It was Fifty Years Ago Today:

Recording Copyright Term and the Supply of Music

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This paper examines the effect of the expiry of recording copyright on the supply of music – in the form of re-releases and concert performances – by artists popular in the UK in the 1960s. In a sample of 11,639 tracks by 135 artists first released between 1928 and 1975, we find that the expiry of recording copyright is associated with an approximately 286-327% 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. However, when a track's original recording copyright expires, it becomes less likely to be performed in concert, particularly by UK-focused artists, after controlling for age, year and artist fixed effects. These results suggest that copyright term extensions may lead to fewer re-releases but more live performances of popular music first recorded approximately fifty years ago.

Copyright law grants exclusive rights to exploit a creative work for a set period of time, and is thought to promote the creation of new works by incentivizing authors and artists. Ex post changes in the duration of copyrights after the work has been created, however, have been controversial. The most prominent recent example of a copyright term extension – the Sonny Bono Copyright Term Extension Act of 1998 – extended the term of US copyrights to the life of the author plus 70 years, or 95 years after publication. 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). There is also empirical research which suggests that such extensions restrict the availability of copyrighted material (Heald 2014, Reimers 2017).

This paper examines the effects of copyright on the availability of music, 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, which extended the copyright of sound recordings from 50 years to 70 years. This became known as "Cliff's Law" since Cliff Richards, not the owner of his songs' publishing rights, was a major advocate for the extension. We examine the effect of the expiry of sound recording copyright on reissues of recordings 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 extension, and whether copyrighted songs are more likely to be performed than songs of the same age for which recording copyrights have expired.

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 2014,

Reimers 2017). In contrast to results on sound recordings, we find a negative effect of public domain status on live performances of songs (after controlling for year, age and artist fixed effects). The effect is largest for UK-focused artists. This result is consistent with the idea that artists use performances to promote sales of recordings. Overall, we obtain mixed results on the effect of copyright term on supply. Our findings suggest that the UK copyright term extension may lead to fewer re-releases but more live performances of popular music first recorded approximately fifty years ago.

I.   Prior Literature

Prior research on copyright in books has found an association between copyright status and the availability of creative works. Heald (2008) 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 (2014) display a discrete drop in availability on Amazon for titles first published in the 1920s, relative to titles published earlier. Reimers (2017) examines the contemporary prices, availability, and sales ranks on Amazon for 249 book titles originally published between 1910 and 1936. She 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 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 (2017) 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, MacGarvie and Moser (2017) 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, Stepan and Valimaki (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. For example, using data on CDs from early 2009, they 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, MacGarvie and Moser 2017 and St. Clair 2004).

Other work has focused on the effects of copyright on reuse of copyrighted material. Heald (2008) 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 (2014) 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. Nagaraj (forthcoming) 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. Watson

(2017) 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 effect is greater in magnitude for more prominent musicians.

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 (2015) 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.

The literature on patent expiry and generic entry in pharmaceuticals has suggested that, when intellectual property rights are threatened by competition from generics (Ellison and Ellison 2011) or parallel trade (Kyle 2008), producers of patented drugs may engage in strategies to deter entry. 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.

II. Music Copyright and "Cliff's Law"

In the UK, copyright on a piece of recorded music is separated into three parts, each protected separately. 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 producer in exchange for a royalty.[1] 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.

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.

Publishing, or musical composition, is the main source of copyright income in the industry. The author gets paid whenever the song is played in public. In the UK, the copyright term is set at 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

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[1]   Directive 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.

rights when playing or reissuing music. This impact on the third parties potentially affects the availability of the music to the public.

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.[2] Songs published before that date enter the public domain after 50 years.[3]

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 Theofilos (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

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[2] EU member states were required to comply with the Directive by November 1, 2013 (Article 2, section 1, Directive 2011/77/EU).

[3] The directive notes that the "rights in the fixation of the performance should revert to the performer if a phonogram producer refrains from offering for sale in sufficient quantity… copies of a phonogram which, but for the term extension, would be in the public domain, or refrains from making such a phonogram available to the public" (section (8), Directive 2011/77/EU). As a result of this provision, some labels issued recordings for the first time around the time of the copyright term extension. For example, in 2012 Sony released in Europe a four-CD set of Bob Dylan's recordings titled "The 50th Anniversary Collection: The Copyright Extension Collection, Volume 1." A representative of Sony told Rolling Stone that the album was released to ensure copyright protection on songs recorded before 1963 that had not previously been released: "[t]he whole point of copyrighting this stuff is that we intend to do something with it at some point in the future" (Greene 2013).

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.[4] If artists derive a significant amount of royalty revenue from songs, they may shift towards performance of copyright-protected songs and away from public domain songs, as the former generate more revenue 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. We can also look at whether they perform in concert at all: artists with a significant share of songs with terms extended may become less likely to perform in concert if the increased royalty income is used as a substitute for revenues from touring. However, it seems most likely that concert revenue dominates royalties from recordings.

Consistent with the theory of Ellison and Ellison (2011), the threat of entry may also reduce incentives to promote tracks as copyright expiry approaches. If this effect is substantial, we can expect to see a relative decline in performances of tracks approaching age 50 under the old copyright regime, with this effect disappearing after "Cliff's Law" goes into effect.

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[4]   Though distribution of recorded music can also increase demand for live performances: Mortimer, Nosko and Sorensen (2012) find that digital file-sharing over the internet increases concert revenues for less well-known artists.

III.   Data

In order to identify a set of songs affected by the copyright term extension, we collected

all Top 10/20 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.[5] There are 135

artists from OfficialCharts that match to the MusicBrainz data, and 50 artists that did not appear

in the database. 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

(normalized to lowercase 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 11,639 tracks by 135 artists from 1960 up to

and including the beginning of 2017. Year of original recording of these tracks runs from 1928 to

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[5]   Other recent papers that use the MusicBrainz database include Mauskapf and Askin (2016) and
Chang (2016).

1975.[6] 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 the MB dataset. 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 3.6) 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, but the same four firms issue only 3.2% of the public-domain recordings in our

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[6]   The releases from the 1920s and 1930s are by Louis Armstrong, Bing Crosby, Judy Garland, Glenn Miller and Frank Sinatra.

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.[7]

Table 1A lists summary statistics on the release regression dataset. Figure 1 displays the mean reissue count by age and type of release, before and after the copyright term extension. This shows an unambiguous increase in the number of re-releases of a track after age 50, except for years after 2013, when the extended copyright term was in effect. The increase appears to come almost entirely from non-major labels. Interestingly,

i. Set List Data

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[7] The NME data were obtained from http://www.nme.com/photos/the-500-greatest-albums-of-all-time-100-1-1426116 (accessed May 2017), and RIAA data come from https://www.riaa.com/gold-platinum/?tab_active=awards_by_artist (accessed May 2017)

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 1B 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.

IV. **Estimation and Results**

i. **Empirical Model**

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

$$Y_{ijtA} = \alpha_0 + \alpha_1 PD_{ijtA} + \sum_{t=1961}^{2017} \beta_t year_t + \sum_{A=2}^{89} \gamma_A age_A + \sum_{j=2}^{135} \delta_j artist_j + \varepsilon_{ijtA}$$

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_{ijtA} 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.[8] $year_t$ is a dummy for release year t and age_A captures the fixed effect of track age. $artist_j$ is the artist fixed effect, representing the separate effect for each of the 135 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.

ii.   Results

Table 2 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. Column (1) includes no controls, and the incidence rate ratio (IRR) on the PD dummy variable is 3.024 with a standard error of (0.519), which implies a highly statistically significant increase of 202% 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 estimated IRR to 11.26 (standard error of 2.894., implied percentage change of 1026%), and adding controls for year of reissue in column (3) reduces the estimate to 2.799 (standard error 0.731, percentage change of 180%). 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

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[8]   Following Pollock, Stepan and Valimaki (2010), we refer to these recordings as being in the "public domain," although the composition is still protected by copyright.

327%.[9] Columns (7) and (8) show that the effect appears to be slightly greater for labels not designated as major labels, corresponding to a 295% increase, compared to majors with a 283% increase.[10]

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 2, and imply a 286% increase when songs enter the public domain (relative to the mean annual number of UK releases of 0.059 displayed in Table 1A).

Table 3 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 2. Breaking down releases by format, we see in columns (5) and (6) that releases on digital format do not experience the same significant increase at the end of recording copyright as CD releases, with the IRR 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

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[9]   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.

[10]   This includes tracks for which no information on label type is available.

than 50 years (for example, an increase in re-releases due to the 50th anniversary of an album).[11] Columns (7) and (8) of Table 3 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 estimates.

Table 4 examines how the effect varies with type of artist. Columns (1)-(3) includes a dummy for artists with more than 50% 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.[12] Column (4) includes the variable NME, equal to one if the artist appears in the 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 >=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

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[11]   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).

[12]   The NME list comes from http://www.nme.com/photos/the-500-greatest-albums-of-all-time-100-1-1426116 (accessed June 2017).

effect of artist popularity on the increase in reissues post-copyright is positive but not statistically significant.

iii. Set list results

Results on public performances of songs are found in Table 5. 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. In some columns we estimate effects separately for UK and non-UK artists. Our hypothesis is that performances by UK artists will be more affected by changes in copyright, because demand for their recordings is affected more than demand for recordings by artists with a more global focus.

We see a negative but insignificant effect of a track being in the public domain when age and year controls are excluded in Column (1), but once we control for year and age in Column (2), we see an IRR of 0.140 on the Public Domain dummy, significant at the 1% level, which implies a reduction of 86.0% in the number of performances.[13] Adding artist fixed effects in column (3) slightly changes the IRR to 0.477, still significant at the 1% level. When we include the UK artist dummy and the UK artist * Public Domain interaction and exclude artist fixed effects in Column (4) we find no significant difference in the effect of Public Domain status on performances for UK artists. However, after including artist fixed effects in Column (5), we estimate a significantly bigger negative effect of copyright on performances for UK artists. The regression in Column (5) implies that songs by UK artists with recording copyrights in the public domain are performed 77.3% less often than songs under copyright, whereas songs by non-UK artists in the public domain are played 47.1% less often.

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[13]   Results are similar when only controlling for age or for year effects individually.

If the expiry of copyright has an effect on the artist's decision to tour, the results in Columns (1)-(5) combine this effect with any potential effect on the decision of which songs to perform. Columns (6) - (7) are conditioned on the artist touring in year t, and therefore isolate the choice of songs. Results are similar to those in Columns (1)-(5). In column (6) we include performance year, age and artist controls and estimate an IRR of 0.538, significant at the 5% level, which corresponds to a 46.2% reduction in the number of performances of tracks in the public domain. When we estimate the effect separately for UK and non-UK artists by incorporating the interaction in Column (7), the effect for UK artists is larger, implying an 82% reduction in performances when the song is in the public domain compared to a 39.4% reduction for non-UK artists (though the difference in the effect of copyright expiry for UK artists implied by the interaction term is only significant at the 10% level).

Figure 2 displays the average annual number of performances by age and year. There is a drop-off after age 50 before 2014, and much higher rates of performance after age 50 once copyright terms are extended.

V.   Conclusion

In this paper, we use identifying variation from the extension of recording copyrights in the UK in 2013 to examine the effect of copyright status on reissues of recordings and 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 fewer live performances. 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. However, given that

artists popular in the 1960s are now in their seventies, this increase in the supply of performances will almost certainly be short-lived.

The results about the supply of re-releases are consistent with prior findings about copyright and the availability of books (Heald 2008, Reimers 2017). However, the welfare implications of the effect of copyright on the supply of recordings may be more significant because the technology used to consume recorded music when the albums of the early 1960s were first released is essentially obsolete today. If music is not reissued in new formats, it may not be heard by typical listeners.[14]

An important caveat to these results is that our data do not include information on availability of tracks on digital platforms such as Spotify or iTunes. More research is needed on whether the effect of copyright on availability extends to platforms. We intend to incorporate information on this in future revisions of this paper.

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[14] In a random sample of 1,500 American recordings released between 1890 and 1962, Brooks (2006) 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)

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Data Appendix

OfficialCharts/Musicbrainz Data:

Weekly top 20[15] album charts were collected from the Official Charts Company (OCC) between 1960 and 1965 to create a sample of 178 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[16] 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. 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. 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.

Set List Data

Musician set list data was collected from setlist.fm using their REST API documented at https://api.setlist.fm/docs/index.html. Setlist.fm's database tracks artists using the Musicbrainz GID, the same unique identifier used by the MusicBrainz database. 99 of the artists in our sample 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.

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15   Official Charts tracked just the Top 10 albums during the first two months of 1960

16   https://musicbrainz.org/doc/MusicBrainz_Server/Setup

Table 1A: Summary Statistics on Releases

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Original release year	1964.294	5.655	1928	1975
UK artist	0.114	0.318	0	1
Year of release	1991.416	15.298	1960	2017
Age of track	27.121	15.523	1	89
Global releases	0.247	0.991	0	87
UK releases	0.059	0.333	0	24
European releases	0.019	0.175	0	12
US releases	0.076	0.411	0	42
Public Domain	0.054	0.227	0	1
UK Major Labels Releases	0.031	0.216	0	13
UK Non-major Label Releases	0.028	0.218	0	24
UK CD Releases	0.048	0.299	0	24
UK Digital Releases	0.0005	0.022	0	2

N. observations: 846,170

Table 1B: Summary Statistics on Set Lists

	(1)	(2)	(3)	(4)
	Mean	SD	Min	Max
Original Year	1965	5.480	1930	1975
Performance Year	1988	14.62	1960	2016
Yearly Performance Count	1.494	7.796	0	178
Tour Dummy	0.589	0.492	0	1
Public Dummy	0.0169	0.129	0	1
Age	23.35	14.42	0	65

N. observations: 103,792

Table 2: Baseline Results on Releases

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
							Major Labels	Non-Major Labels	UK releases, OLS
				UK Releases					
Public Domain	3.024***	11.26***	2.799***	3.012***	3.543***	4.274***	3.832***	3.948***	0.169***
	(0.519)	(2.894)	(0.731)	(0.327)	(0.948)	(1.117)	(1.411)	(0.889)	(0.040)
Age	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Year	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Orig	No	No	No	Yes	Yes	No	No	No	No
Artist	No	No	No	No	No	Yes	Yes	Yes	Yes

N. obs: 846,170. Robust standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Note: This table displays incidence rate ratios (IRR) 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, and displays the un-transformed regression coefficients instead of IRR. 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, with Column (8) uses a dependent variable *Non-original Labels* counting only those releases not labeled as original.

Table 3: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Dropping Top 5 Artists		CD Releases	Digital Releases	Placebo: US releases	
	Dropping bootlegs							
Public Domain	2.651***	4.017***	2.964***	3.882***	4.219***	2.453	0.717	0.933
	(0.740)	(1.069)	(0.740)	(0.943)	(1.089)	(1.890)	(0.188)	(0.178)
Year Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Artist	No	Yes	No	Yes	Yes	Yes	No	Yes
N	838,640	838,640	812,972	812,972	846,170	846,170	846,170	846,170

Standard errors in parentheses * p<0.10, ** p<0.05, *** p<0.01

Note: This table displays incidence rate ratios 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 4: Artist Heterogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Public Domain	2.821***	3.173***	2.972***	3.204***	2.994***	2.942***	3.018***	2.424***	2.434***
	(0.740)	(0.563)	(0.806)	(0.456)	(0.389)	(0.587)	(0.509)	(0.431)	(0.528)
UK Artist	1.123	1.161	1.167						
	(0.275)	(0.278)	(0.285)						
UK *PD		0.450**	0.526*						
		(0.156)	(0.194)						
NME Top 500				2.495***	2.420***	2.475***			
				(0.465)	(0.522)	(0.559)			
NME*PD					1.251	1.119			
					(0.450)	(0.455)			
RIAA							1.248	1.165	1.173
							(0.237)	(0.240)	(0.244)
RIAA*PD								1.580	1.466
								(0.487)	(0.488)
Year Controls	No	No	Yes	No	No	Yes	No	No	Yes
Age Controls	No	No	Yes	No	No	Yes	No	No	Yes
N. obs.	846,170	846,170	846,170	846,170	846,170	846,170	846,170	846,170	846,170

Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01

Note: This table displays incidence rate ratios 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 publicdomain variable, while Column (3) includes the interaction and controls for year and age. Column (4) in introduces the variable NME, equal to one if the artist appears in the NME Top 500 albums list, with Column (5) interacting this measure with publicdomain, 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 5: Set List Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			All years			Touring Years	
Public Dummy	0.792	0.140***	0.477***	0.123***	0.529**	0.538**	0.606*
	(0.270)	(0.0423)	(0.119)	(0.0383)	(0.142)	(0.129)	(0.156)
UK Artist * Public				1.044	0.265***		0.286*
				(0.491)	(0.125)		(0.195)
UK Artist				0.418*			
				(0.193)			
Year Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Age Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Artist FE	No	No	Yes	No	Yes	Yes	Yes
Observations	103,792	103,792	103,792	103,792	103,792	66,461	66,461

Robust standard errors in parenthesis ***p<0.01, **p<0.05, *p<0.1

Note: This table displays incidence rate ratios 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) we control for an interaction of a UK artist flag with the public domain dummy, as well as the UK artist dummy. Column (5) adds artist fixed effects and includes the UK artist interaction. In Columns (6) - (7), 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)