George Shearing Quintet, and Wayne Fontana and the Mindbenders.}

### 4.2 Set List Data

We obtain data on songs performed in concert from www.setlist.fm, a wiki service on which users post lists of songs performed in concert. We queried this site’s API for tracks of artists by MusicBrainz ID for all the artists in our reissue database. We then matched track names
listed in MusicBrainz to the performed tracks listed on setlist.fm. We created a crosswalk of standardized names by parsing out extraneous characters and standardizing case to match songs between the two datasets. We were able to collect and match set lists for 92 artists and 256,290 performances of 5,651 tracks.

Table 3 reports summary statistics on the set list data. We restrict this data to songs with original release years between 1930 and 1975 for our analysis. We create one observation per year that the song could have been performed since 1960 through 2016. We create a count variable containing the number of times the artist performed the song in that year. The typical song is performed in 15.8% of potential song-years. We also restrict the data to performances in years before the artist’s last active year, according to MusicBrainz. After these limitations we have 170,136 song performances across 81 artists and 2,630 tracks. We flag years where the artist was on tour according to our set list data so that we are able to run analysis conditioned on touring as well.

5 Estimation and Results

5.1 Empirical Model

In order to estimate the effect of copyright protection on the reissues of a song, we use the following model:

\[
Y_{itjA} = \alpha_0 + \alpha_1 PD_{itjA} + \sum_{t=1961}^{2017} \beta_t \text{year}_t + \sum_{A=2}^{89} \gamma_A \text{age}_A + \sum_{j=2}^{140} \delta_j \text{artist}_j + \varepsilon_{itjA}
\]

In which the dependent variable is the count of releases of track \( i \) by artist \( j \) in year \( t \) with track age \( A \). Because the dependent variable is a count, we use Poisson regression. \( PD_{itjA} \) is a binary variable equal to one if the song’s recording copyright has expired in year \( t \) and equal to zero if it is still under copyright protection in year \( t \).\(^{21}\) \( \text{year}_t \) is a dummy for release year \( t \) and

\(^{21}\)Following Pollock et al. (2010), we refer to these recordings as being in the “public domain,” although the composition is still protected by copyright.
\textit{age}_A \text{ captures the fixed effect of track age. } \textit{artist}_j \text{ is the artist fixed effect, representing the separate effect for each of the 140 artists in the data. In contrast to prior studies of copyright term extensions that performed before-after analyses, the 2013 term extension allows us to control for a full set of age and year effects.}

### 5.2 Results on re-releases: quantity

Table 4 displays the baseline results from regressions in which the dependent variable is the number of UK re-releases of track \(i\) in year \(t\). Standard errors are clustered by artist. To aid interpretation of Poisson point estimates, we calculate incidence rate ratios (IRR) and percent increase in releases from public domain status as \(e^{\alpha_{\text{PD}}} - 1\). Column (1) includes no controls, and the Poisson coefficient estimate on the PD dummy variable is 1.078 with a standard error of (0.158), which implies a highly statistically significant increase of 194\% in the number of re-releases after recording copyright expires. Controlling for the age of the track (number of years since original release) in column (2) increases the estimate to 2.299 (standard error of 0.250, percentage change of 896\%), and adding controls for year of reissue in column (3) reduces the estimate to 0.878 (standard error 0.247, percentage change of 141\%). As an alternative to controlling for age and year, the regression in column (4) controls for original release year and year of re-release, and results are very similar. Column (6) controls for year of re-release, age, and an artist fixed effect, and implies a statistically significant increase of 247\%.\(^{22}\) Columns (7) and (8) show that the effect appears to be comparable for labels designated as major vs. non-major labels, corresponding to a 216\% increase for non-majors, compared to majors with a 233\% increase.\(^{23}\)

Equivalent regressions were estimated using OLS and Logit, with very similar results, always implying a large and significant increase in the number of re-releases after the expiry of recording copyright. OLS results are found in column (9) of Table 4, and imply a 265\% increase when songs enter the public domain (relative to the mean annual number of UK releases of 0.055 displayed in Table 1).

\(^{22}\)It is not possible to control for age, year, original release year and artist fixed effects because the artist fixed effect is collinear with the original year effects.

\(^{23}\)This includes tracks for which no information on label type is available.
Table 5 contains several robustness checks on the main result. Columns (1) and (2) drop bootleg recordings, causing only a slight decrease in the coefficient and associated IRR for PD. To address potential concerns that the results are driven by a handful of extremely successful artists, in columns (3) and (4) we exclude the top 5 artists in the sample in terms of number of releases (The Kinks, the Beatles, Eddie Cochran, Gerry and the Pacemakers, and Four Pennies). Results are once again very similar to the equivalent columns in Table 4. Breaking down releases by format, we see in columns (5) and (6) that releases on digital format (e.g. MP3) do not experience the same significant increase at the end of recording copyright as CD releases, with the estimate for the former implying a positive and large but statistically insignificant change in releases.

There is a clear and consistent increase in the number of UK re-releases after the expiry of recording rights. Our controls for age ensure this is not something specific about tracks older than 50 years (for example, an increase in re-releases due to the 50th anniversary of an album). In columns (7) and (8) of Table 5 the dependent variable is the number of re-releases of track \(i\) in year \(t\) in the US market. Because recording copyrights did not expire at age 50 in the United States, we would not expect to see any significant effect of the PD variable on US re-releases, consistent with the observed estimates.

Table 6 examines how the effect varies with type of artist. Columns (1)-(3) includes a dummy for artists with more than 50% of their releases in the UK market, as well as an interaction with the PD dummy. Although the effect of being in the public domain appears smaller for UK artists (at the 5% level of significance) in column (2) when age and year controls are excluded, once these controls are added in column (3) the difference in the effect of copyright expiry for artists with a UK focus when compared to more global artists is significant only at the 10% level.

We also explore the effect of artist prominence, using two measures: (a) An artist’s appearance on the NME Top 500 Albums list and (b) having at least 1 million certified units according to RIAA. Column (4) includes the variable NME, equal to one if the artist appears in the

\[24\text{The Beatles’ Sgt. Pepper’s Lonely Heart’s Club Band: Anniversary Edition is a re-release to commemorate the recent 50th anniversary of this album (the opening line of which lends this paper its title).}\]

\[25\text{The NME list comes from http://www.nme.com/photos/the-500-greatest-albums-of-all-time-100-1-1426116 (accessed June 2017).}\]
NME Top 500 albums list, with column (5) interacting this measure with the public domain variable. Columns (6) adds controls for year and age. No significant difference in the effect of copyright is apparent for artists on the NME list. Column (7) includes the RIAA variable, equal to one if the artist has $\geq 1$ million certified units. Column (8) interacts this effect with the public domain measure, while column (9) adds year and age controls. Once again, the differential effect of artist popularity on the increase in reissues post-copyright is positive but not statistically significant.

### 5.3 Availability on Spotify

An important caveat to the above results is that the data do not include information on availability of tracks on digital platforms such as Spotify or iTunes, currently the dominant providers of recorded music. We investigate whether tracks in our MusicBrainz samples are available on Spotify, and if they are, whether there are differences in availability between US and UK geographic markets.

Figure 2(a) displays the pattern over original release years of the percentage of tracks available in both the US and UK (on the right y-axis), as well the percentage of tracks available in the UK but not the US and vice versa. While the percentage of tracks available in the US but not the UK is relatively constant at around 3% during this period, the percentage of tracks available in the UK but not the US falls from 11% prior to 1963 to 6% in 1963 and after. However, in contrast to our results on re-releases, there does not appear to be a discrete change in 1963, but rather a gradual decline from 1962 to 1970.

Figure 2(b) depicts the lack of a public domain effect on DSP availability with a difference-in-differences model, wherein the availability of songs in the UK market is compared to their availability in the U.S. geographic market. There does not appear to be any statistically significant difference in availability in the UK for songs released prior to 1963, and hence in the public domain in the UK, compared to availability in the U.S.

In order to quantify this effect with controls for year and artist effects, we estimate the following regression model:
\[ Y_{ijTk} = \alpha_0 + \alpha_1 Pre63_T + \alpha_2 D_k + \alpha_3 Pre63_T \times D_k + \sum_{j=2}^{140} \delta_{j,\text{artist}} + \varepsilon_{ijTk} \]

In which the dependent variable is equal to 1 if track i by artist j recorded in year T is available on Spotify in market k (either the UK or the US) in 2017. The dummy variable $Pre63_T$ equals 1 if the track was recorded before 1963 (and in some specifications is substituted for by recording year dummies). To control for overall differences in availability across markets, we include $D_k$, a dummy equal to 1 if the market is the UK. To capture the effects of being in the public domain, we include the interaction of these two variables, $Pre63_T \times D_k$ which is equal to 1 for tracks in the UK market released prior to 1963. Because we only observe these tracks in a single year, we no longer control separately for age and year effects, and instead include in some specifications dummies for year of original release. We control for artist fixed effects and cluster standard errors by artist.

We find that sound recordings that have entered the public domain are no more likely to be available on Spotify than recordings still protected by copyright. Table 7 compares the availability in the UK geographic market for songs originally released before 1963 with the availability of the same songs in the US geographic market. Our results suggest that sound recordings released before 1963, (and hence in the UK public domain), are approximately 3% more likely to be available for streaming in the UK than in the US (where the sound recording has not fallen into the public domain) but that this difference is statistically insignificant at the 5% level.\(^{26}\) This small and statistically insignificant difference is of limited economic significance when compared to our results covering copyright’s impact on physical releases.

A possible caveat to this finding is that we have restricted our analysis to artists that appeared on “top twenty” lists in the early sixties. It may be that tracks by artists that are more obscure than the ones in our sample benefit substantially by entering the public domain due to a reduction in uncertainty over licensing rights. This could imply a significant increase in availability for these artists. However, examining obscurity within our sample in columns

\(^{26}\)Recordings made before 1972 are not covered by federal copyright law, but rather by state law, which according to Brooks (2005a) implies that these recordings will enter the public domain in 2067.
(5) and (6) of Table 7, we do not find any impact of recording copyright expiry on the digital availability of the songs of more obscure artists.

It may also be possible that while availability is relatively unaffected by public domain status, actual consumption of tracks is affected. Since Spotify does not have to pay royalties for the recording copyright for public domain tracks, they may have an incentive to promote consumption of them over copyrighted tracks. If Spotify privileges tracks with expired recording copyrights on suggested playlists, we may see higher consumption of these tracks than would otherwise be observed. However, we currently do not have access to data on usage patterns for these tracks.

5.4 Set list results

Results on public performances of songs are found in Table 8. Data are restricted to years in which the artist was active, to tracks with an original release year in 1975 or earlier, and to performances in 1960 or later. The regression model is similar to the one described in Section 5.1, with the unit of observation being the number of performances of track $i$ by artist $j$ in year $t$ with track age $A$. The estimation method is Poisson regression, and fixed effects for year and age, and in some cases artist, are included. Standard errors are clustered by artist.

In column (1) of Table 8, the dependent variable is the total number of concert performances worldwide. We see a negative but insignificant effect of a track being in the public domain when age and year controls are excluded, but once we control for year and age in column (2), we see a Poisson estimate of -1.966, significant at the 1% level, which implies a reduction of 86.0% in the number of performances.\footnote{Results are similar when only controlling for age or for year effects individually.} Adding artist fixed effects in column (3) increases the estimate to -0.740, or a 52% reduction in the number of performances, still significant at the 1% level.\footnote{To ensure the results are not driven by the performance decisions of the most popular artists, we also tried excluding the top 5 artists measured in terms of the number of performances (The Beach Boys, Bob Dylan, Frank Sinatra, The Who, and The Rolling Stones). Estimation results are comparable to the equivalent regressions in columns (3).}

In the next columns, we distinguish between performances in the UK and performances in the US. This allows us to separate the effects of copyright status from the effects of other factors influencing the decision to perform a track in concert. If concert performances are
used to promote tracks to listeners, we would expect artists to avoid performing tracks that have entered the public domain in their UK concerts in favor of tracks still under copyright. At concerts in the US however, we would not expect to observe a difference in the number of performances by UK copyright status. When we focus on UK performances in column (4) we find an estimate of -1.640, significant at the 5% level with a standard error of (0.706), which implies an 81% reduction in the number of times a song is performed in concert after its recording copyright lapses to the public domain. When focusing on US performances in column (5), we see an effect of lower magnitude from UK copyright expiry, as our Poisson regression estimate is -0.604, significant at the 1% level with a standard error of (0.226), a 45% reduction in the number of US public performances. However, the US performance regressions were quite sensitive to the inclusion of outliers, particularly the Beach Boys, who perform much more frequently than other artists in the sample (with 21,018 track performances in the US in 2000 and later, in contrast to the sample median of 15 performances for artists with any performances during the same period) and Bob Dylan. After dropping the Beach Boys and Dylan from the sample, there is no significant effect of UK copyright status on US performances, but there continues to be a large and significant effect on UK performances.

If the expiry of copyright has an effect on the artist’s decision to tour, the results in columns (1)-(3) combine this effect with any potential effect on the decision of which songs to perform. Column (7) is conditioned on the artist touring in year t, and therefore isolates the choice of songs. Results are similar to those in columns (1)-(3). In column (7) we include performance year, age and artist controls and estimate a point estimate of -0.622, significant at the 1% level with a standard error of (0.240), which corresponds to a 46.3% reduction in the number of performances of tracks with original recordings in the public domain.

Figure 3(a) displays the average annual number of performances by age and year. In the pre-2014 time period there is a drop-off in performances after age 50, when the recording copyright expires. The discontinuity in performances around copyright expiry is also depicted in Figure 3. Once recording copyright is extended, we observe much higher rates of performance after age 50 in Figure 3(a). Consistent with Ellison and Ellison (2011), Figure 3(b) shows a run-up in performances prior to copyright expiry, which may reflect increased incentives to promote sales of tracks in the final years of copyright protection.
6 Conclusion

We use the extension of recording copyrights in the UK in 2013 to examine the effect of copyright status on reissues of recordings, availability on Spotify, and the number of live performances by artists popular in the 1960s. We obtain mixed results on the effect of recording copyright term on the supply of music: when a song enters the public domain, there are more reissues of that song, but recordings in the public domain are performed less often in concert. This suggests that, when artists are living at the time of a copyright term extension, the negative supply effects of the extension on re-releases may be counteracted by a positive supply response in live performances. This stands in contrast to prior research which has suggested that extending copyright does not encourage the restoration, maintenance and distribution of pre-existing works (Buccafusco and Heald, 2013). However, given that the artists popular in the 1960s are now in their seventies or older, this increase in the supply of performances is a temporary phenomenon.

The results about the supply of re-releases are consistent with prior findings about copyright and the availability of books (Heald, 2008a; Reimers, 2018). This may not be surprising, because CDs and books share similar distribution models, in which multiple publishers/labels compete to offer desirable editions/releases, and the expiry of copyright lowers barriers to entry for those wishing to offer a low-priced edition/release. The resulting entry lowers prices and increases availability for both books and music distributed on CD.

The negative welfare implications of copyright term extensions may be even more noteworthy because the technology used to consume recorded music when the albums of the early 1960s were first released is essentially obsolete today. Moreover, recent research on book sales has suggested that consumers tend to be wedded to their preferred distribution channel, whether physical or digital (Chen et al., 2018, p. 11) and that, if a track is not available in CD format, consumers may choose a different track available on CD rather than switching to Spotify. This suggests that, if old music is not reissued on CD due to extended copyrights, it may fade into

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29 In a random sample of 1,500 American recordings released between 1890 and 1964, Brooks (2005b) finds that 65% of historic recordings are not available to listeners because they are not reissued by rights holders and because “the physical barriers created by recording technologies change often and have rendered most such recordings accessible only through obsolescent technologies usually found only in special institutions.” (p. 14)
However, our results about digital distribution represent a departure from the prior research on copyright and book title availability. Consumers’ desire for near universal access and the high fixed costs of negotiating licenses with record labels have led to the concentration of digital distribution among a small number of large platforms, and the entry by “generic” producers which is observed in the CD market does not exist. Despite this, we observe no difference in availability on Spotify between public-domain recordings and those remaining under copyright, presumably due to the blanket licensing of tracks by labels to DSPs.

In the long run, the market’s shift away from CDs and towards online platforms like Spotify may thus work to moderate the negative welfare implications of copyright term extensions. It is possible that this null effect of copyright on availability is unique to Spotify, or to the sample of relatively well-known artists we have selected. Additional research is needed to determine whether results are similar for more obscure or older recordings such as those considered by Brooks (2005b). However, the available evidence as examined in this paper indicates that digital platforms may help to moderate the negative effects of copyright term extensions on the availability of music from this period.
References


**Tables and Figures**
Figure 1: Availability of Physical Releases

(a) Average Reissues of Tracks, by Label Type: 1968-2013

(b) Average Reissues 1968-2013: Discontinuity
Figure 2: Availability on Digital Streaming Platform (Spotify)

(a) Average availability of tracks on Spotify, by original release year and market (US or UK)

(b) Digital Streaming Availability: Differences-in-differences
Figure 3: Availability via Live Performances

(a) Average Live Performances: Before 2014 (50 year term) vs. After (70 year term)

(b) Average Performances Before 2014: Discontinuity
Table 1: Summary Statistics on Releases

<table>
<thead>
<tr>
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<th>mean</th>
<th>sd</th>
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<td>Original release year</td>
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<td>6.358</td>
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<td>1975.000</td>
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<td>UK artist</td>
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<td>1.000</td>
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<td>Year of release</td>
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<td>1960.000</td>
<td>2017.000</td>
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<td>Age of track</td>
<td>27.465</td>
<td>15.725</td>
<td>1.000</td>
<td>89.000</td>
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<td>0.933</td>
<td>0.000</td>
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<td>0.241</td>
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<td>UK major label releases</td>
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N. observations: 1,001,473

Table 2: Summary Statistics on Online Streaming

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<th>sd</th>
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<td>Original Release Year</td>
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<td>1975.000</td>
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<td>Available</td>
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<td>0.500</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>pre1963</td>
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<td>0.471</td>
<td>0.000</td>
<td>1.000</td>
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<tr>
<td>Obscure</td>
<td>4.009</td>
<td>1.401</td>
<td>1.300</td>
<td>10.000</td>
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N. observations: 32,704
Table 3: Summary Statistics on Set Lists

\[
\begin{array}{lcccc}
\text{Variable} & \text{mean} & \text{sd} & \text{min} & \text{max} \\
\hline
\text{Original year} & 1964.490 & 5.715 & 1930.000 & 1975.000 \\
\text{Performance year} & 1990.640 & 15.140 & 1960.000 & 2016.000 \\
\text{Year performance count} & 1.257 & 7.171 & 0.000 & 178.000 \\
\text{Touring (= 1 if on tour)} & 0.495 & 0.500 & 0.000 & 1.000 \\
\text{Public Domain} & 0.045 & 0.207 & 0.000 & 1.000 \\
\text{Age} & 26.150 & 15.445 & 0.000 & 86.000 \\
\hline
\end{array}
\]

N. observations: 135,514
Table 4: Baseline Results on Releases

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<td></td>
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<td>Artist Fixed Effects</td>
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N. obs: 1,001,473. Artist clustered standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

This table displays estimated coefficients from regressions in which the dependent variable is the number of UK releases of track \( i \) in year \( t \). Columns (1)-(8) are Poisson regressions, column (9) is Ordinary Least Squares (OLS). Robust standard errors clustered by artist. Column (1) includes no controls. Column (2) includes a dummy for the age of the track (number of years since original release). Column (3) controls for year of release and age. Column (4) controls for original year of release and year of release. Column (5) controls for year of release, age, and original release year. Column (6) and (7) controls for year of release, age, and an artist fixed effect. Column (7) uses a dependent variable Original Labels, with a count of UK reissues released by original production labels, while column (8) uses a dependent variable Non-original Labels counting only those releases not labeled as original.
Table 5: Robustness of Results on Releases

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</thead>
<tbody>
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<td>Dropping Bootlegs</td>
<td>0.861***</td>
<td>1.226***</td>
<td>0.924***</td>
<td>1.165***</td>
<td>1.240***</td>
<td>0.846</td>
<td>-0.330</td>
<td>-0.104</td>
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<td></td>
<td>(0.247)</td>
<td>(0.249)</td>
<td>(0.238)</td>
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<td>(0.236)</td>
<td>(0.247)</td>
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<td>(0.742)</td>
<td>(0.261)</td>
<td>(0.198)</td>
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<td>Placebo: US Releases</td>
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<tr>
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<tr>
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<td>966,515</td>
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<td>1,001,473</td>
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</tr>
</tbody>
</table>

Artist clustered standard errors in parentheses

* \( p < 0.10 \), ** \( p < 0.05 \), *** \( p < 0.01 \)

This table displays estimated coefficients from a Poisson regression. In columns (1)-(6) the dependent variable is the number of UK releases of track \( i \) in year \( t \). In columns (7) and (8), the dependent variable is the number of US releases of track \( i \) in year \( j \). All columns include year and age fixed effects. Columns (1) and (2) exclude bootleg recordings. Columns (3) and (4) exclude the top 5 artists in the sample in terms of total releases (The Kinks, the Beatles, Eddie Cochran, Gerry and the Pacemakers, and Four Pennies). Column (5) counts only UK releases packaged as physical CDs, while column (6) counts digital releases in the UK.
### Table 6: Artist Heterogeneity

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<td>1.133***</td>
<td>0.945***</td>
<td>1.126***</td>
<td>1.071***</td>
<td>0.924***</td>
<td>1.070***</td>
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<td></td>
<td>(0.247)</td>
<td>(0.165)</td>
<td>(0.258)</td>
<td>(0.127)</td>
<td>(0.111)</td>
<td>(0.194)</td>
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<td>UK Artist × PD</td>
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</tbody>
</table>

*Artist clustered standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

This table displays estimated coefficients from a Poisson regression in which the dependent variable is the number of UK releases of track \( i \) in year \( t \). Artist prominence is explored using two measures: (a) An artist’s appearance on the NME Top 500 Albums list (http://www.nme.com/photos/the-500-greatest-albums-of-all-time-100-1-1426116) and (b) having at least 1 million certified units according to RIAA (https://www.riaa.com/gold-platinum/?tab_active=awards_by_artist). Column (1) includes the variable UK artist, = 1 if the artist had over 50% of their releases in the UK. Column (2) interacts this measure with the Public Domain variable, while column (3) includes the interaction and controls for year and age. Column (4) introduces the variable NME500, equal to one if the artist appears in the NME Top 500 albums list, with column (5) interacting this measure with Public Domain, and column (6) fully controlling for year and age. Column (7) includes the RIAA variable, equal to one if the artist has ≥ 1 million certified units. Column (8) interacts this effect with the publicdomain measure, while column (9) controls for year and age.
Table 7: Availability on Spotify

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<th></th>
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<tr>
<td>Available in Market</td>
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</tr>
<tr>
<td>UK</td>
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<td>0.0474***</td>
<td>0.0367***</td>
<td>0.0367***</td>
<td>0.0474***</td>
<td>0.0367***</td>
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<tr>
<td></td>
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<td>(0.012)</td>
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<tr>
<td>pre-1963</td>
<td>0.0911***</td>
<td>0.0749**</td>
<td>0.0631**</td>
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<td>(0.032)</td>
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<td>pre1963×UK</td>
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<td>-0.0713***</td>
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<td>Yes</td>
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</tbody>
</table>

Artist clustered standard errors in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

This table displays coefficients from a linear probability model regression. In all specifications, the dependent variable is a binary variable that equals 1 if song $i$ is available in geographic market $m$ on the digital music streaming platform Spotify as of September 2017. The estimation sample is restricted to songs with an original release year before 1975. The independent variable UK equals 1 for observations in the UK geographic market. Pre-1963 equals 1 for songs with an original release year prior to 1963. The independent variable Obscure ranges from 1.3 to 10, with 10 measuring the most obscure (least popular) artists. Columns (1)-(4) and (6) include artist fixed effects. Columns (4) and (6) include original year of release fixed effects.
### Table 8: Set List Results

<table>
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<th></th>
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<th>(7)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>All Years</td>
<td>UK Performances</td>
<td>US Performances</td>
<td>UK, Dropping Top 2 Artists</td>
<td>US, Dropping Top 2 Artists</td>
<td>Touring Years</td>
<td></td>
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<tr>
<td>Public Domain (in UK)</td>
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<td>-1.966***</td>
<td>-0.740**</td>
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<td>-0.620**</td>
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<td>(0.706)</td>
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<td>(0.722)</td>
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</table>

*Artist clustered standard errors in parentheses

*p < 0.10, **p < 0.05, ***p < 0.01

This table displays estimated coefficients from a Poisson regression where the dependent variable is the number of times a track \( t \) was performed in year \( i \). Column (1) has no controls. Column (2) adds in fixed effects for age, and year, and column (3) controls for age, year and artist fixed effects. In column (4) the dependent variable counts only public performances within the United Kingdom. The dependent variable in column (5) counts only public performances within the United States. Column (6) omits the Beach Boys and Bob Dylan, with the dependent variable counting only performances within the UK, while column (7) omits the same artists but with a dependent variable counting public performances within the US. In column (8) our sample is restricted to years that the artist was on tour (i.e. the artist has at least one set list in our data during that year)
Data Appendix

OfficialCharts/Musicbrainz Data

Weekly top 20 album charts were collected from the Official Charts Company (OCC) between 1960 and 1965 to create a sample of 184 relevant artists. These artist and group names were then hand-matched to the unique database identifiers in the MusicBrainz database, with 143 artists successfully matched between the datasets.

A local Musicbrainz Virtual Machine was then used for generating the data-sets via SQL queries. All recordings and the releases of such recordings by the sample artists were collected – thus we pick up not only albums/singles released by the artists, but also compilation albums featuring various artists. For the purposes of our data-set, an artist was considered to be a “UK Artist” if more than 50% of their albums/singles were released within the UK vs elsewhere. Data was also collected on the country of release, the format of release (e.g., CD, SACD, Digital), and the release label.

A song’s “original release year” was measured by observing the first occurrence of a song’s standardized track name. Song titles were standardized by: a) converting titles to lowercase, b) stripping accent marks, and c) removing punctuation marks. To ensure a reliable year of release, we measured the original year of release as the first occurrence between both our MusicBrainz data and data from the Discogs music database (data.discogs.com). Artists in our MusicBrainz data were carefully hand-matched to the corresponding artists in the Discogs database, and song titles in the Discogs data were standardized via the aforementioned method. For any song in our MusicBrainz sample, we measured the original release year as the earliest release (from the same artist) in either the MusicBrainz or Discogs data.

Set List Data

Musician set list data was collected from setlist.fm using their REST API documented at https://api.setlist.fm/docs/1.0/index.html. Setlist.fm’s database tracks artists using the Mu-

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30 Official Charts tracked just the Top 10 albums during the first two months of 1960
31 https://musicbrainz.org/doc/MusicBrainz_Server/Setup
sicbrainz GID, the same unique identifier used by the MusicBrainz database. Of the artists in our sample, 99 appeared in the Setlist.FM data, as matched by MusicBrainz GID’s. All set lists were collected via the web API for these 99 artists, resulting in 16,847 total concert set lists encompassing 295,232 total performances. Tracks in this data were manually standardized by stripping extraneous characters and standardizing case. They were then matched to equivalently standardized track/artist combinations in the re-release data and matches were kept for analysis. This match resulted in 256,290 total performances across 92 artists and 16,605 concert set lists.

Spotify Data

Artists in our MusicBrainz data were hand matched to Spotify’s artist unique identifiers (URIs). Catalog information, including geographic availability, was then downloaded from Spotify’s API for all of the artists in our MusicBrainz dataset, see https://developer.spotify.com/web-api/get-track/ for fields obtained. Song titles in the Spotify dataset were matched to the MusicBrainz data by standardizing the Spotify track titles to match our standardized MusicBrainz titles: titles were converted to lowercase, punctuation was stripped, and the word “remaster” was stripped. Remaining unmatched titles between our Spotify and MusicBrainz data were then manually matched in order to properly match titles with alternative spellings.

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32Copyrights for remastered sound recording cover only those elements of the new fixation that differ from the original, see guidance from PPL in the UK, http://www.ppluk.com/Documents/Distribution/Guidance%20to%20PPL%20Members%20on%20Remasters.pdf