Copyright term extension

Cost Benefit Analysis

Preston Davies, Ben Barton
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Glossary

Acronym	Stands for
DWL	Deadweight loss
GDP	Gross Domestic Product
GLAM	Galleries, Libraries, Archives and Museums
IFPI	International Federation of the Phonographic Industry
MBIE	Ministry of Business, Innovation and Employment
MED	Moral Entitlement Damage
NLNZC	National Library of New Zealand Catalogue
NZNB	New Zealand National Bibliography
OECD	Organisation for Economic Co-operation and Development
RMNZ	Recorded Music New Zealand
UGC	User Generated Content

Executive summary

We have estimated the economic welfare impact of a 20 year extension of the current copyright term for the books/publishing, music and screen/television sectors in New Zealand.

While there are existing studies to draw from, this has not been a straightforward exercise. In particular, gaps in the data meant that for some aspects of the analysis, we relied on theoretical predictions.

Moreover, the changes in technology and market structures for the creative industries in the last decade alone mean that predicting market futures is impossible. As a result, our 'point-in-time' estimates of impact may quickly become outdated.

We examine effects on Imports, Exports, and the cost to consumers of an extension of copyright term in respect of prices (i.e. DWL). We find a maximum net loss in welfare of $13.7 million in the books sector and $1.7 million for music sector (see Table 1). No data is available on which to base an estimate of the core impact on the screen/television sector. As the modelling method, assumptions and time horizon varies across sectors, it is inadvisable to sum the figures.

Table 1: Extension impact net present value over relevant periods ($ millions)

Sector	DWL	Exports	Imports	Net
Books	-3.7 to -12.2	1.4 to -2.2	-11.3 to 18.1	-13.7 to 3.8
Music	-1.5 to -9.1	-0.5 to -2.2	2.6 to 9.6	0.6 to -1.7

Source: Sapere analysis

To assist with interpretation of this table, imports have been converted so that the negative values represent increases in imports, as they are a cost from a New Zealand perspective. Equally the positive import values are decreases in imports, a benefit from New Zealand perspective. DWL is a cost to New Zealand, and positive export values are benefits from a New Zealand perspective.

Key drivers of the model are the percentage of sales that would be affected by the term change, the chosen elasticity and level of price change caused by the term extension. In sensitivity analysis we investigate the impact of changing these assumptions. While there are material effects from some of the parameter changes, they are best considered scenario analyses. In other words, they represent 'what if?' questions. Given the lack of data on which to base altered parameter values, we present such analysis for completeness only.

Our estimates are well below those derived in previous work of this nature used by the government, but broadly in line with critiques of that work. Table 2 summarises the key commonalities and differences of relevant analysis.

Table 2: Summary of key differences of New Zealand studies on copyright term extension

Key assumptions	Sapere	Ergas (2009)	Gunby and Watt
Sectors	Books and Music	Books and Music	Music
Elasticity of demand	Range (-0.5 to -3)	-1.77	Range (-1.2 to -3)

Growth in future sales	Population based	GDP based	GDP[1] shifted to population
Impacted quantity	RMNZ music consumption data	Library book stock patterns	RMNZ music consumption data
Price change	Theory and transfer from other studies	Australian data	Theory

Source: Sapere analysis

It was not possible to model all elements sufficiently; therefore, the estimated impacts are an understatement.

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[1] Unpublished version, expected update to be population based

1. Introduction

The Ministry of Business, Innovation and Employment, (MBIE) requires analysis to determine the welfare impact on New Zealand if a 20 year extension to the current copyright term were to be implemented (as proposed by the European Union in bilateral trade negotiations with New Zealand). In effect, the extension would lengthen the copyright protection available under the Copyright Act 1994 (the Act) from 50 years to 70 years, though the actual term may be longer.

Table 3: Duration of copyright for kinds of works analysis considers

Kind of work	Current copyright term	Proposed term
Literary works - novels, song lyrics, emails, blogs and computer programs **Dramatic works -** dance, mime and scenario or script for a film **Musical works -** sheet music and other musical compositions	50 years from the end of the calendar year in which the author dies	70 years from the end of the calendar year in which the author dies
Sound recordings - recorded music and podcasts **Films -** visual aspects of movies, TV shows, webseries and home videos	50 years from the end of the calendar year in which the work was made or was made available to the public (whichever is later)	70 years from the end of the calendar year in which the work was made or was made available to the public (whichever is later)
Communication works - the broadcast of TV programmes	50 years from the end of the calendar year in which the communication work was first communicated to the public	70 years from the end of the calendar year in which the communication work was first communicated to the public

Source: MBIE: Review of the Copyright Act 1994 – Issues paper

An updated analysis is required for a range of reasons

In 2009, the New Zealand Ministry of Economic Development (the forerunner of MBIE) commissioned an analysis of the costs and benefits to the country of a 20 year extension to the copyright term.[2] The context for the work was trade negotiations that would likely see a term extension included as part of any agreement.

The report found a term extension would result in a significant negative net impact. That is, in economic welfare terms New Zealand would be worse off from the term extension than from the status quo. Ultimately the term extension did not occur.

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[2] The report was undertaken by Concept Economics, but the principal author was Henry Ergas. Hence, the report came to be known as the Ergas Report.

The Act is currently being reviewed, in part due to the structural and technological upheaval creative industries have undergone in the last decade or so. In addition, free trade negotiations with the European Union (EU) are in train, and copyright term extension has been proposed. Finally, the analysis in the Ergas Report has come under scrutiny, where it was claimed that substantial errors occurred which led to a gross overestimation of the effects of term extension (Barker & Liebowitz, 2016).

Thus, MBIE is interested in a current assessment of the expected impact of a 20 year term extension.

The scope is limited to music, books and screen sectors and excludes exceptions unless directly relevant

Analysis is limited to the music, screen/television and books/publishing sectors. These sectors have differing copyright terms, the most relevant being the life of the author plus 50 years for books and musical compositions, and 50 years from the date of the first recording, or when the recording was first made available to public for music and screen recordings.

The impact of exceptions (permitted uses) to copyright protection, and the ability to enforce copyright protection are not directly covered. These are only addressed though any change in impact due to the proposed term extension.

The analysis assumes the extension would apply to all new works and be retrospectively applied to works currently under the shorter term, but not those works that have already fallen out of copyright and are in the public domain.

2. Approach

2.1 Method based on price and quantity arguments, with sector-specific time periods

For each sector we set out the steps involved in calculations, including the required assumptions and assess the reasonableness and impact of these assumptions. Due to differences in data availability, market structure and the relevant term for analysis, the approach is tailored to each sector. However, the same three core parameters for each sector are estimated:

- **Deadweight Loss (DWL)** - the reduction in consumer welfare caused by the term extension through the impact on the price and quantity of content consumed.
- **Exports** - the gains to domestic suppliers of creative content due to the extra 20 years of copyright protection.
- **Imports** – the cost to consumers due to the extra 20 years of protection granted for imported content.

The basic equation we estimate is:

$$Total\ welfare\ impact = \Delta Exports + \Delta Imports + DWL$$

The change in exports and imports is sensitive to the chosen elasticity of demand. For low elasticities there is small response (a small reduction in quantity demanded) to the price increase resulting in an increase in total revenue (i.e. the term extension will result in increased export revenues and increased spending on imports). For a high elasticity, the response results in a decrease in export and import revenues (i.e. the term extension results in less export revenue and less spending on imports). Therefore, changes in imports and exports can be benefits or costs from the New Zealand perspective. To clarify from a New Zealand perspective:

- Decreased spending on imports is a benefit.
- Increased spending on imports is a cost.
- Increased exports are a benefit.
- Decreased exports are a cost.

The DWL measures the costs of decreased consumption as a result of increased prices and is always a cost to New Zealand.

For recordings, we analyse a period of 70 years, and for books we used a period of 120 years, which is the average age of authors and life expectancy. The impacts are measured against the status-quo, a continuation of the current term limits.

To determine the impact of the three core parameters, we need information on the change in the price and quantity demanded due to the change in copyright term. The economic term for measuring changes in demand as a result of changes in price, is the price elasticity of demand (elasticity). This data is not readily available in a form where the impact of copyright term can be isolated. We

therefore rely largely on theory for the music sector and the work of Heald (2008) for the books sector.

In summary form:

- for the music sector we used industry data
- for the books sector we collated several data sources
- for the screen sector we found no useful data on the price and quantity of consumption so could not follow the same approach as books and music

2.2 While existing work can be drawn on, there are challenges requiring mitigation and assumptions

This work draws on previously completed studies including the Ergas Report the Barker and Liebowitz (2016) criticisms, and a recent update of music sector by Gunby and Watt (2019, v2 unpublished study) commissioned by Recorded Music New Zealand (RMNZ). Nevertheless, gaps and deficiencies exist, which we discuss below.

Data is lacking for the screen sector and patchy elsewhere

Across the board, data is scarce. In the face of this shortage, we are forced to make assumptions, transfer findings from other sectors and jurisdictions, rely on theory, and use ranges and scenarios rather than point estimates.

We note at least one prominent academic warns against transfer of findings between sectors due to the significant observable differences. Our approach is to be as transparent as possible with assumptions and method.

The screen sector is where the data shortage is most acute. Most of the data available counts revenue from international productions in New Zealand in the same way as international visitor spending. Therefore, the measure of exports represents the money spent on productions by foreign companies in New Zealand. We have not found data on the balance of payments for copyright held in New Zealand and internationally, meaning we cannot measure all relevant parameters for an estimate of screen sector impact and present the analysis of this sector in qualitative terms only.

Markets are unstable and factors other than copyright status affect the price consumers face

For all sectors there does not seem to be a position we can take with reasonable confidence, other than that the market is unstable, has been unstable and looks likely to continue in this manner.

The consumption of videos, music, and other new and old media has fundamentally changed. Creative content is exchanged globally at an unprecedented scale often without explicit payment. Consumers can access content on demand, anywhere. Copyright status is not a significant consumption constraint and for a growing set of consumers, the current price of access to content is no longer a barrier to consumption. Technology has, and continues to, transform the costs of creation and distribution, with new platforms emerging and practices shifting in dramatic ways that can be revolutionary for creatives, consumers and industry.

Economic theory suggests that the extension of the copyright term increases the cost to consumers. If copyright is modelled as the standard monopoly, then in the absence of the monopoly protection the competitive price prevails - the situation in which copyright is expired and anyone may reproduce the work freely. The trouble with this theory is that, in practice, the final price a consumer faces for a book, music or screen recording is determined by many other factors than copyright status. As with most modelling exercises we assume ceteris paribus.

The incentive to create is assumed negligible, as are derivative works impacts, piracy effects and changes to quantity of works available for consumption

Theory suggests that even small increases in revenues may be sufficient to stimulate the production of creative works. Especially for those on the margin, where a small increase in revenue can provide enough extra income to induce the creator to switch to pursuing creative endeavours fulltime. In practice, interviews suggest to us that an extra 20 years of revenue over 50 years into the future will have very little impact on production/output decisions. As revenues discounted at a rate of seven per cent quickly become irrelevant, years of revenue protection far into the future may have very little additional incentive value.

Theory also suggests term extension will restrict the creation of works as it will become more expensive or harder to create works based on existing works. We see no way to measure this possible impact.

If the change in term did stimulate the production of creative works, then theory suggests the consumer would benefit from having a greater quantity of content to consume. There is likely also a substitution effect as there is a time constraint on consumption. With an abundance of content currently available and the limited time consumers have available to enjoy entertainment products, the marginal benefit from another average creation would be very small.

While no longer the issue it once was to the music industry, the problem of piracy persists.[3] American publishers claim to be losing hundreds of millions a year and the United Kingdom Intellectual Property Office estimates that 17 per cent of eBooks are consumed illegally.

The extra 20 years protection creates additional time for pirates to profit from unauthorised copying and distribution of creative works. This is a cost on local producers from international pirates. The inverse is a benefit to local consumers of pirated international material. Domestically, piracy is considered an illegal transfer from producers to consumers. We do not see how to quantify and isolate any change in piracy due to the term extension, so it is not included in analysis.

We assume the rule of shorter term is applied in practice

The Berne convention states that:

- Works originating in one of the Contracting States must be given the same protection in each of the other Contracting States as the latter grants to the works of its own nationals

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[3] The shift to streaming services, subscription and advertising supported pricing has alleviated the piracy issue.

(principle of "national treatment"). Protection is independent of the existence of protection in the country of origin of the work (principle of "independence" of protection).

- If a Contracting State provides for a longer term of protection than the minimum prescribed by the Convention and the work ceases to be protected in the country of origin, protection may be denied once protection in the country of origin ceases (WIPO, 2020).

We interpret this to mean that countries currently offering a longer term can deny protection once copyright expires in New Zealand. Under the extension, they would have to offer the extended term of protection. So, the extension would increase the protection granted to New Zealand works by 20 years. In practice, it is likely not this simple. For reasons of tractability and missing data, we assume all trading partners utilise the rule. The true impact is therefore likely to be less than the estimates provided.

In sensitivity testing we gauge the impact of this assumption based on Statistics New Zealand books sector data.

2.3 Some impacts unquantifiable

We attempted to estimate the costs associated with orphan works, the availability of works and unapproved use but ultimately found these impacts incalculable.

2.3.1 Orphan works

Orphan works refers to works that:

- may be protected by copyright and rights holder is unable to be identified
- have an identified rights holder, but they cannot be contacted to request permission for use.

There are costs imposed on society through decreased access to content and constrained reuse. The precise size and scope of the orphan works problem is difficult to gauge. This is, in part, because works are deemed orphan only after an diligent (and often costly) search is conducted.

While the true impact of term extension is unknown, all available evidence suggests the orphan works problem will be exacerbated by a term extension.

2.3.2 Moral Entitlement Damage

Moral Entitlement Damage (MED) is proposed as a measure which captures the damage suffered by creatives from unapproved use once the period of protection expires.

Creatives expressed deep frustration and were astounded that they lose ownership of their output after a set period. This reaction is considered detrimental to sector's participants mental health, with the possibility of causing cultural identity damage as well. We propose this could be modelled as a form of property damage that occurs when a work is used in a manner that is against the creator's ethics.

As the current term for books and compositions lasts beyond the life of the creator, this potential damage would be felt by heirs to a copyright estate who may have different preferences to their relatives. It is also possible that for works of exceptional cultural value to New Zealanders, a wide section of the creative community and general public could be negatively impacted.

There is little anecdotal evidence of incidence, so we suspect MED would currently impact a very small number of works and term extension would decrease the incidence due to the extension of the rights period.

2.3.3 Availability of creative works

Most creative works lose commercial value well within current term limits and are therefore excluded when analysis uses consumption or sales data. The availability of these no longer commercially viable works is limited until copyright term expires. Meaning increased term length increases the period for which these works are of limited availability.

If there is no commercial value in a creative work long before copyright protection expires, then there is no value in increasing the copyright duration on those works.

Copyright extension is likely to have a negative impact on the availability of creative works, limiting consumption and reuse opportunities.

3. Books sector

The net impact is negligible

In the core calculation, we find a total impact over the 120 year period in the range of -$13.7 million to $3.8 million, depending on the elasticity used. We were not able to source an empirically estimated elasticity for books, so we present a range of assumed values for the elasticity. This total impact is immaterial considering the 120 year period of analysis.

Table 4 summarises results using the highest price increase due to term extension for both physical (56 per cent) and digital (46 per cent) products.

Table 4: Extension impact on books sector ($ millions)

Elasticity	DWL	Exports	Imports	Net impact
-0.5	-3.7	1.4	-11.3	-13.7
-0.9	-6.4	0.3	-3.0	-9.0
-1.1	-7.9	-0.1	0.3	-7.7
-3	-12.2	-2.2	18.1	3.8

Source: Sapere analysis

Note: to assist with interpretation of the summary table imports have been converted so that the negative values represent increases in imports, as they are a cost from a New Zealand perspective. The positive import values are decreases in imports, a benefit from New Zealand perspective. DWL is a cost to New Zealand, and positive export values are benefits from a New Zealand perspective.

3.1 Method

Our process began with a search for recent and relevant data and review of previous analyses. This provided a basis for establishing estimates on the price impact and quantity of works affected. Several other less material considerations are required, all of which are outlined in the following sections.

Estimating the core parameters requires working out what happens to the price and quantity of books once they are outside the current term of copyright protection. In the absence of local data, we rely on theory and other studies. Theory suggests price will fall when copyright term expires, as the royalty component of price no longer needs to be paid and competition on the supply of titles becomes possible.

We model the term extension as an increase in the price of books that are sold between 50 and 70 years after the death of the author because an extra 20 years of protection extends the limitation on competition of supply. The price increase causes a decrease in consumption given a chosen price elasticity of demand. In this sense, books are a normal good, in economic terms.

3.1.1 Data sources

As it was in 2009, data is still an issue today. The most relevant and reliable (Statistics New Zealand) data is aggregated to a level that includes newspapers and other printed matter. The publishing sector

has indicated that no other data exists or can be made available. We compiled and analysed data from:

- Statistics New Zealand – excluded as aggregated to a level that includes newspapers and magazines.
- UN Comtrade - also aggregated but with the granularity to exclude newspapers.
- PwC (2016) report – includes data from New Zealand-based publishers and retailers.
- WIPO (2019) reports Nielson BookScan NZ data showing a total of 6.2m million copies were sold for total sales revenue of $95.3 million (US) in 2018 with reported coverage of 70%.
- Statista - $48.6m (US) eBook revenues in 2018.

3.2 Assumptions

The publishing sector has undergone consolidation and a transition from in-person to online sales. It seems highly unlikely the publishing industry is stable and will continue to operate as it does now into the future. This makes it difficult to justify extrapolating recent historical experience of increasing digitisation, diversification and dramatic shifts in the costs of production and distribution into the future. Nevertheless, in lieu of perfect foresight we use current market dynamics to inform our forecasts.

3.2.1 Price impact is transferred from existing studies

Monopoly pricing theory suggests that the price of books no longer in copyright will fall to the perfectly competitive price.

As the market for books is not homogeneous there are many price points that depend on inter alia: the content, genre, author, platform and form. While using averages and aggregated data may distort the marginal impact, we are constrained by data availability so assume the copyright component of price and elasticity is the same for all works.

Many other factors can influence price other than the copyright royalty (e.g. competition between publishers, price of second-hand books, required retailer returns, synchronisation-induced popularity,[4] and derivative titles). For tractability reasons, we hold the influence of these factors constant.

The price of works reduces when the copyright term expires

For digital forms this is easily supported, an eBook can easily be transferred to the public domain and be made available for free. However, even in this relatively straight forward scenario, pricing follows no set rules. Project Gutenberg offers over 60,000 free eBooks while other platforms charge a range of prices for the same titles. Consumers generally prefer free so there must be other market dynamics in play. The quality aspect is likely significant, as are format/device switching barriers.

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[4] An example is the boost in sale due to a book being turned into a movie or television series.

The physical format of public domain publishing has several publishers vying for the consumer, differentiating their versions of the same book with covers, design, translation, introductory essays and explanatory notes. Copyright status is certainly not the only determinant of price differentials in public domain publishing.

We rely on the existing studies for the price impact

Heald (2008) is one of the few studies on the price impact of copyright protection in the books sector. Initially the analysis finds no difference in the average lowest list price per book for 125 copyrighted bestsellers and the 162 public domain bestsellers in print in 2006. By reducing the set to 20 books, a 81 per cent difference is revealed, by only including well-known major publishers the price difference becomes 41 per cent, and for only titles on Amazon.com, there is a 55 per cent higher average price for copyrighted books. To control for print quality and title popularity analysis of the Penguin Classics paperback collection was undertaken. Using an average price per page the author finds a 56 per cent price difference between copyright and public domain titles (Heald, 2008). For academics researching the economics of copyright, this is considered the most reliable figure available (Heald, 2014).

For eBooks there is a South Africa based study that found the average price for copyrighted eBooks was $12.53, while the average price for public domain eBooks was $6.76. The higher price charged for the copyrighted editions is deemed much too large to be caused simply by publishers having to pay royalties. An explanation offered for the large price discrepancy in the eBook market is intense competition in the public domain eBook market, which puts significant downward pressure on pricing (Heald, 2019).

Flynn, Giblin, & PetitJean (2019) provide some local context with their analysis of the library eLending market. They found libraries faced lower prices in the aggregate for public domain eBooks versus copyright titles. Loan limited titles were 54 per cent cheaper in NZ (in copyright verses Australia out of copyright), and time + loan limited titles were 10.5 percent cheaper. The authors also observed publishers widely maintaining high prices for individual eBooks even where they had entered the public domain and attracted competition (Flynn, Giblin, & PetitJean, 2019).

Market size makes local settings less relevant

The size of the New Zealand market means it is unlikely large international publishers will be making decision based on New Zealand copyright law. Price changes in New Zealand are likely the result of international forces. For example, a new version of a book coming out of copyright in America is more likely to be available in New Zealand than when it came out of copyright in New Zealand.

3.2.2 Quantity impact relies on insights from music sales data and chosen elasticity

Only the most popular books are relevant. We assume that to have sales beyond the life of the author plus 50 years the book must already be amongst the most successful titles of their era. It is well demonstrated that the vast majority of books will quickly slide out of print and into commercial irrelevance (Wunsch-Vincent, 2014). Commercial life is typically exhausted within five years of publication, with 90 per cent of titles unavailable in physical form within two years (Flynn, Giblin, & PetitJean, 2019).

Due to the lack of data we assume book sales follow a similar vintage pattern to the sales of music. Using an average of the last three years data we cumulatively sum[5] the average total consumption of works that are 51 to 70 years old.[6] This enables estimation of the percentage of books sold that are out of copyright. It is also used to incrementally progress the term extension impact, necessary as the effect of a term change will not all be felt at once (See A). The full impact affects about 2 per cent of works.

Growth in book sales is based on population growth in key markets

With so much content competing for the consumer's entertainment spend, we consider population to be the biggest driver of growth in the industry relevant for this analysis. Projected population growth rates from Statistics New Zealand (1.7 – 0.6%) and the Organisation for Economic Co-operation and Development (OECD) (0.51-0.33%) are used to forecast future sales (See A).

eBooks modelling uses music sector data

Due to lack of data, we model the quantity of sales impacted by assuming the quantity of works impacted will be similar to the music streaming market.[7] This assumption is tested in sensitivity analysis.

Decreased public domain access restricts the production of derivative works

It is not clear how this would impact the New Zealand market or how to measure it.

No extra primary creation incentive from 20 year extension

We see no evidence of an incentive to create more works due to an extension of the term. Literature is inconclusive. Stakeholders interviewed were more concerned with the breath of copyright protection and enforcement challenges. While term extension was favoured by authors and publishers', arguments invoked a moral right and often considered perpetuity the fair term length.

We find the evidence to support the Ergas (2009) conclusion - an extra 20 years of copyright protection will not boost output in a measurable or meaningful way.

- Stakeholder interviews suggests that creators do not think about a term extension when making output decisions.
- While theory exists that supports the incentive argument, empirical evidence is missing.
- Other factors may dominate constraint and incentivisation of output.
- The current term may already provide the maximum level of incentive to create.
- Any extension will have a negligible impact on the period examined as future revenues are quickly discounted to irrelevance.

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[5] As term extension impact doesn't happen all at once.
[6] This is the best data on sales patterns of aged content available.
[7] This is in the absence of any data on the sales pattern of books aged 100-120 years since publication.

3.2.3 Other assumptions

Analysis period considered relevant is 120 years

With life expectancy approaching 82 years in New Zealand, and the average age hovering at 37 years, at least 115 years are relevant, we round up to account for increasing life expectancy.

Retail margin of 50 per cent

PwC (2016) assumes a retail margin between 45-55 per cent (45% for book seller and 55% for publishers). This is claimed to have come from interviews with local retailers and is in line with expectations.

A range of price elasticities are chosen

Barrot, Becker, Clement and Papies (2015) provide an overview of existing studies on book market price elasticities, the range is dramatic, from zero to -9.8 with their study falling in the middle, -3.72 for hard cover and -4.31 for paperback books. The range is due to the studies having limited scope, such as only online or one publisher (Barrot, Becker, Clement, & Papies, 2015). Considering the large range of figures available, we present a range of elasticities to show how the chosen elasticity impacts analysis.

It is also likely that the price elasticity changes with the vintage of books, as demonstrated with a difference between hard cover and paperback books.

Discount rate

We use a discount rate of 7 per cent as in the Treasury 2015 guide with lower rates investigated in sensitivity analysis.

Several assumptions and processes were required to aggregate data

- Comtrade (2018) data is used to estimate the value imports and exports.
- Nielson BookScan data reported in WIPO (2019) is used to estimate average retail prices and local consumption for physical sales.
- Consumption is inflated to approximate historical levels of New Zealand works by adjusting market coverage of BookScan data.
- Statista (2018) data was used to estimate eBook sales.
- Heald (2019) is used to estimate eBook prices

3.3 Results

3.3.1 Physical

Using the 56 per cent price change we find a total impact of negative $10 million for physical products. The DWL increases with the chosen elasticity, whereas the exports and imports impact shifts direction when higher elasticity causes larger reductions in demand. With a high elasticity there is a large demand response and reduction in the spending on imports, resulting in a net positive impact of $7 million.

Table 5: Physical books summary ($ millions)

Elasticity	DWL	Exports	Imports	Net impact
-0.5	-2.7	1.0	-8.0	-9.8
-0.9	-4.2	0.1	-1.0	-5.1
-1.1	-4.8	-0.2	1.8	-3.2
-3	-7.9	-2.0	16.7	6.8

Source: Sapere analysis

For the elasticities under one (-0.5 and -0.9) both export (a benefit) and import (a cost) spending increases. The reduction in quantity demanded due to the price increase is small so the increase in price nets a boost in total revenue.

For elasticities over one (-1.1 and -3) both export and import spending decreases. The reduction in quantity is larger so the increase in price nets a decrease in total revenue.

Deadweight loss increases with elasticity as the price change causes larger reductions in demand, so DWL is always a cost from a New Zealand perspective.

3.3.2 eBooks

We assume the average public domain and copyright prices from Heald (2019) and assume the same ratios of imports and exports as the rest of the book market. The net impact is in the range of negative $4.5 to negative $3 million over the entire 120 year period depending on the elasticity.

Table 6: eBooks impact summary ($ millions)

Elasticity	DWL	Exports	Imports	Net impact
-0.5	-1.0	0.4	3.3	-3.9
-0.9	-2.2	0.2	2.0	-4.0
-1.1	-3.2	0.2	1.5	-4.5
-3	-4.3	-0.2	-1.4	-3.0

Source: Sapere analysis

3.4 Educational publishing is excluded from analysis

Educational books are deemed to be unaffected by the term change, as the material is likely to be either out of print or long past relevance. This is based on stakeholder interviews and our understanding of how the sector operates. The drivers for creation in this market are syllabus orientated and the time in which material is updated or superseded is well inside the copyright period currently granted. Stakeholders investing in this market indicated anything more than a ten-year horizon for income from an educational book would be highly unusual.

3.5 Audio books

No sales data available.

3.6 Sensitivity testing

We investigate the impact of different discount rates and add an elasticity of zero. We also investigate the impact of using music data to determine the quantity of works impacted, examine the impact of the application of the rule of the shorter term and investigate extreme changes to the price of eBooks.

3.6.1 Discounting and zero elasticity

Discounting enables benefits and costs that occur in different time periods to be compared. The appropriate rate is a contentious issue. For forecasts far into the future the discount rate can have significant impact on costs and benefits. At a rate of 7 per cent, one dollar is worth three cents in 50 years' time.

With zero elasticity there is no quantity reduction from the term extension induced price increase. This eliminates deadweight loss but increases the impact on imports and exports. We know elasticities can differ depending on position on the demand curve and the impact on purchasing power. The relatively small number of works impacted and the relative price comparison to new releases and clearance mean even the relatively high price increase assumed, due to term extension, might be absorbed by the market.

Table 7: Net impact under lower discount rates ($ millions)

Elasticity	7 per cent	5 per cent	3 per cent
0	-23.6	-36.6	-68.5
-0.5	**-13.7**	-21.2	-39.6
-0.9	**-9.0**	-14.0	-26.1
-1.1	**-7.7**	-11.9	-22.2
-3	**3.8**	5.9	11.1

Source: Sapere analysis (**Bold is base case**)

3.6.2 Quantity of works impacted is a key assumption

As we use proxies from the music sector to determine the impacted quantity, (see Appendices for details) we adjust the quantity of works impacted.

Table 8: Adjusting the impacted quantity of works ($ millions)

Elasticity	Half	Favoured music proxies	Double
0	-11.8	-23.6	-47.2
-0.5	-6.8	**-13.7**	-27.3
-0.9	-4.5	**-9.0**	-18.1

-1.1	-3.8	**-7.7**	-15.4
-3	1.9	**3.8**	7.5

Source: Sapere analysis (**Bold is base case**)

This quantity assumption has considerable impact. If books sector data on the vintage patterns of book sales becomes available, this assumption should be amended.

3.6.3 Adjusting for application of the rule of the shorter term is insignificant

Statistics New Zealand data shows on average 85 per cent of book exports are to the UK, EU, USA, and Australia. USA and Australia grant copyright according to their own law, rather than NZ's shorter term so there is likely little to no impact from term extension on this share of exports.

Table 9: Book export market share

Year	2016	2017	2018	2019	Average
Australia	62%	48%	45%	48%	51%
UK	12%	10%	9%	7%	10%
USA	15%	27%	24%	29%	24%
EU	0%	1%	1%	0%	1%
Total	90%	85%	78%	85%	85%

Source: Statistics New Zealand, Sapere analysis

If we remove the impact on Australian and American book exports, then the net impact is only on 25 per cent of export volumes.

Table 10: Rule of short term not applied to Australian and American book exports ($ millions)

Elasticity	DWL	Exports	Imports	Net impact
0	-	0.8	26.8	-26.0
-0.5	**3.7**	0.3	**11.3**	-14.7
-0.9	**6.4**	0.1	**3.0**	-9.3
-1.1	**7.9**	-0.0	**-0.3**	-7.6
-3	**12.2**	-0.6	**-18.1**	5.4

Source: Sapere analysis (**Bold is base case**)

3.6.4 Extreme price change for digital works

Here we consider a scenario where public domain eBooks, that are distributed for free by sites such as project Guttenburg, become more popular in the future. That is, the average price of public domain books becomes much lower than the assumed 46 per cent. 99.9 per cent change in price represents the scenario where all public domain books become free.

Table 11: Extreme price change for eBooks ($ millions)

Elasticity	99.9 per cent	99.2 per cent	92 per cent	84 per cent	46 per cent
0	-274.4	-36.5	-11.9	-9.8	-4.9
-0.5	-2,680.5	-271.1	-29.6	-15.7	**-3.9**
-0.9	-5,009.0	-500.6	-49.2	-23.7	**-4.0**
-1.1	-6,373.4	-635.9	-61.6	-29.2	**-4.5**
-3	-7,251.6	-721.6	-68.0	-31.1	**-3.0**

Source: Sapere analysis (**Bold is base case**)

With high elasticities and extreme changes to prices of digital books, term extension could have a significant impact.

4. Music sector

The total impact of the core calculation over the 70-year period ranges from -$1.7 million to $0.6 million. This is due to the balancing effect of decreased import payments offsetting the cost of lost exports and the deadweight loss. Again, these estimates are immaterial from an economic welfare perspective over the relevant time period.

Table 12: Total combined impact ($ millions)

Elasticity	DWL	Imports	Exports	Net impact
-1.2	-0.5	0.9	- 0.2	0.3
-1.4	-1.5	2.6	- 0.5	0.6
-1.6	-2.8	4.3	- 0.9	0.6
-1.8	-4.0	5.7	- 1.2	0.6
-2	-5.1	6.9	- 1.5	0.3
-3	-9.1	9.6	- 2.2	-1.7

Source: Sapere Analysis

Note: to assist with interpretation of the summary table imports have been converted so that the negative values represent increases in imports, as they are a cost from a New Zealand perspective. The positive import values are decreases in imports, a benefit from New Zealand perspective. DWL is a cost to New Zealand, and positive export values are benefits from a New Zealand perspective.

The non-streaming impact is marginal and is expected to reduce even further if analysis is adjusted for the expected continuing decline in sales of physical music recordings.

Table 13: Non-streaming impact ($ millions)

Elasticity	DWL	Imports	Exports	Net impact
-1.2	0.1	-0.2	-0.1	0.0
-1.4	0.2	-0.5	-0.2	0.0
-1.6	0.5	-0.9	-0.4	-0.1
-1.8	0.6	-1.2	-0.6	0.0
-2	0.8	-1.5	-0.8	0.0
-3	1.5	-2.6	-1.3	-0.2

Source: Sapere Analysis

There is no evidence to support the theoretical price change modelled for the streaming market. Currently, the streaming industry does not adjust prices based on the proportion of catalogue protected by copyright. There may be implications for bargaining with suppliers over access to content but how this would affect consumer prices is unclear. Therefore, the current impact may be better represented by just the non-streaming market.

Table 14: Streaming impact ($ millions)

Elasticity	DWL	Imports	Exports	Net impact
-1.2	0.4	-0.8	-0.1	0.2
-1.4	1.3	-2.1	-0.3	0.5
-1.6	2.3	-3.4	-0.5	0.6
-1.8	3.4	-4.5	-0.6	0.5
-2	4.3	-5.3	-0.7	0.3
-3	7.6	-7.0	-0.9	-1.6

Source: Sapere Analysis

4.1 Caveats

The current and past volatility of the music industry creates significant uncertainty for modelling that is required to look 70 years ahead.

With the sheer volume of content available (reports claim 30,000 songs uploaded to Spotify per day) the "antique catalogue" (over 50 years old) could quickly become irrelevant especially as demographics change and new content delivery mechanisms emerge.

Currently, the market for streaming music does not distinguish between music that is in-term or out-of-term. That is, royalties are paid on streams to the copyright owner of collecting agent even if the recording has entered the public domain. It is possible that transaction costs are currently too high to justify the distinction. As pressure mounts for streamers to provide returns to investors, the unrequired royalties are an area where streamers can reduce marginal costs. We assume there is a distinction, and therefore a difference in price, for in-term and out-of-term content.

Another difficulty encountered in the music sector is delineating between the recording and composition rights. While copyright in sound recordings lasts for 50 years, the music and lyrics is protected for the life of the author plus 50 years. Meaning that to reproduce and sell copies of public domain recordings, permission is needed from the holders of copyright of the music and lyrics.[8] We have largely ignored composition rights by assuming a change in price occurs once the sound recording copyright expires.

4.2 Method overview

Gunby and Watt (2019, v2 unpublished study) provide an approach we consider to be robust and relevant as it attempts to account for the dramatic industry shift towards streaming revenue. In essence, it updates what was done in the Ergas Report to account for technological and other market changes.

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[8] Analysis assumes composition rights are paid from recording incomes.

We broadly replicate this approach by estimating the quantities affected and the change in price. The increase in price reduces demand due to chosen elasticities. The stylised equation below expresses a simplified version of the change in price and quantity calculation.

$$Term\ Extension\ Impact = \left(Q_{status\ quo} \times P_{public\ domain}\right) - \left(Q_{term\ extension} \times P_{copyright}\right)$$

4.2.1 Data is provided by industry

RMNZ provided Sapere with a data set that contains measurements of wholesale revenues and a proxy for quantity (usage points) used to calculate the share of royalty payments. This data set is not perfect but, in our opinion, it provides a reasonable approximation of the market.

The calculation of a proxy for imports from a field in the data set is problematic as the payments often filter out through intermediaries. We have been in discussions with RMNZ but are yet to resolve this issue. Currently the proxy overstates the level of imports.

4.2.2 The arrival of streaming requires a market split

We spilt the market into streaming and non-streaming segments.

The streaming market involves consumers purchasing access to a catalogue of content for a monthly subscription fee or paying indirectly through advertising. The number of streams and the total wholesale revenue from streaming providers is used to calculate a proxy price per stream.

The non-streaming market groups together all other sources of revenue that are most often consumed after a one-off payment for the product. The total value and total quantity of all these revenue streams is used to determine an average price across all products in the category. This likely suppresses the marginal impact but considering we do not have details on price changes due to the extension, it is immaterial to analysis.

4.2.3 Monopoly market structure is chosen for modelling simplicity

A key assumption is the structure of the industry as it is used to calculate pricing behaviour, which is a key determinant of the term extension impact. Monopolies are characterised by a lack of economic competition to produce the good or service and a lack of viable substitute goods. This does not fit with our observations of the market but does approximate the scenario where each product has a copyright monopoly on itself; it cannot be copied and sold freely. Alternative scenarios like monopolistic competition involve more complex modelling, like Gunby and Watt (2019, v2 unpublished study) we favour a parsimonious approach and consider the monopoly structure to represent an upper bound. The true impact is likely smaller than our estimates.

We see evidence supporting a near perfectly competitive market. For example, current prices for streaming content appear to be producing no profit for retailers. Modelling as perfect competition is a simple exercise, as there would be no impact on prices and therefore a net zero impact.

4.3 Price impact is based on theory

Monopoly price change theory is plausible even though it lacks empirical evidence

Analysis follows economic theory that suggests an extension of the copyright term increases the cost to consumers. By modelling copyright as the standard monopoly, we assume in the absence of the monopoly protection the competitive price prevails - the situation in which copyright has expired and anyone may reproduce the work freely. The trouble with this theory is that, in practice, the final price a consumer faces for a music recording is determined by many other factors than copyright status. We assume ceteris paribus and use the monopoly pricing rule to calculate a proxy for the royalty component paid in both streaming and non-streaming markets (details in Appendix E). In sensitivity analysis we set fixed price changes levels to investigate the impact of this assumption.

RMNZ data is used to calculate wholesale prices

Wholesale prices are derived from RMNZ data on aggregate for the streaming and non-streaming markets. GST and a retail mark-up are applied to arrive at a retail price.

We use the wholesale price to derive the copyright component, as this fits with our understanding of how royalties are paid in the industry. Using the retail price to derive the copyright component causes the percentage change in price and quantity to increase, the impact is investigated in sensitivity testing.

Using RMNZ data we arrive on slightly different prices for consumption than imports and exports. This does not materially impact calculations as it is the change in price and quantity that drives the impact.

Table 15: Price summary

Market segment	Trade	Wholesale price	Retail price	Copyright component (E_d=-1.2)	Change in price
Non-streaming	Consumption	$1.9697	$3.4068	$0.33	11%
	Exports/imports	$2.3114	$3.9978	$0.39	11%
Streaming	Consumption	$0.010338	$0.023777	$0.003446	17%
	Exports/imports	$0.010570	$0.024311	$0.003523	17%

Source: RMNZ, Sapere analysis

The difference in price change percentages are due to the slight difference in formula for the different markets, (details in E).

A range of elasticities are investigated

Elasticity measures the percentage reaction of a dependent variable to a percentage change in an independent variable. For example, an elasticity of -2 means that a price increase by 1 per cent provokes a fall in quantity demanded of 2 per cent.

Table 16 demonstrates how the monopoly pricing rule is used to calculate different levels of royalty payment (the copyright component of price) and the associated change in price and quantity.

Table 16: Copyright component non-streaming (exports/imports)

Elasticity	Royalty	Retail price	% change P	% change Q

-1.2	$0.39	$3.61	11%	-13%
-1.4	$0.66	$3.34	20%	-28%
-1.6	$0.87	$3.13	28%	-44%
-1.8	$1.03	$2.97	35%	-62%
-2	$1.16	$2.84	41%	-81%
-3	$1.54	$2.46	63%	-188%

Source: RMNZ, Sapere analysis

The monopoly pricing formula does not support elasticities under -1. These are investigated in sensitivity analysis.

4.4 Quantities impacted are derived from data and chosen elasticities

Base quantities are derived from RMNZ data for consumption and imports and PwC (2018) estimates are used for exports.[9] This is on aggregate for the streaming and non-streaming markets. To derive the 2019 base quantity, we apply the percentage change between the 2017 and 2018 to the 2018 level. The 2019 streaming figures are inflated with population growth rates, for non-streaming we keep the levels constant as we expect they will continue to fall but keeping them constant is thought to produce an upper bound.

Table 17: Quantities summary

	Imports		Consumption		Exports	
year	Streaming	Non-streaming	Streaming	Non-streaming	Streaming	Non-streaming
2019	7,843,008,142	10,036,008	8,434,761,860	14,529,128	1,116,343,565	4,904,784
2020	7,976,339,280	10,036,008	8,578,152,812	14,529,128	1,121,754,446	4,904,784

Source: RMNZ, PwC, Sapere analysis

An industry funded report is used to calculate export levels

PwC (2018) estimate that in 2016 average royalties for exports of New Zealand copyrighted music were $22 million. This estimate is an average over the period 2012 to 2016, a period that includes the height of Lorde's international sales, so we suspect this figure overstates the current level. We investigate the impact of this potential overstatement in sensitivity testing.

We inflate the $22 million with inflation rates of 2.49 per cent (2017) and 2.61 per cent (2018) based on the New Zealand imputed deflator to arrive at a 2019 base.

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[9] These are not perfect data sources but are considered the best available.

The export market spilt is based on IFPI reported streaming rates

Gunby and Watt (2019, v2 unpublished study) report IFPI streaming and performance shares of OECD sound recording revenues at 51 per cent in 2017. We use this to split the export market between streaming and non-streaming. We use the RMNZ data derived import prices to establish proxies for export quantities.

Population growth is used to forecast demand growth

There has been an explosion in the quantity of creative content available. With an abundance of content offered at very reasonable price points all competing for the consumer's entertainment spend, we consider population growth to be the biggest driver of sales growth in the industry. We use projected population growth rates from Statistics New Zealand (1.7 - 0.6%) and the OECD (0.51 - 0.33%) to forecast future sales.

The quantity of works impacted is estimated from RMNZ usage data

We find a significant difference between the usage rates of vintage works for the streaming and non-streaming markets (see full details in Table 29). We therefore apply different rates of works impacted to the different market segments as shown below.

Table 18: Quantity of musical works consumed that are 51-70 years old

Year	Non-streaming		Streaming		Combined	
	Average	Cumulative	Average	Cumulative	Average	Cumulative
Full impact	0.0073%	2.1426%	0.0055%	1.2353%	0.0055%	1.2388%

Source: RMNZ data, Sapere analysis

4.5 Other assumptions

Analysis period is 70 years

We focus on recorded music rather than composition, so analyse a period of 70 years.

Discount rate used is 7 per cent

We use a discount rate of 7 per cent as in the Treasury 2015 guide with higher and lower rates investigated in sensitivity analysis.

No extra primary creation incentive from 20 year extension

We see no evidence of an incentive to create more works due to an extension of the term. The literature is inconclusive, and stakeholders were more concerned with the breadth of copyright protection and enforcement challenges.

Decreased public domain access restricts the production of derivative works

It is not clear how this would impact the New Zealand market or how to measure it.

4.6 Sensitivity analysis

We investigate the impact of lower discount rates and calculate impacts for elasticities of -0.5 and zero. We also look at the level of price change required for the impact to become significant and consider the possibility of the data on exports representing a temporary peak.

4.6.1 Lower discount rates and elasticities below -1

The appropriate discount rate is a contentious issue. For forecasts far into the future the discount rate can have significant impact on costs and benefits. Using lower discount rates increases the size of the impacts.

With zero elasticity there is no quantity reduction from the term extension induced price increase. This eliminates any deadweight loss but increases the impact on imports and exports. The small proportion of works impacted and the relative price comparison to new releases and clearance items mean price increase assumed due to term extension might be absorbed by the market.

To calculate the impact of elasticities under -1 we fix the price change at the level calculated from the -1.2 elasticity (11 and 17 per cent for non-streaming and streaming).

Table 19: Discount rate and elasticity impact on music sector analysis ($ millions)

Elasticity	7 per cent	5 per cent	3 per cent
0	-4.4	-6.5	-10.9
-0.5	-2.2	-3.3	-5.5
-1.2	**0.3**	0.4	0.7
-1.4	**0.6**	0.9	1.5
-1.6	**0.6**	0.9	1.5
-1.8	**0.6**	0.9	1.5
-2	**0.3**	0.5	0.9
-3	**-1.7**	-2.5	-4.1

Source: Sapere analysis (**Bold is base case**)

The elasticity is a key driver of the level of impact. With less demand response to price increases, the net impact is significantly increased.

4.6.2 Even under extreme price changes the total impact is small

We used monopoly pricing theory and elasticities to establish price changes. This may not represent reality so we change the monopoly assumption and set price changes to investigate by how much prices would have to increase to have a material impact.

Table 20: Impact with the level of price change set ($ millions)

Elasticity	10 per cent	20 per cent	30 per cent	40 per cent	50 per cent	99 per cent
0	-3.2	-6.4	-9.6	-12.8	-16.0	-31.6
-0.5	-1.6	-3.3	-5.1	-7.0	-9.0	-22.0
-1.2	0.3	-0.0	-1.0	-2.6	-4.6	-21.9
-1.4	0.8	0.7	-0.1	-1.7	-3.9	-21.9
-1.6	1.3	1.4	0.6	-1.0	-3.3	-21.9
-1.8	1.8	2.1	1.4	-0.2	-2.6	-21.9
-2	2.2	2.8	2.1	0.4	-2.1	-21.8
-3	4.2	5.4	4.6	2.6	-0.4	-21.8

Source: Sapere analysis

With 50 per cent of the final price attributed to copyright (representing a 100% price increase due to term extension) and zero elasticity (no demand reduction due to the price increase) the total impact over the 70 year period represents a cost of $1.1 million per year.[10]

The 99 per cent attribution of pricing to copyright status represents a scenario where works out of copyright are free to distribute, disseminate and use. At this level of price change we see the elasticity has far less impact. That is, the price change strictly dominates any demand response in the range of elasticities examined. The total impact over the 70 year period with no demand response (zero elasticity) represents a cost of around $2.2 million a year.

4.6.3 Adjusting the exports ratio is insignificant

It appears likely the PwC figures used to calculate the value of exports ($22 million) represent a time where New Zealand music exports were at a temporary peak due to the global success of Lorde. Recent Statistics New Zealand data is inconclusive as it does not pick up streaming income or digital sales but does indicate a significant decline since 2013. We investigate the impact of an export level a quarter of the PwC estimate and 50 per cent higher. Even if the initial figures are significantly overstated, the measured impact on exports is immaterial as the figures in Table 21 represent the full impact in present value terms over the entire 70 year forecast period.

Table 21: Adjusting export levels ($ millions)

Elasticity	25 per cent	50 per cent	100 per cent	125 per cent	150 per cent
0	0.3	0.5	1.1	1.3	1.6
-0.5	0.1	0.2	0.5	0.6	0.7
-1.2	-0.0	-0.1	**-0.2**	-0.2	-0.3

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[10] Using an equivalent annual annuity approach

-1.4	-0.1	-0.3	**-0.5**	-0.7	-0.8
-1.6	-0.2	-0.4	**-0.9**	-1.1	-1.3
-1.8	-0.3	-0.6	**-1.2**	-1.5	-1.8
-2	-0.4	-0.7	**-1.5**	-1.8	-2.2
-3	-0.6	-1.1	**-2.2**	-2.8	-3.3

Source: Sapere analysis (**Bold is base case**)

5. Screen sector

We were unable to measure the core impact of the 20 year term extension on the screen industry as data is either not suitable or unavailable. In our analysis we find little evidence to suggest a term extension would have a significant impact on the price consumers pay at theatres, for subscription services or through the advertising burden on free-to-air television and online platforms. Therefore, it is not possible to measure any impact on the key parameters; consumption, exports and imports, as done for the books and music sectors.

5.1 Core analysis was not possible

The challenges involved in the core analysis of the screen sector are briefly outlined below.

The available data does not capture appropriate payments

Most of the data available counts revenue from international productions in New Zealand in the same sense as international visitor spending. Therefore, the measure of exports represents the money spent on productions by foreign companies in New Zealand. We have not found any data on the balance of payments for copyright held in New Zealand and internationally. The closest is aggregated royalty and licensing payments from Comtrade but this captures much more than copyright revenue.

Screen content markets are unstable

Traditional viewing of television and movies is waning. Video content is increasingly being viewed on mobile phones and through social platforms. The popularity of streaming has resulted in studios consolidating and shifting into the streaming market. The streamers are making large investments in rights to content and funding creation as they compete for viewers' time and attention.

The Amazon and Apple streaming offerings are not necessarily based around the traditional screen content business model. These businesses don't need to make a profit if they can contribute to sales in other areas of the behemoth's business.

In New Zealand, the future is uncertain with the media industry under serious financial threat. TVNZ and RNZ could be combined into a new national broadcasting entity. MediaWorks TV arm is for sale. The paid services of Sky television are facing more competition for sports content and from products like VodafoneTV that also offer the time-shifting convenience of MySky (pause, record and rewind live TV).

Production is not incentivised by term extension

Local stakeholders tell us a term extension would not impact investment decisions. This is because very few screen productions have commercial value beyond the current term and investment decisions look at a much shorter horizon. Other factors like the New Zealand Screen Production Grant (NZSPG) are far more influential in incentivising creation.

Internationally the New Zealand market is insignificant, so any change to the term granted here would be irrelevant to production when looking at global markets.

Derivative works impact immeasurable

Theoretically the term extension would reduce the production of derivative works by reducing the pool of content available to creators. We have not found a way to quantify this potential impact.

The quantity of works impacted is unknown

To calculate an impact, we need to know something about the amount of screen content that is currently consumed or broadcast that is between 51 and 70 years old. There is evidence that most copyrighted works become commercially worthless within a decade or two and only a small minority generate revenues beyond 50 years. We could assume similar rates to music but due to the difference between the products this is likely a poor proxy. For example, the utility from multiple listens to music may increase as the listener can learn the words and sing along. This is unlikely for most movies as they are usually only watched once or twice.

Advances in digital technology quickly make old screen content commercially obsolete

Even movies that are only 20-30 years old, can lack the picture quality of modern productions. The definition, special effects, audio and rate of cultural decay can make even iconic movies a painful viewing experience within decades of their production. With the current speed of technological change and the sheer volume of content currently being produced we assume that in 50 years' time even less 51-70-year-old content will be consumed.

The sheer quantity of content available may change the marginal impact

In almost every area of screen content there is more content available than ever before. With more platforms and shows, consumers are overwhelmed for choice. Another show made available may detract from a viewer's utility as they suffer from options fatigue - spending more time attempting to choose what to watch than viewing the selected content.

Prices consumers face are not based on copyright status

The business models of screen content providers do not involve copyright term-based price changes to the consumer. We could use monopoly pricing theory to estimate changes, but this does not seem appropriate given the market dynamics – copyright ownership ("chain of title") is important for financing production but the relationship to consumer pricing appear absent.

Theatre or film exhibitions prices are not related to copyright term

Major theatres generally charge a set price to watch a movie, they also would not screen content that is outside of copyright term. Small, independent or community theatres that might screen some public domain content would generate negligible revenues and likely charge the same price.

Subscription services

These products are sold as access to a bundle of content making it very difficult to determine what consumers are paying for a single show. We would need detailed data that is highly proprietary.

Advertising supported free-to-air television

Advertising revenues are based on the ratings a show receives, the spend is a promise of the number of people who will see the advertisement. So, the expectations of how many people will view a show is the primary mechanism for determining what a network can pay for the right to air the show. A change in copyright status is highly unlikely to impact the demand to see a show or its value (expressed as the amount of people who tune in and watch).

However, copyright status likely impacts the cost side of the equation. Once a show enters the public domain a network could broadcast it freely if it already owns or is in possession of a copy. Therefore, its costs are reduced to the next best substitute for the timeslot, so revenue still depends on how many people are expected to view the show.

Most of the time very few people are expected to view shows more than 50 years old, there may be exceptions, such as anniversaries or other relevant times of the year.

Prices are not directly constraining consumption

Basic economic theory suggests that if the price of a screen product goes down then consumers would buy more of it. Screen products don't seem to follow this rule for several reasons.

- For subscription services the purchasing decision involved are more stepwise - to pay for a subscription service or not.
- The time available for consumption is constrained so once price reaches a certain point, time and other factors dominate the consumption decision.
- Advertising supported consumption offers a viable alternative to those that are price constrained, as does piracy[11] for the morally unconstrained.

Changing demographics are shifting consumption habits

Ratings show people under 50 are abandoning television. It is implausible that this same group that has moved away from television will be watching what we consider television in 50 years' time.

How the next generations consume and relate to older content will determine the value of vintage shows. The pace of technological and social change means current content could be considered outdated in a short time frame.

Multiple copyrights make permissions challenging

Screen content typically involves several works with copyright expiring at different times (e.g. script, score, and underlying material). The rights can belong to different creators, and each right may have one or more owner. Obtaining rights to reuse content could require releases from actors, writers, narrators, composers as well as the owner of the screen content, the sound recording, and possibly

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[11] The willingness of some people to watch poor quality bootlegged versions of new films is a personal trade-off of quality for immediacy and inability or unwillingness to pay for immediate access.

fees to directors and writers' guilds. These barriers are assumed unchanged if another 20 years of protection was granted, likely negating any impact due to copyright extension.

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Appendix A: Books sector data

BookScan data is used to establish an average price for physical sales

We use Nielson BookScan data reported in WIPO (2019) to estimate the local print market size and establish an average price across all sales platforms. We use this average price as a proxy for the copyright price. The actual average copyright price is expected to be higher as this method includes sales of works out-of-copyright that we assume would on average fetch a lower price.

Table 22: New Zealand book sales 2018 (print)

Sales ($ millions)	Volume (millions)	Average price
137.89	6.2	22.24

Source: (WIPO, 2019)

To determine quantities consumed in New Zealand we inflate Nieslon Bookscan NZ 2018 data as the figure is reported to represent approximately 70 per cent market coverage.

Comtrade data provides estimates of imports and exports

Comtrade commodity codes; 4901 - Printed books, brochures, leaflets and similar printed matter, whether or not in single sheets, and 4902 - Children's picture, drawing or colouring books are used. As this is in US dollars, the ofx.com historical exchange rate average of 1.446757 is used to convert to NZ dollars. Then add a retail margin of 45 per cent is added.

Comtrade data shows a 26 per cent reduction in exports and 11 reduction in imports since the 2015 data used in the PwC analysis so it is likely the ratio of local consumption is changing and not in a predictable way.

We adjust reported coverage to align with estimates of local consumption of local content

The reported 70 per cent coverage of the BookScan data causes imports to make up 101 per cent of consumption. PwC (2016) estimates indicate domestic sales represent 24 per cent of the local market for trade books. A recent survey with 1,906 respondents found around 20 per cent of all books read in New Zealand, were authored by New Zealanders up from 17 per cent in 2017 (Horizon Research Limited, 2018).

This highlights issues with combining data sources. By adjusting the market coverage of the BookScan data to 55 per cent, the ratio of domestic consumption shifts to 21 per cent and is harmonised with other data sources.

Table 23: Proxies for imports, exports and consumption 2018

Data coverage %	Consumption $	Exports $		Imports $		Ratio %
	Retail	Wholesale	Retail	Wholesale	Retail	%

| 70 | 196,965,632 | 19,359,297 | 136,921,900 | 28,070,981 | 198,536,755 | 101 |
| 55 | 250,683,531 | 19,359,297 | 136,921,900 | 28,070,981 | 198,536,755 | 79 |

Source: Sapere analysis

Price impact is transferred from other work

To establish an out-of-copyright price for physical works we use Heald (2008) evidence supporting a 56 per cent higher price for copyrighted books, it is considered the most reliable figure available for analysis (Heald, 2014).

Flynn, Giblin, & PetitJean (2019) provide some local context with their analysis of library elending market. They found public domain titles were 10.5 to 54 per cent cheaper in NZ (Flynn, Giblin, & PetitJean, 2019).

For digital works we use Heald (2019) for average price for the copyrighted eBooks $12.53, and $6.76 for public domain eBooks (Heald, 2019).

With the average author share of around 10-25 per cent of retail price depending on the product and contract it seems questionable the removal of this obligation would have such a larger impact. We use the Heald (2008) figure as an upper bound and sensitive test lower levels of price changes.

Table 24: Price change proxy ($NZ)

Impact	Average price	Price change	Public domain price
56 per cent	22.24	7.81	14.43
28 per cent	22.24	4.86	17.37
14 percent	22.24	2.73	19.51

Source: Sapere analysis

The impact on demand is based on a chosen elasticity and a linear demand curve.

Table 25: Reduction in demand due to price increase (physical books)

Elasticity / Price increase	56 per cent	28 per cent	14 percent
-0.5	-28%	-14%	-7%
-0.9	-50%	-25%	-13%
-1.1	-62%	-31%	-15%
-3	-168%	-84%	-42%

Source: Sapere analysis

Table 26: Reduction in demand due to price increase (digital books)

Elasticity / Price increase	46 per cent	23 per cent	12 percent
-0.5	-23%	-12%	-6%
-0.9	-41%	-21%	-10%
-1.1	-51%	-25%	-13%

| -3 | -138% | -69% | -35% |

Grow in sales is based on population growth

Table 27: Growth rate assumptions (%)

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029 -2047	2048 - 2067	2068 -2141
NZ	1.70	1.70	1.70	1.70	1.70	0.90	0.90	0.90	0.90	0.90	0.80	0.80	0.70	0.60
OECD	0.51	0.48	0.46	0.45	0.43	0.42	0.40	0.39	0.37	0.36	0.34	0.33	0.33	0.33

Music sector data provides a proxy for the quantity of works impacted

For a proxy of the proportion of works impacted by the extension, we use data from the music industry on the consumption of physical vintage works. This requires a strong assumption - the patterns of consumption in music provide a reasonable representation of the books. We take the position that it gives a basis to test the relative importance of the parameter on the model and we are aware of no other useful data.

Table 28: Quantity of works impacted books sector

	Physical		Digital	
Year	Average	Cumulative	Average	Cumulative
1	0.4178%	0.4178%	0.2539%	0.2539%
2	0.3278%	0.7456%	0.2067%	0.4606%
3	0.2562%	1.0018%	0.1357%	0.5964%
4	0.2245%	1.2263%	0.0945%	0.6908%
5	0.1688%	1.3951%	0.0775%	0.7683%
6	0.1519%	1.5470%	0.0754%	0.8438%
7	0.0993%	1.6463%	0.0638%	0.9076%
8	0.1398%	1.7862%	0.0685%	0.9761%
9	0.1087%	1.8949%	0.0616%	1.0376%
10	0.0988%	1.9937%	0.0700%	1.1076%
11	0.0526%	2.0463%	0.0491%	1.1567%
12	0.0349%	2.0812%	0.0289%	1.1856%

13	0.0221%	2.1034%	0.0155%	1.2011%
14	0.0059%	2.1093%	0.0043%	1.2054%
15	0.0078%	2.1171%	0.0057%	1.2111%
16	0.0045%	2.1215%	0.0050%	1.2161%
17	0.0049%	2.1264%	0.0047%	1.2208%
18	0.0005%	2.1269%	0.0032%	1.2240%
19	0.0083%	2.1353%	0.0059%	1.2299%
20	0.0073%	2.1426%	0.0055%	1.2353%

Source: RMNZ data, Sapere analysis

Appendix B: Ergas approach to books sector

In the absence of more recent work, we review the Ergas (2009) report as despite its well documented deficiencies it sets out to achieve the same task and estimates the same core parameters using the best data available. As our task is identical, we outline the Ergas approach, key assumptions and limitations to establish where we can update and improve on the work.

The core steps are:

- forecast future book sales
- calculate the percentage of sales that would be affected by the term change
- assume an elasticity to allow calculation of quantity changes due to price increase from extended copyright protection on imports, exports and deadweight loss.

Data sources

- Statistics New Zealand
- Australian Bureau of Statistics (ABS)
- National Library of New Zealand (NZNL)
- New Zealand Book Publishers Association.

Key assumptions

1. The 110-year period for analysis comes from an assumed 70 year life expectancy and 30 year average age (now 82 and 37).

2. Supply elasticities from term extension are zero, meaning there will be no incentive for increased creation/production.

3. New Zealand Book Publishers Association data was found to indicate 15 per cent of sales each year came from works published the previous year or earlier.

4. The National Library of New Zealand (NLNZ) book stock vintage pattern is used as a basis for calculating the percentage of works that are in-rights.

5. Australian Bureau of Statistics (ABS) data is used to help disaggregate Statistics New Zealand data. Book and Magazine accounted for 17.9 per cent of total Book and Paper Products wholesale sales of goods. Then assumed that 60 per cent of Book and Magazine sales relate to books, equivalent to 10.7 per cent of total Paper Products.

6. A representative ratio of wholesale book sales to nominal GDP is based on a weighted average of the period 2003 to 2008, to find:

7. 23 per cent of book sales relate to domestically produced and sold books;

8. 68 per cent of book sales relate to imported books; and

9. 8 per cent of book sales relate to exported books.

10. Copyright royalty mark-up uses Australian data and assumes that this is representative of the copyright royalty mark-up in New Zealand.

11. Australian vintages data is used to calculate the percentages of works that fall out of rights each year. These results were used to derive a weighted average mark-up, calculated as: royalties/ (sales with royalties minus royalties). The estimated mark-up is 9.3 per cent.

12. Real GDP growth estimates of 3 per cent annual growth are used to estimate future book sales. Also assumes that the ratio of book sales to GDP calculated is constant.

13. Only calculate the effects of copyright term extension on works produced before 2009, assumed to be constant at 15 per cent of book sales (85 per cent of book sales in each year from 2009 relate to books published in the same year).

14. Assume a price elasticity of demand for books of −1.77, based on a 2006 Norwegian study.

Criticisms and limitations

The Barker and Liebowitz (2016) response to the Ergas (2009) report mainly focused on the music side of calculations but the criticisms are relevant to the books sector analysis as the method was similar. Broadly three key areas were seen to make the analysis unsuitable:

- the incentive for new creative output was ignored or dismissed
- there were significant errors in calculations (overstates quantity impacted)
- the method lacked transparency.

The incentive to create was dismissed

By how much would an extra 20 year of protection stimulate output? With the term of protection granted already at 50 years (plus life for authors and composers) the Baker & Liebowitz (2016) argument "…copyright would have a negative impact on economic welfare if there were no impact on the creation of new works" (Barker & Liebowitz, 2016, p. 7), seems to divert attention away from the important consideration; the marginal impact of an extra 20 year copyright protection on top of the life plus 50 years already granted.

Errors and lack of transparency

- Library stocking patterns (holdings) data does not look like a good proxy for book sales.
- The lack of evidence provided for consumer prices of books decreasing by 9.3 per cent when copyright expires is significant as this is a key model input.
- The use of a mark-up over costs essentially assumes that there will be no profits generated in the book market without copyright and may overstate the size of the transfer due to copyright.
- The size of the impact found seem implausible.

Appendix C: Music sector data

Table 29: Quantity of works impacted music sector

Year	Non-streaming		Streaming		Combined	
	Average	Cumulative	Average	Cumulative	Average	Cumulative
1	0.4178%	0.4178%	0.2539%	0.2539%	0.2545%	0.2545%
2	0.3278%	0.7456%	0.2067%	0.4606%	0.2072%	0.4617%
3	0.2562%	1.0018%	0.1357%	0.5964%	0.1362%	0.5979%
4	0.2245%	1.2263%	0.0945%	0.6908%	0.0950%	0.6929%
5	0.1688%	1.3951%	0.0775%	0.7683%	0.0778%	0.7707%
6	0.1519%	1.5470%	0.0754%	0.8438%	0.0757%	0.8464%
7	0.0993%	1.6463%	0.0638%	0.9076%	0.0639%	0.9103%
8	0.1398%	1.7862%	0.0685%	0.9761%	0.0688%	0.9791%
9	0.1087%	1.8949%	0.0616%	1.0376%	0.0617%	1.0409%
10	0.0988%	1.9937%	0.0700%	1.1076%	0.0701%	1.1109%
11	0.0526%	2.0463%	0.0491%	1.1567%	0.0491%	1.1601%
12	0.0349%	2.0812%	0.0289%	1.1856%	0.0289%	1.1890%
13	0.0221%	2.1034%	0.0155%	1.2011%	0.0155%	1.2045%
14	0.0059%	2.1093%	0.0043%	1.2054%	0.0043%	1.2088%
15	0.0078%	2.1171%	0.0057%	1.2111%	0.0057%	1.2145%
16	0.0045%	2.1215%	0.0050%	1.2161%	0.0050%	1.2194%
17	0.0049%	2.1264%	0.0047%	1.2208%	0.0047%	1.2241%
18	0.0005%	2.1269%	0.0032%	1.2240%	0.0032%	1.2274%
19	0.0083%	2.1353%	0.0059%	1.2299%	0.0059%	1.2333%
20	0.0073%	2.1426%	0.0055%	1.2353%	0.0055%	1.2388%

Source: RMNZ data, Sapere analysis

Table 30: Data on rates of usage

Sector	Status	2012	2013	2014	2015	2016	2017	2018
Streaming	In term	99.54%	99.45%	99.23%	99.23%	98.75%	98.44%	98.20%
	Null	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.05%
	Data error	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Out of term	0.46%	0.55%	0.77%	0.77%	1.24%	1.54%	1.75%
Non streaming	In term	95.84%	95.10%	94.48%	93.82%	93.27%	92.27%	92.09%

Null	3.17%	3.86%	4.42%	4.66%	4.61%	5.14%	5.27%
Data error	0.09%	0.04%	0.05%	0.02%	0.01%	0.00%	0.00%
Out of term	0.90%	1.00%	1.05%	1.50%	2.12%	2.59%	2.63%

Source: RMNZ data, Sapere analysis

Table 31: Price and elasticity impact consumption non-streaming market

Elasticity	Pc	Pr	% change P	% change Q
- 1.2	$0.33	$3.08	11%	-13%
- 1.4	$0.56	$2.84	20%	-28%
- 1.6	$0.74	$2.67	28%	-44%
- 1.8	$0.88	$2.53	35%	-62%
- 2.0	$0.98	$2.42	41%	-81%
- 3.0	$1.31	$2.09	63%	-188%

Source: RMNZ data, Sapere analysis

Table 32: Price and elasticity impact consumption streaming market

Elasticity	Pc	Pr	% change P	% change Q
- 1.2	$0.00345	$0.02033	17%	-20%
- 1.4	$0.00591	$0.01787	33%	-46%
- 1.6	$0.00775	$0.01602	48%	-77%
- 1.8	$0.00919	$0.01459	63%	-113%
- 2.0	$0.01034	$0.01344	77%	-154%
- 3.0	$0.01378	$0.00999	138%	-414%

Source: RMNZ data, Sapere analysis

Table 33: Ratio of domestic music consumption

	2016	2017	2018
Total imports	$ 85,609,696	$ 96,056,007	$ 103,339,072
Total consumption $	$ 89,935,290	$ 99,958,373	$ 108,007,787
% NZ music	4.81%	3.90%	4.32%

Source: RMNZ data, Sapere analysis

Table 34: Base prices, quantities and revenues

Area	Sector	2016	2017	2018	2019 (Forecast)

Imports	Non-streaming	$43,604,153	$37,913,615	$32,675,065	$23,196,960
	Streaming	$42,005,543	$58,142,393	$70,664,006	$82,898,912
Consumption	Non-Streaming	$45,849,649	$39,596,483	$34,072,113	$28,618,452
	Streaming	$44,085,641	$60,361,890	$73,935,674	$87,196,695
Usage Imports	Non-Streaming	16,312,523	15,733,339	14,136,647	10,036,008
	Streaming	3,347,786,632	5,128,852,603	6,685,472,282	7,843,008,142
Usage consumption	Non-Streaming	19,111,731	18,559,762	17,297,864	14,529,128
	Streaming	3,524,031,295	5,447,528,620	7,151,988,973	8,434,761,860
Average price imports	Non-Streaming	$2.67305	$2.40976	$2.31137	$2.31137
	Streaming	$0.01255	$0.01134	$0.01057	$0.01057
Average price consumption	Non-Streaming	$2.39903	$2.13346	$1.96973	$1.96973
	Streaming	$0.01251	$0.01108	$0.01034	$0.01034

Source: RMNZ data, Sapere analysis

Table 35: Quantity growth

	Imports		Consumption		Exports	
year	Streaming	Non-streaming	Streaming	Non-Streaming	Streaming	Non-streaming
2019	7,843,008,142	10,036,008	8,434,761,860	14,529,128	1,116,343,565	4,904,784
2020	7,976,339,280	10,036,008	8,578,152,812	14,529,128	1,121,754,446	4,904,784
2021	8,111,937,048	10,036,008	8,723,981,410	14,529,128	1,126,960,284	4,904,784
...	...	...	...	...	...	...
2037	9,343,437,329	10,036,008	10,048,398,191	14,529,128	1,193,850,087	4,904,784
2038	9,418,184,827	10,036,008	10,128,785,377	14,529,128	1,197,746,921	4,904,784
2039	9,493,530,306	10,036,008	10,209,815,660	14,529,128	1,201,656,474	4,904,784

Source: RMNZ data, Sapere analysis

Appendix D: Overview of Gunby and Watt approach to music sector

The authors first assess the method and relevance of the Ergas (2009) report. The approach is relatively straight forward treating music as a homogenous product. The core steps are:

- forecast future music sales using a music revenue to GDP ratio and treasury forecast of GDP growth
- calculate the percentage of sales that would be affected by the term change
- estimate a royalty mark-up to derive the impact on the price of copyright extension
- assume an elasticity to allow the deadweight loss calculation due to price increase from extended copyright protection and the impact on imports and exports.

The Barker and Liebowitz (2016) criticisms are summarised as challenges to the assumptions and parameters rather than the basis of the model. This is given little attention as it has become less relevant due to the evolution of the music market - particularly the decline in physical sales and the growth in streaming. The changed market for music products is determined to make the Ergas (2009) approach inappropriate.

Splitting the market into two categories

The basis of the new approach is a model that splits revenue between streaming and other forms of copyright income.[12] This enables a distinction between revenue sources and how they respond to the term extension:

- The streaming market is characterised as purchasing access to a catalogue of content for a subscription fee or paid indirectly through advertising. The number of streams and the total revenue of streaming providers is used to calculate a price per stream.
- The non-streaming market groups together all other sources of revenue that are consumed after a one-off payment for the product. The total value and total quantity of all these revenue streams is used to determine an average price across all products in the category.

Parameters remain the same

Three key parameters remain relevant; exports, imports and deadweight loss.

Assumptions and implications

A key assumption is the structure of the industry, as it is used to calculate pricing behaviour which is a key determinant of the term extension impact. Gunby and Watt (2019, v2 unpublished study) note there are reasons to support any of the potential market structures from monopoly to perfect

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[12] The deficiencies of using highly aggregated data and the instability of the market structure are noted.

competition and the scenarios in-between. They choose a monopoly scenario for simplicity and suggest it would provide an upper bound to the costs of the term extension. This is because theory suggests perfect competition pricing is unaffected by the presence of copyright protection and therefore, the scenario would mean there is no impact from the extension. Whereas in a monopoly structure, prices will be higher when copyright protection exists.

The monopoly pricing rule is used to calculate marginal costs for both streaming and non-streaming markets. Elasticities of greater than minus one are chosen as elasticities of greater than one indicates a firm has little market power. The only estimates available for price elasticity suggest an elasticity under one (-.21 and -.58). This is claimed to reinforce the upper bound nature of analysis.

Other key assumptions:

- The same elasticities for streaming and non-streaming are assumed for simplicity
- For streaming the average wholesale price, and the 50 per cent share to record companies is used to work out the profit maximising price. Then from price elasticity of demand the marginal cost is inferred.
- For non-streaming estimates of mark-ups for physical and digital from PWC (2014) are weighted based on proportion of total revenues to get a weighted average retail mark-up of 50.4 per cent.13
- The calculation of deadweight loss assumes a linear demand curve and ignores the potential mediating effect of piracy.

Forecasting future revenues

To forecast future revenues there is a choice around the starting point and growth rate. Market instability is noted as a significant limitation of the analysis. The chosen approach:

- uses 2018 revenue and quantity data to calculate the price of sound recordings
- assumes export and import prices are the same
- bases initial quantity growth on the last two years change in growth rates and the assumption that the same change in growth rate will occur for 2019.

Then calculations assume:

- 3 per cent real income growth for streaming growth
- zero growth in non-streaming.

For exports of New Zealand music:

- OECD real income growth rate of 2 per cent for streaming growth and zero for non-streaming
- OECD streaming and performance share of sound recording revenues of 51 per cent give the streaming and non-streaming ratio

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13 Both the share and mark-up are tested in sensitivity analysis

- PWC (2017) estimates of export revenues $22m is inflated to 2019 terms.[14]

Graduated decay rate

The next challenge is to estimate how much music will be consumed that is 51-70 years old. Recorded music data is used to determine the decay rates of music consumption for both market segments. This gives an approximation of the proportion of music consumption likely to be affected by a 20 year term extension. The data from Recorded Music New Zealand (RMNZ) is the best available but has limitations, the most recent data is more accurate.

This data presents the year of consumption against the year of release so an estimate of the percentage of consumption that is of recordings between 51-70 years old can be produced. A three-year average (2015-2018) of the total amount of times a recording is consumed between 51-70 years is used to adjust the quantity of consumption and as a weighted average for prices in and out of copyright. As the extension would be applied retrospectively the impact does not happen all at once. If the term extension began in 2020 then all music recording from 1969 would be in the public domain but 1970's recording would get the extra 20 years protection. Therefore, the decay rates are cumulative with the full impact taking effect in 2039.

The decay rates feed into changes in domestic consumption of imported and domestically recorded music, and exports of recorded music.

Price changes use monopoly pricing theory

The final price to consumers depends on the elasticity of demand and the cost of the sound recording. Using the average wholesale price for music, and the share of revenues the before (and after) tax monopoly profit maximising price is calculated.

There is only one original sound recording marginal cost. This inferred marginal cost is what has been allocated to this "product" from the original sound recording (effectively a joint product cost allocation problem) plus any associated marginal cost involved in getting the recording to where the downstream firm can use it to generate revenue.

Results provide a range of scenarios

The analysis presents a base case in which only non-streaming prices change and an alternative in which streaming prices also change. Various elasticities below negative one are also present for each scenario.

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[14] Author's note - The PWC report aggregates revenues from both recorded music and music publishing in its headline figure of $22 million. Since this analysis concerns only recorded music figures, the headline figure will need to be adjusted to remove the music publishing component. This will be done in a later version.

Appendix E: Music price change formula

Due to the lack of empirical evidence on price changes caused by copyright status we follow Gunby and Watt (2019, v2 unpublished study) and rely heavily on theory even though it doesn't fit observed reality. By assuming copyright allows the copyright owner to set a higher price for a sound recording than would occur in the absence of copyright protection, we can model a theoretical price change induced by a change in copyright status.

While observations of market structure do not align with the traditional monopoly assumption, it provides a basis for modelling a price change. A critical value is the price elasticity of demand. Ergas (2015) assumes a royalties mark-up (26%) and price elasticity of demand (-1.40). An issue with picking these independently is that they are related. The relationship between price elasticity and profit depends on the marginal cost of production.

If P_M is the monopoly price, and $P_C = MC$ is the competitive price equal to marginal cost, and $E_d < 0$ iss the price elasticity of market demand, then:

$$\frac{P_M - P_C}{P_M} = -\frac{1}{E_d}$$

Rearranging we have the monopoly price setting rule,

$$P_M = \frac{P_c}{(1 + \frac{1}{E_d})}$$

A key assumption is that the marginal cost of production is constant. Choosing a value for E_d enables a theoretical P_c calculation which is equal to the wholesale marginal cost of production.

$$P_c = \left(1 + \frac{1}{E_d}\right) P_M$$

This gives a proxy for the change in price caused by copyright term expiry,

$$\Delta P = P_M - P_C$$

Due to demand elasticity the quantity demanded will change due to the change in price, E_d is related to the change in quantity,

$$E_d = \frac{\%\Delta Q}{\%\Delta P}$$

By choosing a E_d to calculate the change in price we cannot directly use it to calculate the change in quantity as it introduces a circularity into the equation.

$$\%\Delta Q = E_d \times \%\Delta P$$

Here we adjust the assumption that copyright creates a monopoly to model copyright as a property right for a product that faces competition from close substitutes. The existence of substitutes in a market implies that competition will drive prices below the level that would exist without the presence

of competing substitute products. We therefore think about the P_c as the copyright component of the retail price P_r.

For both the streaming and non-streaming markets the data provides a representation of wholesale prices. For the non-streaming market, the price the consumer faces P_r include GST, t and the retailer markup, m, giving

$$P_r = P_w(1 + m)(1 + t)$$

For the streaming market there is bargaining over the share of the monopoly price between retailer and wholesaler. We have a proxy for the wholesale price, P_w and some indication of the share between the wholesaler and retailer, α so

$$P_c = \frac{P_w}{\alpha}\left(1 + \frac{1}{E_d}\right)$$

Giving

$$P_r = \frac{P_w}{\alpha}(1 + t)$$

Meaning that for the proportion of works impacted by the term extension the price will increase from $P_r - P_c$ to P_r which is fixed while P_c changes with the chosen value for E_d.

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For more information, please contact:

Preston Davies
Phone: +64 9 909 5822
Email: pdavies@thinkSapere.com

Wellington	**Auckland**	**Sydney**	**Melbourne**	**Canberra**
Level 9	Level 8	Level 18	Level 2	PO Box 252
1 Willeston Street	203 Queen Street	135 King Street	161 Collins Street	Canberra City
PO Box 587	PO Box 2475	Sydney	GPO Box 3179	ACT 2601
Wellington 6140	Shortland Street	NSW 2000	Melbourne 3001	
	Auckland 1140			
P +64 4 915 7590	P +64 9 909 5810	P +61 2 9234 0200	P +61 3 9005 1454	P +61 2 6100 6363
F +64 4 915 7596	F +64 9 909 5828	F +61 2 9234 0201	F +61 2 9234 0201 (Syd)	F +61 2 9234 0201 (Syd)

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